How to explain Modsy: Development of an engaging and easy to understand introductory tutorial

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modsy

Abstract

Understanding how to use a product is important, not only for a user but also for a company. Research shows that 40 to 90 per cent of new products fail because a consumer does not understand the product features of benefits [1]. So to increase the chances of succeeding for Weirdly Wired, an engaging introductory tutorial had to be created for Modsy. Modsy is a music controller that consists of a hardware controller and a software plugin. This product, in development by Weirdly Wired, is made for digital producers and performers. It makes their process of music-making more fun, creative and expressive. It focuses on making software instruments feel like using physical, analogue instruments. Weirdly Wired calls this feeling of having physical knobs and everything that it triggers, the “analogue feel”.

Background research uncovered concepts for making an easy to understand and engaging tutorial. These concepts were found through literature and a closer look at the state of the art. With this knowledge in place, an ideation process was started. With brainstorming and other relevant techniques, the possibilities for this introductory tutorial were explored. This led to the idea of an experience that starts when unpacking the controller. The user is guided through setting up Modsy and installing the software with paper overlays that are on the controller when unpacking. These overlays have cut-outs so the knobs can stick through the paper. The overlays can be taken off after setting up, after which the Modsy software will be introduced through an interactive digital tutorial. The tutorial explains the functionalities of the controller while trying to make it feel like making music.

This concept was specified and realised in a prototype. The prototype is then evaluated on usability and engagement. Although self-report scales showed a high score for usability and engagement, the interviews with test participants showed that the concept has too many flaws. The main argument is that it is an overly guided approach, while users want to be able to instantly play with Modsy, as they experienced it to be relatively intuitive by itself. Therefore an improved concept is proposed, which gives users the freedom to explore by themselves. The paper overlays are replaced by a manual for getting started with the hardware and for installing the software. The long digital tutorial is cut up into sections and via a menu, users can choose which functionalities they want to know more about. With tooltips, a user gets an explanation when hovering over a button. It also shows a relevant tutorial that the user could start. A long-term test is recommended to find out whether this improved concept will produce the desired results.

Acknowledgement

I would like to thank several people for their involvement in this research. To start close to me, I want to thank my peers and colleagues, **Bram van Driel** and **Olivier Mathijssen**. We together started Weirdly Wired and developed Modsy. The countless hours in our office working on this research (and Modsy) are appreciated. In the weird times of the COVID-19 pandemic, we were very lucky to have each other for asking questions, discussing problems, getting insights and for some much-needed entertainment.

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Glossary

The terms used in this research can have different definitions in different contexts. For this reason, a glossary is given with relevant terms and the corresponding definitions that are used in this research. Reading it from top to bottom is recommended, as some definitions make use of other definitions.

1. **Digital Audio Workstation (*DAW*)**

   A software application used by producers and performers to record, arrange, compose, mix and master audio. This piece of software can be compared to a physical studio filled with music gear.

2. **Musical Instrument Digital Interface (MIDI)**

   MIDI is a standard technical communication protocol for a variety of instruments, computers and other audio devices. It can be used for playing, editing and recording music.

3. **Music producer (Producer)**

   A music producer is someone who creates the sound and structure of a song. In the context of this research, the word producer will be often used. Sound designers and other people that record either music or sound are also included in this term for this research. Most of these producers work in a DAW. Users of Modsy are advanced DAW users and for this reason, they can be called power users.

4. **Music performer (Performer)**

   The term music performer refers to someone who performs music, often on a stage in front of an audience. In the context of this research, the word performer will be often used. In the case of Modsy, the term performer refers to digital music performers who are on stage with a DAW and possibly other gear. Users of Modsy are advanced DAW users and just as with producers, performers can also be called power users.

5. **Ableton Live (*Ableton* or *Live*)**

   Ableton is an example of a DAW, that has multiple millions of users [2]. This DAW is made by Ableton for both producers and performers, whereas most DAWs are only focused on producers. Ableton is relevant for Modsy as Modsy will first exclusively function within this DAW.

6. **Device**

   A device inside of Ableton Live can be an audio effect, instrument or MIDI effect. This software instrument or effect can be dragged onto a track, from which it can either produce audio or manipulate the audio in that track.

7. **Plugin**

   A software component that enhances audio-related functionality. This component is "plugged in" to a DAW to add extra functionality, for instance for digital sound synthesis or processing.

8. **Mapping**

   The connection between a software parameter in Ableton and the physical Modsy controller. The word 'mapping' can refer to a single parameter that is mapped or refer to a group of software parameters that is mapped to the Modsy controller.

9. **Mapping button**

   The mapping button is a physical knob on the Modsy controller, dedicated to loading the selected mapping. When a user presses this button, the controller will map to the selected device.

10. **Function buttons**

    The Modsy controller has four physical push buttons that can be assigned to navigation functions inside of Ableton. This includes functions such as play/pause, stop, undo, record and more. A user can choose which function corresponds to one of the function buttons. With visual feedback, in the form of a LED under the button, the user can see what function is assigned to a particular function button.

11. **Control knobs**

    The term 'control knobs' refers to the 28 rotary knobs and 4 push buttons that form a 4 by 8 grid on the Modsy controller. These knobs are dedicated to controlling the mapped device.

12. **Modsy plugin**

    The Modsy plugin is a software device that links the physical controller and the software parameters of the mapped device. In this Modsy plugin, mappings can be edited, function buttons can be assigned to a function and other preferences can be changed.

13. **User interface (*UI*)**

    A user interface is a space where a user interacts with a machine, this can be in the form of a keyboard and mouse, game controller, touchscreen or anything related. In this research, the term UI is used to refer to the layout of the physical Modsy controller. This includes all the physical knobs, buttons and screens that are on the device.

14. **Graphical user interface (*GUI*)**

    A graphical user interface is a form of a user interface that allows for interaction between a user and an electronic device. The Modsy plugin is the graphical user interface (GUI) of Modsy.

Chapter 1 – Introduction

The first section of this research aims at introducing the problems and giving context to the matter. This is then followed by an introduction of the product called Modsy. After this, the goals and research questions are introduced. Finally, the outline of this report is explained.

1.1 Problem description

First impressions are important in all parts of life and so it is important for products. For instance, aesthetics have a large influence on the value perceived by a user [3]. In the automotive industry, the aesthetic value of a car can boost sales by 30% or more when the aesthetic design is improved [4]. However, this research is done for a product in the music industry. A product called Modsy is used as an example in this research. This is a tool for advanced music producers and performers (power users) that aims at making the interaction between the musician and the music software intuitive and easy to use, allowing for more fun, creativity and expression (see *1.2 Context analysis* for more information about Modsy).

A user of Modsy must immediately understand the product to see the value, for instance when a user plays with it at a booth at a music technology event. When a user sees the product for the first time he or she might wonder what every knob does. This may lead to a cognitive overload, meaning that a user is unable to effectively learn the use of the product [5]. Without a proper introduction, a product could fail in this situation. Research shows that 40 to 90 per cent of new products fail, “often due to consumers’ lack of understanding of product features and benefits.” [1, p. 593]. By accelerating the learning process firms can realize more profit [6]. Therefore an engaging introductory tutorial must be created for the Modsy controller, which gives the user adequate knowledge to use it independently and see the value of the product.

1.2 Context analysis

In this section the context of music production will be discussed, followed by an explanation of what Modsy is.

1.2.1 The current status of music production

Music production has changed a lot over the last 20 years. The rise of computers created a new way to create and manipulate music. Where musicians first needed whole rooms of equipment to create a song, musicians nowadays can record whole albums with the use of their smartphone [7]. While a smartphone might be slightly inconvenient, a laptop or computer is a perfect basis for music production and most modern musicians rely on software for music creation and manipulation. The software program at the core of this music production is called a Digital Audio Workstation, or DAW for short. In figure 1, an example of a DAW can be seen. This software can be seen as the studio of a music producer. Inside a DAW a musician can use different digital instruments and effects that can be used within music production. A DAW also allows for the composition into a song and ways to mix, master and finalize music.

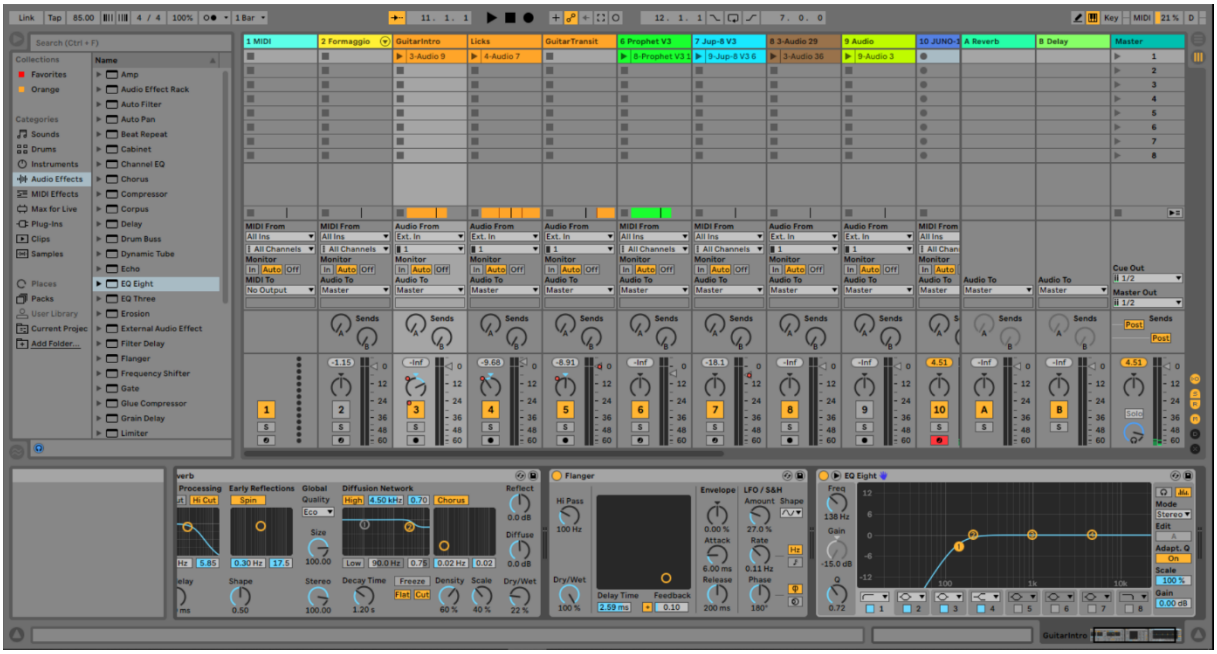


Figure 1: Screenshot of Ableton Live shown as example of a DAW

Music production has become more accessible, flexible, and cheaper. However, there is also a downside to computer-based music production. This is due to the fact that musicians can only use their mouse and computer keyboard to manipulate the sounds of instruments and effects. As one can imagine, this is far from the original feeling of analogue instruments and effects. Analogue instruments and effects create a workflow that is more expressive, creative and it is a whole lot more

fun. Tweaking multiple buttons at the same time, mistakes that turn out to be masterpieces and collaborating with peers are examples of the pros of having physical control.

1.2.2 Modsy

This is where Modsy steps in. Modsy is created by Weirdly Wired [8]. It is a start-up founded by Olivier Mathijssen, Bram van Driel, and Robbert-Jan Berkenbos, who are three Creative Technology students from the University of Twente. Modsy creates a way for musicians to get an analogue feeling over their digital music production. Modsy is a hardware and software solution that creates an environment that allows musicians to instantly take physical control over any digital instrument or effect inside of their DAW. Below in figure 2, the hardware controller can be seen.

Figure 2: Render of the Modsy controller

The controller will be connected to the DAW of a user. The controller has 32 parameters to control an instrument or effect, with a display above each of these parameters. Figure 3 shows the three steps of connecting an instrument or effect to Modsy. When a user selects a digital instrument or effect in his DAW (figure 3, step 1) and presses the mapping button on the controller (figure 3, step 2), the controller automatically maps itself to the digital instrument or effect (figure 3, step 3). All of the control knobs will be linked to software parameters of the digital instrument or effect and the musician can start manipulating the sound right away. The displays above each parameter will then show the parameter name and value. This is essentially what the Modsy controller does; it provides direct analogue control to digital instruments and effects and ensures that the manipulation

of these parameters is fully intuitive. This creates an analogue workflow for any digital music production tool.

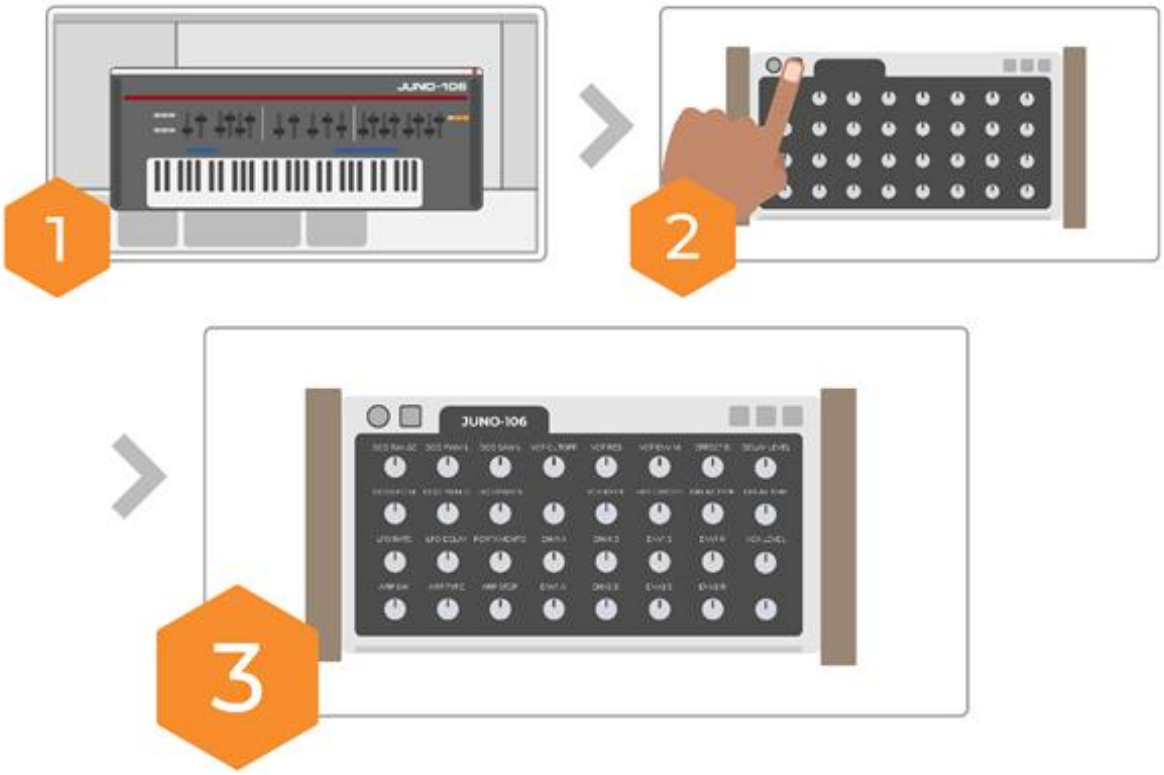


Figure 3: Three steps of mapping a device to the Modsy controller

The unique selling points of Modsy are:

- Automatic mapping to any digital instrument or effect within a DAW
- Display for each parameter
- Direct control over 32 parameters for giving the sense of analogue control

1.3 Goals and Research questions

1.3.1 Goals

The goal of this project is to design, prototype and test a first experience with Modsy. This experience has to be engaging and give the user adequate knowledge about Modsy. Therefore, research has to be done into how to design a system that can give the user adequate knowledge of Modsy so it can be used independently. This can be in the form of a tutorial that takes the user through all the features by letting the user play with the device. The experience must be engaging, as it should show the value of Modsy, which is assumed to be engaging for the target group. First research will be done to make a theoretical solution. After that, a prototype will be made based on this theory and other insights. The effectiveness of the prototype will be evaluated by user tests.

1.3.2 Research questions

The research is driven by the following research questions and sub-questions:

- How to design an introductory tutorial for the Modsy controller that is engaging and gives adequate knowledge about Modsy?
    - How to design an introduction that learns the user adequate knowledge of the controller, to be able to use it independently?
    - Which factors will make an introduction for Modsy engaging?
- How to make a prototype of an introductory tutorial that complies with the main research question?
    - How to test whether the designed solution provides the desired experience?

1.4 Report outline

After this introduction, chapter 2 will continue with background research. This consists of a theoretical underpinning and a state of the art. This theoretical underpinning looks into the theory behind making a tutorial easy to understand, engaging and how to show the value of a product. The state of the art can partly be analysed by this theoretical underpinning. The state of the art also gives inspiration for chapter 4, the ideation phase. Before going to the ideation phase, chapter 3 covers the methods and techniques used throughout chapter 4 to chapter 7. The Creative Technology design process is introduced there (*3.1 Creative Technology design process*), which forms the structure throughout the following chapters.

The first phase in this process is the ideation phase. Chapter 4 describes this ideation phase, which is about diverging the thoughts about the project. Through several methods, the user and

Modsy are analysed. After developing many ideas, it is time to converge and one idea will be picked as a preliminary concept. The next phase in this process is the specification phase. Chapter 5 covers this phase, where the preliminary concept is further specified into a final design. In chapter 6 the realisation phase is covered. In this phase, the final design is implemented. In this process of realisation, certain things will turn out differently than designed. This is discussed in this chapter. The final phase of the Creative Technology design process is the evaluation phase, which is covered in chapter 7. Here it is discussed how the prototype is tested and the results of these user tests are discussed. This chapter and therefore the design process in this research is concluded by the proposal of an improved concept. Finally, in chapter 8, the research will be concluded and recommendations for future research will be discussed.

Chapter 2 – Background Research

This chapter provides a theoretical underpinning for this research. This entails theoretically exploring which factors make a tutorial easy to understand, engaging and show value. After this, the state of the art is explored. Existing solutions are analysed and inspiration will be gained for a Modsy tutorial. This chapter concludes with a preliminary conclusion on the subjects discussed in this chapter, which will lead to pointers for the ideation phase.

2.1 Theoretical underpinning

The objective of this section is to develop a theoretical framework for designing an introductory tutorial for Modsy. This tutorial must be engaging and must learn the user adequate knowledge about Modsy to be able to use it independently. Furthermore, it is of interest to see what factors contribute to showing the value of Modsy. First, research will be done into what makes a tutorial easy to understand. Secondly, when comprehension is covered, the role of engagement in a tutorial will be discovered. Thirdly, the theory behind showing value to a customer is treated. Finally, a conclusion will be given, based on the previous sections, including a discussion.

2.1.1 An easy to understand product tutorial

Multiple factors can make a product tutorial easy to understand. One of the most obvious factors that can be pointed out is the difficulty of the tutorial. Although it sounds obvious, it is an important factor for not only the understanding of a user but also the engagement [9]. The engagement of a user will be discussed in *2.1.2 An engaging first experience with a product*. According to Reis et al. [10], it helps novice users to minimize the number of buttons and to only see essential options. To make this simplified interface even easier to understand, other methods can be added to it. One of these is the use of common user interface (UI) and user experience (UX) patterns. Less explanation is needed when users are already familiar with the UI through using related tools [11]. The research of Reis et al. [10] also shows that after proper training, a complete interface makes users more productive. This leads to the distinction between learners with a low understanding of the target concept and those who quickly grasp target concepts. Shannon et al. [12] mention that free learning, meaning that the student decides the pace and focus of the learning, can be beneficial for quick learning students, while low-understanding students can be overwhelmed by choices and get frustrated. For these low-understanding students, it can be beneficial to study examples instead of learning freely. When users see a new user interface (UI) that they are unfamiliar with, common

sense is used in combination with trial and error according to Sutcliffe [9]. He adds that most of the time an interface is not completely new or unfamiliar and previous knowledge can be applied when learning to use a new interface.

The last method to discuss has to do with customization. Research [13] shows that users can be unwilling to make use of customization, especially when they are in the middle of a production process, although customizing their interface will make them work more efficiently. The same research indicates that users must be made aware of the options of customization. This shows the significance of the first interaction with a product. During the first interaction, a user should be able to customize the interface because it could also help to make it easier to understand [14].

Figure 4: Render of the Modsy controller, top view

To summarize, it is important to make a tutorial with the right difficulty for a user. In this subchapter, the objective is to find aspects that make a tutorial for the Modsy controller easy to understand. To lower the difficulty for a user, the UI and GUI could be simplified. For the GUI it could help to minimize the number of buttons on the screen and to first only show the essential options. According to Reis et al. [10], this is only effective for novice users. As this Modsy tutorial is made for first-time users, every user can be seen as a novice user. This does indicate that the tutorial should adapt to the user's capacity. The hardware interface is not changeable, but there are LEDs on the controller (see figure 4) that could indicate whether the user should focus on a certain knob or not. This way a simplified view can be created for a user in both the physical and digital domain for Modsy. As Modsy focuses on advanced producers and performers, free learning seems to be the optimal approach. To improve the experience of a user the UI and UX should be familiar for a user.

Modsy is a product that initially will work in combination with Ableton, which is a DAW. This piece of software has a specific UI and UX (see figure 5), which can be mimicked to make the Modsy interface appear familiar to a user. For instance, the use of the colour orange when something is selected in Ableton can be used in the Modsy GUI. Options of customization also make an interface easier to understand. These options should be presented at the right moment of the tutorial for Modsy so that the amount of options does not confuse a user.

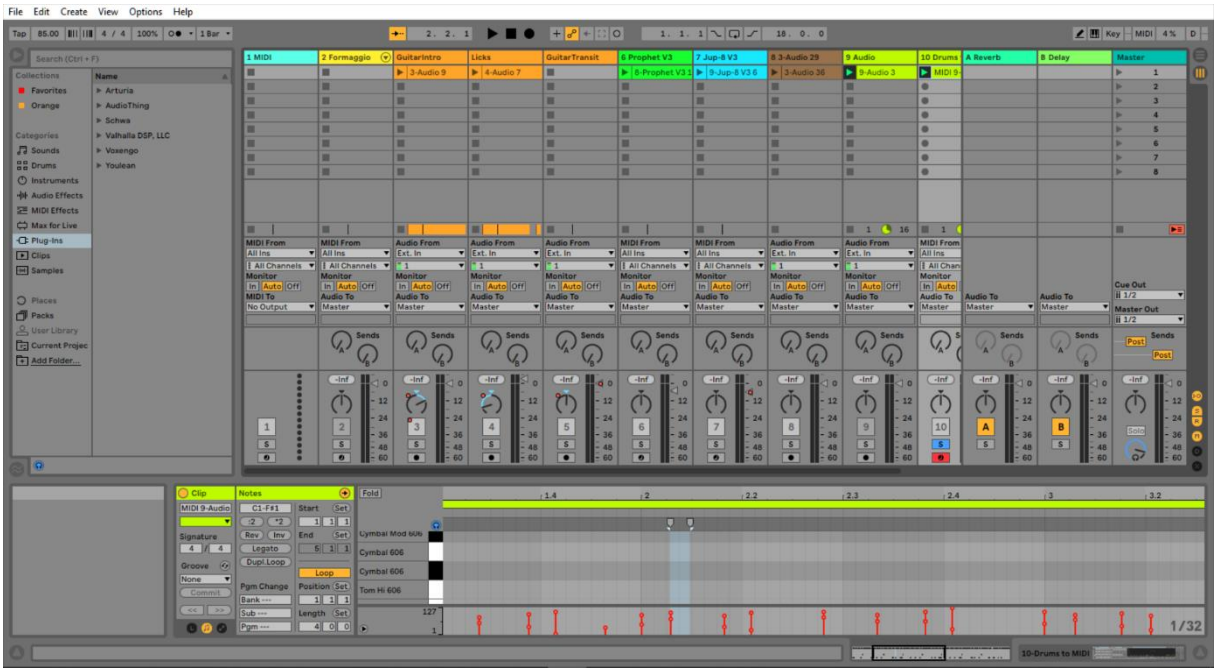


Figure 5: Screenshot of the Ableton Live GUI

2.1.2 An engaging first experience with a product

The term 'engagement' can be interpreted in different ways and will need to be defined for this research, together with the process of engagement. According to O'Brien et al. "engagement is a quality of user experiences with technology that is characterized by challenge, aesthetic and sensory appeal, feedback, novelty, interactivity, perceived control and time, awareness, motivation, interest, and affect" [15, p. 23]. The research continues by claiming there are four stages in the process of engagement: point of engagement, period of sustained engagement, disengagement and reengagement. These stages can be seen below in figure 6 with their according attributes. To give a more precise description of engagement, Chapman et al. describe engaging systems as "enticing users; drawing users into the activity; seducing and spurring users on; and catching, capturing, or captivating the interest and attention of users" [16, p. 2].

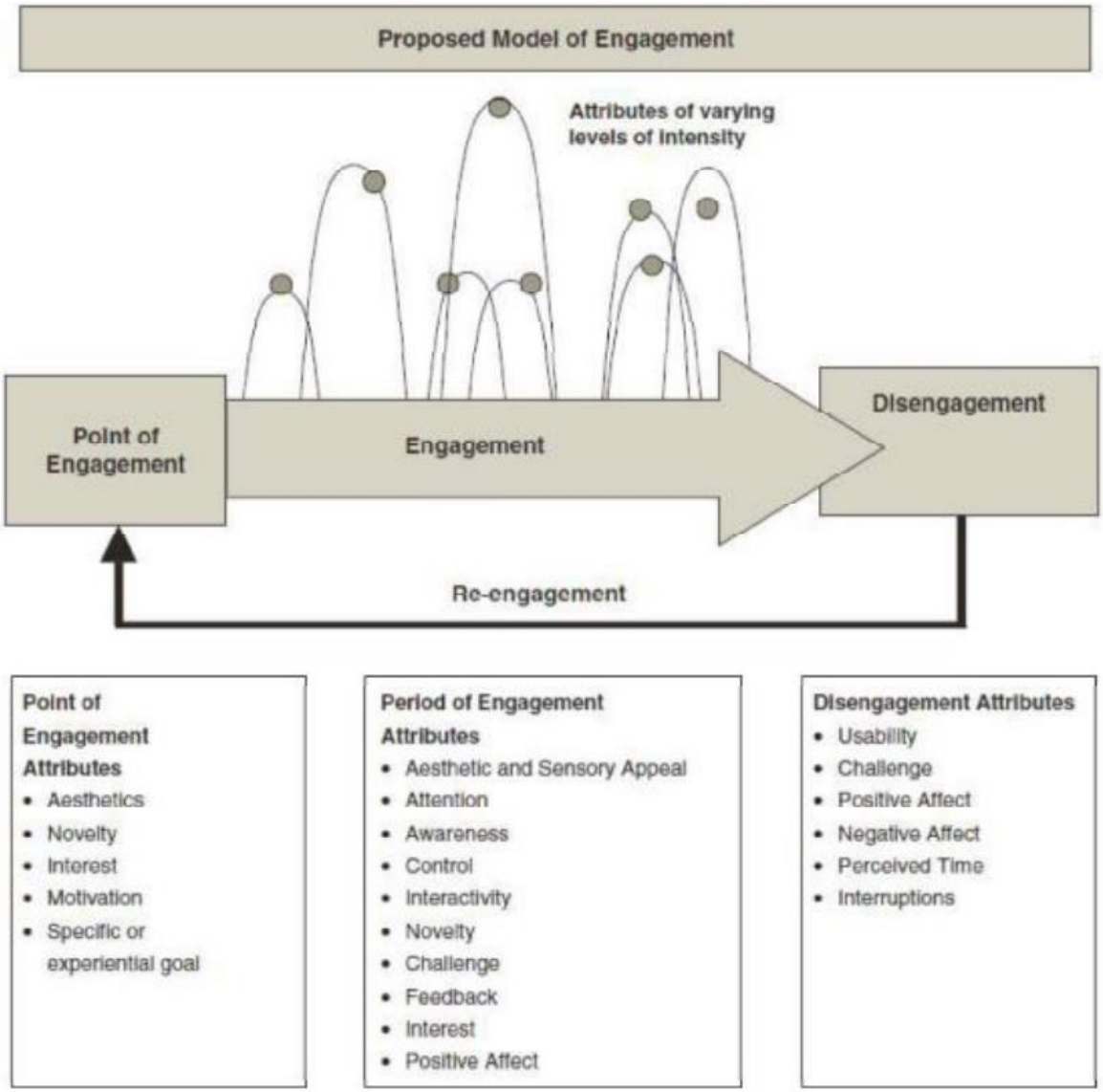


Figure 6: Proposed model of engagement and its attributes by O'Brien et al., [15]

Sutcliffe [9] adds to this that for user engagement the challenge is to keep a user's interest and arousal by varying in difficulty and familiarity in the interaction between Rasmussen's levels. These levels consist of skill, rule and knowledge. Firstly, according to Rasmussen [17], skill-based behaviour is about automated patterns of sensory-motor performance, so an action or reaction without conscious control. Secondly, rule-based behaviour is behaviour based on rules that are explained earlier to someone or that are empirically derived from earlier experiences. These rules that are stored in someone's mind are then used. Thirdly, knowledge-based behaviour is used when someone is unfamiliar with the task or goal. Then the task must be identified and based on the environment and decisions of someone, an action will be performed.

Ease of learning and use is most important in work- or goal-oriented applications, where interactions must be as efficient as possible. This varying in difficulty and familiarity is closely tied to 'flow', Sutcliffe introduces the concept of flow which she explains as "the sense of engagement and being absorbed in an interactive experience" [9, p. 8]. According to Chapman et al. [16], a user experiences several states of mind, under which curiosity, attention, focus, intrinsic interest and a sense of control. Flow has a lot to do with the difficulty of a tutorial, when it is too difficult to use the interface the user will get frustrated and discouraged. When it is too easy a user might get bored and skip the entire tutorial [9]. This indicates the importance of a system that knows the level of a user and can adapt accordingly.

A second important aspect is the emotions that involve engagement. As can be read in the quote of O'Brien et al. in the first paragraph of this chapter, engagement deals with many different emotions and factors. Research shows that an experience with only positive emotions might be seen as shallow amusement. Experiencing negative emotions such as anger, sadness or frustration, in an experience can make it feel more worthwhile or valuable [10]. Fokkinga and Desmet explain how experiencing these emotions can transform a person's attitude and perception. The transformation makes the negative emotion to some extent refreshing, empowering or exciting, which is what makes it worth experiencing [10].

A third aspect that is also important for engagement is customization, especially for power users such as advanced producers and performers [9]. According to O'Brien et al. [15], users want to be able to customize their interface to arrange it in a way that meets their needs, so it can give appropriate and timely feedback. Customization can also add a sense of ownership because the user has made his own configuration [9]. Although customization seems to be beneficial in multiple ways, it is still a trade-off between the time that a user has to invest in configuring the interface and the result of an interface that fits the user's needs.

In summary, there are 4 stages of engagement: point of engagement, period of sustained engagement, disengagement and re-engagement. A user is always in this continuous process where the right difficulty or familiarity can be deciding whether a user stays in his flow. To help to stay in this flow the system should adapt to the difficulty that fits the user. Negative emotions can also help with the engagement of a user, as long as these can be overcome in the experience. Finally, also customization plays an important role in engaging a user, especially for power users. This is beneficial under the premise that the time that a user needs to invest is low enough for a user.

For Modsy it is important to have a system that can adapt to the difficulty that fits the user. The ease of learning and use is very important, as Modsy is mostly used for work- and goal-oriented tasks by power users, although it can also be used for fun. This flow can sometimes almost be interrupted by negative moments but in the end, these emotions can make the whole experience more worthwhile because of a transformation of the attitude of a user. In the case of Modsy emotions are very important, as making music is closely tied to emotions. It is important that there are as few negative emotions as possible in the form of frustrations caused by the interface or product in any way. A user might be overwhelmed and frustrated by having many options in front of him or her when seeing Modsy for the first time. With the right flow of a tutorial, meaning that it is not too easy or too hard, the user can overcome these negative emotions, which is the transformation. Customization also contributes to this flow, only if this does not cost too much time. As Modsy is a product for power users it must offer this customization in use, which also fits the product in general, as Modsy offers customization options regarding the hardware. The user can for instance pick his or her own knobs. In the end, this could add to the user's experienced ownership.

2.1.3 Showing the value of a product

The value of a technological product can be interpreted differently, therefore the term will have to be defined and put into context. Producers expect their product to have a certain value for a customer, which can be called the intended value. On the other end, customers expect a value that can be called the perceived value. The value a user sees coincides with the expectations he or she has prior to the first use [3]. The value of a technological product can be defined as an estimate of the value of that product, in a certain social context [3]. According to Gentile et al., there is a relationship between customer experience and customer perceived value: the experience is used as a channel to perceive product value [19]. Dey et al. add to this that only after experiencing a software product users can see the value of the product. Users may reach a different conclusion regarding the value of a product, so experiencing the product does not necessarily increase the perceived value [20]. Still, this substantiates the use of a product tutorial and the importance of letting people experience a physical product hands-on instead of only through digital media.

Novelty is an important factor for seeing the value and it can be exciting for many users, but depending on the user's ability it can elicit strong emotions that are not always positive for seeing the value [3]. Making the product familiar for a user can help overcome these strong emotions, although these emotions can also sometimes have a positive effect on the perceived value. Both Rindova & Petkova [3] and Fokkinga & Desmet [18] discuss the positive effect that negative emotions can have. In the research of Fokkinga & Desmet, this concerns a transformational experience because the user sees growth and learns. A similar process can be seen in the research of Rindova & Petkova, where it is seen as a recursive cycle in which a user experiences positive emotions after the negative emotion because of the learning which increases comprehension. This in turn increases positive emotions. This cycle can also work the other way around, where negative emotions increase scepticism, which increases negative emotions. To prevent a user from experiencing these strong emotions, familiar UI and UX patterns can help, as a user is then at least familiar with a part of the product [11]. As mentioned, being able to customize the interface can give a sense of ownership, which can also be beneficial for seeing the value of a product [9].

A second important factor for seeing value is the aesthetics of a product. Formal unity and coherence as well as subconscious responses to specific textures and shapes trigger spontaneous emotions. These can be both instinctive and reflective responses, meaning that someone might just feel some way about the product by instinct and that someone might compare it to other experiences. These emotions can be both positive and negative depending on the aesthetics of the product. It is important that these emotions are positive because people who experience positive emotions like almost everything better, which can lead to a more positive opinion about the product

[3]. Aesthetics is also important for seeing the financial value of a product, for instance in the automotive industry improving a design aesthetically can boost sales by 30% or more [4]. It is good to note that cars are a specific product where customers might be more sensitive to aesthetics. In other industries, this might differ.

Summarizing, showing value can be an intricate process with different outcomes for different users. Value can be formed in a social context and the experience of a customer is the channel through which the value of a product is perceived. Novelty is one factor that can be communicated through this channel and which can have a positive effect on the perceived value. A product should not be too novel, as it might become too unfamiliar and therefore perceived of a lesser value. Aesthetics have a similar effect on the perceived value, as it can evoke emotions. These emotions can be both positive and negative depending on the formal unity, coherence and specific textures or shapes.

Figure 7: Old school synthesizer called Moog Minimoog, with an exterior made of wood and aluminium [65]

Figure 8: Modsy controller, with an exterior made of wood and aluminium [8]

The value that Modsy offers for a user is the ease of use and the feeling of direct physical control over software parameters. The target group of Modsy is quite specific, which can help to design a solution that fits the user on two fronts. Firstly, it should fit the user's experience, making Modsy novel enough to generate interest, but not too novel that it could shut out certain users. Secondly, it should fit the user's aesthetic preference. As said, Modsy is for a specific target group that shares several characteristics. The current design of the physical Modsy controller (see figure 8) incorporates aesthetic elements of old school instruments (see figure 7) that are popular with this target audience. As Modsy will be made specifically for Ableton, the GUI can use familiar symbols and elements from Ableton to not shut users out because of the novelty of the device. For instance, the symbols for functionalities that can be triggered by the function buttons can be used, see figure 9 for some of these symbols. For the GUI the aesthetic elements of Ableton could also be used to fit the user's aesthetical preference, as a Modsy user already is an Ableton user. Combining these elements will probably help to let the user see the value of Modsy.

Figure 9: Symbols from the Ableton GUI that can be used in the Modsy GUI

2.1.4 Conclusion from the theoretical underpinning

The goal of this subchapter is to develop a theoretical framework for designing a tutorial that is engaging and learns the user adequate knowledge about Modsy to be able to use it independently. To design this it is also of interest to see what factors contribute to showing the value of Modsy. A factor that applies to all three elements – engagement, comprehensibility and perceived value – is difficulty. The right difficulty in a tutorial is good for engagement and the flow of a user. The right difficulty means that it is comprehensible for a user, and when a user understands a product he or she seems to be more positive about its value. The number of buttons or options could be limited in the beginning to make it easier to understand for a user, but this should not conflict with the flow of a user, because if it is too easy a user could get bored and quit the tutorial. To further improve this comprehensibility, Modsy should offer the user a familiar experience, using Ableton visual language in their Modsy GUI, which also could help a user experience Modsy as being novel without being too novel. This increases the perceived value of Modsy. Customization of the interface can improve comprehension and engagement, especially for power users. It also adds to the feeling of ownership which could improve the perceived value.

From this theoretical underpinning, table 1 can be constructed. This table can be used as a framework for comparing and analysing introductory tutorials in section *2.2 State of the Art*. It consists out of the three elements *understanding*, *engagement* and *value*, which will be evaluated on the use of *familiar UI/UX patterns*, *difficulty* and *customization*. The impact of the latter three methods on the former three concepts will be explained in a cell. A cell will be coloured red, orange or green according to how well the method performs. A red colour indicates it performs badly, orange indicates mediocre performance and green indicates it performs well. The effect of familiar UI/UX patterns on engagement is not found in this theoretical underpinning, therefore this cell is labelled as “not applicable” and can be ignored.

	Understanding	Engagement	Value
Familiar UI/UX patterns		n / a	
Difficulty			
Customization			

Table 1: Empty table that analyses the effectiveness of a product, to be filled in during the analysis in the State of the Art

2.1.5 Discussion

This theoretical underpinning made use of other research outcomes and sources that treat related topics but are not focused on a music production or performance product. A product for

music production and performance is a niche product and Modsy is also unique from other products. For this reason, a lot of general papers are used, which discuss topics of learning, engagement or value in a broad sense. Another approach that has been taken in this research is to look for papers into fields that are similar in a few aspects. For instance, the concept of flow is borrowed from gaming. Most games also make use of a tutorial where gamers need to learn which button triggers a certain function, similar to how a user of Modsy must know what function a certain button triggers. This seems to be a valid assumption but it is not proven in research. Another concern in this research is the validity of sources that are not recently published. The way humans and technology interact is everchanging and the way people understand technology is equally variable. Newer papers may be more relevant than older papers concerning this aspect.

2.2 State of the Art

Next to a theoretical underpinning, it is also important to look at what can be learned from existing products. In this chapter, existing products that could be related to an introduction tutorial for Modsy are discussed. These examples are used for inspiration, but also to get an idea of what is already tried and which concepts seem to be working. This chapter will cover relevant music product tutorials and game tutorials. Eventually, other inspiration from onboarding techniques from apps such as Duolingo is discussed. For analysing the concepts, a table with relevant concepts from the theoretical underpinning is used. This table is explained in *2.1.4 Conclusion from the theoretical underpinning*.

2.2.1 Music products

Many people are learning how to work with their DAW, plugins or other music gear via video tutorials on YouTube [21]. In these videos, users can see someone walking through the functions of for instance a plugin. Users also search for a certain sound that they want to create with a specific plugin. They for instance search for “how to make plucks in Serum”. It appears that music producers and performers are motivated enough to search for tutorials themselves. This learning technique involving YouTube has an important role in the learning performance according to Pratama et al. [21] and seems to be useful for the learners.

Arturia V Collection

Arturia, a company that has made many plugins and also physical music gear, also makes use of tutorials on their YouTube channel for almost every product they have made [22]. The V Collection is a popular collection of plug-ins by Arturia. It contains software instruments based on classic old school synthesizers and other instruments. For these plugins, they have an introduction video and a tutorial video on their website [23]. Besides these video tutorials, they also have highly detailed interactive tutorials for their plugins.

Figure 10 shows the welcoming screen that pops up when a user opens a plugin from the V Collection for the first time. It is an optional tutorial that is easy to skip and which might not be very inviting or exciting at first sight. For most of these plugins, the tutorial begins with some background information about the original instrument where the plugin is modelled after. This is in plain text, while it is proven that text is less engaging for a user than video or audio content [16]. This is then followed by several steps where there is some explanation about a function. The user is urged to try it out and hear the influence of turning a knob, as can be seen in figure 11. The user can see the

number of steps at the bottom of the pop-up window. The tutorial breaks down the functionalities of a plugin into small steps, which is in agreement with the outcomes of the theoretical underpinning.

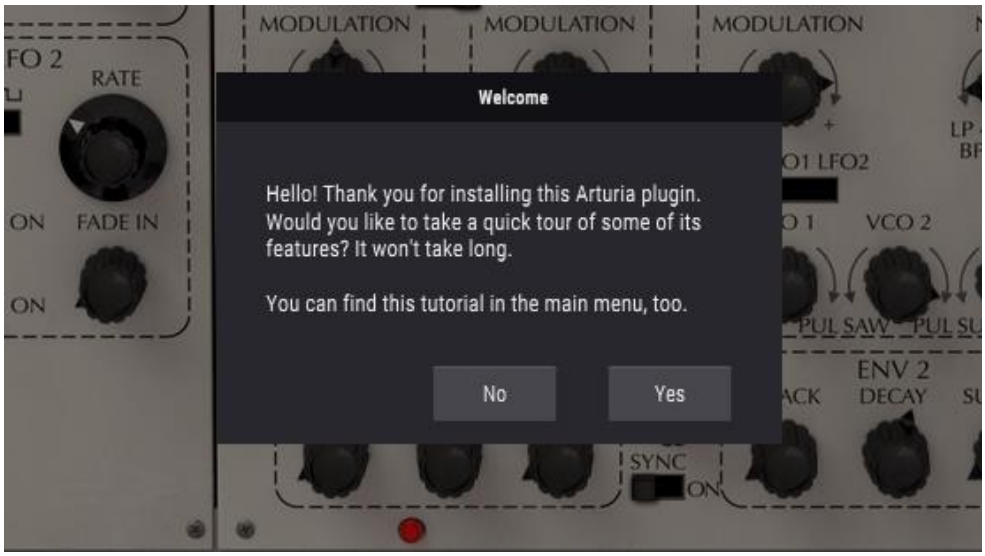


Figure 10: Welcome pop-up when opening an Arturia V Collection plugin for the first time

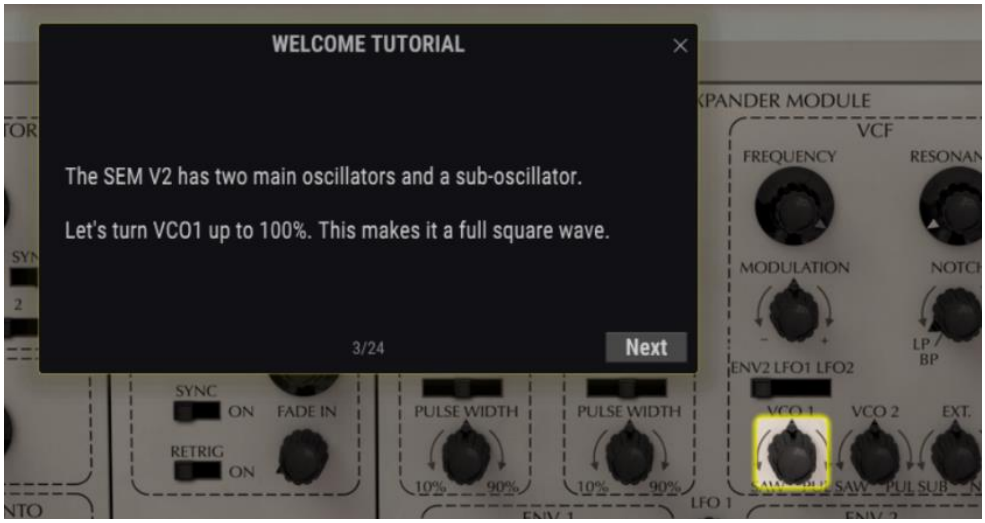


Figure 11: Welcome tutorial of an Arturia V Collection plugin, showing interactive part of the tutorial

To summarize, Arturia makes use of multiple mediums to interact with their users, which is also probably used as marketing to new users. This is a smart move because, as seen in the theoretical underpinning, the value that users see coincides with the expectations they have prior to the first use of a product [3]. Their welcome tutorials are long and not very inviting to a user and start slowly with only background information in text format. The user is guided through the tutorial step by step. This might be the safest choice of learning techniques for the target audience of Arturia, but for quick learning users, it might get tiresome easily. A free learning approach with tips might be

a better solution for these users [12]. To give an overview of the performance of their welcome tutorial the following table is used:

	Understanding	Engagement	Value
Familiar UI/UX patterns	Unique lay-out with 3D representation. Familiar UI/UX patterns through all the V Collection plugins, but not in connection with a DAW.	n / a	When a user is used to the V Collection the patterns are similar, but for a standard user the UI and UX patterns are new.
Difficulty	Walks the user through the interface function by function.	Tutorial can be skipped, but not adjusted to the level of the user	The tutorials are so easy that a user will most likely always understand it and so see the value.
Customization	Not possible.	Not possible	Not possible

Table 2: Table that shows a matrix for discussing the effectiveness of the Arturia V Collection Welcome Tutorial with concepts from the theoretical underpinning

Moog manuals

Moog is a legendary synthesizer brand that is founded by Bob Moog in 1964. The first Moog synthesizer opened the doors for infinite possibilities of electronic sounds. These sounds can be heard through all genres and in every decade since their first synthesizer [24]. An analogue synthesizer, such as every synthesizer from Moog, is the embodiment of analogue feeling. Moog's products are relevant for Modsy, as Modsy tries to mimic this analogue feeling with software synthesizers.

The Moog Subsequent 25 is used as an example, which can be seen in figure 12. For this product, many YouTube videos give an introductory tutorial to this synthesizer [25]. All these videos are not made by the Moog, but by other people. A user who buys the Moog Subsequent 25 gets an extensive paper manual with it, that consist of 51 pages including the following contents [26]:

- Unpacking & inspection
- Setup & connections
- About Subsequent 25
- Features & controls

- Hidden parameters
- MIDI operations & charts
- Specification
- Warranty
- Service & support

Figure 12: Picture of the Moog Subsequent 25 [66]

After unpacking and inspecting whether everything is present, very detailed information is given to the user about every option of connectivity. Then a text that fills two-thirds of a page explains the background of the Subsequent 25. Then the basics of sound are explained for people that are "new to the world of music synthesis." [26, p. 11]. After that, a complex chart of the signal flow is given. It must be said that analogue synthesis is something for a more "nerdy" audience, so a certain level of understanding can be assumed. Still, it is not very logical to show such a complex drawing after explaining the basics of sound. After explaining the first few control knobs, the oscillators, there appears a "Try this" section which can be seen in figure 13. This concept of explaining some functionalities and giving a "Try this" section afterwards also returns for several other functionalities. The basics of the synthesizer can be discovered by playing with the device. After every step, the user should read the next step and perform another action. The user must be highly motivated and not easily distracted to get through the whole manual.

TRY THIS

PATCH INITIALIZATION

1. Press the **ACTIVATE PANEL** button.
2. In the **FILTER** section, turn the **CUTOFF** knob all the way up, the **EG AMOUNT** knob to center position, and the remaining knobs all the way down.
3. In the **ENVELOPES** section, turn the **SUSTAIN** knobs all the way up and the remaining knobs all the way down.
4. Set the **OCTAVE** knobs for both Oscillators to 16' and center the **OSCILLATOR** section's remaining knobs. The **HARD SYNC OSC 2** and **PITCH AMT OSC 2 ONLY** buttons should be turned off.
5. In the **MODULATION** section, turn the **LFO RATE** to 8 and the remaining knobs all the way down. Make sure the **MOD** wheel is turned all the way down, too.
6. Next to the **PRESETS** section, **FINE TUNE** and **OCTAVE** should be centered and **GLIDE RATE** should be all the way down.
7. Finally, turn all the **MIXER** knobs fully counterclockwise.

When you play the keyboard with these settings, you shouldn't hear anything. This procedure initializes the front panel and gives you a starting place for creating your own Patches and exploring the capabilities of your Subsequent 25.

Figure 13: "Try this" section in the manual of the Moog Subsequent 25 [26]

To give an overview of the performance of Moog's take on an introductory tutorial the following table is used:

	Understanding	Engagement	Value
Familiar UI/UX patterns	A user is familiar with a paper manual and with the concept of an analogue device that produces sounds. The parameters that can be tweaked are familiar for synthesizer users and these are also explained for laymen.	n / a	Depending on the previous experience with synthesizers it is a familiar UI/UX experience. When it is the first experience with Synthesizers it might be intimidating.
Difficulty	The manual does cover functionalities in separate sections, but the build-up is not logical.	The manual does not allow for different levels of users, it is one size fits all.	The value that a user sees because of this manual is highly dependent on the level of understanding of synthesis. It can either be very informative or an overload of information.
Customization	Not possible.	Not possible	Not possible

Table 3: Table that shows a matrix for discussing the effectiveness of the Moog Subsequent 25 Manual with concepts from the theoretical underpinning

2.2.2 Games

Although Modsy is not a game and will be used by power users on a more serious note, games can give a lot of inspiration in terms of engagement and tutorials. Game tutorials are in a way very similar to a future Modsy tutorial. In a game tutorial, you will learn how to use the physical controls, whether it is a handheld controller or a keyboard. The user will learn that pressing a certain button will trigger a certain function or action in the game. This is similar to what a Modsy tutorial should entail. The buttons on the Modsy controller can be compared to a game controller or keyboard, but then with a very different layout that is aimed at music production and performance. Game tutorials also need to be engaging from the start. Often a free demo of a game can be downloaded and played to give a short impression of the real game. Here the controls should be learned in a very engaging and quick way because the demo should be convincing players to buy the real game in a short time. This is a second aspect that shows the relevance of video games for inspiration for a Modsy tutorial.

These similarities encourage to take a closer look at game tutorials and what makes these successful, in order to gain knowledge and inspiration for a Modsy tutorial. For this, Quora is used as a source of information. Quora is a platform where questions can be asked by individuals and then anyone could answer these questions, among which professionals or other knowledgeable individuals [27]. An answer can be voted up by other Quora users so that the democratically chosen answer appears as the first answer on the page of the question. It must be noted that there is no control over false or misinformation. Quora is used in a way that semi-structured interviews would be used and so it is used to get opinions. Also with these interviews, a researcher cannot be sure that the participant is telling the truth. The following information is only used as inspiration and can be seen as anecdotal, as it is gained from people who publicly shared their opinion on a question.

A relevant question for this research that was proposed on Quora anonymously: “What video game has the best tutorial of all time?” [28]. The top answer, with 9 upvotes mentions a game called Dark Souls; more importantly, he explains why this is his answer with two arguments. First, this person states that it is not intrusive and it only gives the player the basic controls he or she needs to start playing. Another person adds to this that his best game tutorial does not have a formal tutorial but only tells which buttons to press, “it trusts you to figure it out” [28]. To continue, the second argument for calling Dark Souls the game with the best tutorial is that it has the right pace and is not slow. This is mainly because the tutorial feels like the main game and not like a sandbox. When you fail, the game shows an overlay to explain a certain control feature and then starts over. Shannon et al. [12] also show evidence for the effectiveness of all concepts mentioned above.

To summarize, a game tutorial can be very similar to a Modsy tutorial and is a good inspiration for engagement. According to Quora users, a tutorial is not intrusive and gives the user only the basics to be able to start playing and exploring independently. It should feel like the real game and not like a sandbox. To give a general overview of how welcome tutorials in games perform the following table is used:

	Understanding	Engagement	Value
Familiar UI/UX patterns	Games generally use the same buttons for a certain action. For instance, that R1 is always meant for shooting.	n / a	When a user can start playing immediately because the controls are already known, this could add value.
Difficulty	Most games can adapt the difficulty to the user's skill level.	Tutorials can be skipped in most games and the difficulty can adapt to the user's skill level.	Novice users can learn and understand the game through a good tutorial.
Customization	Controls can be customized in most games. A user can make a setup that makes it easier to understand.	Controls can be customized in most games. A user can change the setup to increase engagement and to keep his flow.	Customizing the interface can add a sense of ownership, thus increase the perceived value.

Table 4: Table that shows a matrix for discussing the effectiveness of game tutorials in general with concepts from the theoretical underpinning

2.2.3 Inspirational elements from other types of tutorials

More products deserve to be mentioned but these will not be fully analysed like the concepts above. This because the upcoming products possess inspirational elements for a Modsy introductory tutorial but comparing their entire introduction is not seen as highly relevant for the purpose of this research. All of these examples are about purely digital tools and their onboarding techniques.

Justinmind

Justinmind is a prototyping tool for UI design and for making interactive high-fidelity prototypes (see figure 14 for an impression). Users can choose to open the desktop app of Justinmind in 'full mode' or 'beginner mode'. Beginner mode guides a user through the features and gives tooltips and YouTube tutorials. A user can quit this mode any time for full mode [29]. The main takeaway of this product is the option for a user to choose between full mode and beginner mode.

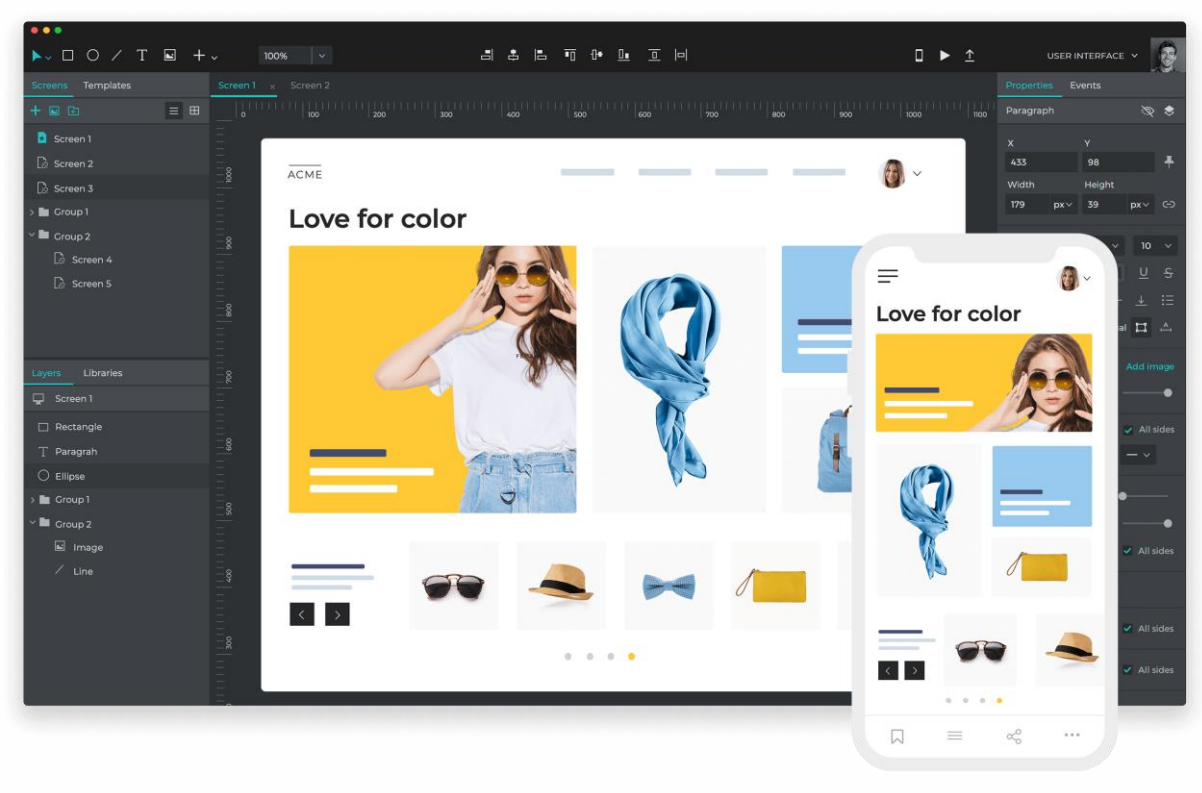


Figure 14: Impression of the prototype tool Justinmind [67]

Basecamp

Basecamp is a project management tool (see figure 15 for an impression). After creating an account, a personal message from the CEO of Basecamp is showed and then immediately the program asks which projects the user is working on. The user is then taken to the project template that fits their project best [29]. The main takeaway of this product is the option of template-based customization, which is a low-effort option for a user to customize the interface.

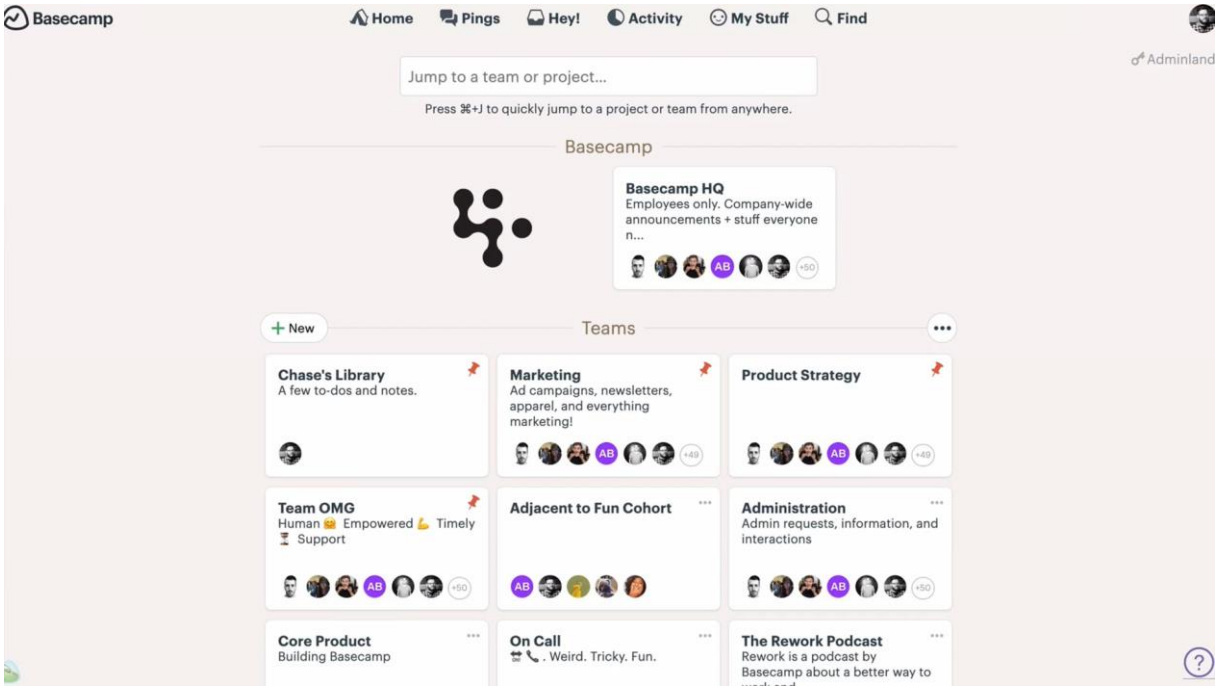


Figure 15: Impression of project management tool Basecamp [68]

Duolingo

Duolingo is an educative app for learning new languages. Users can get started almost right away with very little registration. In figure 16 a part of the onboarding experience can be seen. The app asks for some personal information or you could just connect your Facebook account, then the user can tell why he is learning a language and set a daily goal. Within 10 clicks a user is already learning a language. Users can start from the beginning with learning or they can take a placement test, which enables users to skip lessons they do not need [29]. The main takeaway of this product is to give the user the option to test his skills so he can start on his level. It is also possible for the user to just start from the basis. This way a user can start with the right difficulty, which is as discussed beneficial for the understanding, engagement and perceived value of a user.

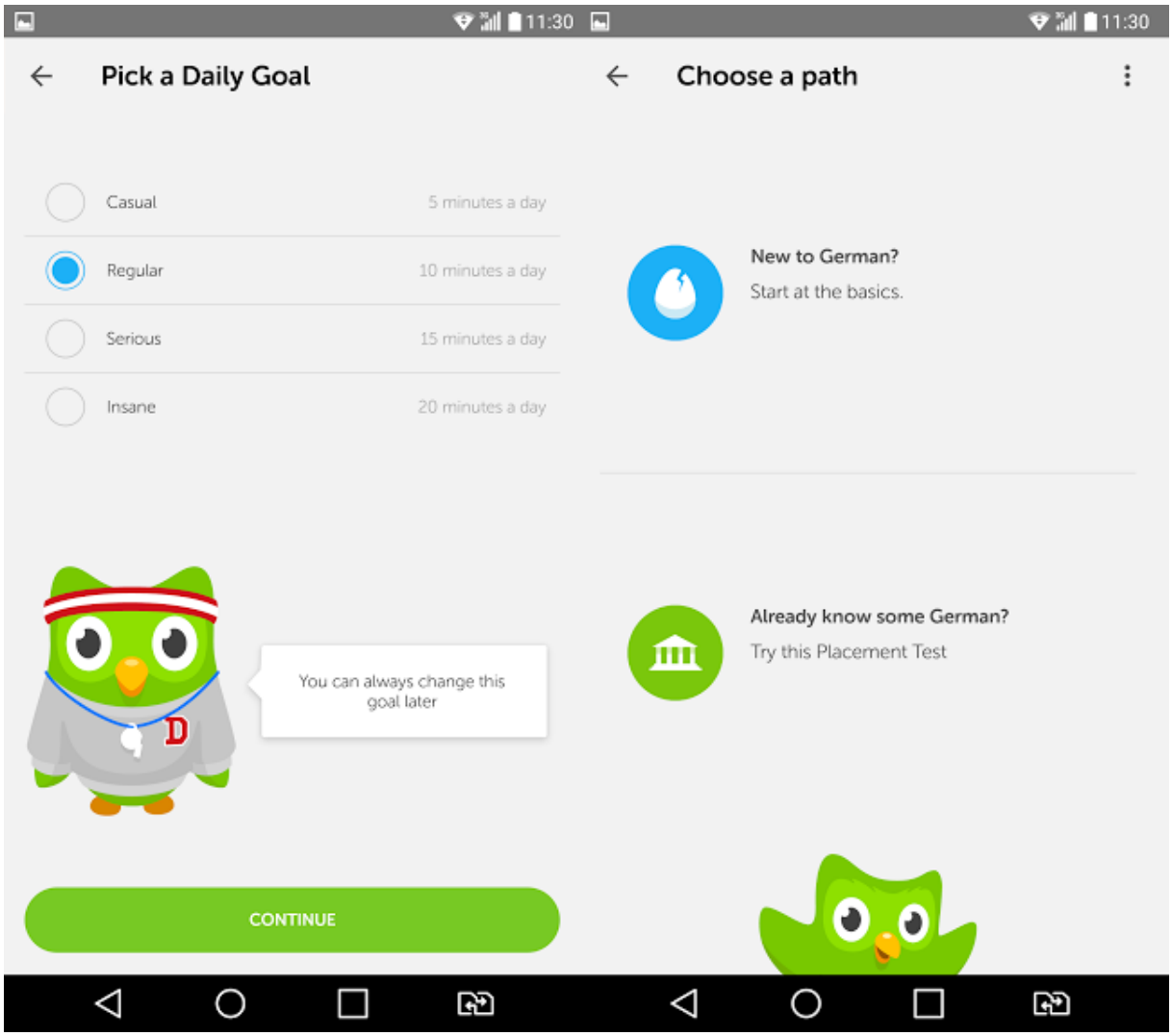


Figure 16: Impression of Duolingo, showing the option to pick a goal and the option to start learning from the basics or take a placement test instead to skip unneeded lessons [69]

2.3 Conclusions for ideation

From both the theoretical underpinning and the state of the art, the following possibilities can be found to apply these in the upcoming phases and eventually in the design of the Modsy tutorial:

- Reduce the number of buttons and options at the beginning of a tutorial and expand this later as the user progresses
- Always give a user the option to skip the tutorial
- Make the UI and UX patterns of the Modsy GUI familiar for an Ableton user
- Create a tutorial that feels like making music and not like a walk-through of functions
- Use as little text explanation as needed, rather make use of voice or video explanation
- Let the tutorial immediately begin, with as few clicks as possible
- Make (cautious) use of customization for the function buttons, mappings and additional interface settings of Modsy

Chapter 3 – Methods and techniques

This chapter gives an overview of all the methods and techniques that are used throughout the upcoming chapters. One of the most important methods is the Creative Technology design process, which is used as structure throughout the upcoming chapters.

3.1 Creative Technology design process

The Creative Technology design process is the method that is used throughout this research. It consists of four phases: ideation, specification, realisation and evaluation. These phases all have intermediate results which are obtained through a spiral model. This way each phase can start or end in any of the sub-phases (see figure 17) [30].

3.1.1 Ideation

The ideation phase is the starting point of this process and also the place where the initial ideas will be found. The process that takes place here starts by diverging and finding all sorts of ideas and technologies that could work for this research. This space will be discovered with brainstorming, a PACT analysis, a stakeholders analysis and individual ideation sessions. These concepts will also be explained later in this methods and techniques section. After this has sparked many ideas, converging is needed to pick the best concepts. This is done by finding requirements, that fit the research goal and stakeholders needs. The outcome of this phase is a preliminary idea and a set of preliminary requirements.

3.1.2 Specification

In a specification phase, it is conventional to make use of prototypes to evaluate a concept with a user or expert and get feedback efficiently. These prototypes can be quick low-fidelity prototypes that test a certain interaction or effect. The outcome of the specification phase is a list of final requirements together with a clear picture of the final idea that will be worked out in the realisation phase.

3.1.3 Realisation

In the realisation phase, the concept specified in the specification phase will be made. Following a method of engineering design, a decomposition of the start specification, realisation of the components, integration of the components and evaluation will be made.

3.1.4 Evaluation

In the evaluation phase, the concept will be tested with users. The functional and non-functional requirements will be evaluated, but mainly non-functional requirements will be tested in

this phase. A final verdict will be given whether all requirements from the specification phase are met. Finally, an improvement of the concept will be proposed together with an improved requirements list

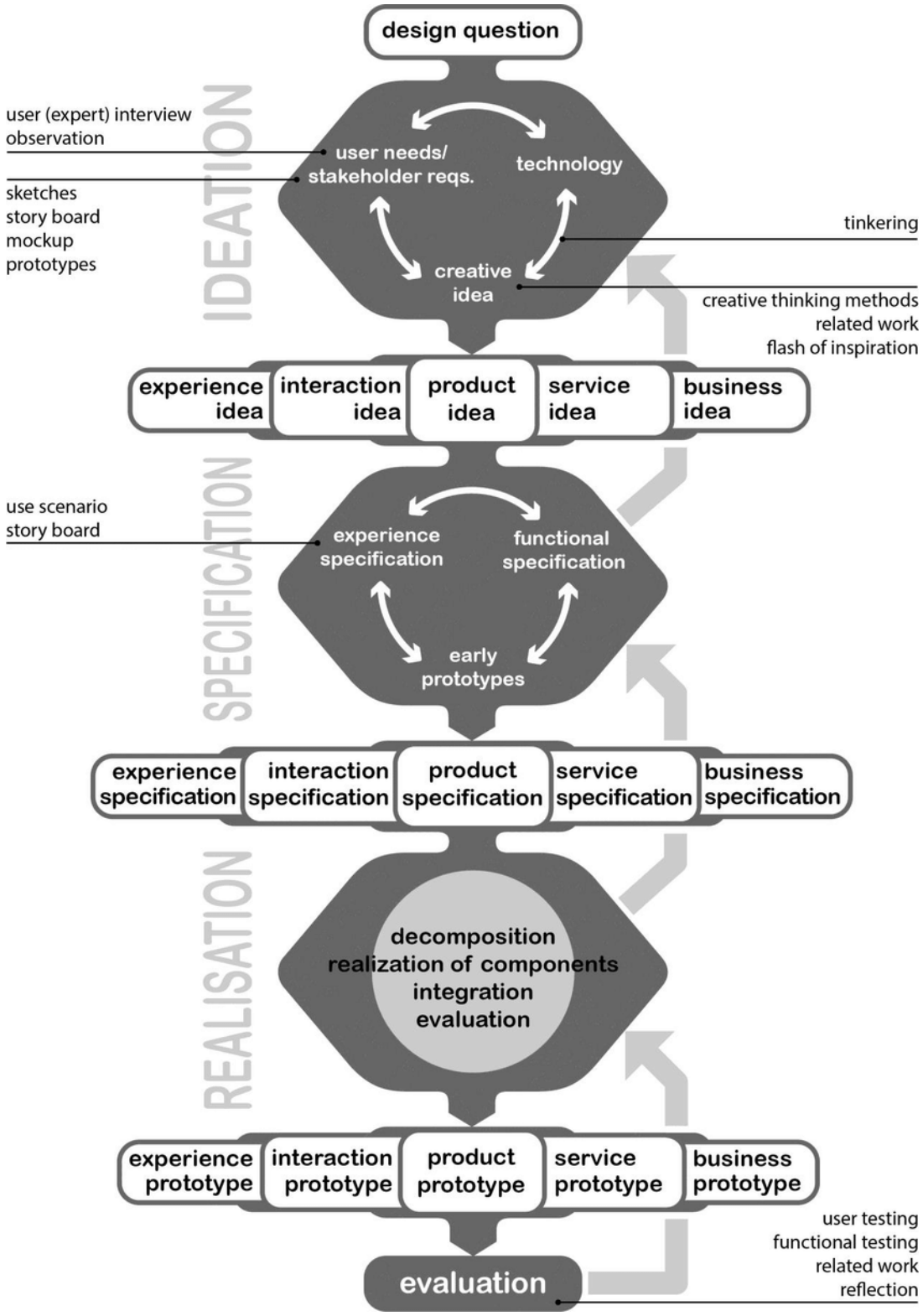


Figure 17: Representation of the Creative Technology design process [30]

3.2 Stakeholder analysis

The goal of a stakeholders analysis is to analyse which individuals or groups of people might have an interest in the project as this could have an influence on the course of this research project. A stakeholders analysis helps to identify opportunities to use the support of certain stakeholders in the project [31]. It can also help to understand the intentions and behaviour of stakeholders, so it can be taken into account what their influence might be on decisions and outcomes [32]. An overview of all the stakeholders will be made and the according interest and influence levels will be provided.

3.3 PACT analysis including personas

PACT stands for People, Activities, Context and Technology. It gives a designer insights into who the users are, what they are doing, in which context they are working and what technologies already are involved. With this tool, a designer creates a more profound base to make rational choices for his design. A PACT analysis can also help to gain insight into which problems and difficulties can occur in current systems [33]. For the aspect “People” personas will be used, for which the method can be read in the section below. The personas are made in collaboration with Olivier Mathijssen [34] and Bram van Driel [35], as these two researchers share the same target audience for their research.

3.3.1 People/Personas

Personas can be helpful to get a picture of what a user of Modsy could look like. According to Miaskiewicz and Kozar [36], using personas in the design process helps with focusing on the actual goal of users and getting a clear picture of who the designer is designing for. They continue that by choosing to design for a more specific audience the design choices can be limited, allowing for calculated design choices. Pruitt and Grudin [37] add to this that personas can provide a channel to communicate a variety of qualitative and quantitative data. Personas help focus on design and use aspects that other methods overlook. Miaskiewicsz and Kozar [36] state that the story of a persona should start with describing specifics of the persona, such as what type of person he is, what he likes and dislikes and more specifics. Before this persona can be described, as much information about the target group should be gathered, which can be done with for instance interviews, market research and focus groups [37]. After this, the product comes into play and the specific needs and personal goals of the persona are described concerning the product [36].

3.3.2 Activities

Under activities, the activities of a user with the product are explained. It can be about the frequency of use of the product, but also the time pressure and peaks of workload [38].

3.3.3 Context

Under context, it is explained in which context the user makes use of the product. This can be a physical environment, social context and organizational context [38]. The latter context will not be applicable for Modsy.

3.3.4 Technology

Under technology, the technology that can be used by the designer is introduced. There are three subtopics: Input, output and means of communication. Input is about the ways of input for the system. Output is about the ways of output for a system. Normally the third subtopic is "communication", but in this case, it is replaced by "means of communication" [38]. Instead of thinking about communication protocols for inside the system, it seemed logical in this situation to think of means of communication with the user.

3.4 User Scenarios

User scenarios describe a user that is engaged in a relevant activity with the envisioned system [39]. It is a story that is created by a designer to show how a user might achieve his goals with the envisioned system. It helps to keep the design user-centred [40]. To be more precise, a user story describes what a user is likely to experience using the ideal solution. Before making user stories, it is important to know who your users are, what goals they want to achieve, what relevant tasks they have to do for this and in which context they perform these tasks [40]. In the PACT analysis (*3.3 PACT analysis including personas*) these components are all covered, so this makes a good basis for the user stories. In the PACT analysis, four personas will be introduced. Two of these personas will be the main character in the two user scenarios.

3.5 Brainstorming

Brainstorming is a technique to come up with multiple ideas in a free train of thought. No criticism is allowed during brainstorming and freewheeling is encouraged [41]. Brainstorming can be done individually and in groups. Research shows that brainstorming in groups produces fewer ideas which also are of a lower quality than brainstorming individually [41]. On the other hand, Taggar suggests that group brainstorms are superior because of the cross-fertilization that can take place

[42]. He also suggests that groups that consist out of 'creative individuals' are most likely to take advantage of cognitive stimulation. Parnes and Meadow [43] also suggest that when brainstorming it is beneficial for the quality of ideas to brainstorm with people trained in creative problem-solving. They also found that it is important to give participants the right instructions. Furnham [41] emphasizes that a session should not be over-structured, it should still be spontaneous and fun. Most importantly, participants must be made aware that they should list all ideas without judgement.

3.5.1 Rapid ideation brainstorm

As both individual and group approaches seem to have specific benefits, the brainstorm will be a hybrid form between an individual and group brainstorm. Furnham [41] suggests that the group size should be between 5 to 7 people. For this reason, the group will consist out of 5 Creative Technology students. These third-year students are relatively trained in creative problem-solving. First, the participants will be introduced to Modsy and the functionalities it has. It is explained what needs to be in an introduction for a future Modsy user. Eventually, a persona will be introduced to the participant group, so they get a better picture of the target audience. Then, the participants will be asked to take 10 minutes to brainstorm individually. After this, the 5 participants will be put together to start brainstorming again. The idea is that participants have developed their own thoughts on the matter, so they can optimally participate in a group session. The goal of the group session is to make use of this cross-fertilization and mix ideas. Here they will put their ideas on the whiteboard, where every participant will explain his best ideas to the other participants. The other participants will mark the two best ideas of that person. After this, 40 minutes are taken to discuss the best ideas, to combine them and to discuss how they will be implemented. After this, the remaining ideas will be placed on a 2-axis scale, with "cost/effort" on one axis and "impact" on the other axis. With "impact", the degree of engagement and effective learning is meant. Both variables will always be a rough estimate. The post-its will be placed on the scale after discussing the right placement. This process could lead to new ideas or improvements of the idea.

3.6 Interviews

The interviews in this research are semi-structured. This means that a set of precomposed questions is asked during an interview, but the conversation could elaborate on any topic of interest that comes up. The interview can be seen as a guided conversation. By allowing the researcher more freedom to ask follow-up questions, the participant can give more context to the previous answer [44]. Nowak and Haynes [45] even suggest that semi-structured interviews can uncover data that

would otherwise be overlooked. This would be data about people's attitudes and subjective experiences.

3.7 MoSCoW Requirements

To evaluate the outcome of this research, requirements are used. These requirements should be based on what the user wants and what the product should convey. The success of a product does not only depend on technical matters because qualitative and subjective factors may even play a larger role in this success [46]. Regardless of which factor is most important for the success of a product, it is important to make a distinction between functional and non-functional requirements. Functional requirements will mostly be depending on technical implementations of the system and will therefore most likely have an unambiguous answer. Non-functional requirements will mostly be depending on users and how they perceive product features. This may lead to a more ambiguous answer, for instance when looking at the level of engagement of a user. For these reasons the requirements will be divided into functional (FR) and non-functional requirements (NFR).

For the requirements, a prioritization technique is used, called MoSCoW. This stands for Must have, Should have, Could have, Won't have. This is a simple prioritization technique for requirements that is used across all kinds of business disciplines, especially to work with stakeholders [47]. When there is a limited amount of time it is important to know the relative importance of the work so deadlines can be kept and progress can be made [48].

3.7.1 Must have

These requirements must be delivered otherwise, a viable solution can not be delivered to the stakeholders [48].

3.7.2 Should have

These requirements are important and could be painful to leave out, but the solution is still viable without these [48].

3.7.3 Could have

These requirements are desirable but not as important as the requirements above. It would make less impact if these requirements were left out, compared to the requirements above. These are requirements that will only be delivered in a best-case scenario [48].

3.7.4 Won't have

These are requirements that can be added to the solution, but that will not be possible in the scope of this research project. It is still good to mention these for managing expectations and showing the possible scope of the project [48].

3.8 User Engagement Scale

The User Engagement Scale (UES) is a self-report scale that gives an overall engagement score. In this research, the UES short form is used, consisting out of 12 items. This shorter version of the UES has proven to be as robust as the original long form version, which consists out of 31 items [49]. The results of this scale are not generalizable, so the results of the scale have to be interpreted in the context of this research. The UES short form will be used together with the SUS (see *3.9 System Usability Scale)*, which will give a combined total of 22 items. To avoid a very long questionnaire that could cause participant fatigue, the UES short form is preferred. The UES short form consists out of four subscales which can also be used to measure the engagement score for that specific topic. The following subscales can be defined:

- Focused attention (FA): The feeling of being absorbed in the interaction losing track of time.
- Perceived usability (PU): Negative feelings experienced due to the interaction, degree of control and effort needed.
- Aesthetic appeal (AE): The experienced attractiveness and visual appeal of the experience.
- Reward factor (RW): The feeling of being rewarded by the experience for the effort made

All questions from the UES short form can be found in Appendix A. The abbreviations of the subscales introduced above can be found in front of the questions that relate to that specific subscale.

3.9 System Usability Scale

The System Usability Scale (SUS) is created by Brooke in 1996 as a "quick and dirty" survey scale [50]. After many years of usage, it has proven to be not so "quick and dirty", but rather reliable and versatile [51]. It contains 10 statements that are scored by a user on a 5-point Likert scale. The SUS is a good option for this research as it is a reliable, proven method and relatively quick to fill in for a participant [51]. Another advantage of this method is that the result is a score that is easy to understand. The score will end up between 0 and 100, where a higher score means a higher usability.

The score must be seen as a percentile ranking, meaning that for instance, a score of 74 means the product has a higher perceived value than 70% of all other tested products. A score of above 68 would be considered above average and anything below 68 can be considered below average [51]. The 10 questions can be altered to fit he context of the research. In case of this research the word “system” in every question can be replaced by “introduction”. See Appendix B for all questions of the SUS.

Chapter 4 – Ideation

The goal of this chapter is to ideate and find creative solutions. This will be done by diverging the ideas for a solution. This will start with a stakeholder analysis, followed by an explanation of the different levels of Modsy usage. Then a PACT analysis including personas is used, followed by a brainstorm. Eventually, by converging, this leads to the preliminary concept and preliminary requirements.

4.1 Stakeholder analysis

This research project has several stakeholders who come from different backgrounds and may have different interests and influences on the project. First, the different stakeholders will be introduced, after which their interest and influence levels are mapped.

4.1.1 Prospective users

Basic level users

A basic level user does not fit into the target audience of Modsy. These individuals will most likely not be interested in a product like Modsy because Modsy's functionalities are more relevant for advanced users. Nonetheless, these people can buy a Modsy, the difference with other users is that their feedback on the product will be less important.

Medium level users

A medium level user is also not the target group of Modsy, although their opinion on the product can be a little more significant.

Advanced level users

The general user of Modsy is an advanced producer or performer in Ableton. These people will benefit most of Modsy's capabilities. As these people are the target audience of Modsy, their opinion on the product is highly valued. Characteristics of this target audience are explained in section *4.3.1 People/Personas*.

Professional users

A professional user is similar to an advanced level user, with the only difference that the professional user makes money from music production or performance. These users are also part of the target audience of Modsy.

4.1.2 Developers and Weirdly Wired team

During the period of this research, three people are working on the development of Modsy. Olivier Mathijssen is working on the playfulness of the controller [34], Bram van Driel is working on

the cognitive load of the controller [35] and Robbert-Jan Berkenbos (the author of this research) is working on the engaging introductory tutorial for the controller. These three people are also the founders of Weirdly Wired, which is the company that is developing Modsy. The vision of these three people is essential for the decisions that have to be made for Modsy.

4.1.3 Advisors

The supervisor of this project is Wouter Eggink and the critical observer is Erik Faber. Both provide feedback on the steps that are made in this project and on how this report is written. Their opinions are highly valued because of their experience with graduation projects and their academic background with subjects that are relevant for this project. They also set and safeguard the time window within which this project takes place.

4.1.4 Ableton

At first, Modsy will function only smoothly within Ableton. In a later stage, Modsy could also expand to other DAWs but for now, exclusively Ableton can be used with Modsy. This might give Ableton as a company an interesting position. From a financial perspective, Modsy might have the interest of Ableton, as Modsy could lure musicians to make the switch to Ableton. From a technical perspective, Ableton could have a high influence. When their developers change parts of Ableton, Modsy might need to be updated too.

4.1.5 University of Twente

The University of Twente is the client for this project. It is also the institution that offers help with certain parts of the research. Another important role of the University of Twente is the assurance of ethical behaviour during the research. For any interaction with other people – for instance user tests, interviews, focus groups – the plan has to be checked with the ethics committee.

To give an overview of all stakeholders and their interest and influence levels, table 5 is constructed. In the table below these levels are expressed with a discrete scale that consists of: “Low”, “Medium” and “High”.

Stakeholder	**Interest**	**Influence**
Basic level users	Low	Low
Medium level users	Medium	Medium
Advanced level users	High	High
Professional users	High	High
Ableton	Low	High

Developers/Weirdly Wired team	High	High
Wouter Eggink	High	High
Erik Faber	High	High
University of Twente	Medium	Medium

Table 5: Stakeholders with their interest level and influence level

4.2 Essential functionalities for explaining Modsy

There are different levels of understanding in the usage of a Modsy controller. Optimally, the user knows about all the functionalities when he or she is done with the introductory tutorial. This will not always be the case. For instance, sometimes someone might drop out earlier and skip the remaining part of the tutorial. Therefore it is good to know which functionalities are essential and which are less essential. Firstly, there are instructions for setting up the controller. This needs to be done before someone can start using Modsy. Secondly, the essential functionalities must be known to a user to be able to see the value of Modsy. This is why mastering the essential functions is defined as adequate knowledge of the controller in this research. Thirdly, there are less essential functionalities. These are not as important as essential functionalities, but they could still add to the perceived value.

1. Setting up
    a. Screwing the wooden sides on the controller
    b. Mounting the knobs on the potentiometers
    c. Connecting the controller to the computer via USB
    d. Installing Modsy software
    e. Start the Modsy plugin in Ableton
2. Essential functionalities
    a. Mapping a device to the controller with the physical mapping button on the controller
    b. Using the device selector to go through devices or tracks
    c. Making your own mappings
    d. Editing mappings
    e. Using the function buttons
    f. Setting the functionalities for the function buttons
    g. Changing groupings of control knobs with the LEDs
3. Less essential functionalities
    a. Using the next mapping page button
    b. Making an extra mapping page
    c. Changing names of parameters
    d. Changing the way of parameter control
    e. Using MIDI-out

4.3 PACT analysis including personas

In this section four personas will be introduced as the “People” section of the PACT analysis. Next, the Activities, Context and Technology are analysed according to the PACT analysis. This analysis is explained in section *3.3 PACT analysis including personas*.

4.3.1 People/Personas

Personas are used to form a picture of the group of people that will be using Modsy and the introduction tutorial. These personas are based on research in which interviews with the target audience is performed [52]. The Territory Manager for the Benelux from Ableton [2] is also contacted for more information about Ableton users, which can be seen as Modsy’s target audience. This information is also used for making the personas.

Boris, male, professional producer, 28 years old, Amsterdam, DJ/Producer

Figure 18: Picture of non-existing person used for persona called Boris [70]

Boris is a 28-year-old DJ and producer. He has an apartment in Amsterdam together with this girlfriend. Boris is signed to an electronic music label based in Amsterdam and can utilize a studio owned by this label. Next to this, Boris has different music production equipment in his apartment. This equipment consists of good speakers, a synthesizer and a keyboard. In the studio, he has different synthesizers, drum computers and mastering equipment at his disposal. Boris has been making music for a long time and has always been a digital music producer. Musical concepts are mostly created in his apartment. The finalizing of the concepts into actual songs, s the mixing and mastering stage of his music production, is done from the studio of his label. Boris his main drivers for music production are income, enjoyment, and emotional release. Boris has signed a deal with his label which states that he has to release at least 1 album each year. Boris is very active on social media, mostly for the promotion of his music. Furthermore, Boris has a large social circle within Amsterdam with many friends active in the music industry, this results in a lot of local collaboration and support.

Josh, male, advanced producer, 32 years old, Berlin, software developer

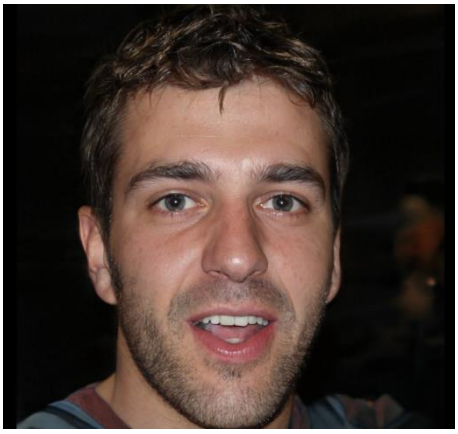


Figure 19: Picture of non-existing person used for persona called Josh [70]

Josh is 32 years old and has been producing music since his childhood years. He started out playing only guitar but later moved on to digital music production in Ableton. He knows almost all the ins and outs of Ableton. After studying computer science at the University of Delft, he now works a full-time job as a software developer in Berlin. He lives alone in a moderate apartment in the city of Berlin. Josh mostly partakes in music production during evenings and the weekend. Josh his main drivers for music production are enjoyment, emotional release, and personal development. He does not release his music often, but occasionally releases some of his work on Soundcloud or his Spotify page. Josh is a member of a Facebook group where he talks with other like-minded musicians. He is not very active in this group, but occasionally he will engage in a discussion. Josh can finance his musical activities well since he has a stable income. His setup is minimalistic but of good quality, with a proper mixer, good speakers, a MIDI keyboard, and a few other instruments.

Nina, female, advanced producer, 21 years old, Utrecht, Sound Design student

Figure 20: Picture of non-existing person used for persona called Nina [70]

Nina is a student sound design at the HKU in Utrecht. In this program, she specialises in sound for video content. She works part-time at a sound design agency and makes her own music as well. She has a lot of contact with young producers and DJ's and is trying to build a portfolio for herself, which includes being active on social media and doing promotional work. Since she wants to distinguish herself from the crowd she is always looking for creative ways to make music. This includes utilizing old instruments or sampling old records. Her budget is not big which means she spends her money very thoughtful on specific music gear she needs.

Robert, male, advanced producer and performer, 56 years old, Hogeveen, Electrical engineer

Figure 21: Picture of non-existing person used for persona called Robert [70]

Robert is 56 years old and has been performing music for a long time. He started out in bands around the age of 16 and has been making music ever since. This passion has progressed parallel to this professional career in engineering. The music Robert produces is mostly psychedelic rock and synth wave music. Roberts main drivers for music production and performance are emotional release and enjoyment. He makes a small amount of money from his music performances, but this is not the main driver. Robert records music with a band and uses different instruments in this process. Robert has always been very interested in the mixing and mastering of the audio and has a small mixing studio in his garden. This studio holds a variety of guitars, effects, a mixing board, and some synthesizers. Robert mostly uses Ableton for the finalizing of his recordings and occasionally uses software instruments or effects in the process.

4.3.2 Activities

The introductory tutorial of Modsy will in most cases be used only once by a user. Most likely, this introduction will be the first interaction with Modsy for a user. When the controller is plugged in and Ableton is running a user can drag the Modsy plugin onto a track. From here the user will be taken through the functionalities and will engagingly learn the functioning of Modsy. The user will for instance be explained how to use the buttons on the controller. The software will also be explained. Afterwards, the user can independently use the controller.

This independent use of Modsy can be in the form of music production or performance. The main activity of playing with a digital instrument through the Modsy controller is the same for both. Activities besides playing with this will be different. A producer will for example use a function button to start and stop, so he can listen to the same loop over and over again. This while a performer will probably only use Modsy to play with parameters, as the music should not be stopped during a performance. An advanced producer or performer is expected to use Modsy in almost every session, which could mean multiple times per week. These sessions can last from one to many hours [52]. Making music can bring people in a flow state, meaning that they are fully absorbed in the music-making [53].

4.3.3 Context

The user can make use of this introductory tutorial in different contexts. A user could encounter the tutorial after buying the product and plugging it in for the first time. Another scenario could be that a user encounters Modsy at a music technology event or a physical music store. In the scenario of buying the controller, the controller would most likely be placed in a (home)studio on a desk. A user might have bought it to improve his workflow and gain expression and fun. Most users will probably be excited to use the product and are willing to try it. Professional users might want to start using Modsy for making music as fast as possible, as they might be working under the time pressure of a client or record label. This could force them to skip the tutorial or to rush through it. In the other scenario, the controller would be placed at a booth at a crowded venue of a music technology event. Many people will walk by the booth and some might feel triggered to try out the product. In this vibrant setting, the user will have to stay engaged with Modsy. There can be a lot of distractions and there can be so much more to discover for a visitor of such an event. In consultation with Weirdly Wired, it is decided to only focus on the scenario of a user who has bought a Modsy. This because the two scenarios are thought to be too different and need two different solutions according to Weirdly Wired.

4.3.4 Technology

Input

Modsy is a device with 32 control knobs (see figure 22) and several other dedicated physical knobs (see figure 23). This controller is connected to the user's laptop or computer by USB. The input will be processed by the Modsy plugin that functions inside of Ableton. In Ableton, this plugin can be opened and with a GUI a user can give input with a mouse and keyboard.

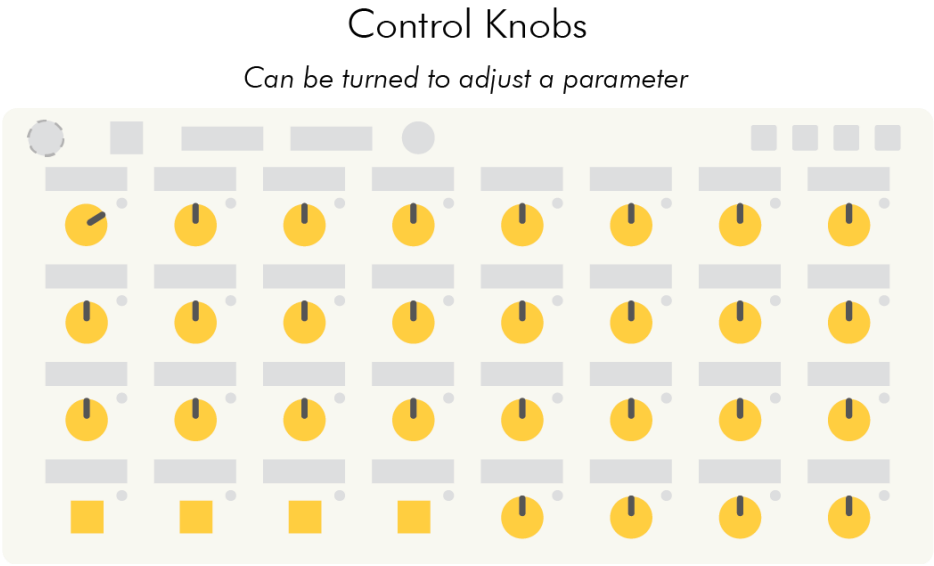


Figure 22: Illustration of the interface of the Modsy controller with the control knobs highlighted

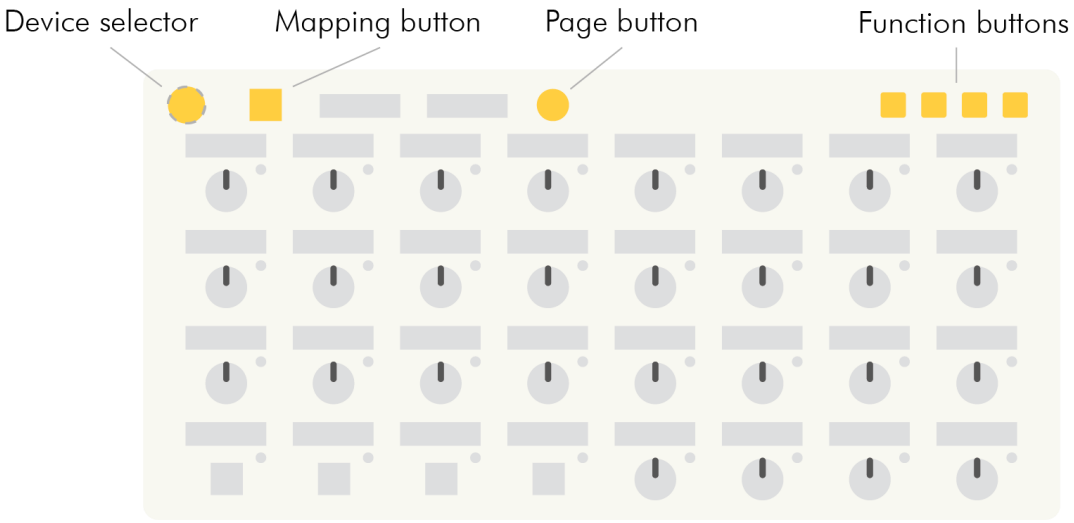


Figure 23: Illustration of the interface of the Modsy controller with the dedicated buttons highlighted

Output

The two means of output are the hardware controller and the computer screen that displays Ableton and the Modsy plugin. The hardware controller has 34 small screens (see figure 24) and 32 LEDs for output (see figure 25). For instance, when a user turns a knob the controller will display the value of that parameter through the corresponding display. The 32 LEDs can be used for grouping control knobs on the physical controller. There are also LEDs underneath the pushbuttons. When pressing a button the user will get optic feedback through an LED that lights up the button.

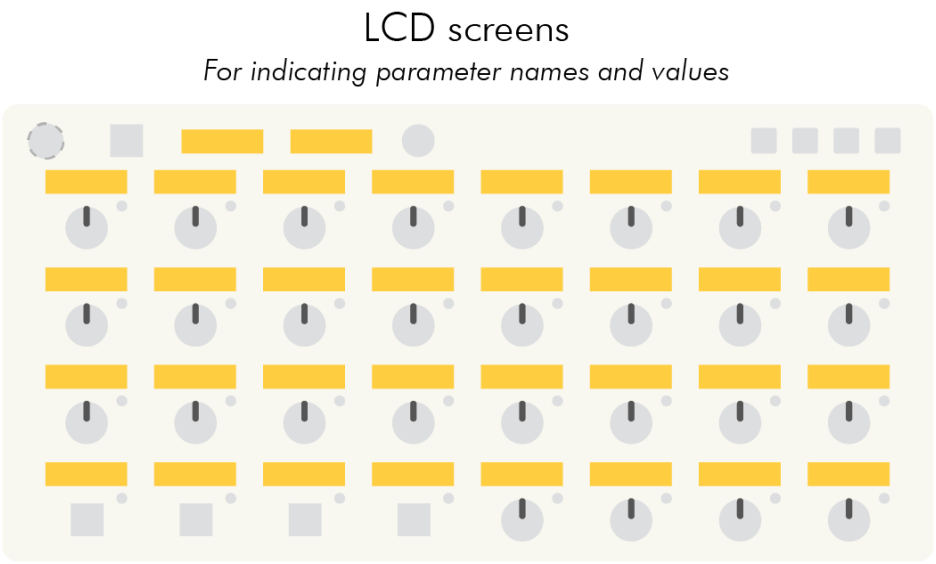


Figure 24: Illustration of the interface of the Modsy controller with the LCD screens highlighted

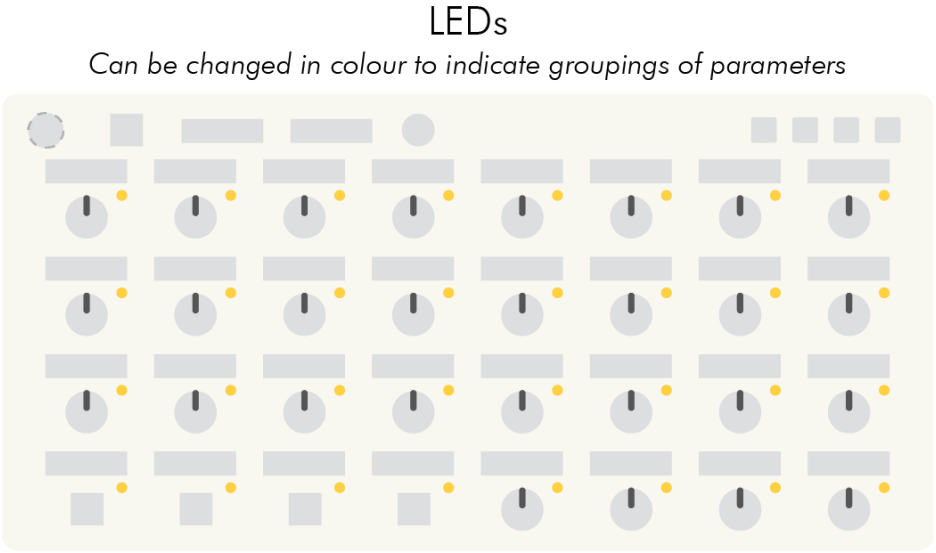


Figure 25: Illustration of the interface of the Modsy controller with the LEDs highlighted

Other means of communication

Another means of communication with the user can be through the cardboard box that the user sees when receiving Modsy. This box will be the first thing that a user sees and can therefore communicate the first steps in the tutorial. After this, the user can unpack his product and during the unpacking stickers or pieces of paper could be placed on top of parts to give directions.

4.4 User scenarios

In this section, two personas will come alive in two separate user scenarios. The two personas called Boris and Robert from section *4.3.1 People/Personas* are used for these user scenarios. As these personas are described in the previous section in great detail, the personas will not be introduced again. The first user scenario with Boris will be about general use with Modsy. The second user scenario with Robert will be about the use of an introductory tutorial. The exact way to introduce a tutorial has yet to be found. This second user scenario is therefore meant to give an idea of the situation when someone gets introduced to Modsy. The exact instructions or flow of a tutorial is therefore kept general and the outcome described is an optimal outcome.

4.4.1 Boris using Modsy

As Boris is a professional DJ and producer, he spends a lot of time in his studio. Sometimes the process of making music becomes a bit too obvious for him. He always follows a similar pattern when making a song. It starts with a melody, he goes through the pre-sets of a few of his favourite plugins and leaves those unaltered. He plays a melody, then he adds drums, a bass and finally some more fills. The songs are not bad, but the process feels a bit too similar for him and not truly creative. Since Boris started using Modsy, he experienced how fun it is to tweak synthesizers and effects. Instead of selecting a pre-set and settling with that one sound, he now starts playing around with different parameters of a plugin. This improves his sense of creativity in the process. It sparks his creativity. The hands-on approach encouraged him to explore all corners of his soft synths. All of this increased the fun Boris has while using Modsy and also improves the expressiveness of his music. There is more of a natural sound and human touch in the music he makes nowadays.

4.4.2 Robert using an introductory tutorial for Modsy

Although Robert is not a full-time musician, he has a lot of knowledge about music and Ableton. When he received Modsy he was intrigued. Robert was used to working with analogue gear, but since the rise of the DAWs, he also got familiar with digital music-making. Still, he likes this feel of analogue gear where he can work with knobs and can focus on the instrument, rather than the computer screen. While Robert unpacks Modsy he gets excited to try it out. While unpacking he encounters the instructions for setting up the controller. After this, he gets taken through the essential functionalities of Modsy. After finishing the introductory tutorial Robert feels comfortable with Modsy. He immediately dives into the controls of his soft synths with Modsy and he loses himself for a few hours.

4.5 Brainstorm

In this section, the process of a rapid ideation brainstorm is described. This is done to diverge and generate as many ideas. Next, in a converging manner, the outcome of the brainstorm is described. The ideas with the greatest potential are described more extensively, other ideas with less potential are only mentioned.

4.5.1 Process

The brainstorm was organized in a physical room with 5 Creative Technology students, including the brainstorm organizer (author of this research). In advance of the brainstorm, an introduction to the project was given to the participants. The participants were already familiar with Modsy and with this research project but the introduction was meant to get everyone on the same page. In this introduction, the target audience was described with two personas from section *4.3.1 People/Personas*. The functionalities that needed to be in an introduction are explained based on what is described in section *4.2 Essential functionalities for explaining Modsy*.

Figure 26: Participant explaining his ideas from the individual brainstorm

The individual brainstorm part generated many different ideas, which were then explained to each other. Probably because the group of people already knew each other, it was easier to share ideas freely and to have fun together. After voting, the two best ideas of every participant were picked and put to the side. After this, these ideas were put on a scale with on the Y-axis “effort/costs to be made to realize the idea” and on the X-axis “impact of the idea on the user”. One of the participants pointed out that it is hard to talk about the effort or costs of an idea because the implementation is still vague. This participant added that there are many good ideas and that one idea might be skipped for bad reasons with this method. For this reason, another short brainstorm was started after finishing the graph (the graph can be seen in figure 27).

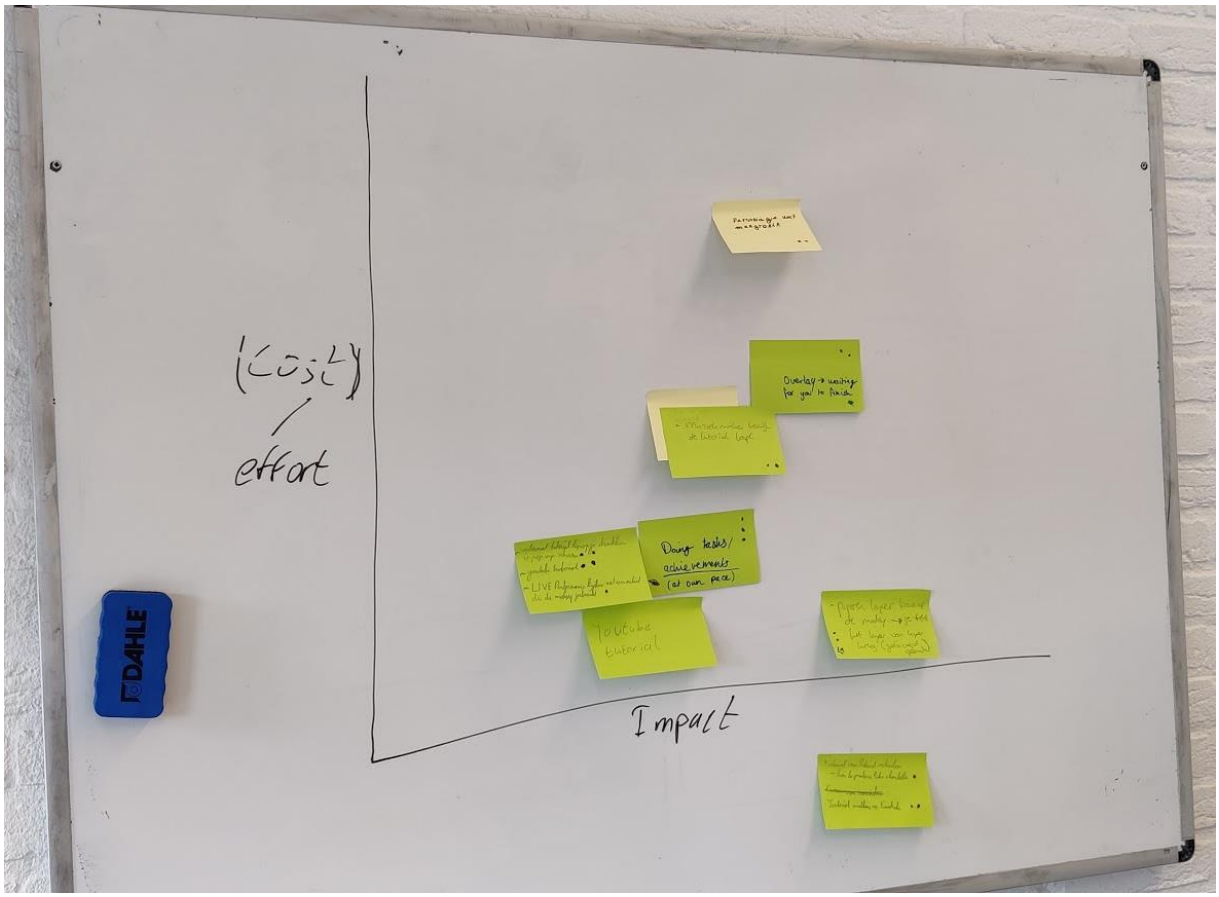


Figure 27: Cost/effort vs. impact scale, filled with the generated brainstorm ideas

As a solution, the researcher asked the participants in this short extra brainstorm which idea was their favourite from all the ideas that were on the board. In response, the participant group chose a certain idea. Coincidence or not, this idea scored very well on the previously mentioned scale. It can be seen at the bottom right on the scale, indicating that it does not cost a lot of effort and creates a high impact.

4.5.2 Outcome

The ideas that have the greatest potential according to the participants and the researcher are explained in further detail in this section. Pictures of the post-its containing the two best ideas of each participant can be found in Appendix C.

Paper overlay

When unpacking the Modsy out of a box it will be covered with layers of paper that guide the user through the functionalities of Modsy. This way a user could still rip off all the layers at once, but most likely the user is tempted to immediately start the tutorial with the first use. These layers are positioned in a specific order that makes sense for the user. Sometimes the overlays refer to something in the plug-in, so there should also be a digital part that can be started and works

together with the paper introduction. Eventually, the idea of a paper overlay was transformed into the idea of a booklet with holes, so that the user can revisit the tutorial when he or she wants to.

Making music

The first time opening Ableton with Modsy connected to the computer, a tutorial will pop up that invites the user into making music. The tutorial will feel like making music and at the same time, important functionalities of Modsy are explained.

Live performance

A live stream with an artist using a Modsy is recorded and can be watched online. In this live stream, the functionalities of Modsy are explained. When the artist makes use of a certain functionality an on-screen overlay shows in text what is happening.

Hidden tutorial

A user can just start using the controller without any introduction. As the user encounters a certain functionality it will be explained in an overlay with text and possibly with images. It must be noted that when a user is not explorative enough, it might be the case that certain functionalities will never be discovered. Nonetheless, the concept of information that pops up when the user needs it is a good inspiration.

Remaining inspiration from brainstorm

- Learning from friends/community and the one who has learned should pass his knowledge on to someone new.
- Talking to the controller to ask how to do something, then the controller talks back and explains how the user should do it.
- Doing tasks, which will be shown as achievements on a page, so users can come back to do a task at their own pace.
- A YouTube tutorial with a famous artist that explains how to use Modsy.
- Put candy in the box that Modsy arrives in so that a user can take a candy with every step that is finished.
- A personal character that grows with the user during their introduction tutorial of Modsy.

4.6 Preliminary concept

In this section, the preliminary concept is explained. After this, the list of design advice (*2.3 Conclusions for ideation*) that followed from the background research is discussed in relation to the concept. Eventually, the considerations for picking this concept are discussed. This preliminary concept will be further specified in *Chapter 5 – Specification*.

4.6.1 Physical introduction

The brainstorm and conversations with the Weirdly Wired team gave the inspiration to emphasize that Modsy is a tool for gaining that analogue feeling. The preliminary concept is to make an introduction that starts physically. When a user unpacks Modsy he or she will see the controller with a physical overlay on top of it (see figure 28). This can be in the form of a paper booklet or plastic sheets that can be removed to see the next step. With this physical start, a user might be more tempted to actually continue with the tutorial. It can still be skipped but it takes a physical action to skip the tutorial, instead of one press on a button. Users will be guided through the first steps such as connecting the controller to their laptop, starting Ableton and starting the Modsy plugin. After these basics, the user will be asked to start the introduction tutorial in the Modsy plugin.

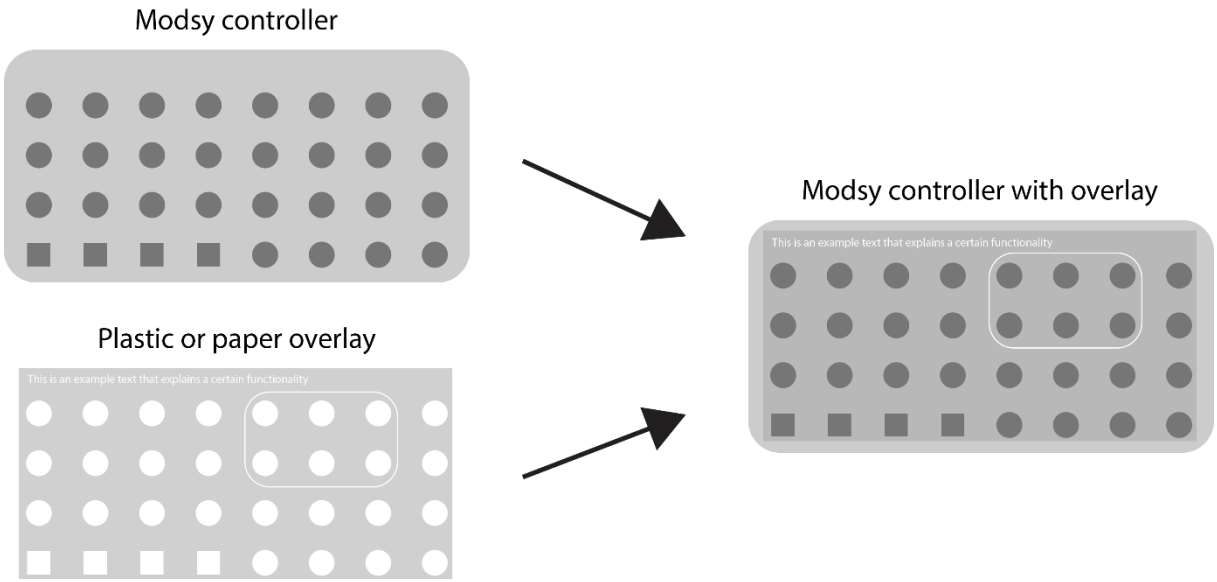


Figure 28: Simplified representation of the Modsy controller with a physical overlay

From there the introduction will be both digital and physical. The LEDs in the controller will be used to highlight buttons on the controller and the overlay can give the user prompts to press a certain button to see what it does. The user will be directed to play with instruments and to record a few notes. These notes can then be influenced and with this loop running, the function buttons can

be explained. Subsequently, the user will be asked to change device by using the device selector and mapping button. The exact interactions will be explained in the specification phase in chapter 5.

At a certain moment, the GUI has to be explained, from here the physical overlay will have to direct the user away from the controller to the computer screen. Some functionalities here can still be explained in combination with the hardware controller. In the end, the user will be shown a link to the Modsy YouTube channel, where videos of usage and other explanations can be found. This can be seen as a backup for when a user does not entirely understand certain functionalities but it can also be seen as another way of learning. Some users might prefer to learn via YouTube tutorials, as this is a very common way of learning for music producers and performers.

4.6.2 Based on background research

In section *2.3 Conclusions for ideation*, advice for designing an engaging and easy to understand tutorial was given, based on the literature and the state of the art. The following points of this list are incorporated in the preliminary concept. The point is mentioned and followed by an explanation of how it is incorporated.

- **Reduce the number of buttons and options at the beginning of a tutorial and expand this later as the user progresses**
    - The pushbuttons with the LEDs under them and the LEDs for indicating groupings can all be lit when needed, so the user only focuses on the buttons that are highlighted. This way the function buttons, mapping button, page button and all control knobs can be introduced one by one.
- **Always give a user the option to skip the tutorial**
    - The user will always have the option to skip or quit. When using the paper overlays they can be taken off. During the digital part of the tutorial a button with “leave tutorial” will be made.
- **Make the UI and UX patterns of the Modsy GUI familiar for an Ableton user**
    - The UI and UX patterns of the digital part of the tutorial will be familiar to an Ableton user. The Modsy plugin is designed by Weirdly Wired, but improvements can be made when needed for the tutorial. The tutorial will expand on this GUI with digital overlays. Meaning that the UI and UX patterns of the tutorial should be similar to the patterns of the Modsy plugin instead of Ableton.
- **Create a tutorial that feels like making music and not like a walk-through of functions**

- The tutorial will incorporate moments where the user can make music, play around and record sounds. Certain Modsy functionalities will have to be explained, which do not directly have to do with making music. This is a limitation, but with this, it could hopefully still feel like making music.

- **Let the tutorial immediately begin, with as few clicks as possible**
  - The idea of beginning the tutorial when unpacking the box makes it possible to start the tutorial without a single click.

When this advice was given, not all options and restrictions of the design were clear, because these were discovered in this chapter, the ideation phase. The following points will not be incorporated in the design due to these restrictions. Similarly, these points are followed by an explanation of why these are not incorporated.

- **Use as little text explanation as needed, rather make use of voice or video explanation**
  - The tutorial must start physically because the controller has to be assembled by the user. The paper overlay immediately guides the user, but it has only text and images. Despite this, the paper overlay is preferred over the advice of using as little text as possible. A paper in the box could for instance refer to a link to a website that contains an introductory video. For this, the user has to perform multiple clicks. It is assumed that it is better to immediately start the tutorial, even though it only has text and images at first.
- **Make (cautious) use of customization for the function buttons, mappings and additional interface settings of Modsy**
  - The customization that is possible with the Modsy plugin is already limited and is a given from Weirdly Wired. Therefore nothing can be done with this last point of advice.

4.6.3 Discussion of the concept

The theoretical underpinning and techniques in the ideation phase gave rise to the idea of letting a user explore Modsy more by itself. The idea of this other concept was that a user will be guided through the basics with a physical overlay. Next, the user can just start playing with Modsy and when he or she presses a button on the controller or in the GUI that might need explanation, a window will pop up. This will explain the functionality and it can be closed afterwards. This pop-up and future pop-ups can also be disabled in this window. The downside of this concept is that it might be the case that a user feels lost because of all the functionalities that are still unknown. It could also

be that a user does not independently start exploring functionalities. In both cases, the user does not get sufficient information to see the full potential of Modsy. Because of this argumentation, it seems not optimal to let the user freely discover the functionalities. Some form of guidance seems needed to make sure that the user feels guided and gets a complete overview of all possible functionalities. For this reason, the concept called *Physical introduction* shows more structure and a storyline for the user. Implementation of this concept will be further discussed in *Chapter 5 – Specification*.

4.7 Conclusion and preliminary requirements

In this section, the ideation phase will be concluded. After a conclusion to this chapter, a list of preliminary requirements is introduced. These will be taken to the specification phase in Chapter 5, where the concept will be further specified.

4.7.1 Conclusion

This ideation phase was all about diverging. First, Modsy and its users were analysed, as this would form the base of new ideas. Different stakeholders were analysed with their interest and influence levels. One of the given elements was Modsy and the functionalities that needed to be explained. These were summed and ordered in three groups: Setting up, essential functionalities and less-essential functionalities. Next, a PACT analysis was performed. This gave insights into the users of Modsy, the activities that would be relevant during an introduction, the context Modsy would be used in and the technology available with Modsy. To get a more detailed picture of a situation that Modsy and the introductory tutorial could be used in, user scenarios were made. The first user scenario gives an example of the general use of Modsy. The second user scenario gives an idea of the use of an introductory tutorial for Modsy. With these techniques a nice base for new ideas was formed. With this base of information, a brainstorm was executed. There were many good ideas, but one outcome stood out and formed the preliminary concept. This concept is then explained and discussed in the context of the theoretical underpinning and other ideas.

4.7.2 Preliminary requirements

A list of preliminary requirements is composed based on the knowledge and insights from this chapter and previous chapters. The MoSCoW method (explained in section *3.7 MoSCoW Requirements*) is used together with the labels ”functional requirement” (FR) and “non-functional requirement” (NFR).

- Must have
    - FR1: The system must explain how to screw the wooden sides on the controller
    - FR2: The system must explain how to mount the knobs on the potentiometers
    - FR3: The system must explain how to connect the controller to the computer via USB
    - FR4: The system must explain how to install the Modsy software
    - FR5: The system must explain how to start the Modsy plugin in Ableton
    - FR6: The system must explain how to connect the controller to the computer
    - FR7: The system must explain how to map a device to the controller with the physical mapping button on the controller

    - FR8: The system must explain how to use the device selector to go through devices or tracks
    - FR9: The system must explain how the user makes his or her own mappings
    - FR10: The system must explain how to edit mappings
    - FR11: The system must explain how to use the function buttons
    - FR12: The system must explain how to set the functionalities for the function buttons
    - FR13: The system must explain how to make and change groupings of control knobs with the LEDs
    - FR14: The system must start physically
    - FR15: The system must give the user an option to skip the introductory tutorial
    - NFR1: The system must keep the user engaged from the start
    - NFR2: The system must feel like making music instead of a walk-through of functions
    - NFR3: The system must embody the analogue feel that Modsy stands for
- Should have
    - FR16: The system should contain playful elements
    - FR17: The system should persuade the user to finish the introductory tutorial
    - FR18: The system should offer an option to start the tutorial in the GUI for users that skipped the physical start
    - FR19: The system should explain how to use the next mapping page button
    - FR20: The system should explain how to make an extra mapping page
    - FR21: The system should explain how to change the names of parameters
    - FR22: The system should explain how to change the way of parameter control
    - FR23: The system should explain how to install the Modsy software
- Could have
    - No “could have” requirements
- Won’t have
    - No “won’t have” requirements

Chapter 5 – Specification

In this section, the preliminary concept of *chapter 4 – Ideation* will be further specified. The different media that the designer has to communicate with the user will be described. With these media, an introductory tutorial will be designed and described. Two musicians from the target audience are asked for in-depth feedback on this design. After this, the design is adjusted to incorporate the feedback. In the end, the preliminary requirements from the ideation phase (*4.7.2 Preliminary requirements*) will be revised and formed to the final requirements.

5.1 Different media to communicate with the user

A user will receive Modsy in a box, so on this box the introduction could already start. In this box, several separate elements are placed which the user will have to assemble on the controller. Therefore these elements should be labelled, for instance with the use of stickers on every separate part that is in the box. Besides this, the concept of a paper overlay or booklet will be worked out. This will consist of pieces of paper with cut-outs, so it can lay on top of the controller to indicate sections or give explanations of buttons. Another means of communication is the controller itself, with its LCD screens, LEDs for groupings and LEDs underneath pushbuttons. One important remark here is that the LCD screens cannot be used while the paper overlay is on top of the controller. A cut-out for these elements cannot be made, because the margins between borders would then become too small. So the paper part must be finished before the LCD screens can start playing a role. Finally, the graphical user interface can also be used to give a digital introduction. This will especially be important for introducing the software side of Modsy. To give an overview, the following possibilities for communicating with a user are found:

- The cardboard box that contains Modsy
- Stickers on the different contents in the box
- Paper overlay/booklet for over the controller
- Physical controller with
    - LEDs for groupings
    - LCD screens
    - LEDs underneath pushbuttons

  (see *4.3.4 Technology* for an exact specification of the previous three elements):
- Graphical User Interface

5.2 The flow of the introduction

The concept and means of communication are clear now. A user will start with a physical introduction to Modsy, as it is not even technically possible to start it digitally. This is because the user also needs to be guided through the process of setting up the hardware before using it. Although all of this is clear now, a storyline can have many twists and bends. For this reason, a storyboard is made to give a clear picture of the exact interactions that will take place. The first iteration of the introduction is explained below in text and images where needed.

5.2.1 First Iteration of the introduction sequence

The introduction will start on the box that the controller will be delivered in, the user will be urged to open the box. There the user will encounter a piece of cardboard which can be seen in figure 29 below. From here the user is guided to the controller, which has a paper booklet on top of it. This is the source of information for a user that helps getting him or her started. From there the user is guided through assembling the controller, for which a logical order is chosen for practical reasons. The sides will be put on the controller first, so the controller has a nice angle to work with for the user. Then the control knobs are set on the controller so the knobs can be used. After this, the user is told to connect the USB and then the physical setting up is done.

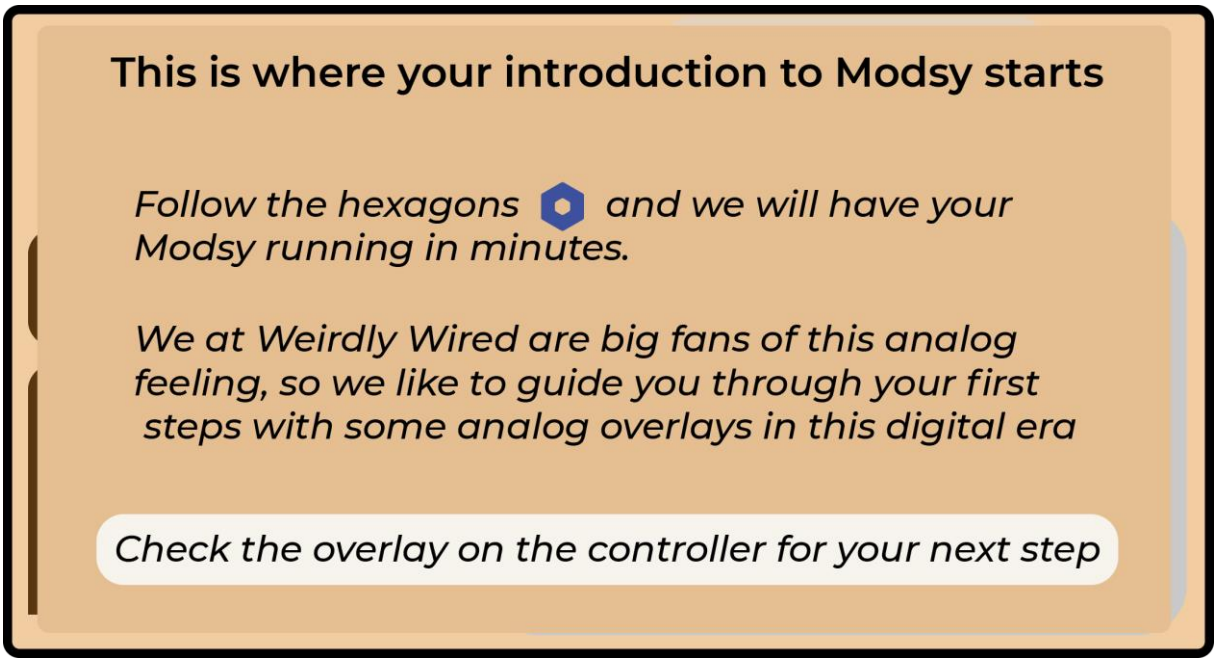


Figure 29: Piece of cardboard that informs user over the introduction

The digital side also has to be set up. So for this, the user is redirected to the (for now non-existing) Modsy website where the instructions can be followed to install the needed software. This part will be left out in this research, as Weirdly Wired is still developing this installer and the webpage for instructions. Next, the user will be guided through inserting the Modsy plugin in Ableton

and starting the introductory tutorial in this plugin. From there on, the paper booklet will be removed by the user and the LCD screens and LEDs for groupings will be used for highlighting things on the controller. The Modsy plugin will guide the user through recording something by using the function buttons, changing from device with the device selector and mapping button and much more. The storyboard in Appendix D shows a large part of the interaction.

5.2.2 Feedback on the storyboard

This storyboard is sent to two users from the target audience who gave in-depth feedback. The storyline that is sent to these producers was explained above. The exact storyboard that is sent to the producers can be found in Appendix D. This storyboard does not cover the entire storyline, as this was not needed to get feedback on the way of interaction between user and prototype. The most important feedback on the first storyboard is summarized:

- Think of a strong anecdote for on the box.
- Make the Modsy controller sticker say “Start here!” or “Start with me!” as people might be overwhelmed with everything that is inside of the box when unpacking.
- Information on the overlay can look more organized (padding, outlines, etc).
- Consider expanding the overlay to the right or left, so that all necessary instructions can be presented here and the spaces between knobs are clean.
- Consider putting instructions on the wooden sides to explain how to mount these, because the explanation the orientation is not clear this way.
- Use a more guided approach in the overlays, maybe use numbers or a line to guide a user from step to step.

5.3 Final Design

Based on the user feedback a final design is made. All feedback is evaluated, but not everything can be incorporated due to constraints or other considerations. The following section describes the final design of the introductory tutorial.

5.3.1 Boxing

The box that Modsy will get delivered in is designed with playfulness in mind. The user is guided to open the box by cutting through the sticker. This sticker, which can be seen in figure 30, can be easily put on the box after Modsy is packed. All other writing is printed on the box. The long side of the box has the Modsy logo printed on it. Both short sides have an arrow that points the user to the top (see figure 31). On the top, the user can read a short anecdote. It could be said that the introductory tutorial starts here, as the user is urged to “open the fun” (see again figure 30).

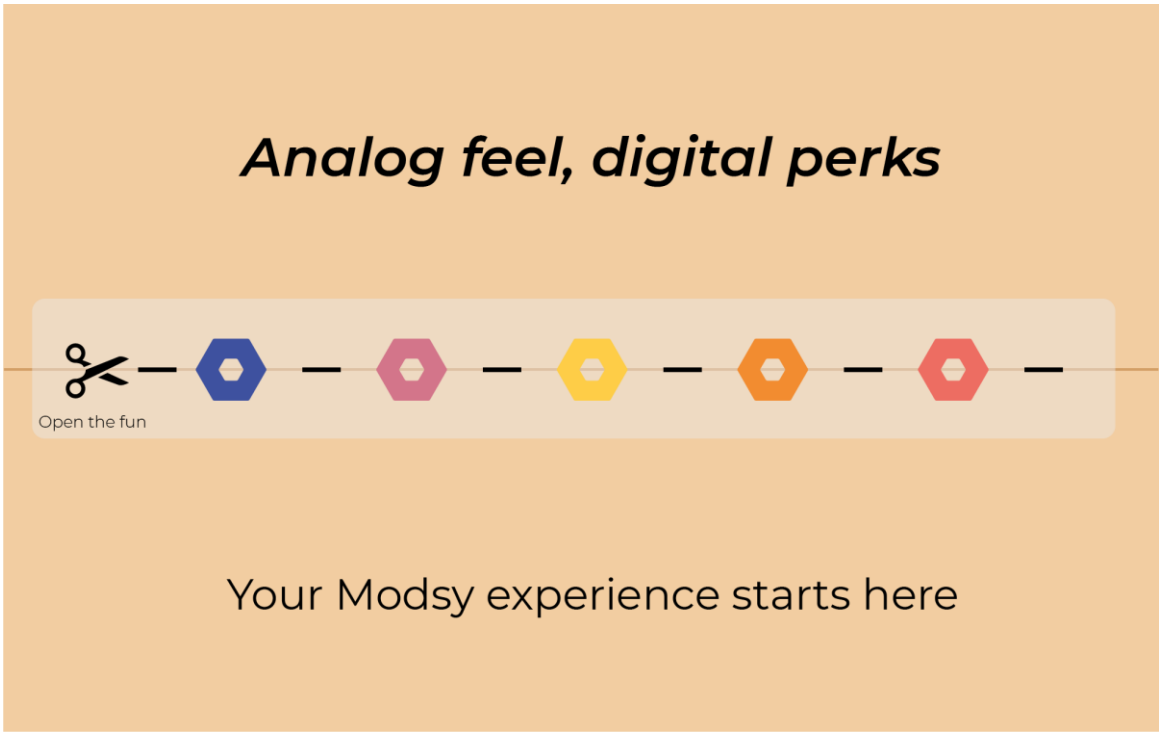


Figure 30: Final design for the top of the box that Modsy arrives in

Figure 31: Final design for the entire box that Modsy arrives in

5.3.2 Unpacking the box

When opening the box, the first thing a user sees is a welcome message in the form of a cardboard paper that lays on top of the other elements (see figure 31). Here the user is informally introduced to Weirdly Wired's mission of bringing back analogue feel. The user is made aware of the use of analogue overlays and the next step is highlighted. This introduction could be expanded by Weirdly Wired if needed. For instance, the history of the company and some other interesting background information could be communicated to a user here.

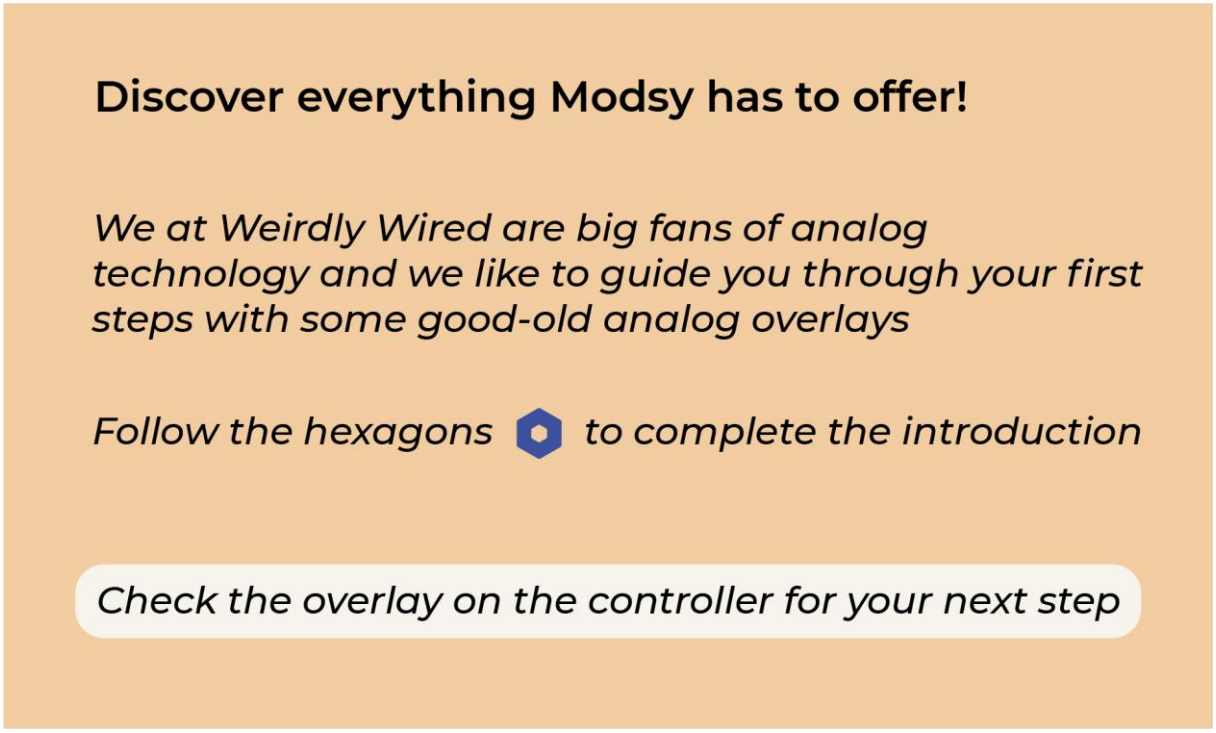


Figure 32: Final design of the welcome sheet that a user encounters when opening the box

After taking this piece of cardboard off, the user will see all the parts of Modsy laying in the box. The two wooden sides (figure 33, component b), a bag with rotary knobs (figure 33, component c), the USB-C cable (figure 33, component d) and the controller itself can be seen (figure 33, component a). To guide the user in this possibly overwhelming moment, every part has a sticker on it that tells the user what it is. The sticker on the controller also tells the user to start there, as the next steps for installation are explained on the controller.

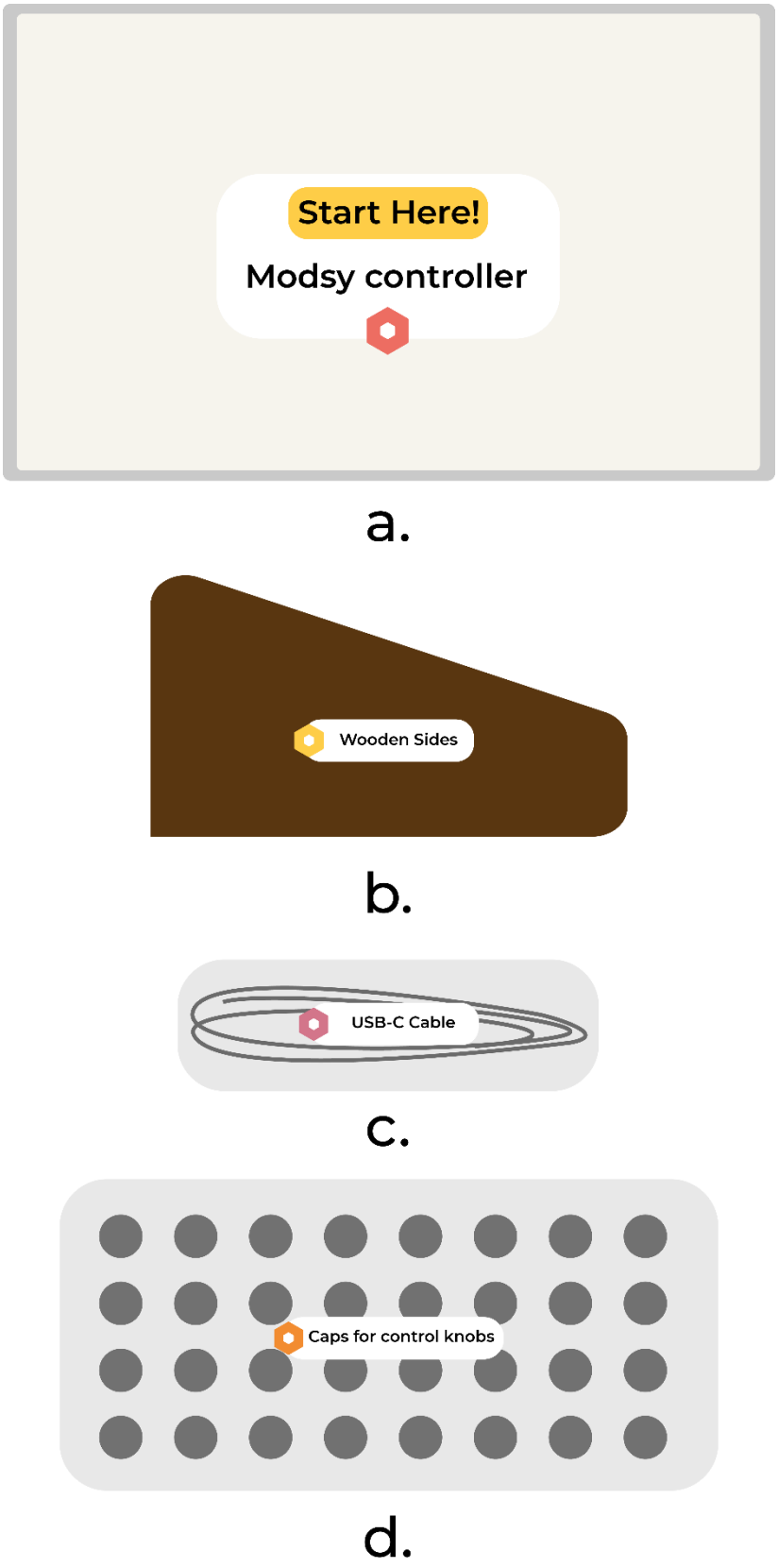


Figure 33: All components that are inside of the box when unpacking Modsy with stickers to guide the user

5.3.3 Setting up the controller

The user can personalize some hardware features, which is why Modsy is not entirely assembled “out of the box”. The rotary knobs can be put on the controller by users so they can create a layout with the bigger and smaller knobs that makes sense for them. The wooden sides can be put on the controller in two orientations, which result in a different angle to work with Modsy. All of this is explained in the analogue overlays. This is a package of papers with cut-outs that is already on the controller.

The paper overlays have a pattern cut out so that all knobs on the controller will stick through the paper. These overlays will already be on the controller when the user opens the box. After removing the extra packaging that protects the controller the user will see the first steps explained on the paper overlay. Every overlay extends on the left side of the controller, so the text does not have to cramped between the knobs. The structure of all 5 overlays is the same. The black bar on the top shows the number and name of the step. Then there are numbered sub-steps, highlighted with a hexagon. Each sub-step has text and where possible images to clarify the step. It is tried to explain the steps in a playful manner. Informal wording is used in combination with round shapes and the colourful Modsy palette. The use of naturally bend arrows also tries to make it look less strict. At the bottom of each overlay, the user is told to go to the next overlay if the specific task of the current overlay is executed. The benefit of these overlays is that certain elements on the controller can be highlighted, such as the placement of the bolts in the controller for the wooden sides (see figure 34).

Overlay 1

The first overlay, which can be seen in figure 34, explains to the user how to mount the wooden sides. First, it is explained that there are two orientations to mount the sides. In step 2 the four places to put the bolts in are shown.

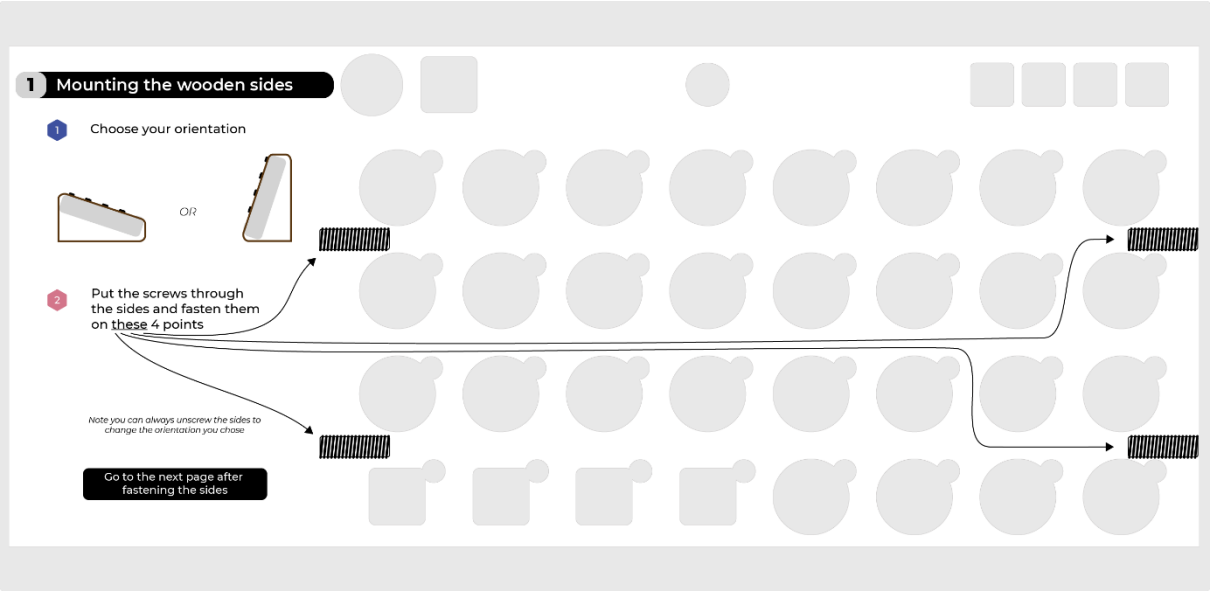


Figure 34: Final design of the first paper overlay, explaining how to mount the wooden sides

Overlay 2

The second overlay, which can be seen in figure 35, explains how to mount the control knobs. An example of a layout for placing the smaller and bigger knobs is shown. In the second step, it is explained how to fasten the knobs with the screwdriver. The knobs have a set screw that tightens the knob on the potentiometer shaft. There is one correct orientation for the knob, otherwise the indicator stripe does not match the value of the potentiometer. A small playful element is added where the arrow points the user to “Those grey things” on the controller. This refers to the metal shafts of the potentiometers on the controller.

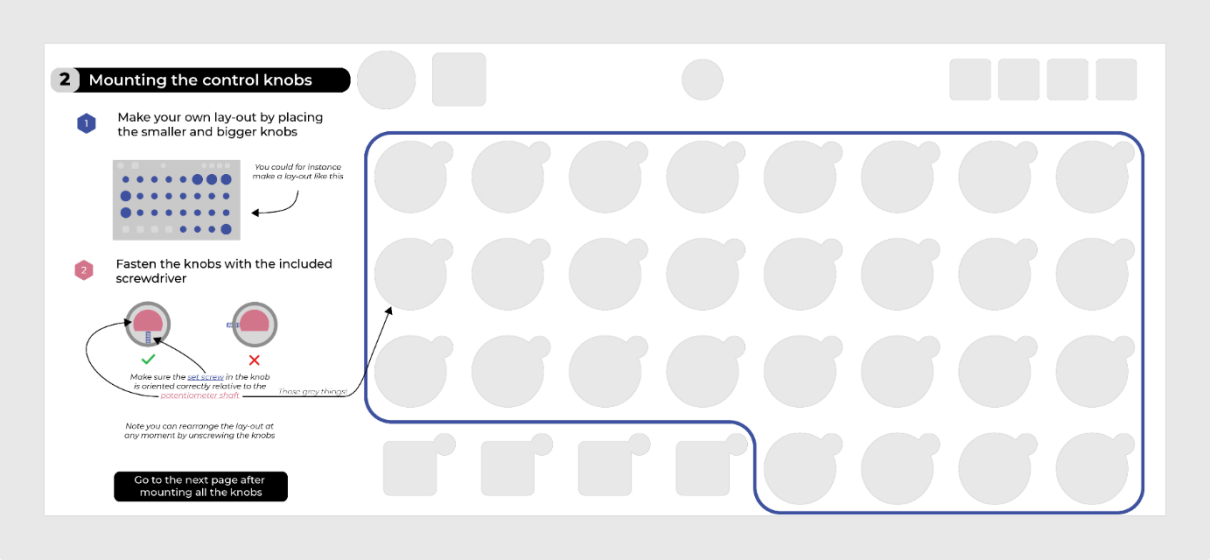


Figure 35: Final design of the second paper overlay, explaining how to mount the control knobs

Overlay 3

The third overlay, which can be seen in figure 36, explains how to connect the USB to the Modsy controller. It explains that the user should see the LEDs light up if the controller is connected correctly. As users might think that they are missing a power cable, it is explained that Modsy can be powered by only USB. There are arrows pointing the user to the two ports. On these arroww a playful text is written that explains to the user what they are looking at.

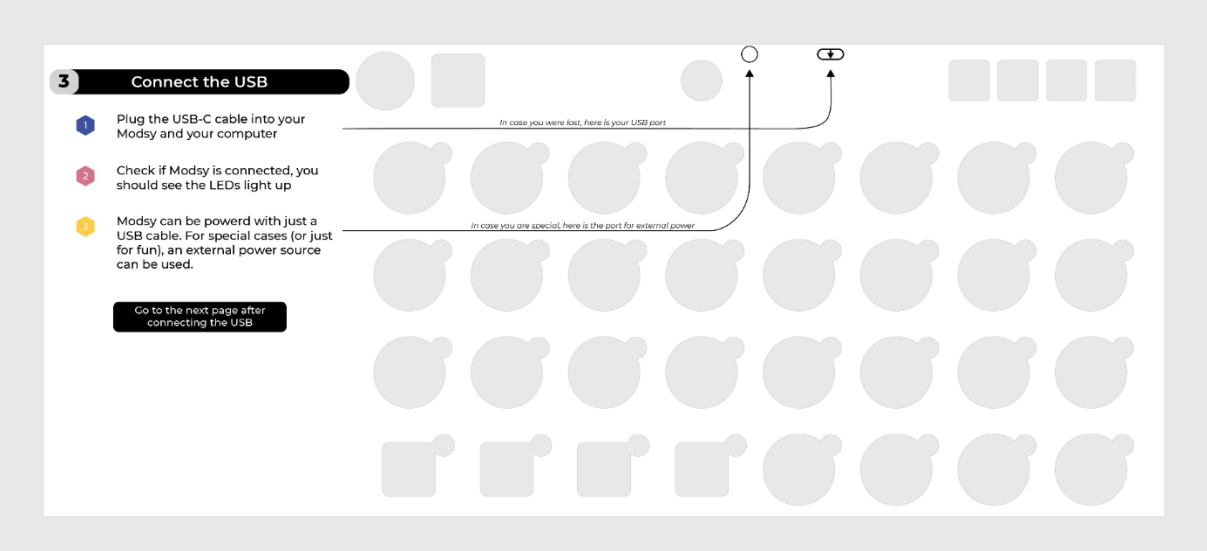


Figure 36: Final design of the third paper overlay, explaining how to connect the USB

Overlay 4

The fourth overlay, which can be seen in figure 37, explains the different sections that are on the controller. It also tells the names of the three dedicated buttons. The names of some of these buttons are important for the digital part of the tutorial.

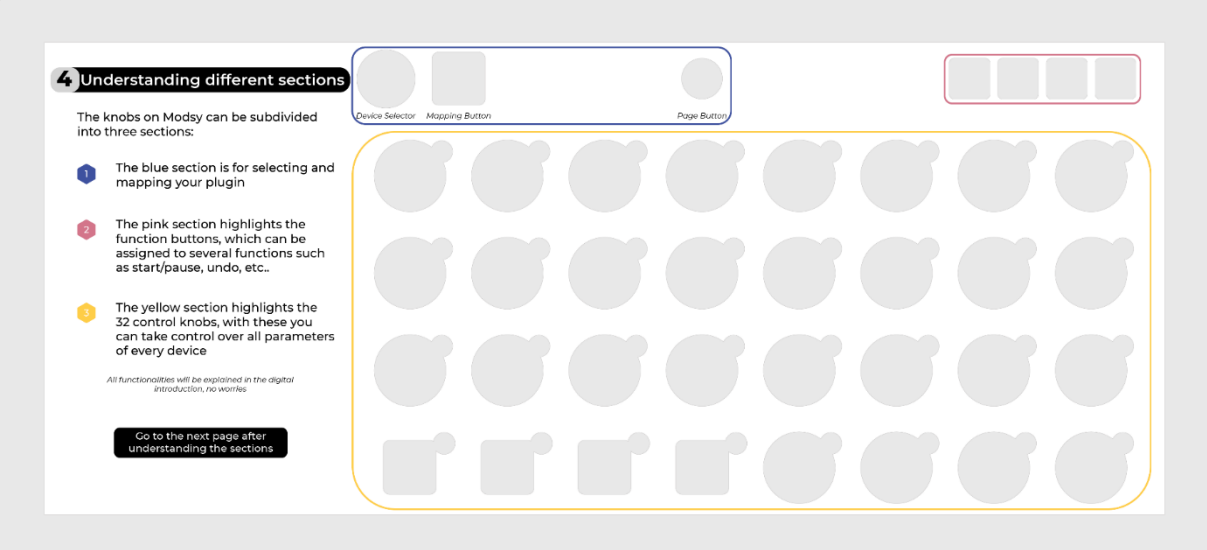


Figure 37: Final design of the fourth paper overlay, explaining the different sections on the Modsy controller

Overlay 5

The fifth overlay, which can be seen in figure 38, explains how to start the digital part of the introduction. It first explains how to download the Modsy plugin via a special website. Via the instructions on the website and in the installer, the user will be guided through installing the plugin. After installing the installer program will tell the user to return to the overlay. This part could not be developed for this research, as this website and the entire software package is still in development by Weirdly Wired. After returning, the user is asked to open an Ableton project. Then the user is guided in how to select the right control surface. Next, the user is asked to drag and drop the Modsy plugin, that is just installed, in a track. Eventually, the user is asked to press the button in the Modsy plugin that says “let’s go”. The user is told that the overlays can be taken off the controller now.

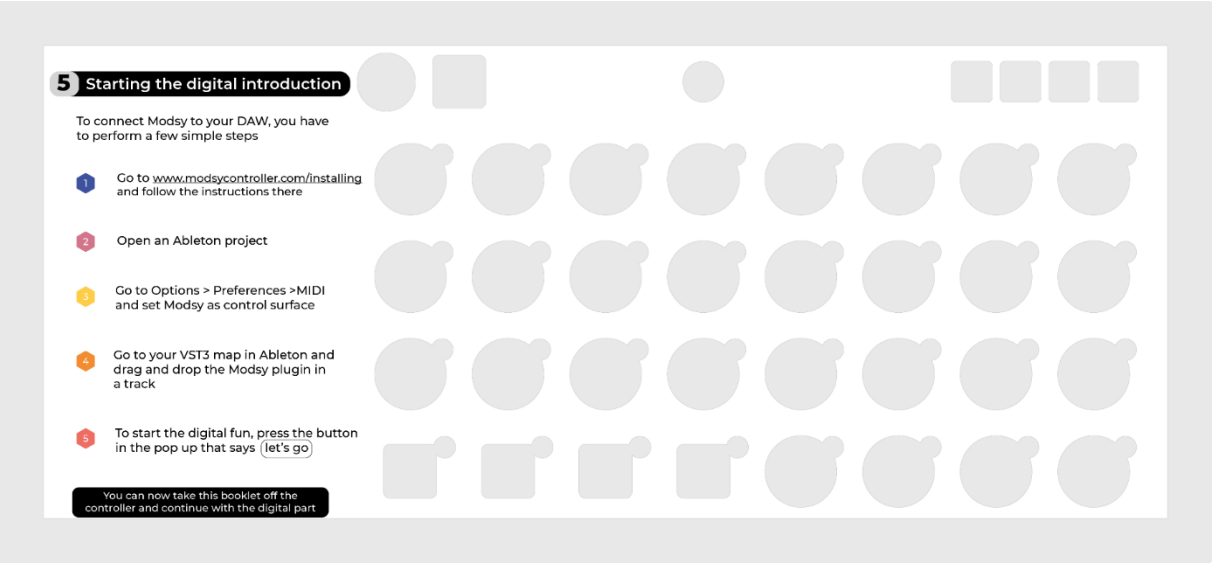
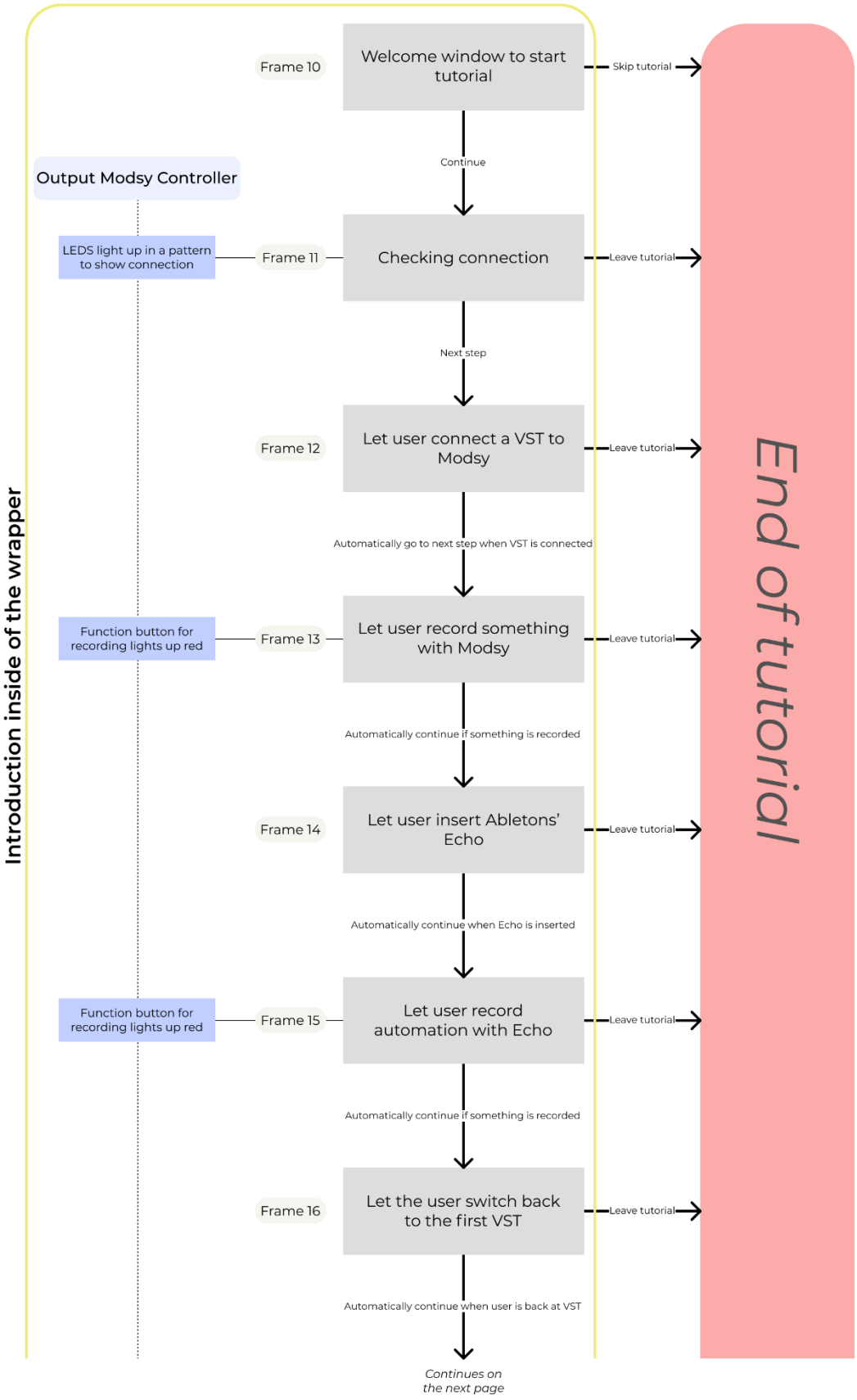


Figure 38: Final design of the fifth paper overlay, explaining how to install the software and start the digital introduction

5.3.4 Digital part of the tutorial

The final design of the digital part of the tutorial will stay almost the same as explained in *5.2.1 First Iteration of the introduction sequence*, as there was no important feedback for this part. The storyboard in Appendix D, onwards from frame 10 contains the final design. Minor changes will be made during the realisation, such as fixes for spelling mistakes. To give an overview of the final design, a block diagram is used to render the frames of the storyboard more concisely (see figure 39). Every frame about the digital part that can be seen in Appendix D is included in this diagram. The diagram is from a system’s point of view. Every arrow is a button that the user can press or an action that the user can perform to go to the next step. It is also possible to leave the tutorial at every step. From frame 12 onwards, it is possible to go to the previous step. To keep the diagram concise and clear this action is not included. During the implementation of the design, some changes might occur

due to the programming language and framework that have to be used. The result of this will become obvious in *Chapter 6 – Realisation*.



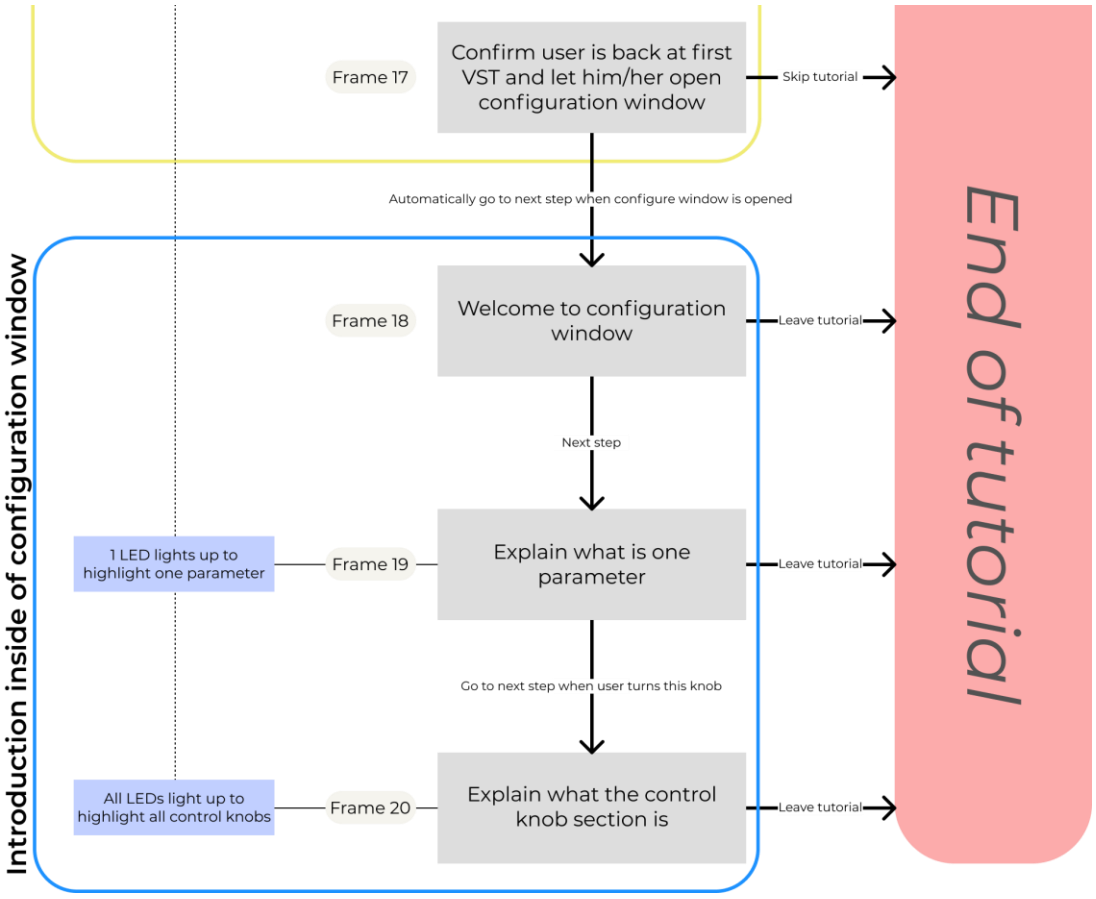


Figure 39: Block diagram of the final design of the digital part of the introductory tutorial

5.4 Final requirements

In section *4.7.2 Preliminary requirements*, a list of requirements was given. Insights from the specification phase will be incorporated in this list. The biggest change is that certain requirements are placed from the “must have” category to the “won’t have” category. This decision is made because it is not needed for the goal of this research to introduce every functionality to a user. With only a few functionalities the factors that make it engaging and easy to understand can still be researched. Introducing every functionality of Modsy would also not be possible due to the short period of time to realise this concept. Designing every step takes a lot of time and implementing it in code or on paper is, even so, a time-demanding task.

- Must have
    - FR1: The system must explain how to screw the wooden sides on the controller
    - FR2: The system must explain how to mount the knobs on the potentiometers
    - FR3: The system must explain how to connect the controller to the computer via USB
    - FR4: The system must explain how to start the Modsy plugin in Ableton
    - FR5: The system must explain how to map a device to the controller with the physical mapping button on the controller
    - FR6: The system must explain how to use the device selector to go through devices or tracks
    - FR7: The system must explain how to use the function buttons
    - FR8: The system must start physically
    - FR9: The system must give the user an option to skip the introductory tutorial
    - NFR1: The system must keep the user engaged from the start
    - NFR2: The system must feel like making music instead of a walk-through of functions
    - NFR3: The system must embody the analogue feel that Modsy stands for
- Should have
    - FR10: The system should contain playful elements
    - FR11: The system should persuade the user to finish the introductory tutorial
    - FR12: The system should offer an option to start the tutorial in the GUI for users that skipped the physical start
- Could have
    - No “could have” requirements
- Won’t have
    - FR13: The system won’t explain how the user makes his or her own mappings
    - FR14: The system won’t explain how to edit mappings

- FR15: The system won’t explain how to set the functionalities for the function buttons
- FR16: The system won’t explain how to make and change groupings of control knobs with the LEDs
- FR17: The system won’t explain how to use the next mapping page button
- FR18: The system won’t explain how to make an extra mapping page
- FR19: The system won’t explain how to change the names of parameters
- FR20: The system won’t explain how to change the way of parameter control
- FR21: The system won’t explain how to install the Modsy software

Chapter 6 – Realisation

In this section, the implementation of the final design will be described. During the implementation, changes are made to the design to realise the prototype in time for the user tests. The design incorporates many different components. These can be split up into hardware and software. The prototype that follows from this realisation phase is the prototype that will be tested in the evaluation phase (*Chapter 7 – Evaluation)*.

6.1 Hardware

The hardware for the final design incorporates different components which will be treated separately below.

6.1.1 The box

The box that can be seen in figure 40 is the realisation of the final design. There are some clear differences with the final design. Ordering a single box of the correct size with custom printing on it was too expensive, as there was only a small budget for this research. The price per box is much lower when ordering multiple boxes. Instead, a box is recycled by turning it inside out, which resulted in a white outside. Then stickers with the quote “Analog feel, digital perks” and “Your Modsy experience starts here” were put on the box. This would otherwise be printed on the box. The Modsy logo and arrow which could be seen in figure 31 would otherwise also be printed on the box. For this test, this was not on the box. The sticker for opening the box was also not on this box, as this box had another opening mechanism. It would also not be possible to let a test person cut the box open every test. With fewer financial restrictions this could easily be realised.

Figure 40: picture of the final implementation of the box for the user tests

6.1.2 Packaging and stickers

The packaging of the wooden sides, USB-C cable, control knobs and Modsy controller is made out of what was available. It does not precisely represent the packaging that Modsy will be in when it will later be shipped. It does give an impression of what it could like and it is sufficient for the purpose of guiding the user. In figure 41 it can be seen how Modsy is wrapped in bubble wrap with the sticker on it. Together with the other stickers for this project, this sticker is printed on a sheet of sticker paper. It is then cut out by hand in the desired shape with a paper scalpel, which is a little pencil with a sharp blade at the end of it. In figure 42 you can see the wooden sides, which are of plastic, in a reclosable plastic bag with the sticker on it. In figure 43 you can see the caps for the control knobs in a cardboard box with a sticker on it. Lastly, the USB-C cable can be seen in figure 44. It is packed in a reclosable plastic bag with the sticker on it.

Figure 41: Final implementation of packaging and sticker for the controller

Figure 42: Final implementation of packaging and sticker for the wooden sides

Figure 43: Final implementation of packaging and sticker for the caps for control knobs

Figure 44: Final implementation of packaging and sticker for the USB-C cable

6.1.3 Paper overlays

The instructions on the paper overlays are printed on 200 grams per square meter (GSM) silk paper. In figure 45 you can see the package of paper overlays on the controller. The choice of paper could be further researched. 200 GSM gives the paper a thickness with which it lays sturdy without wrinkles. The part of the paper that sticks out on the left keeps hanging, but paper with a higher GSM could be preferred. The silk coating makes a smooth appearance and makes the sheets feel smooth.

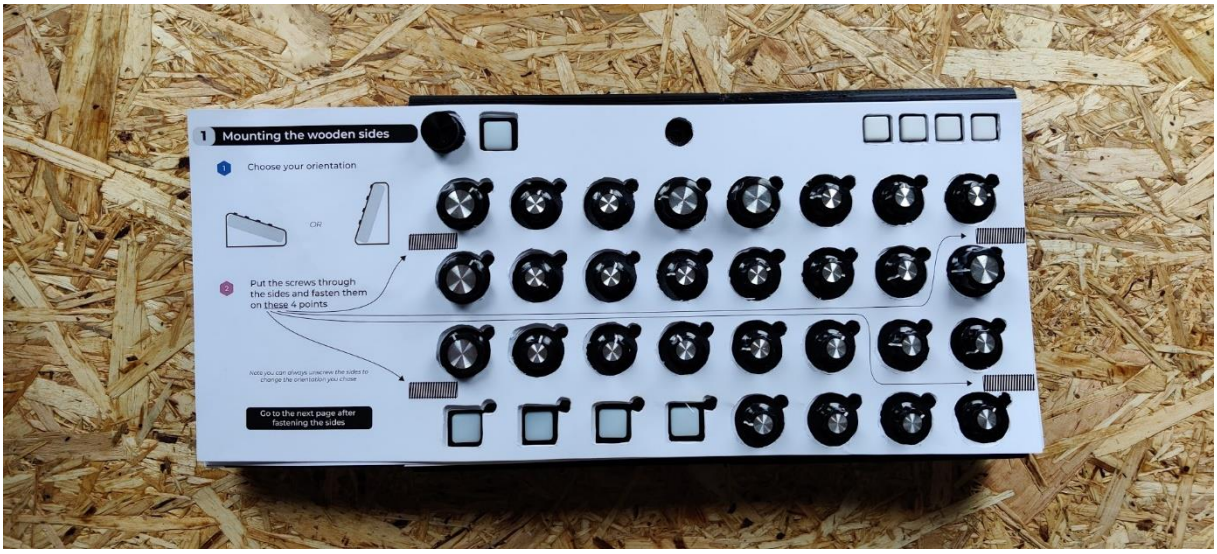


Figure 45: Modsy controller with all 5 overlays on the controller

Initially, the plan was to put every sheet under a laser cutter for all the cutouts. As can be seen in figure 45, there are many cutouts for all knobs. Laser cutters are able to cut through many sorts of paper, including this silk paper [54]. The laser cutters available at the University of Twente were also capable of cutting through paper. The problem that arose was that these Trotec Speedy 500 laser cutters were not equipped with a camera for calibrating. This could be bought as an add-on, but it was not available at the University of Twente. Calibration is needed to cope with the small deviation of the prints on the paper.

In hindsight, the overlays should have been designed with a margin for the deviation of the printer and laser cutter. In the short time frame and with the small budget it was not possible to redesign and print these again. Therefore the 5 overlays are cut out by hand, using a paper scalpel. This tool is the same tool as is used for cutting out the stickers. Cutting this by hand is a time-consuming process and the preferred method is to design with a margin or have a self-calibrating laser cutter. The result was sufficient for testing purposes, only small irregularities could be seen. With five layers on top of each other (as seen in figure 45) it is easily noticeable if one layer is out of shape. It is assumed that these irregularities will have little to no influence on the test results. All five paper overlays with cutouts can be seen in Appendix E.

All paper overlays could be used as they were designed, except the fifth overlay. This overlay directs users to an installing website of Modsy for the plugin. As this website is not online, the user is told to skip this step through a post-it that is put over the text of this step (see figure 46). The next two steps are also covered by the post-it, as these could also not be done by the participant. In figure 38 it could have been seen that step 2 asks the user to open an Ableton project. Step 3 asks the user to select the right control surface. Both steps could not be done by the user, as the Modsy controller needed some special adjustments before it would work. This meant that Ableton was already started in the test setup and the control surface was already selected.

Figure 46: Final implementation of overlay 5 with an adjustment for the user tests regarding steps 1 to 3

6.1.4 Modsy controller

Modsy is in a development phase and for that reason, the newest prototype had some flaws. This newest prototype is used for this project and will also be used for the user tests. The casing is still from plastic instead of aluminium and the wooden sides were also from plastic instead of wood (see figure 47). Functionally speaking there were some flaws in the prototype. Relevant parts for this research that did work were the device selector and function buttons. In the user tests, it can be observed whether the user will perform the right action. The problem is that the right action, for instance pressing a button, does not trigger anything. This can be solved by stepping in as the researcher to trigger something in the software manually.

Figure 47: Prototype of Modsy used for this project and so for the user tests

6.2 Software

In this section, the implementation of the software is discussed. First general information about the coding language and framework that is used is given. This is followed by an explanation of the structure of the code. Eventually, the struggles while implementing the design in this code are explained.

6.2.1 Coding for VST

When making a plugin, the VST format is a standard that is used in every DAW. The newest version of this is VST3. Because the name of the format is VST, people often refer to a plugin by the name VST. A VST must be made in the coding language C++ and for this a framework called iPlug is used [55] [56]. With this framework, the Modsy plugin also has been made. The code for the introductory tutorial builds on this code for the Modsy plugin, that is delivered by Weirdly Wired. From the plugin (VST) the LEDs on the controller must be triggered for the introduction. For this, Open Sound Control (OSC) is used to communicate from the VST (the C++ code) with the Modsy controller. OSC is a data transport specification that is made for communication between applications and hardware [57].

6.2.2 Structure of the code

As mentioned, the tutorial will take place inside the Modsy plugin. This means that the tutorial had to be incorporated into the Modsy plugin code. The iPlug framework has a lot of built-in functions, which were sufficient for building the introductory tutorial. There are functions for drawing rectangles, buttons and text. With these three elements, the digital part of the introductory tutorial can be made.

The iPlug framework makes it possible to give every object that you draw a label. For instance, in the small snippet of code below (see code snippet 1) a rectangle is drawn with as label “step 1”. This makes it possible to hide or unhide all objects with the same label at the same time. All elements that needed to be drawn, for step 1 in this case, have the label “step1”. When the user presses the button to go to the next step, hide will be set as true for step one and false for step 2. This mechanism is used to go through all steps. Explaining the entire code will not add to the results of this research. Further explanation would lead to explaining how the iPlug framework works, while documentation for this can be found online [58]. The full code of the introductory tutorial can be found in Appendix F. The code of the entire Modsy plugin is not included, as this is the property of Weirdly Wired.

```
pGraphics->AttachControl(new IVPanelControl(pinkOverlay, "",
pinkBGNoHover.WithRoundness(.2f)), kNoTag, "step1")->Hide(true);
```

Code snippet 1: Snippet of the code showing how a rectangle is drawn with a label to hide and unhide

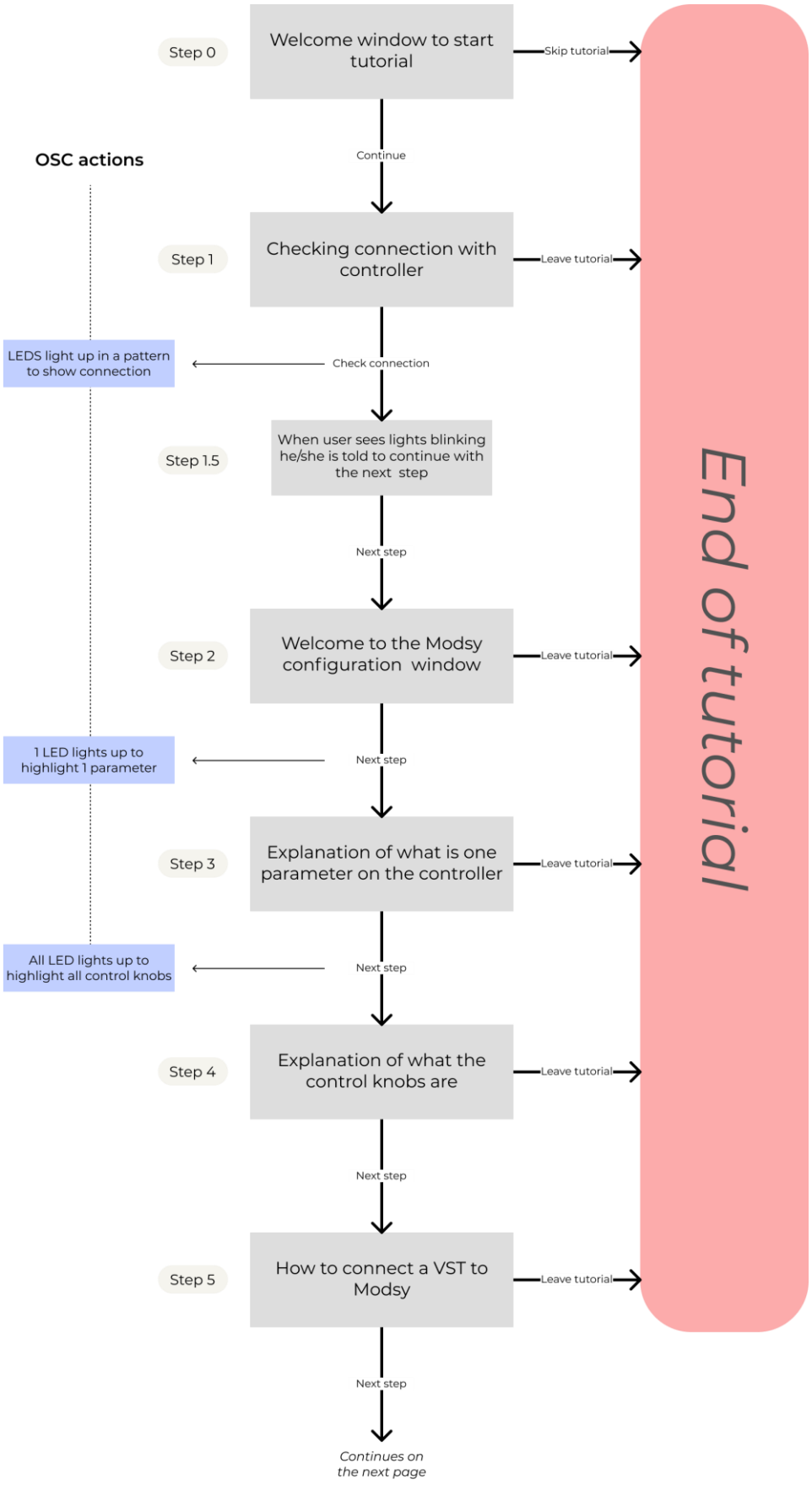
As explained, OSC is used for communication between C++ and the Modsy controller. When the user presses the “next” button, a OSC call would be made if it is needed for that step. For instance when checking connection, the snippet of code below is used in C++ (see code snippet 2). This sends the message “/modsy/intro/check” to the Modsy controller. In the Modsy controller an Arduino based program is running that will receive this message. It wil then trigger a function that turns the LEDs on one for one. All functions that are triggered by receiving the OSC on the controller can be found in Appendix G.

```
OscMessageWrite msg;
msg.PushWord("/modsy/intro/check");
SendOSCMessage(msg);
```

Code snippet 2: Snippet of code showing how an OSC message is sent to the Modsy controller

6.2.3 Final implementation of the design

While designing the tutorial, it was expected that every part of the Modsy software would be finished. The Modsy software consists of a wrapper, in which the VST (instrument or effect) can be opened, and of a configuration window. Unfortunately, the wrapper was not ready yet and so the digital introduction had to be altered. Luckily, the configuration window contains almost all functionalities that need to be explained to a user. For testing the concept of a paper introduction and digital part this is also thought to be sufficient. The final design of the digital tutorial included a large part that would take place in the wrapper. This design is adjusted and everything now takes place in the configuration window. The new flow of the tutorial can be seen in the block diagram on the following pages (figure 48). Every arrow can be seen as an action of the user pressing a button in the GUI. On the left, OSC calls that are made when pressing a button are shown. All the different screens that a user will encounter in the digital part of the tutorial can be seen in Appendix H.


Step 0
Welcome window to start tutorial
Skip tutorial
Continue
OSC actions
Step 1
Checking connection with controller
Leave tutorial
LEDS light up in a pattern to show connection
Check connection
Step 1.5
When user sees lights blinking he/she is told to continue with the next step
Next step
Step 2
Welcome to the Modsy configuration window
Leave tutorial
1 LED lights up to highlight 1 parameter
Next step
Step 3
Explanation of what is one parameter on the controller
Leave tutorial
All LED lights up to highlight all control knobs
Next step
Step 4
Explanation of what the control knobs are
Leave tutorial
Next step
Step 5
How to connect a VST to Modsy
Leave tutorial
Next step
Continues on the next page
End of tutorial

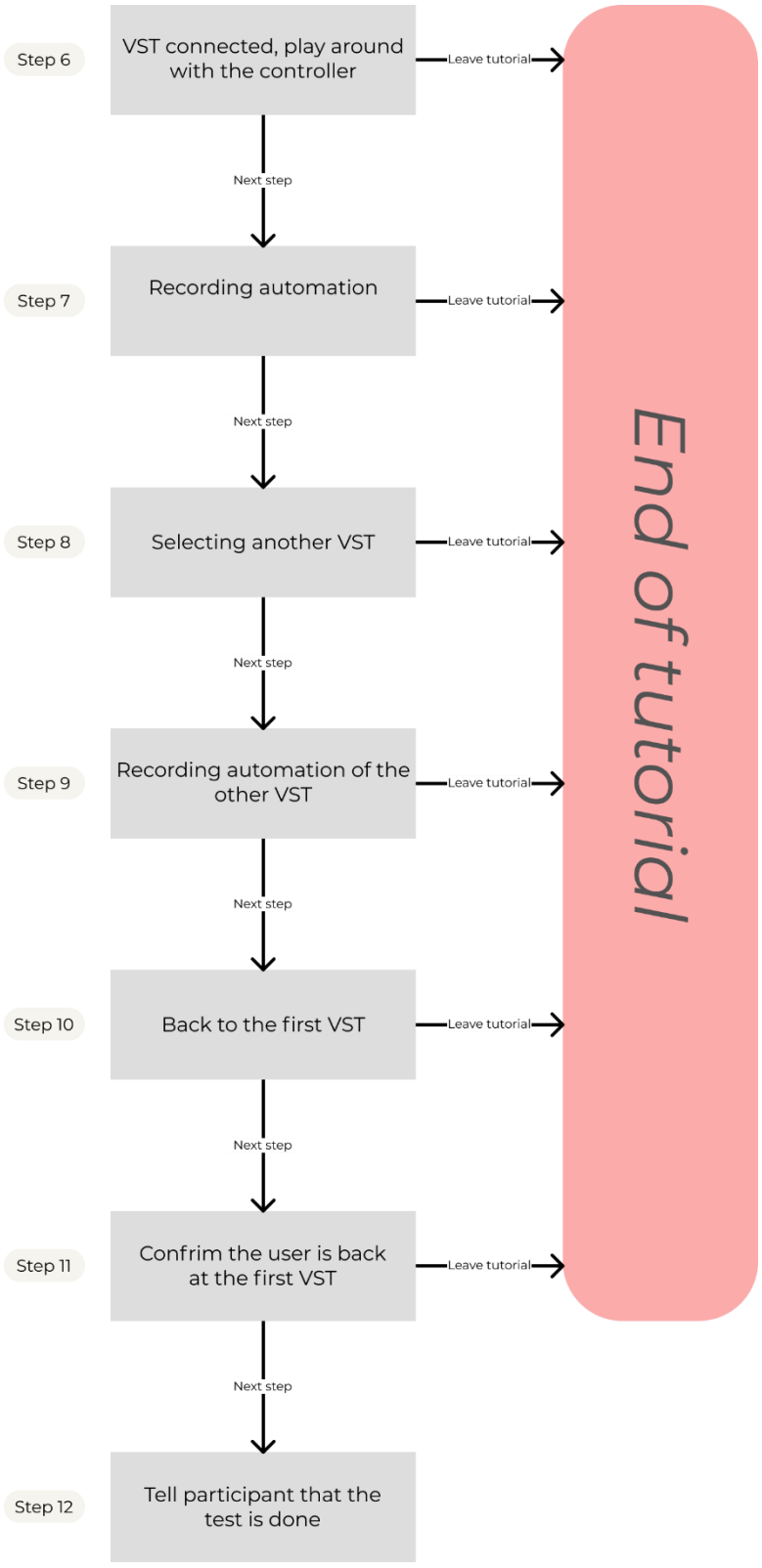


Figure 48: Block diagram of the final implementation of the digital part of the introductory tutorial

Chapter 7 – Evaluation

The goal of the evaluation phase is to find out what factors make the introduction engaging and easy to understand. The current prototype evolved from an idea to a worked-out concept. Now, the concept is discussed with users and the feedback will be incorporated into the final design of the concept. The goal of this user test is to find improvements for the concept and to find out which factors are already a success. Definite outcomes such as “the tutorial is engaging” and “ the tutorial is easy to understand” cannot be expected in this research. In the end, the functional and non-functional requirements will be evaluated and conclusions will be made.

7.1 Participants

In this section, the choices for the number of participants will be explained. After that, the characteristics of the participants that took part in the test are mentioned to see whether it fits in the target audience of Modsy.

7.1.1 Number of participants

The procedure explained in section *7.2 Test procedure* will be repeated 5 times. Empirical research has shown that 5 participants can be enough to find almost 80% of the usability problems of a system [59] [60]. AlRoobaea and Mayhew [60] even discuss that 3 participants can be enough for reliably finding most usability problems, which makes it the most cost-effective way. The same researchers also discuss how this will be different for each research. It must be taken into account that even the difference in participants’ personalities and other characteristics can influence results. With less than five participants, it is the case to include as many differences. Therefore it is not recommended to test with less than 5 participants. Every test setup, participant group and system to be tested is different. Due to these differences and more factors, there is no consensus on the correct sample size for every usability research [60]. For this test procedure, a number of 5 participants seems appropriate. This because the concept is already improved by in-depth feedback from the target group. With 5 participants who have somewhat different personalities, it can be assumed that reliable results will be found.

7.1.2 Characteristics of participants

It is important to see whether the participant group coincides with the target audience of Modsy and so with the target audience of this research. Testing the prototype with different people than the target audience will make results irrelevant. In section *4.3.1 People/Personas* the target

group of Modsy is described with the use of 4 different personas. The previous section (*7.1.1 Number of participants*) emphasizes the importance of the diversity of the participant group.

The 5 participants in this test were different people, with ages ranging from 19 to 40 years. They had different skill levels and were at home with different musical genres. The group consisted of advanced and professional digital musicians. The group is diverse and is a good resemblance of a part of the target audience for Modsy. Looking at the personas, there are two main differences to be seen. The first being that the participant group, unfortunately, existed out of men only, while there is also a female persona. It is known that the music industry still is male-dominated [61], so it has little influence on the relevance of the results. Still, there are some female digital musicians and it would have been interesting to see differences between genders. The second difference with the target audience is the age of the test participants. There were only two participants that were older than 30 years. Despite these differences, the group seems to be a relatively good representation of the Modsy target audience.

7.2 Test procedure

All tests are executed in the same room and by the same researcher. This room is clean and there is a chair with a table. This table mimics a simple setup of a producer or performer. It includes a laptop, two monitors (speakers) and an audio interface for connecting the monitors to the laptop. There is also a simple MIDI keyboard with which the participants can play notes during the introduction. These essential elements are present in almost every producer's or performer's studio [52]. Besides these elements, the box with the Modsy controller and all other components needed for the introduction in it stands on the table. See figure 49 for the entire setup.

Figure 49: Test setup with a laptop, keyboard, audio interface, monitors and the Modsy in a box

When a participant arrives at the test location, a brochure and consent form is handed over (see Appendix I and Appendix J respectively). When the consent form is filled in and the participant agrees with the terms an explanation is given to the user. This explanation has to be the same for every participant to maintain reliable results. For this reason, the following story is told to every participant:

- We are in the following situation: You are a customer and you just received a Modsy controller. You want to unpack it and try it out.
- If anything during this experience is unclear, don't hesitate to tell me (the researcher) this. I will write down what it was and we can talk about this after the test is completed. The comments can be about any matter you encounter.
- Please take place and start unpacking your Modsy.

The user will then start unpacking the box with as few external interruptions as possible. When the user has finished the tutorial he will be asked to fill in two self-report scales. The first scale is the User Engagement Scale, which is meant for getting an idea of the engagement of a user. The

second scale is a System Usability Scale, for getting an idea about whether the introduction is easy to use. Together the scales contain 22 items, to be filled in by the user in one go. If there were any unclarities during the test they are discussed after filling in these self-report scales. Finally, the participant is asked questions in a semi-structured interview. The following questions are asked and follow-up questions will be asked whenever it seems appropriate:

- What motivated you to continue the tutorial?
- What did you think of the paper overlays? (Fun? A waste of paper? Handy?)
- Did this experience remind you of something you have seen or experienced before?
- What would you think if this digital part would continue for twice as long, explaining other essential features (would you continue or would you want to start playing with the controller?)
- How would you improve this introduction?
- Is there anything else you would like to mention?

7.3 Results

In this section, the results from the tests are presented. First, the results of the System Usability Scale will be shown, followed by the results of the User Engagement Scale. Then the results of the semi-structured interview will be discussed in a comprehensive way. Finally, general observations during the tests are discussed.

7.3.1 User Engagement Scale

In section *3.8 User Engagement Scale* the UES is introduced. This scale gives an impression of the engagement that the user experiences while interacting with the prototype. As explained in section *7.2 Test procedure*, the participants filled in this questionnaire immediately after finishing the introduction.

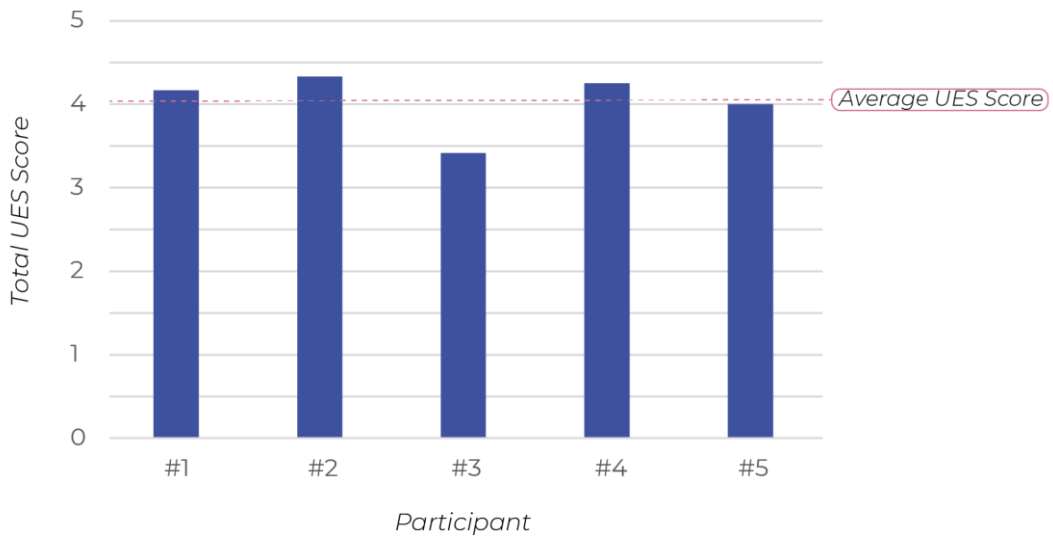


Figure 50: Graph plotting the User Engagement Scale scores per participant and the average score

The scores of the UES can be seen in figure 50, these are on a scale from 0 to 5. The average score is a 4.03. Looking at the individual differences, there is only one participant that had a remarkably lower score. This was participant #3, with a score of 3.42. The scores indicate a high user engagement for these 5 participants.

7.3.2 System Usability Scale

In section *3.9 System Usability Scale*, the SUS is introduced. This scale gives an impression of the usability of the system. As with the UES, the participants also filled in the SUS after finishing the introduction.

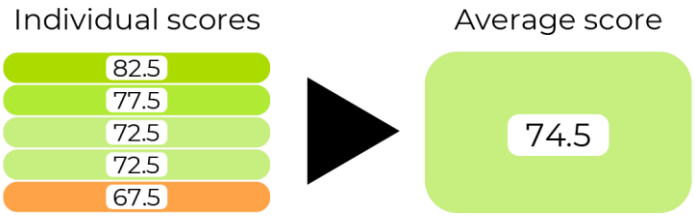


Figure 51: Representation of the System Usability Scale score for the 5 participants, leading to an average score

In figure 51 the individual SUS scores of the 5 participants can be seen and the average that follows from these scores. The score is on a scale of 0 to 100. The average score gives an indication that the usability of the prototype is good, but not excellent. In the individual scores, there is one score of 82.5 that would rate as excellent according to this scale. There is also one score of 67.5, that would rate as poor. The other 3 scores would rate as good. A score above 68 can be seen as above average, so overall the usability of the prototype seems to be good [62].

7.3.3 Semi-structured interviews

Every question that is asked during the interview will be answered in this section, based on the different responses of participants. Conflicting answers will be discussed and opinions will be compared. The complete answers of every participant can be found in Appendix H

What motivated you to continue the tutorial?

4 of the 5 participants continued the tutorial and the main motivation for continuing the tutorial was the test setup. These participants said they continued because they had the idea that they had to finish it for the research. One participant did not continue the tutorial, so the question was rephrased into “What made you skip the tutorial?”. The participant said that the Modsy controller and plugin seemed intuitive to him, therefore he said he would not need an elaborate introduction. This element of exploring things by yourself came back in 4 of the 5 answers to this question. Despite the wrong main motivation, two participants mentioned they were intrigued by the interaction. Reading something, doing something in the software and seeing something happen on the controller seemed to intrigue them.

What did you think of the paper overlays? (Fun? A waste of paper? Handy?)

2 of the 5 participants indicated they liked the idea of overlays and would otherwise not read the manual. One of these 2 participants already mentioned that the use of overlays was sometimes a bit clumsy. The other three participants also mentioned the latter, they found the use of overlays

very awkward. 2 of the 5 participants also mentioned that they would like to immediately see the product when opening the package. This experience of opening a product is exciting and they wanted to see what they just received. They did not like the idea of first going through multiple steps. Reducing it to one sheet or just making a regular manual was their advice.

Did this experience remind you of something you have seen or experienced before?

For 3 out of 5 people, this experience reminded them of sheets that are used for analogue synthesizers. These sheets can be placed on the synthesizer and a user can then mark the orientation of all knobs to store those settings. For the other 2 participants, this experience did not remind them of something.

What would you think if this digital part would continue for twice as long, explaining other essential features (would you continue or would you want to start playing with the controller?)

All answers indicate that a shorter introduction is needed. It is obvious that all participants wanted to play with the controller instead of walking through steps. Some said that a small introduction would work for them with an option to later dive into certain functionalities. 2 out of 5 participants said explicitly that they would explore all functionalities on their own and when they are stuck they would look for YouTube tutorials or a manual.

How would you improve this introduction?

Most improvements were already discussed, so this question was meant to serve as an extra chance to mention improvements. That is why most participants did not have any new improvements to mention. One participant mentioned that the use of videos in the tutorial would be nice. Another participant said that how to fasten the set screws for the rotary knob could have been more clear. He also mentioned that highlighting the sections could have been more clear. This is not something that the other participants indicated.

Is there anything else you would like to mention?

One participant said that the whole experience would be a lot nicer if the little bugs and unfinished things would be fixed. Two other participants said that the use of tooltips would be nice as it is done in Ableton. Tooltips, also known as info tips or hints is a GUI element. When the user hovers over a button, the GUI will inform the user about that functionality with the use of text.

7.3.4 General observations

Packaging and paper overlays

As seen in the interviews, some participants wanted to immediately see the controller when unpacking the box. The overlays are in the way for that purpose. Another problem that participants addressed during unpacking was that the overlays could be torn apart when unpacking the

controller. Most participants said they would normally tear apart all packaging material during the test. With part of the paper overlays sticking over the body of the controller a user may tear the overlays apart.

Taking the paper overlays off the controller

Every participant took the paper overlays off the controller at a certain point. When assembling the wooden sides, the paper overlay would be in the way and all participants took it off. After this, most participants kept the paper overlay on the table and did not put it back on the controller. Only the step that explains the different sections made a few put it back on.

Influence of the test setting

As the first question of the interview confirms, people felt unnatural with this test setup. Especially the moments when they had to make music they felt a bit pressured. This could be noticed by small comments they made about it during the test.

7.4 Evaluation of requirements

In this section, the requirements that are set in *5.4 Final requirements*, are evaluated. The functional requirements can mainly be answered by looking at the final design of the introduction. Some of the outcomes of the functional requirements can be substantiated by the results of this evaluation. The non-functional requirements are mainly answered with the use of the results from this evaluation.

7.4.1 Must have

FR1: The system must explain how to screw the wooden sides on the controller

Requirement was met

The first paper overlay, which can be seen in figure 34, explains to the user how the wooden sides have to be screwed on the controller. A problem with the paper overlay is that it is taken off the controller by almost all users when encountering this step. The overlay is in the way of the user when mounting the left side, because of the longer piece of paper on the left. It is possible to mount the side underneath this piece of paper, but it appeared to be in the way for all participants.

FR2: The system must explain how to mount the knobs on the potentiometers

Requirement was met

The second paper overlay, which can be seen in figure 35, explains how to mount the knobs on the potentiometers. The user is informed about the option of making a personal layout with the bigger and smaller knobs. After this, the user is told how the orientation of the knob matters when fastening the set screw.

FR3: The system must explain how to connect the controller to the computer via USB

Requirement was met

The third paper overlay, which can be seen in figure 36, explains that the USB-C cable has to be put into the Modsy and the computer. If this is done correctly LEDs light up on the controller, indicating that the controller is connected.

FR4: The system must explain how to start the Modsy plugin in Ableton

Requirement was met

The fifth paper overlay, which can be seen in figure 38 explains how to install the Modsy plugin, how to open it in Ableton and how to start the tutorial.

FR5: The system must explain how to map a device to the controller with the physical mapping button on the controller

Requirement was met

In step 10 from the digital introduction (see figure 48), the user is asked to go to another plugin. Here it is explained how to use the mapping button to get back.

FR6: The system must explain how to use the device selector to go through devices or tracks

Requirement was met

In step 10 from the digital introduction (see figure 48), the user is asked to go to another plugin. Here it is explained how to use the device selector before hitting the mapping button to get back.

FR7: The system must explain how to use the function buttons

Requirement was met

In step 7 from the digital introduction (see figure 48), the user is asked to use a function button to record something. At this step, the push button on the controller will light up to highlight the correct button.

FR8: The system must start physically

Requirement was met

When opening the box the user is notified of an introduction with paper overlays. This is where the system starts. The user is directed to the paper overlays and so the introductory tutorial starts physically.

FR9: The system must give the user an option to skip the introductory tutorial

Requirement was met

The paper overlays can be taken off the Modsy controller very easily. The digital part of the tutorial can also be skipped. Every step in the digital tutorial also has a button that gives the option to leave the tutorial.

NFR1: The system must keep the user engaged from the start

Requirement was partially met

4 of the 5 participants started with the introductory tutorial and seemed engaged from the start. One of the participants immediately skipped all overlays and just connected the sides and USB. Although the test was performed with a small participant group, the results show that all users would stop early with the introductory tutorial. It is interesting to note that the UES scores were relatively high. It could indicate that the tutorial was engaging, but that playing with the Modsy controller independently was more engaging.

NFR2: The system must feel like making music instead of a walk-through of functions

Requirement was partially met

All participants made music during the introductory tutorial. The problem was that most participants kept making music and most of them only continued because they were in this research setting. During the interview, it became clear that many participants would have left the tutorial after a few steps because they wanted to keep playing with Modsy. This suggests the need for a different system that chops the introduction into sections and offers the option to continue at a later stage. Ideas for such a concept will be further specified in section *7.6 Improved concept based on evaluation*.

NFR3: The system must embody the analogue feel that Modsy stands for

Requirement was partially met

The start of the tutorial seems to embody this analogue feel, as it starts with paper overlays. This makes the user focus on the hardware instead of the digital environment. The digital part of the tutorial is less successful in embodying this analogue feel, as it takes place on the computer screen. Different ways for explaining things on the controller with for instance the screens could be considered. Eventually, a part of the tutorial must be digital, as the Modsy software must be explained.

7.4.2 Should have

FR10: The system should contain playful elements

Requirement was met

The system contains multiple playful elements throughout the steps. For instance, the opening of the box, as seen in figure 30, shows the text “open the fun”, with a cutting line with the colourful hexagons. Another example can be found in paper overlay 3, seen in figure 36. This overlay explains

that external power is only needed for special cases. The user is shown where the USB and external power ports are. An arrow points to this exact place on the controller with the text “In case you were lost, here is your USB port” and “In case you are special, here is the port for external power”. Overall, the introductory tutorial contains messages with informal language and a friendly tone. The round shapes and Modsy colour palette can also be seen as playful elements.

FR11: The system should persuade the user to finish the introductory tutorial

Requirement was not met

Although it was tried to persuade the user to continue the tutorial, it did not seem to work. As mentioned, all participants but one have finished the introductory tutorial. The problem was that 3 of the 5 felt pressured to continue because of the test-setup. That means that only one person would finish the introductory tutorial. The steps were simple and short, but it mainly went wrong when the participant was urged to play around with the controller. As discussed in NFR 2, the participant would keep playing with the controller. A similar solution as proposed in NFR 2 would seem appropriate for fixing this problem.

FR12: The system should offer an option to start the tutorial in the GUI for users that skipped the physical start

The first digital screen welcomes the user to the digital introduction. This screen will be shown when the user opens the plugin for the first time. The message also says that it does not matter if the user has skipped the paper part and that he or she can still “hop on”.

7.5 Discussion of results

The goal of this evaluation was to find usability problems and to see which factors make an engaging and easy to understand introductory tutorial for Modsy. Although most requirements are met, the current design for an engaging and easy to understand introductory tutorial seems not ideal. By solving a few usability problems, the current concept could work for some people. As it will not work for all people, a redesign will be proposed based on the evaluation. This improved concept can be read in the next section, *7.6 Improved concept based on evaluation*. Despite the introduction of an improved concept, the results of the evaluation of the old concept gave some matter for discussion.

The old concept seemed to be not engaging enough for users to continue, which is interesting as it scored relatively high on the UES. The usability was also not the problem for the users as the SUS scores were high. This despite the participants mentioned quite some usability problems with the introduction. One possibility is that participants thought that the questions were about Modsy as a whole. All questions in both questionnaires clearly stated that it was about the introduction, but maybe this could have been more clear. It could also be that the introduction is engaging and has few usability problems but that Modsy is simply more engaging to use than the introduction. The ease of usability of Modsy could also be quite high. 2 out of 5 participants mentioned that they think most functionalities do not need any introduction. This could also contribute to the participants thinking that they do not need an introduction. It would have been interesting to see how many functionalities the users would understand with and without the current introduction. The excitement of the participants to discover what Modsy can do was visible. The introduction gave the users space to play around with the controller, but that seemed to be not enough. Participants would keep playing with the controller at these moments. The test setup made most participants continue eventually, while they said they would not continue at home.

The test setup also influenced how the participants interacted with the tutorial. For instance when the tutorial asks the user to play a few notes so they can be manipulated by Modsy. Most participants felt a little pressured to play something nice because of the presence of the researcher. This presence of the researcher also led to participants asking questions about the functionalities of the controller, while they should just continue the tutorial and find it out themselves. The researcher did not answer these questions, but it could still distract a participant.

The problem with the current concept was that participants, and probably also the larger part of the target audience, wanted to just play with Modsy. The designer is here faced with a trade-off between the engagement of the user and the number of functionalities explained. On the one

hand, an introductory tutorial could explain all functionalities in one go, so users will definitely see the entire value of Modsy. The downside of this first option is that it is unsure whether users will finish the entire tutorial. On the other hand, the designer could explain only bare essential information, so users will stay engaged and can play with Modsy after that. The downside with this second option is that a designer cannot be sure that a user will understand all functionalities and see the total value of Modsy. With the results of this evaluation, it seems to be almost a certainty that a long tutorial explaining everything will be skipped. For this reason, the second option seems preferable, which only explains essential information and lets the user discover Modsy on his own.

The participant group was diverse but existed out of only 5 participants. Despite the small participant group, it seems that personal differences could cause different results. Some people seem to like a more guided approach when being introduced to a new product. These people like to know everything before they use the product. This while other people like a more autonomous approach where they can discover things on their own while using it. These two descriptions must be seen as a depiction of two extremes. This insight about personal preference notes the importance of a system that gives the option to continue at a later stage.

7.6 Improved concept based on evaluation

The old concept mainly failed at giving the user the option to explore Modsy on his own. The main mistake here was that it was not considered which functionalities might already be intuitive for a user without any introduction. The new concept is built on the assumption that Modsy is easy and intuitive in use. It will be good to research which functionalities are intuitive for a user and which are not. Assuming someone understands the basic functionalities, the user will be able to play with Modsy and see the largest part of the value. Only for more advanced features, an explanation might be needed. For some people, also basic functionalities might need explanation and so this will also be possible.

When opening the box the user will encounter a simple manual that explains how to assemble the controller and how to get started in the software (see figure 52). This basically replaces the overlays. When a user is stuck with setting up the controller or just wants to follow all steps that are needed, he or she can consult the manual.

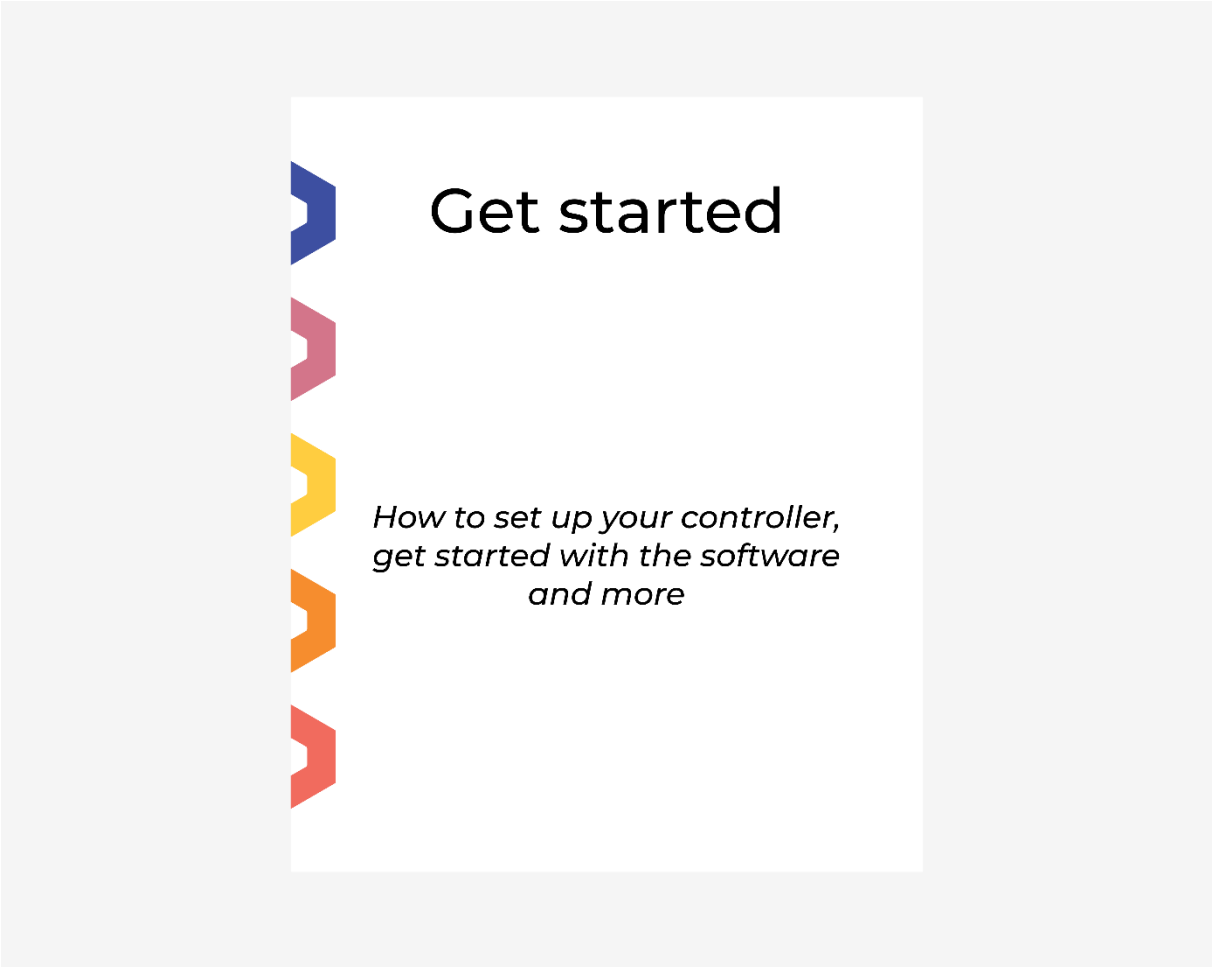


Figure 52: Design for the manual that will be included in the improved concept

When the user opens the Modsy plugin for the first time a small window will pop up, which explains to users where they can find tutorials and explanations (see figure 53). This way users can choose to discover everything that Modsy has to offer in a guided way or all by themselves. The menu behind this lightbulb will show the users different tutorials, ordered from basic to advanced. The first tutorial will for instance be about the different sections of knobs on the controller, while the last tutorial will explain how to make multiple mapping pages. The latter is an example of something that is not needed for basic usage of Modsy. Users can see in this menu whether they already finished a tutorial. The tutorials that are not completed will be highlighted, so users can see what they could still discover.

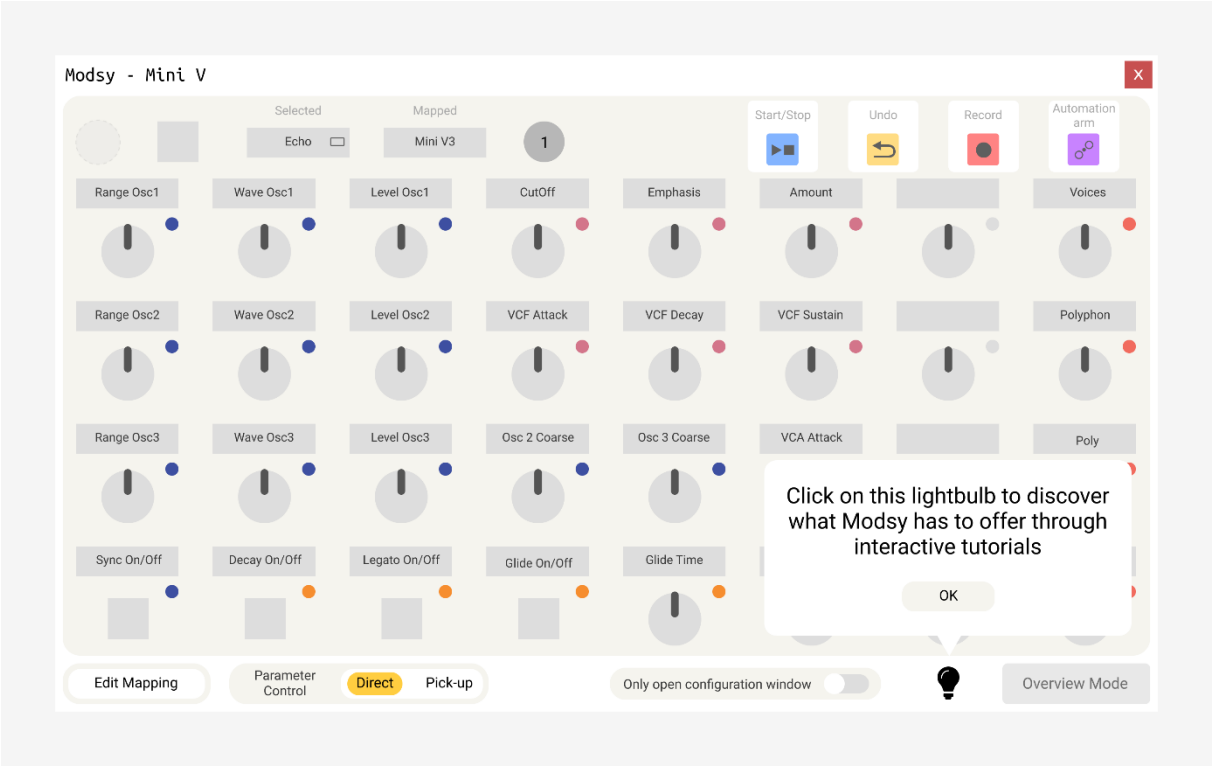


Figure 53: Design for the improved concept where a pop up shows users where the tutorials can be found

Another concept that is used for explaining functionalities in a non-intrusive manner is called tooltips. As shortly introduced before, it is a common GUI element that consists out of a window with text. This window with text, the tooltip, will appear when a user hovers over a button for a few seconds. The tooltip for a specific function will also give the user the option to go immediately to a tutorial that explains that functionality. See figure 54 for an example of how this would look.

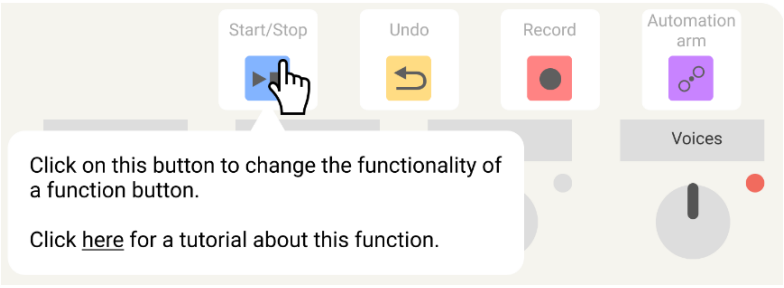


Figure 54: Example of a tooltip for the improved concept

7.7 Improved requirements

With an improvement of the old concept, lessons are learned and so the requirements for a solution are very different. The following list of requirements is composed based on the new concept and the evaluation of the old concept. All the functionalities that the system should explain to a user are not included separately in this requirement list. In FR1 “all functionalities” are mentioned instead. As the user can now choose to follow a tutorial about a certain functionality, all functionalities should be included.

- Must have
    - FR1: The system must explain all functionalities of Modsy in separate tutorials
    - FR2: The system must prioritize and display the separate tutorials from essential to less-essential (basic to advanced)
    - FR3: The system must give the option for self-paced learning (user has the freedom to skip parts and to start with a tutorial at a later stage)
    - FR4: The system must have a physical part for getting started with the controller and software
    - FR5: The system must include tooltips
    - FR6: The system must make the user aware of where they can find more to learn about Modsy
    - NFR1: The system must give users the option to explore Modsy on their own
    - NFR2: The system must embody the analogue feel that Modsy stands for
    - NFR3: The system must learn users enough about Modsy so they can use it independently
- Should have
    - NFR4: The system should contain playful elements
    - NFR5:The system should persuade the user to finish all tutorials
- Could have
    - No “could have” requirements
- Won’t have
    - No “won’t have” requirements

Chapter 8 – Conclusion and future work

In this final chapter, an overview is given of this project. In this overview the goals of this project are discussed and whether these are achieved. Next, the sub research questions are answered, which will lead to the main research questions being answered. This section and therefore this research is concluded with a section discussing future work that follows from this project.

8.1 Conclusion

When starting this project, the goal was to design, prototype and test a first experience with Modsy that is engaging and gives the user adequate knowledge about Modsy. This goal was partially achieved. A first experience with Modsy was designed, prototyped and tested. An introduction that started when opening the box was created. Paper overlays on the controller guide the user on how to set up the controller. When the setting up is done, the user is directed to the digital part of the introduction. Here the Modsy software is explained and where possible the physical controller is used for interactions. The LEDs on the controller will for instance light up when the user presses a digital button to check the connection between the controller and software.

Although the scores of the User Engagement Scale suggest a high engagement (see section *7.3.1 User Engagement Scale*), users did not seem very engaged. Note that all results are based on 5 user tests, which means no statistically significant statements can be made about engagement or usability. In the interviews after the user test, it became clear that users were motivated to continue the tutorial because of the test setup. The introduction was easy to understand for users, which is also backed by the results of the System Usability Scale that was used. This positive result must be interpreted in the context of Modsy. Participants indicated that the controller and GUI were easy to use and understand. For this reason, it might have been more relevant to make a tutorial for advanced functions. It could not be expected that the product of this research would instantly be a perfect solution. Rather than a perfect solution, ideas for improvements of the product and also for improvements of the research method are found. More about this can be read in the following section *8.2 Future work*.

The first sub research question stated, "*How to design an introduction that learns the user adequate knowledge of the controller, to be able to use it independently?*". After the user tests, it seemed that most participants were capable of using the controller independently after completing the introductory tutorial. Modsy has several functionalities which needed explanation. A distinction was made between three sorts of explanation: installing, essential functionalities and less-essential functionalities. All sorts of explanations except for less-essential functionalities were seen as

adequate knowledge. Modsy seems intuitive in use, which is why some participants said they thought they could use the controller independently without any introduction. Hidden features should still be explained, but the basic functionalities might already be clear for some users. The user tests suggest that the answer for this sub-question would be that you do not have to design an introduction that learns the user adequate knowledge to be able to use Modsy independently. This because most users will not spend a significant amount of money on music gear that they do not know. Music producers and performers will do their research before buying a Modsy. They will know the basic functionalities through reviews and other videos. Still, there might be users that not do this. Therefore, it is important to research how intuitive Modsy is, to find out which functionalities still need explanation. With the improved concept, explained in section *7.6 Improved concept based on evaluation*, the user will be able to decide which functionalities need explanation.

The second sub research question stated, "*Which factors will make an introduction for Modsy engaging?*". In the literature, it was found that the right difficulty is very important for the user's engagement. This importance of the right difficulty is demonstrated by the introduction that is designed and prototyped. It could be said that the content of this introductory tutorial was too easy for most users. As mentioned above, someone who buys a Modsy is already familiar with the controller, which means they understand a lot already. The participants in the test were not familiar with the controller, but most of them still felt like they did not need an introduction. The interaction between the software and the controller seemed interesting to all users and received positive feedback. Pressing a button in the software and seeing something being triggered on the controller was also interesting for most participants in the user tests.

With the improved concept, the factor that makes the introduction engaging is Modsy itself. The controller seems to engage people, as test participants kept playing with it. The idea is that users can discover Modsy by themselves and that there is guidance when needed. This guidance can be found in the form of a tutorial that is about a specific topic, so users can choose to learn about what they think they should learn. With the use of tooltips, the user can keep making music. A small explanation is given when hovering over a knob. This way a user can stay engaged in the music-making, while still receiving valuable information. Via this window, the user can also go to a relevant tutorial with one click.

With the sub research questions answered, the main research question can be answered. The first main research question stated: "*How to design an introductory tutorial for the Modsy controller that is engaging and gives adequate knowledge about Modsy?*". To answer this research question, the design process can be summarized. First, it was important to find literature about

engagement and learning the use of products. With a theoretical underpinning and inspiration from the state of the art, an ideation phase was started. This phase was to diverge the thoughts with methods such as a brainstorm. The result of this ideation phase was a preliminary concept. This concept was further specified and in-depth feedback of the target audience was gathered on this concept. The concept was improved with this feedback and a final design was made.

The second main research question stated, “How to make a prototype of an introductory tutorial that complies with the main research question”. This follows from the answer given above. The concept that was specified and reviewed by producers is worked out. The paper part of the tutorial is printed on sheets of paper and after that cut out by hand. The digital part of the tutorial is made inside of the Modsy plugin with C++ and the iPlug framework. When this was finished it needed to be tested.

The second main research question has one sub research question which stated “*How to test whether the designed solution provides the desired experience?*”. The desired experience entails an engaging tutorial that gives the user adequate knowledge. In a test setup, users could unpack a Modsy and set it up and learn about its functionalities. The engagement of users was measured by using the UES. The results of this scale are not statistically significant, as only 5 participants took part in the test. The UES helped to get an indication of the level of engagement of a participant. By using semi-structured interviews it was tried to discover what it was that kept the user engaged. For measuring the usability of the system a SUS was used. This gave an indication of whether the introduction was easy to understand. After analysing the results of the UES, SUS, semi-structured interviews and general observations it could be discussed whether the desired experience was achieved.

The outcome of this research suggests that it should be researched how intuitive Modsy is in use. The improved concept in section *7.6 Improved concept based on evaluation*, is the blueprint for the design of this engaging tutorial that gives adequate knowledge about Modsy. This concept has to be proven through further research. More on this in the next section (*8.2 Future work*).

8.2 Future work

In this final section, the recommendations and other future work that follow from this research are discussed. An improved concept for the introductory tutorial is already discussed in the evaluation (*7.6 Improved concept based on evaluation*). Therefore, only recommendations and future work for the improved concept are discussed here and not for the old concept.

8.2.1 Testing the improved concept

The improved concept is only a concept. It should be realised as a prototype and after that, it should be tested extensively. For these tests, there are some lessons to be learned from this research. Firstly, it is suggested to increase the number of test participants for more reliable results. It seemed that personality could have a large influence on what kind of product tutorial someone prefers. With a large and diverse participant group, the influence of this factor could be minimized. It would also be interesting to include women in the test. Although women are underrepresented in the music industry [61], there are still a lot of women. It would be interesting to include female subjects, as differences between male and female subjects can be compared. Secondly, it could be of interest to measure the engagement during a tutorial with more than a self-report scale. Methods as eye-tracking and electrodermal activity could be used to measure engagement [63]. For this research, it was not possible to use such a method because of the timeframe. Thirdly, it would be interesting to test the improved concept over a longer period of time. Long-term tests would be ideal for the improved concept, as this concept assumes that musicians will make use of it when they think they need it. It can be tested whether users will make use of the tutorials and whether they like this way of learning. The Modsy plugin could for instance record how many times and for how long someone made use of a tutorial. This way the results can be easily extracted after the long-term test, without burdening the participant with any bookkeeping. Fourth and lastly, it could be interesting to test which functionalities of Modsy are intuitive for a large part of the target audience. When for instance a certain functionality is tested to be very intuitive, that data can help the designer decide to spend less time on that functionality in the tutorial. This may improve the flow of the tutorials.

8.2.2 Unpacking experience and the manual

When continuing with the improved concept, it will be good to look at the details for the packaging and the manual. Wever and Del Castillo [64] explain how the unpacking experience for consumer electronic products has to generate a “feel good” sensation. According to them, this is not only important for the product, but also for the brand. They have researched what consumers liked and disliked about unpacking CE products. This could be used for designing the unpacking experience for the next concept. In the short time period and with the small budget it was not possible to design

and realise this in this research. For the manual, types of paper and types of bindings could be examined. The costs for packaging and printing should also be taken into account. In this research, it was about discovering new possibilities and not about finding a low-cost solution. To make it more likely that Weirdly Wired will adopt a final design, the cost must be taken into account.

8.2.3 Other remarks

More literary research could be done into how to design for an *engaging* and *easy to understand* tutorial. Due to time restrictions this research only touched the surface of these topics in section *2.1 Theoretical underpinning*. Both topics could separately form a whole research, so there is clearly more to discover there.

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Appendices

Appendix A: Questionnaire items of the User Engagement Scale Short From

FA = Focused attention

PU = Perceived usability

AE = Aesthetic appeal

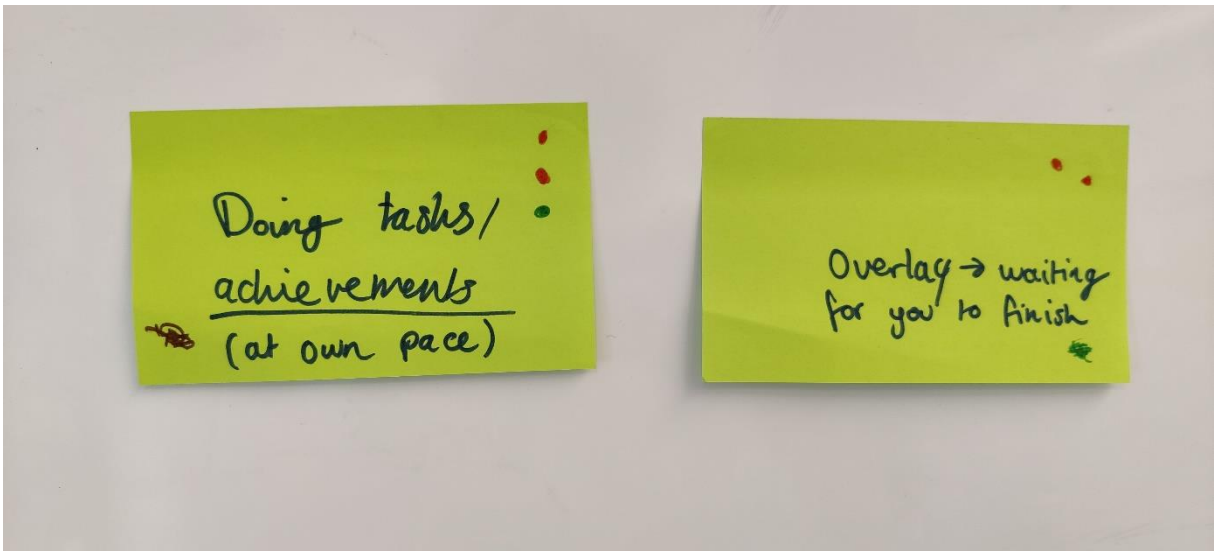
RW = Reward factor

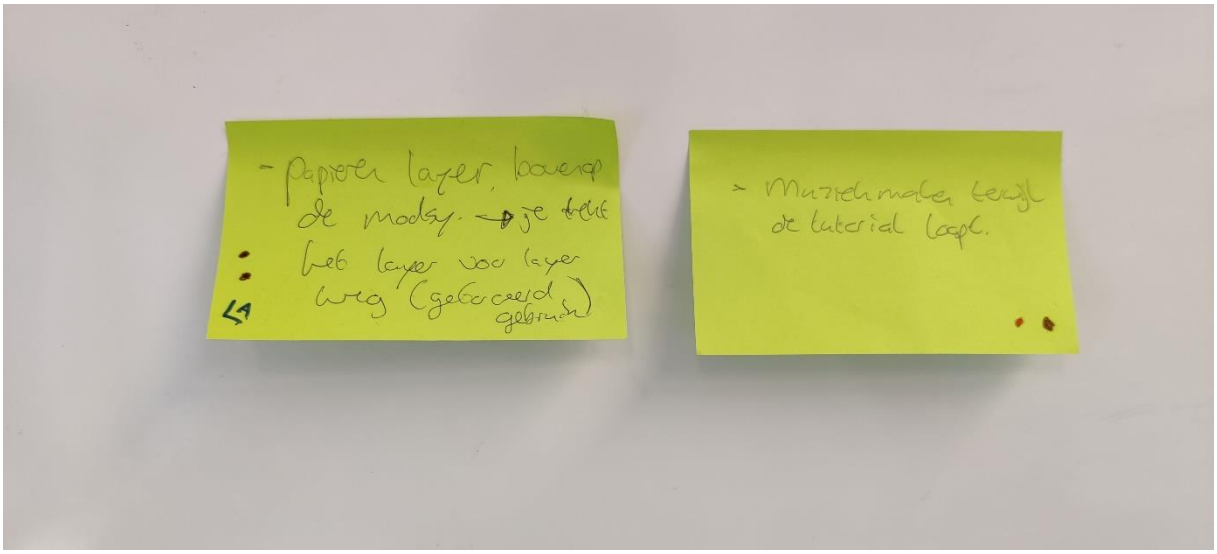
FA-S.1	I lost myself in this experience.
FA-S.2	The time I spent using *the introduction* just slipped away.
FA-S.3	I was absorbed in this experience.
PU-S.1	I felt frustrated while using this *introduction*.
PU-S.2	I found this *introduction* confusing to use.
PU-S.3	Using this *introduction* was taxing.
AE-S.1	This *introduction* was attractive.
AE-S.2	This *introduction* was aesthetically appealing.
AE-S.3	This *introduction* appealed to my senses.
RW-S.1	Using *the introduction* was worthwhile.
RW-S.2	My experience was rewarding.
RW-S.3	I felt interested in this experience.

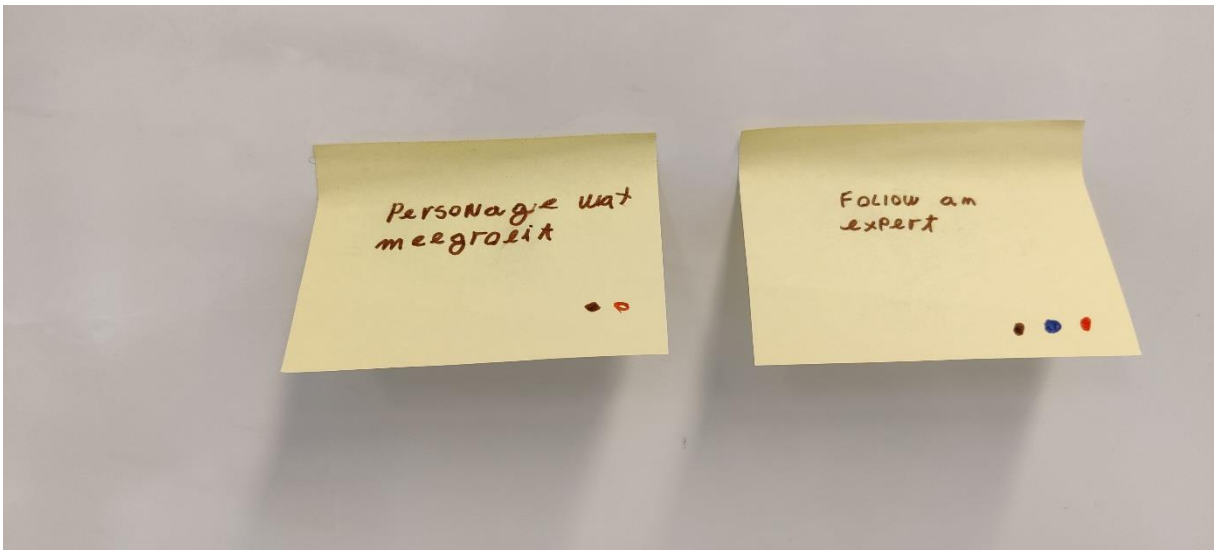
Appendix B: Questionnaire items of the System Usability Scale

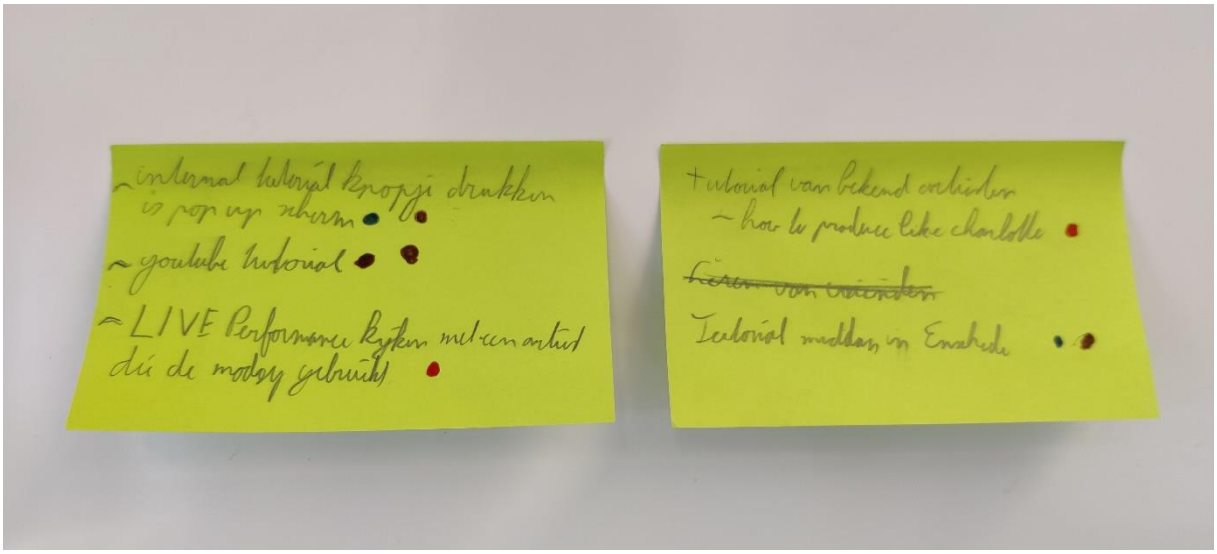
1. I think that I would like to use this introduction frequently (in the case I would forget how certain things work)
2. I found the introduction unnecessarily complex
3. I thought the introduction was easy to use
4. I think that I would need the support of a technical person to be able to use this introduction
5. I found the various functions in this introduction were well integrated
6. I thought there was too much inconsistency in the introduction
7. I would imagine that most people would learn to use this introduction very quickly
8. I found the introduction very cumbersome to use
9. I felt very confident using the introduction
10. I needed to learn a lot of things before I could get going with this introduction

Appendix C: Two best ideas from each participant of the brainstorm





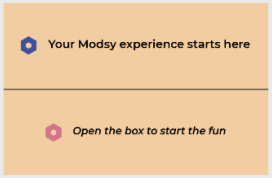

Personage wat meegroeit
Follow an expert


~ internal tutorial knopjes drukken is pop up scherm
~ youtube tutorial
~ LIVE Performance kijken met een artist die de motion gebruikt
+ tutorial van bekend artiesten
~ hoe te produceren like charlotte
Tutorial making in Enschede

Appendix D: Storyboard that is sent to producers for in-depth feedback

1

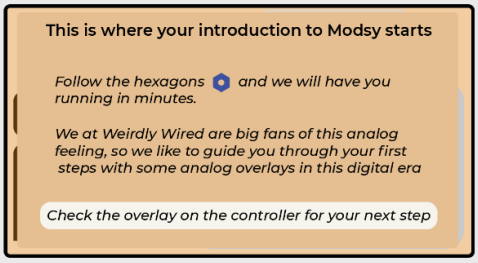
User receives Modsy in a box.



2

User gets informed about the introduction

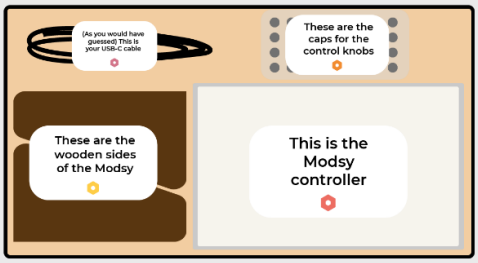
Piece of cardboard can be seen when user opens box



3

User removes piece of cardboard.

Stickers with text will show the name of the part

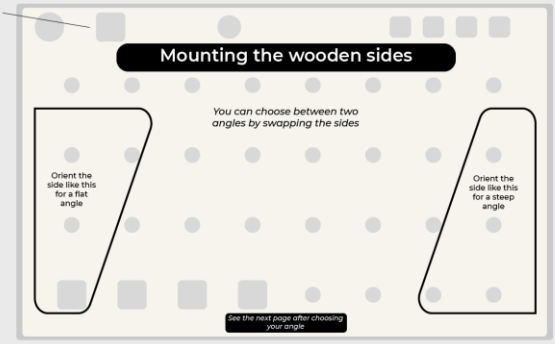


4

User sees controller with overlay

Overlay explains the two options of orientation of the wooden sides

The push buttons and potentiometer shafts will stick out of the body

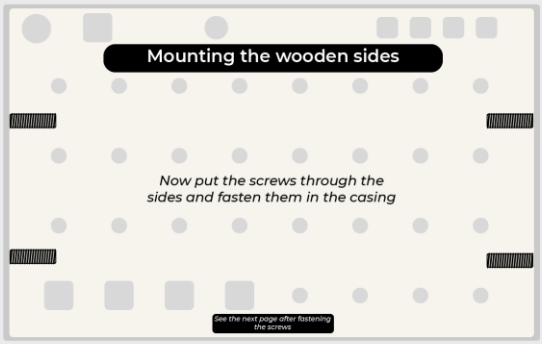


COMMENT:
Change this text left and right into an vector image of the whole Modsy in that orientation

5

User removes first layer and sees next layer

Overlay tells user to put the sides on the controller



6

User again removes the previous layer

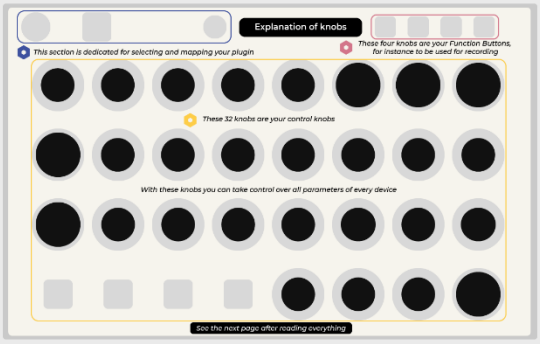
Overlay tells user to put the rotary knobs on the controller

Overlay needs bigger holes from this step because of the potentiometer caps that will be put on

7

User again removes the previous layer

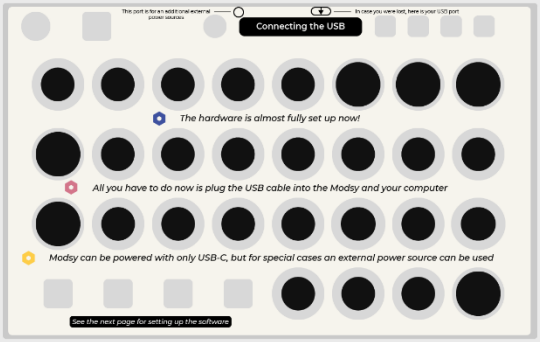
Overlay explains the sections of buttons for the user



8

User again removes the previous layer

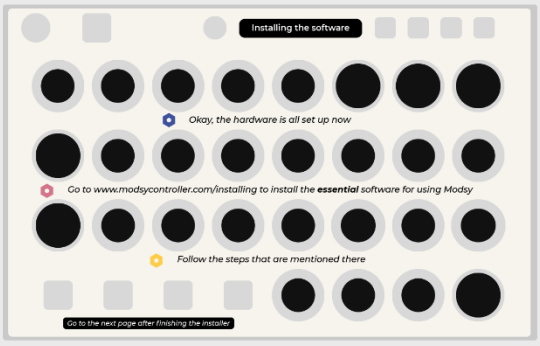
Overlay tells user to connect the USB cable



9

User again removes the previous layer

Overlay tells user to install the Modsy software

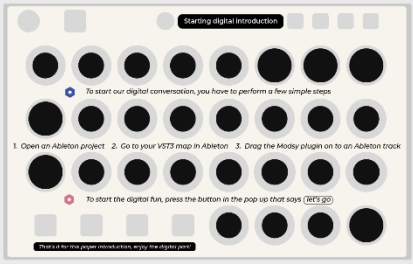


The installer will guide the user through installing the Modsy Plugin and will eventually redirect the user to this physical introduction

From this point the introduction will be both digital and physical. The light gray rectangle on the left represents the physical part a user sees on his Modsy controller. The darker gray rectangle on the right represents the digital part that a user can see on his computer screen.

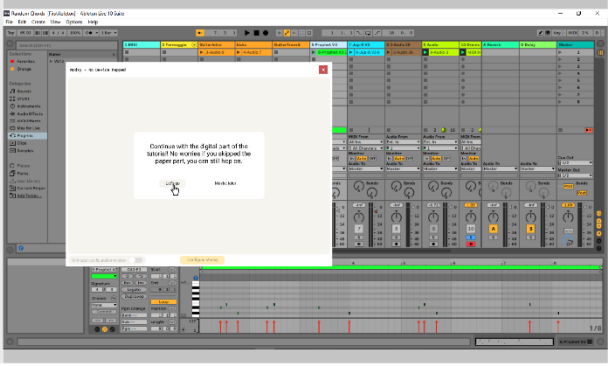
User again removes the previous layer

Overlay tells user how to start the digital part of the introduction



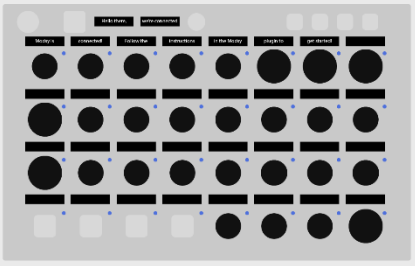
10

Window pops up when user first opens the Modsy plugin

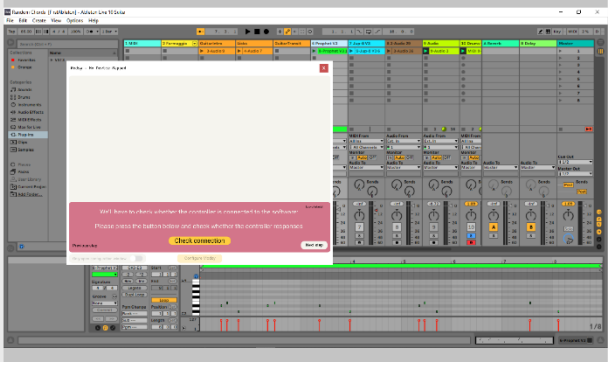


User removes paper booklet

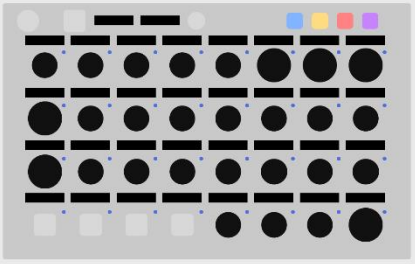
LEDs start blinking when user presses button in plugin



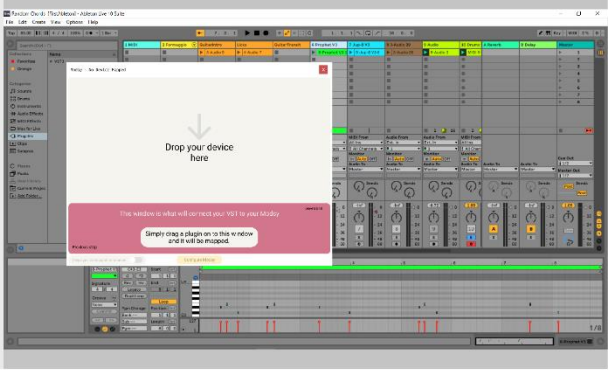
11



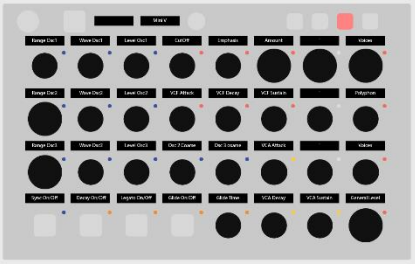
After clicking on "Next step" the screens are empty again and LEDs stop blinking



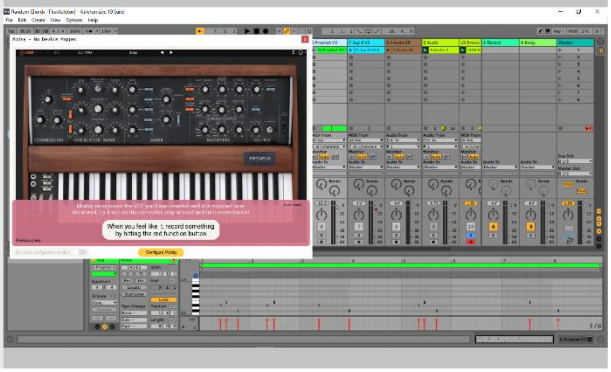
12



Mapping will be loaded, function button for recording lights up

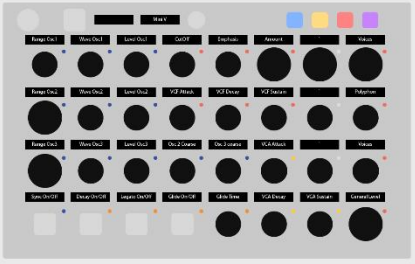


13

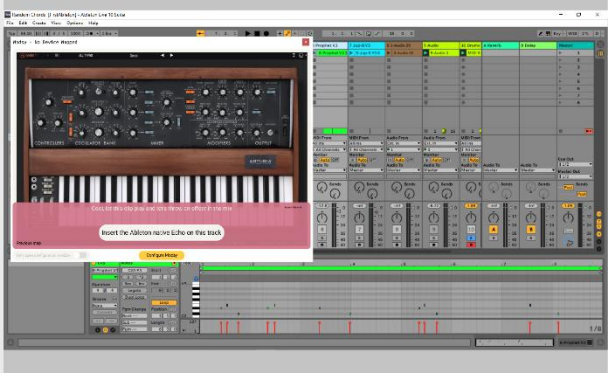


Function button for recording gets pressed

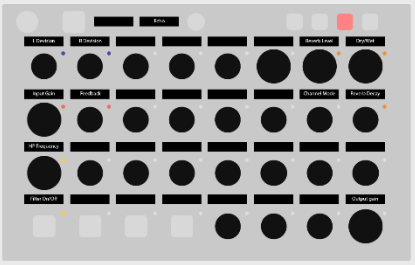
Controller stays the same



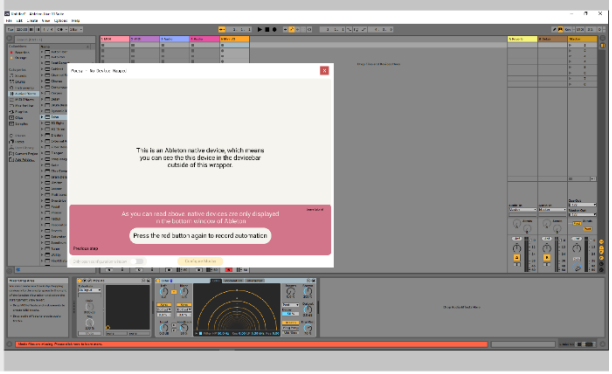
14



User inserts an echo in the track and Modsy maps to this device

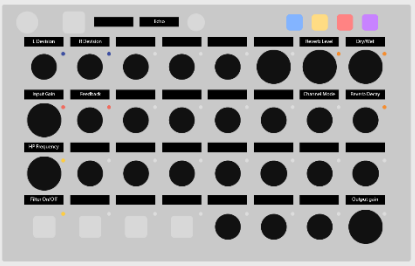


15

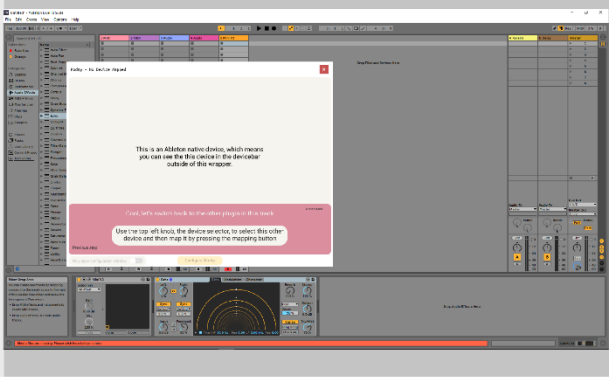


Function button for recording gets pressed

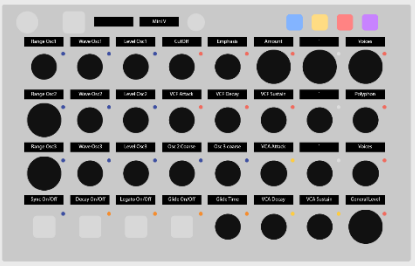
Controller stays the same



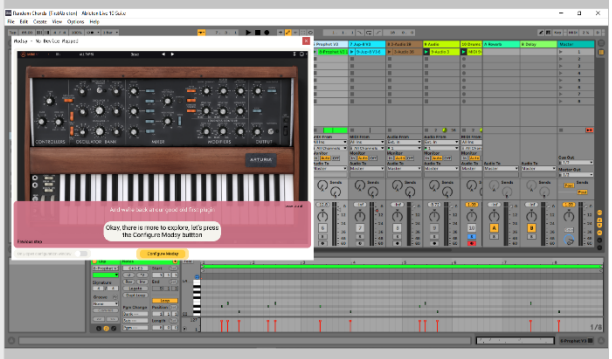
16



Controller maps again to previous plugin

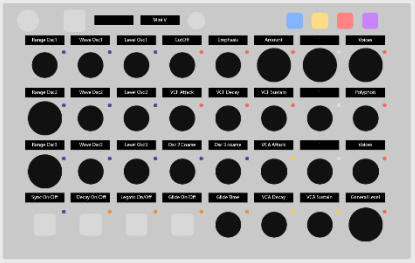


17



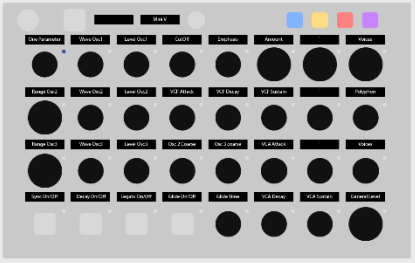
“Configure Modsy” button in GUI gets pressed

Controller stays unchanged

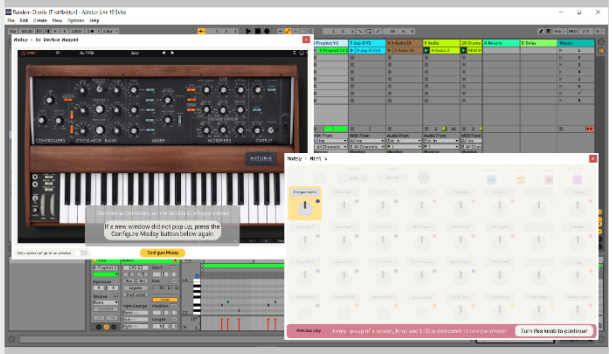


18 *User gets introduced to configuration window*

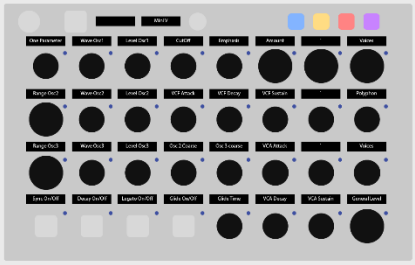
One LED blinks simultanously with LED in the GUI



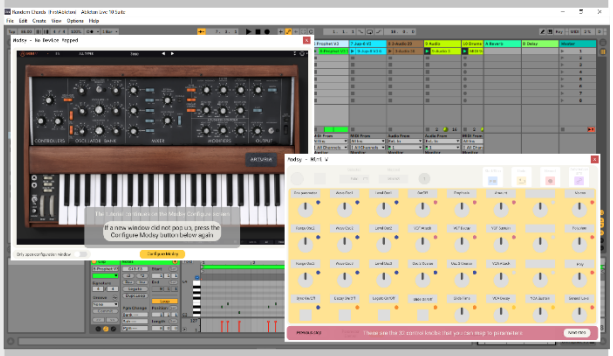
19



All LEDs BLINK simultanously with LEDs on controller



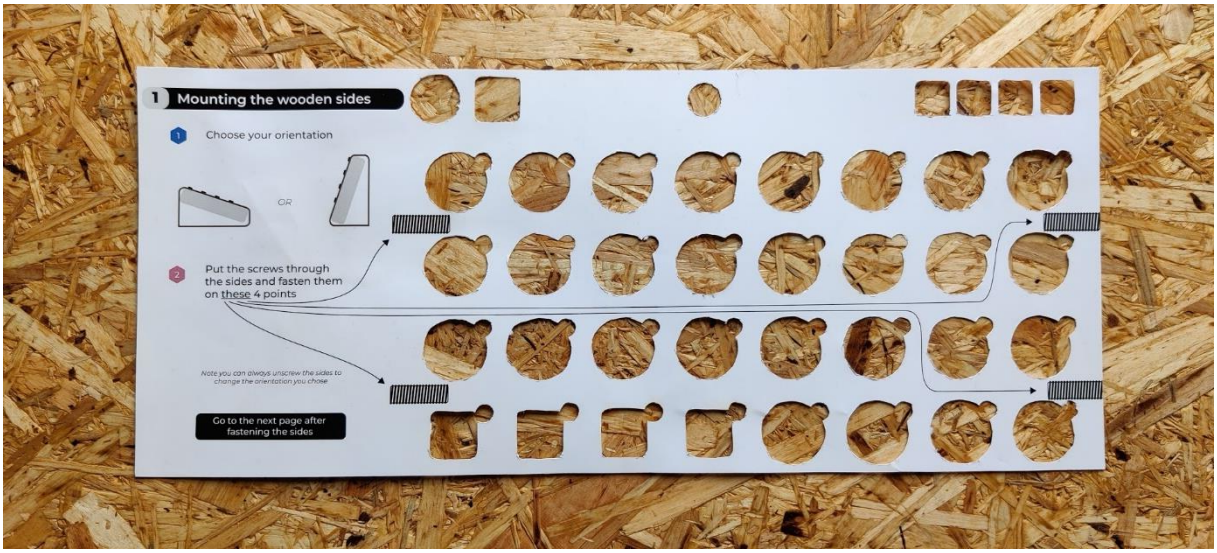
20

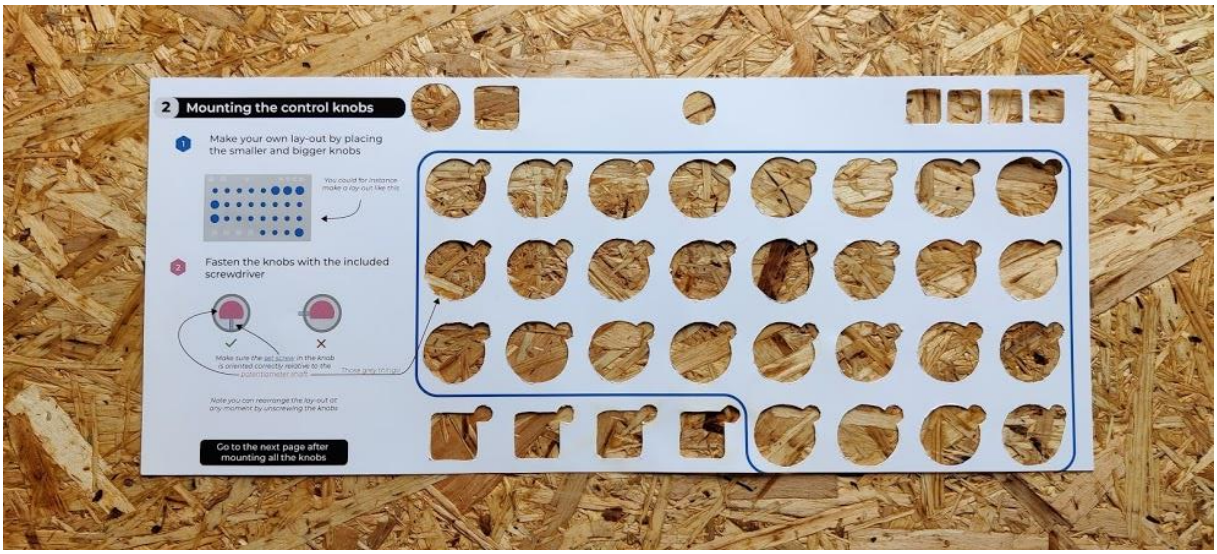


21

Et cetera

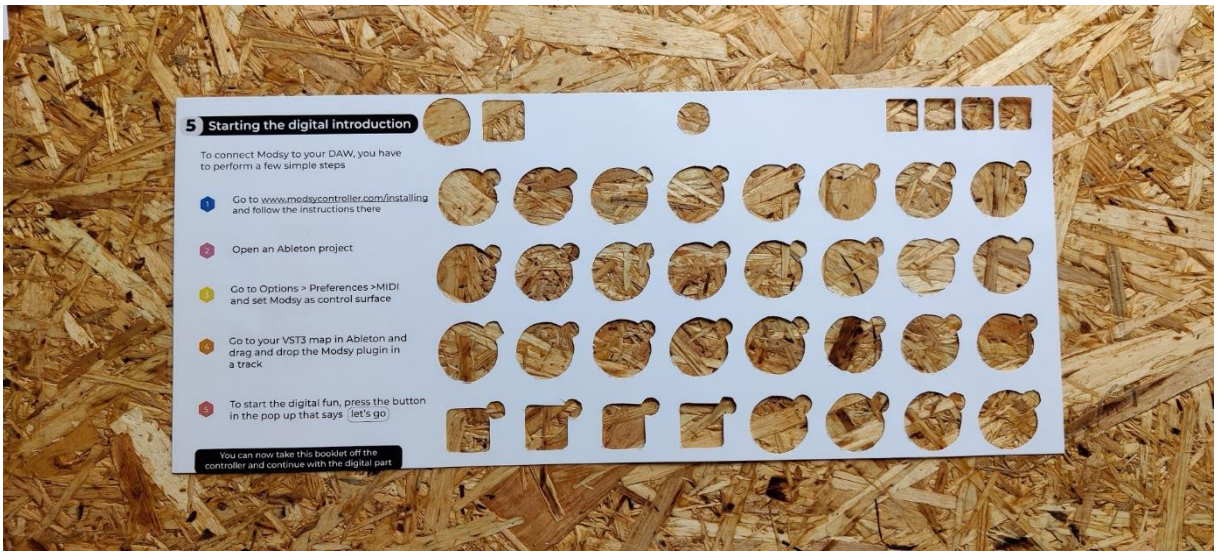
Appendix E: Implementation of the final design of the 5 paper overlays for setting up the Modsy controller






3 Connect the USB
Plug the USB-C cable into your Modsy and your computer
Check if Modsy is connected, you should see the LEDs light up
Modsy can be powerd with just a USB cable. For special cases (or just for fun), an external power source can be used.
Go to the next page after connecting the USB


4 Understanding different sections
The knobs on Modsy can be subdivided into three sections:
The blue section is for selecting and mapping your plugin
The pink section highlights the function buttons, which can be assigned to several functions such as start/pause, undo, etc..
The yellow section highlights the 32 control knobs, with these you can take control over all parameters of every device
All functionalities will be explained in the digital introduction, no worries
Go to the next page after understanding the sections
Device Selector
Mapping Button
Page Button


5 Starting the digital introduction
To connect Modsy to your DAW, you have to perform a few simple steps
1 Go to www.modsycontroller.com/installing and follow the instructions there
2 Open an Ableton project
3 Go to Options > Preferences >MIDI and set Modsy as control surface
4 Go to your VST3 map in Ableton and drag and drop the Modsy plugin in a track
5 To start the digital fun, press the button in the pop up that says let's go
You can now take this booklet off the controller and continue with the digital part

Appendix F: Code (C++ with iPlug framework) for the implementation of the digital part of the introductory tutorial

Due to the length of the code and the lines, it was not possible to properly fit the code into the appendix. For these reasons, the code is uploaded to Github. Everyone can visit the code with the link below.

Link to the code:

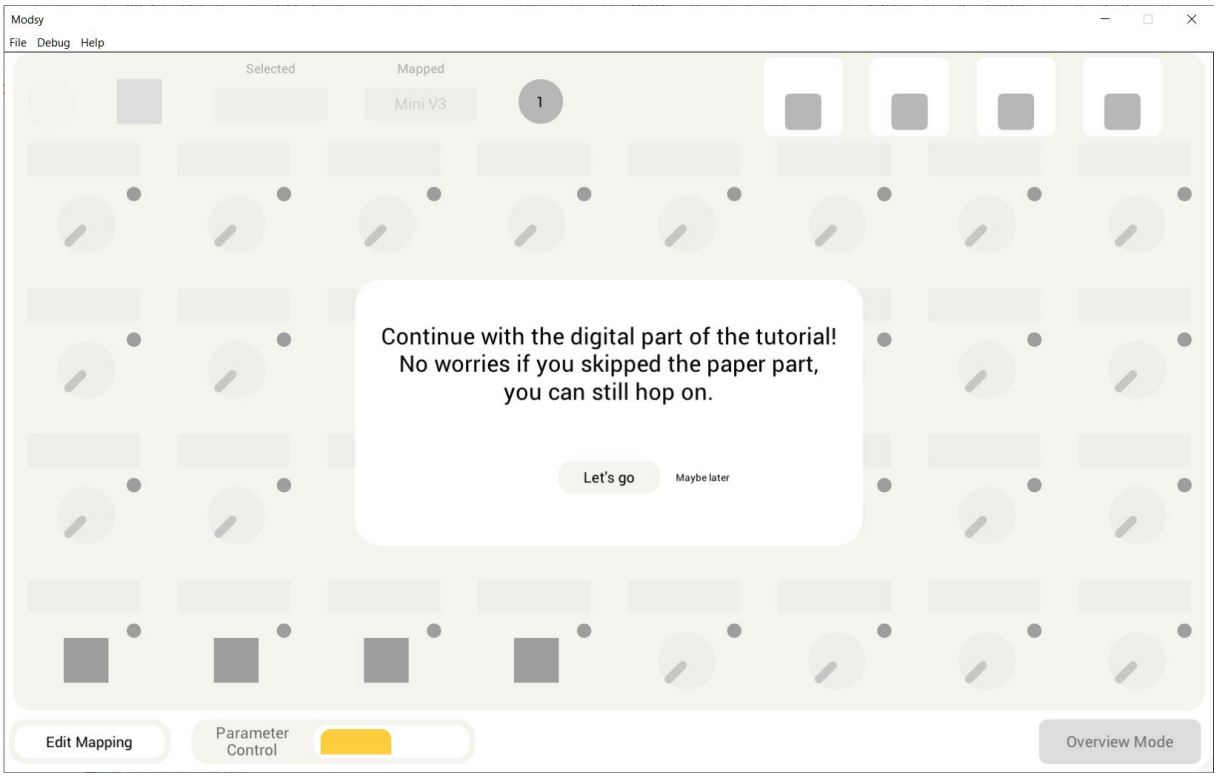
https://gist.github.com/RobbertJ/6e549fdd74755e38e90caa6e2e9c8967

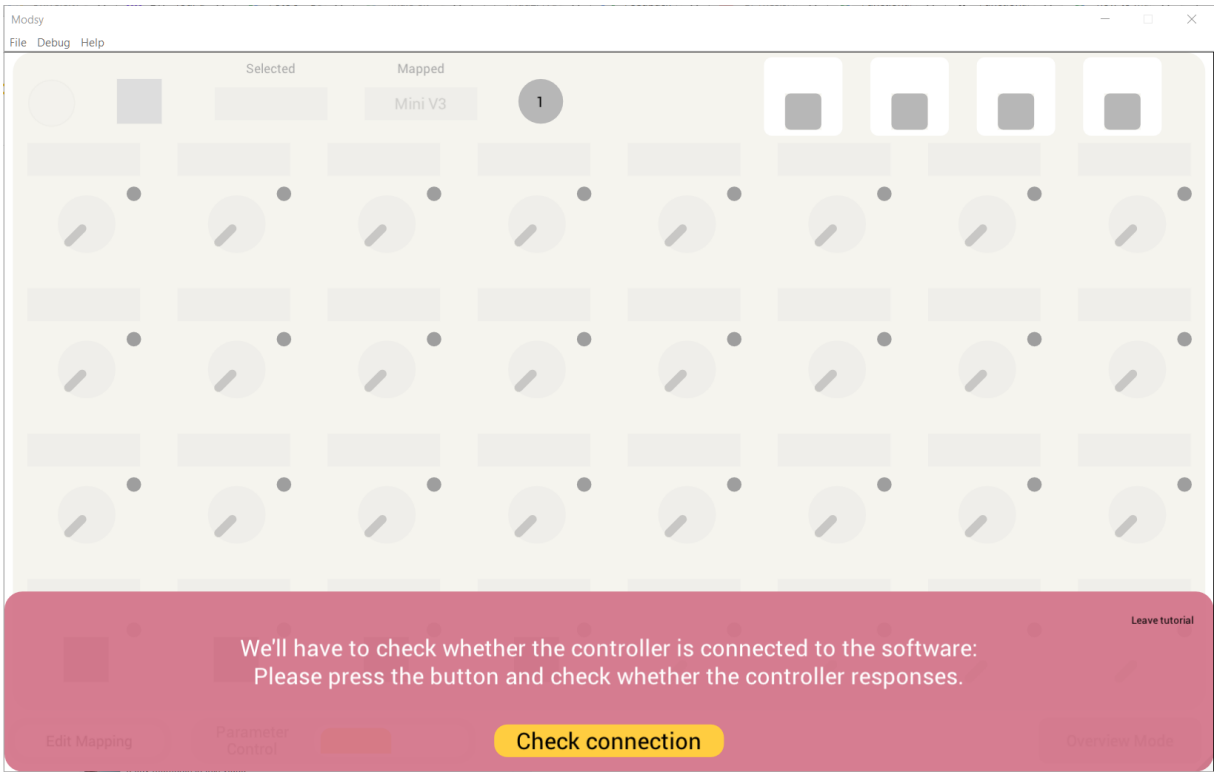
Appendix G: Code on Modsy controller (Arduino) for receiving OSC calls and triggering LEDs

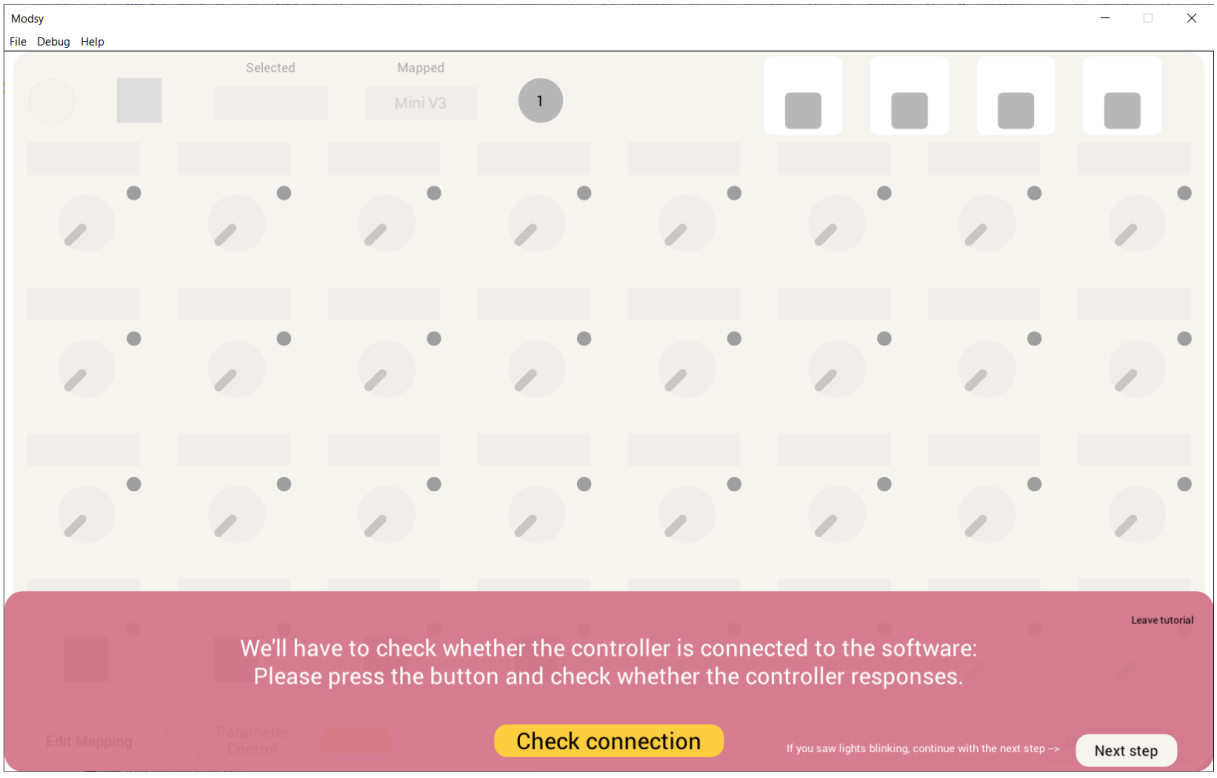
```
void OnMidiSysEx(byte* data, unsigned length) {
  char incoming_chardata[length];
  String total_message;
  boolean display_message = true;
  boolean intro_message = false;
  char char_par_num[2] = {'0', '0'};
  String parameter_number_str;

  for (uint16_t i = 0; i < length; i++) {

    if (data[i] == 240) {
      //Start message
      incoming_chardata[i] = ' ';
    } else if (data[i] == 247) {
      incoming_chardata[i] = '\0';
    } else {
      incoming_chardata[i] = char(data[i]);
    }

  }

  //Check for the type of message
  if (incoming_chardata[1] == 'l') {
    display_message = false;
  }  else if (incoming_chardata[1] == 'i') {
    intro_message = true;
  } else {
    display_message = true;
  } //Could add extra for value updating

  //For the display or LED number
  char_par_num[0] = char(incoming_chardata[2]);
  char_par_num[1] = char(incoming_chardata[3]);

  if (char_par_num[0] == '0') {
    parameter_number_str = String(char_par_num[1]);
  } else {
    parameter_number_str = String(char_par_num);
  }

  int parameter_number = parameter_number_str.toInt();
  total_message = String(incoming_chardata).substring(4);

  if (intro_message == true) {
    switch (parameter_number) {
      case 55:
        led_vis(1);
        break;
      case 56:
        led_vis(2);
        break;
      case 57:
        led_vis(3);
        break;
      case 58:
        led_vis(4);
        break;
      case 59:
        led_vis(5);
        break;

      default:
```

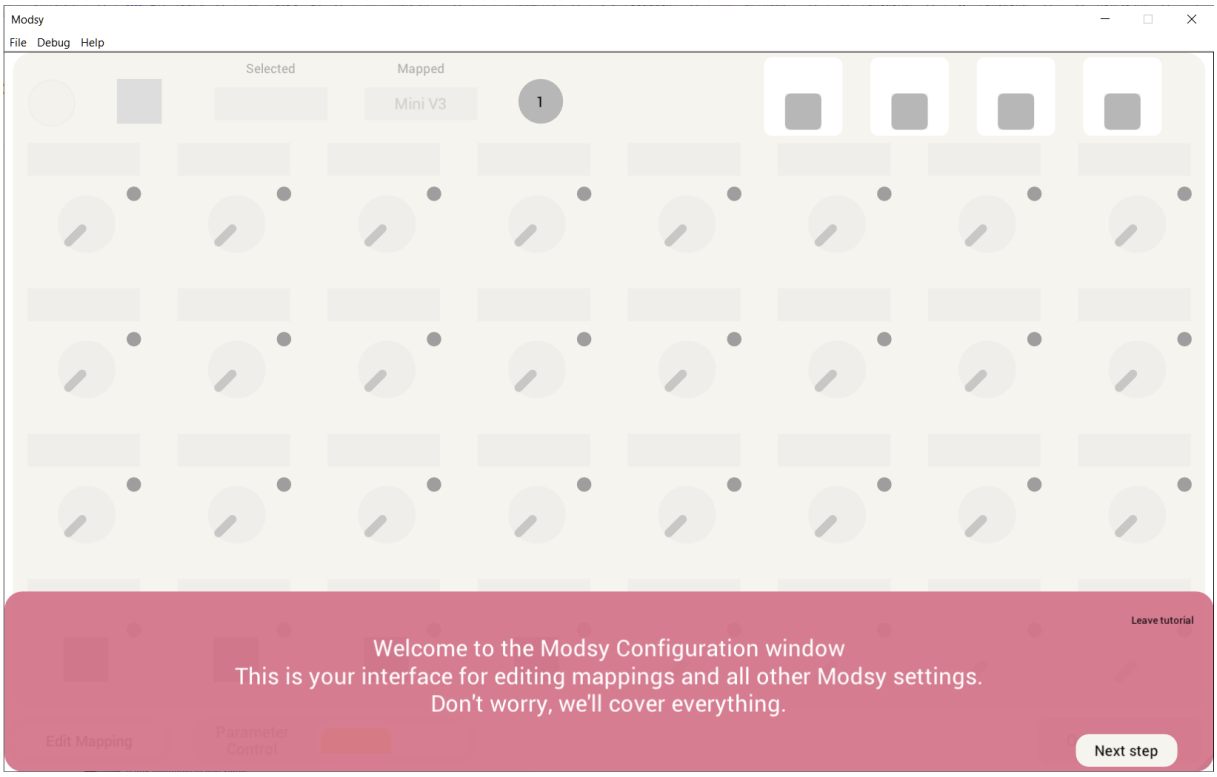
```
        break;
    }
  }
}



void led_vis(int type) {
  //LED visualisation for introductory tutorial

  switch (type) {
    case 1:
      for (int i = 0; i < strip.numPixels(); i++) { // For each pixel in strip...
        strip.setPixelColor(i, strip.Color(61, 79, 161));         //  Set pixel's
color (in RAM)
        strip.show();                             //  Update strip to match
        delay(50);                               //  Pause for a moment
      }
      for (int i = 0; i < strip.numPixels(); i++) { // For each pixel in strip...
        strip.setPixelColor(i, strip.Color(0, 0, 0));         //  Set pixel's color
(in RAM)
        strip.show();                             //  Update strip to match
        delay(50);                               //  Pause for a moment
      }

    case 2:
      //Top right parameter ON
      strip.setPixelColor(1, strip.Color(61, 79, 161));
      strip.show();

      break;

    case 3:
      //Top right parameter OFF
      strip.setPixelColor(1, strip.Color(0, 0, 0));
      strip.show();

      break;

    case 4:
      //All parameters ON
      for (int i = 1; i < strip.numPixels(); i++) {
        strip.setPixelColor(i, strip.Color(61, 79, 161));
        strip.show();
      }
      break;

    case 5:
      //All parameters OFF
      for (int i = 1; i < strip.numPixels(); i++) {
        strip.setPixelColor(i, strip.Color(0, 0, 0));
        strip.show();
      }
      break;

  }
}
```

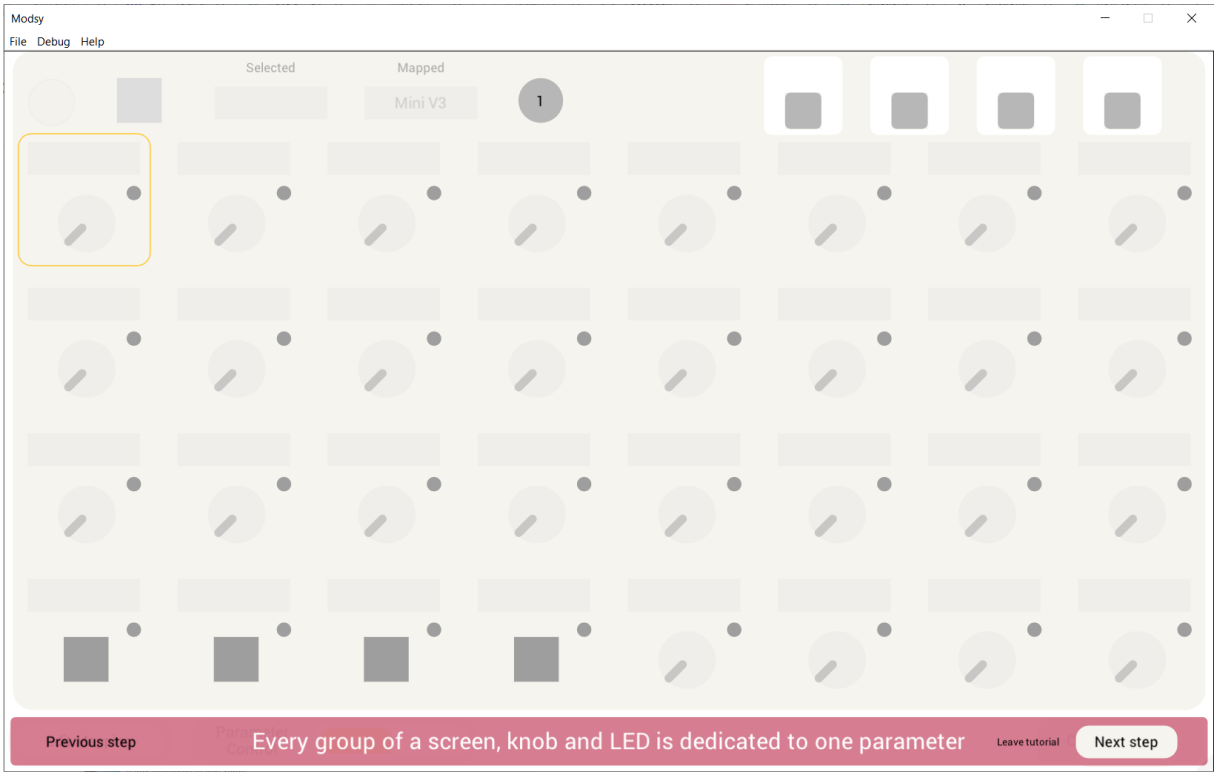
Appendix H: The screens of the final implementation of the digital part of the introductory tutorial

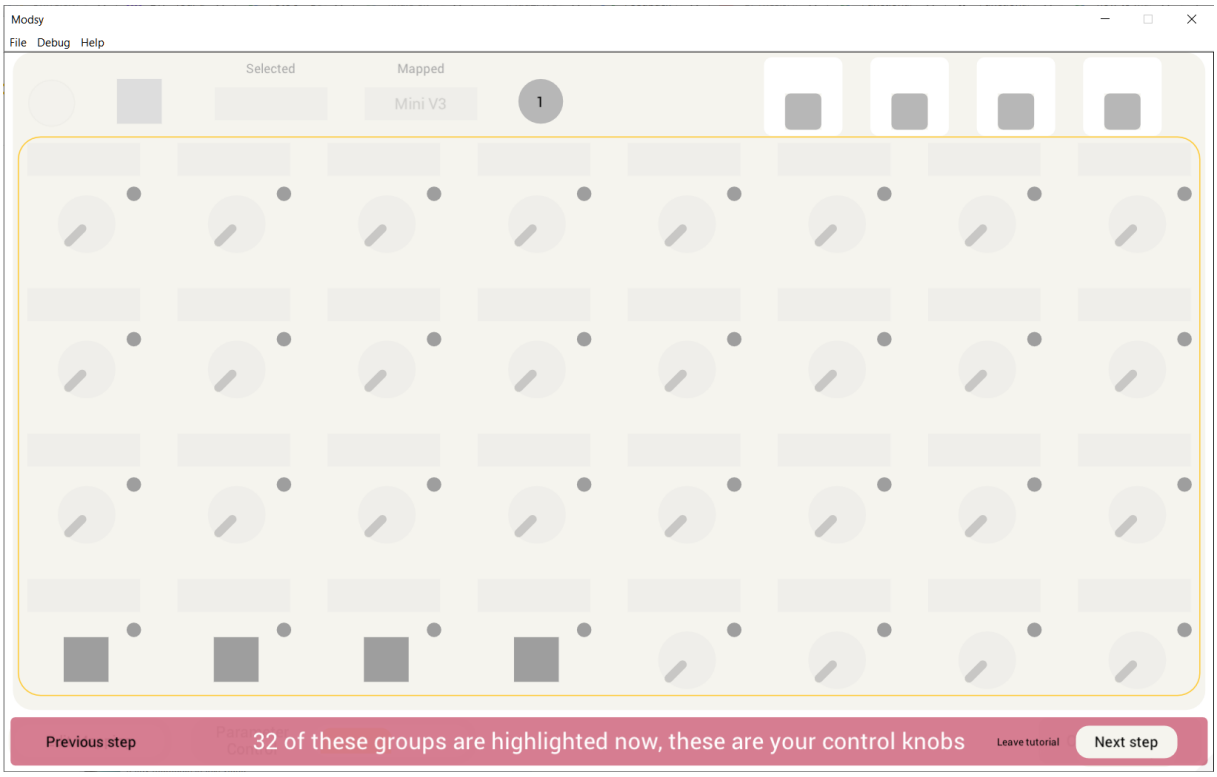


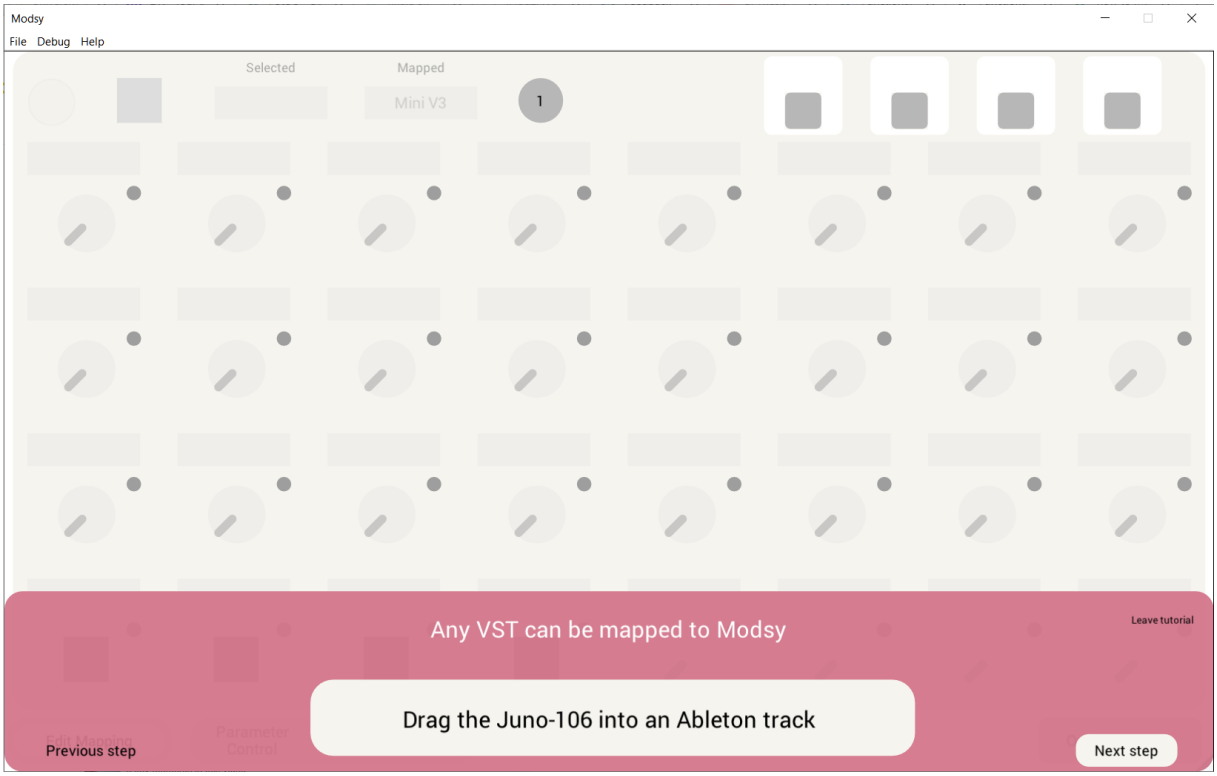

Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Leave tutorial
We'll have to check whether the controller is connected to the software:
Please press the button and check whether the controller responses.
Check connection
Edit Mapping
Parameter Control
Overview Mode

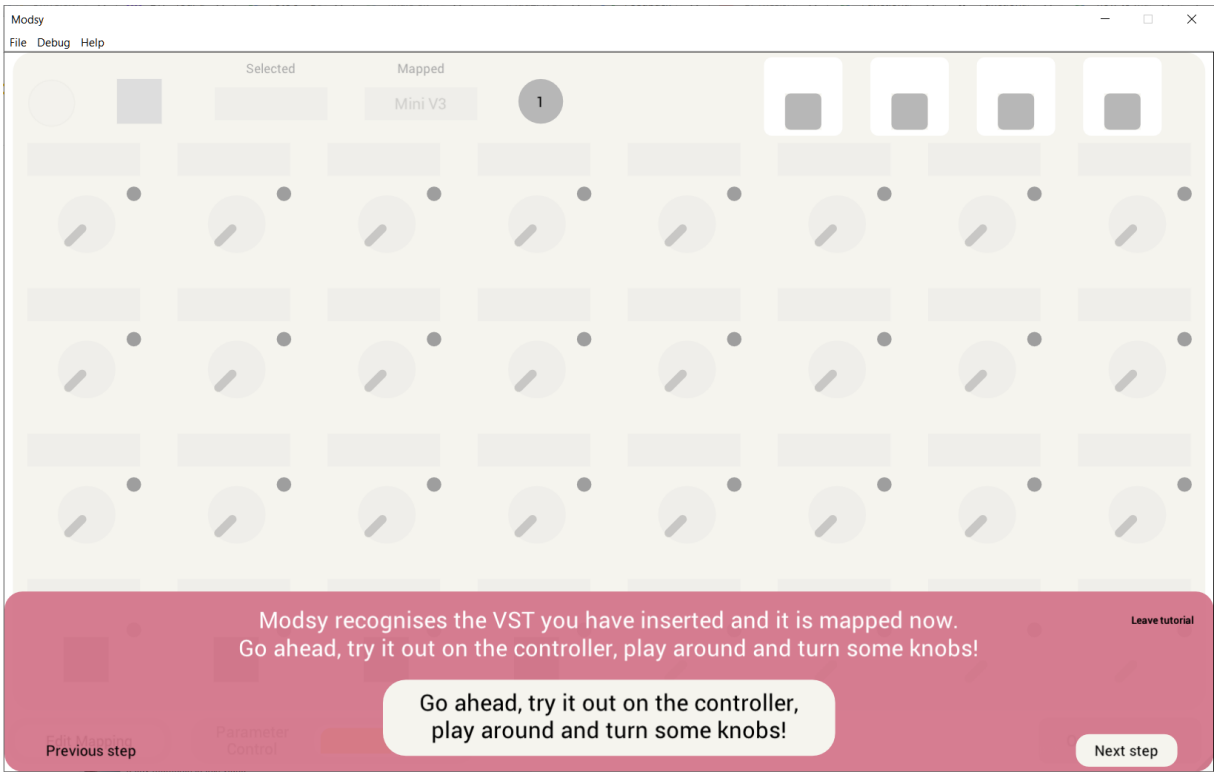

Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Leave tutorial
We'll have to check whether the controller is connected to the software:
Please press the button and check whether the controller responses.
Check connection
If you saw lights blinking, continue with the next step -->
Next step
Edit Mapping
Parameter Control

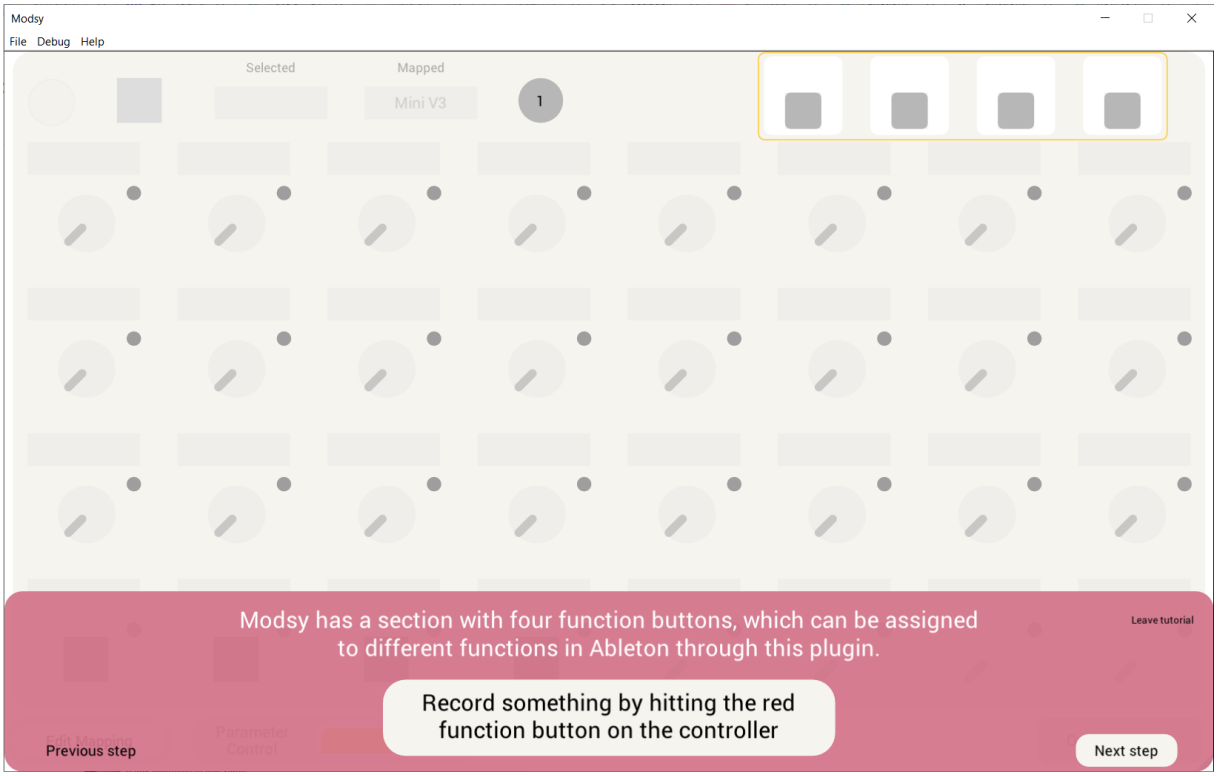

Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Leave tutorial
Welcome to the Modsy Configuration window
This is your interface for editing mappings and all other Modsy settings.
Don't worry, we'll cover everything.
Next step

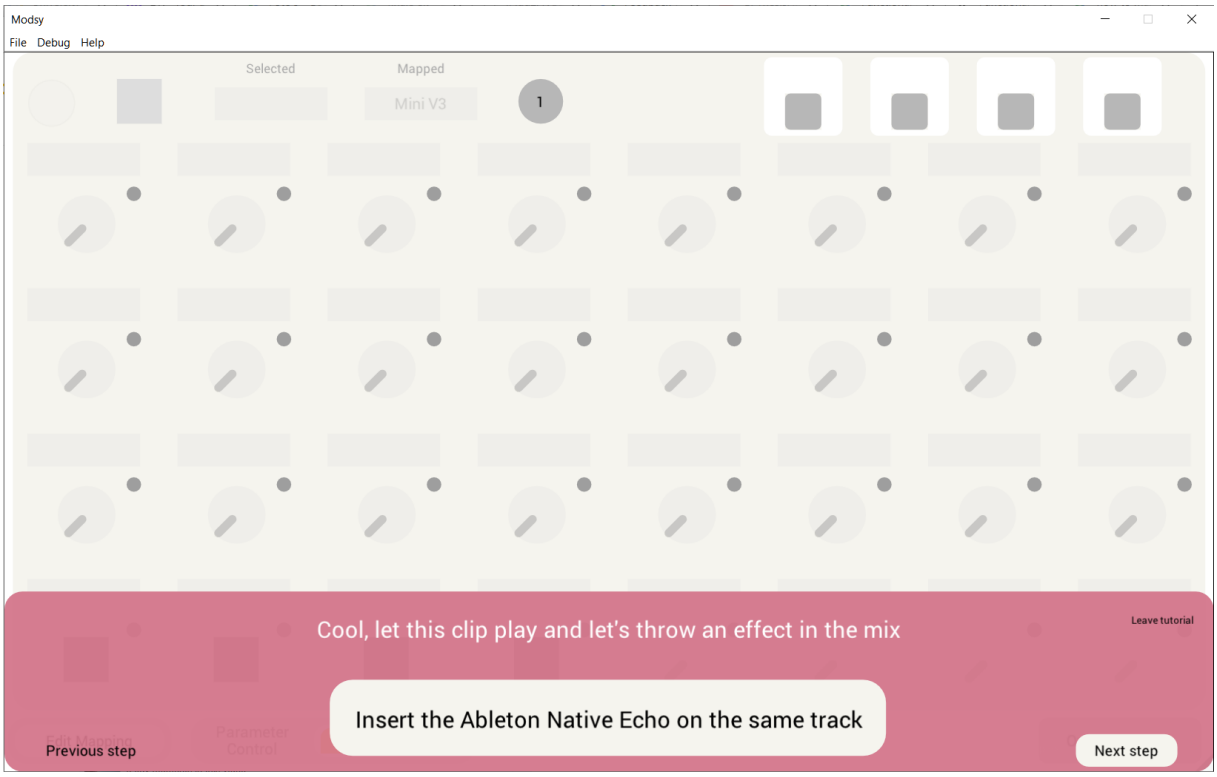

Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Previous step
Every group of a screen, knob and LED is dedicated to one parameter
Leave tutorial
Next step

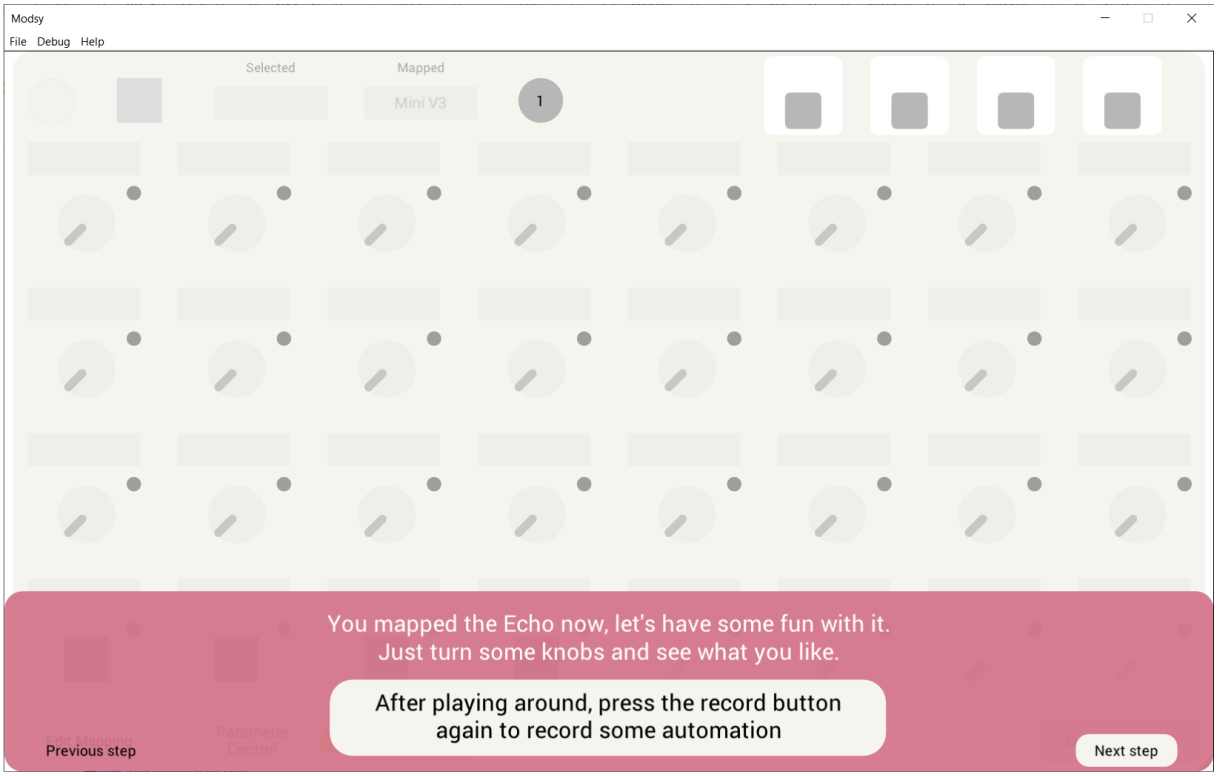

Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Previous step
32 of these groups are highlighted now, these are your control knobs
Leave tutorial
Next step

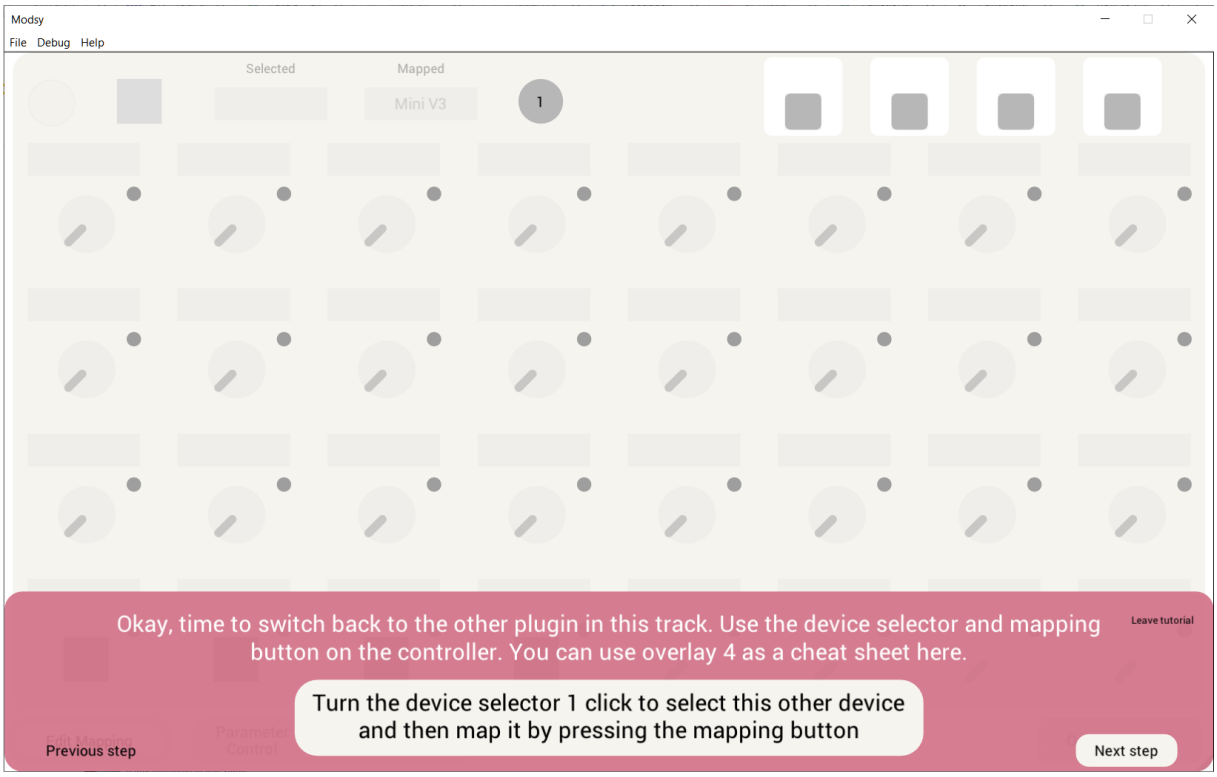

Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Any VST can be mapped to Modsy
Leave tutorial
Drag the Juno-106 into an Ableton track
Previous step
Next step

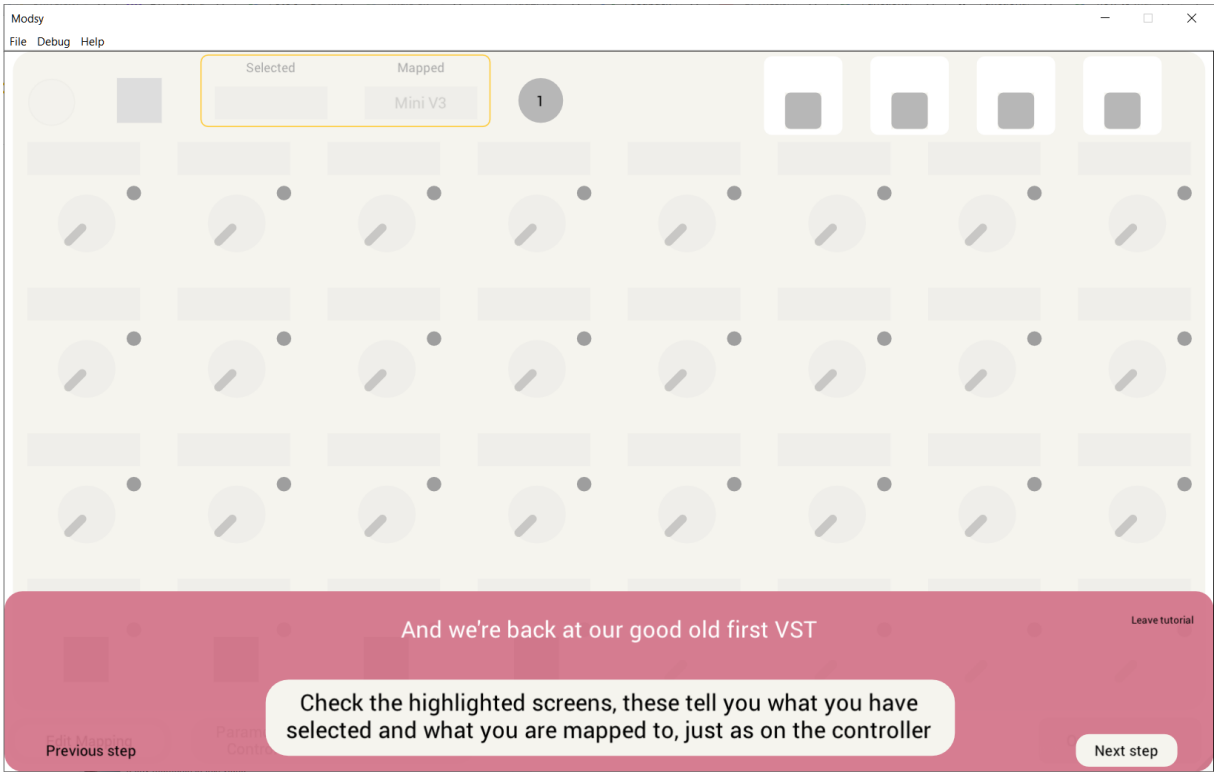

Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Modsy recognises the VST you have inserted and it is mapped now.
Go ahead, try it out on the controller, play around and turn some knobs!
Leave tutorial
Go ahead, try it out on the controller, play around and turn some knobs!
Previous step
Next step

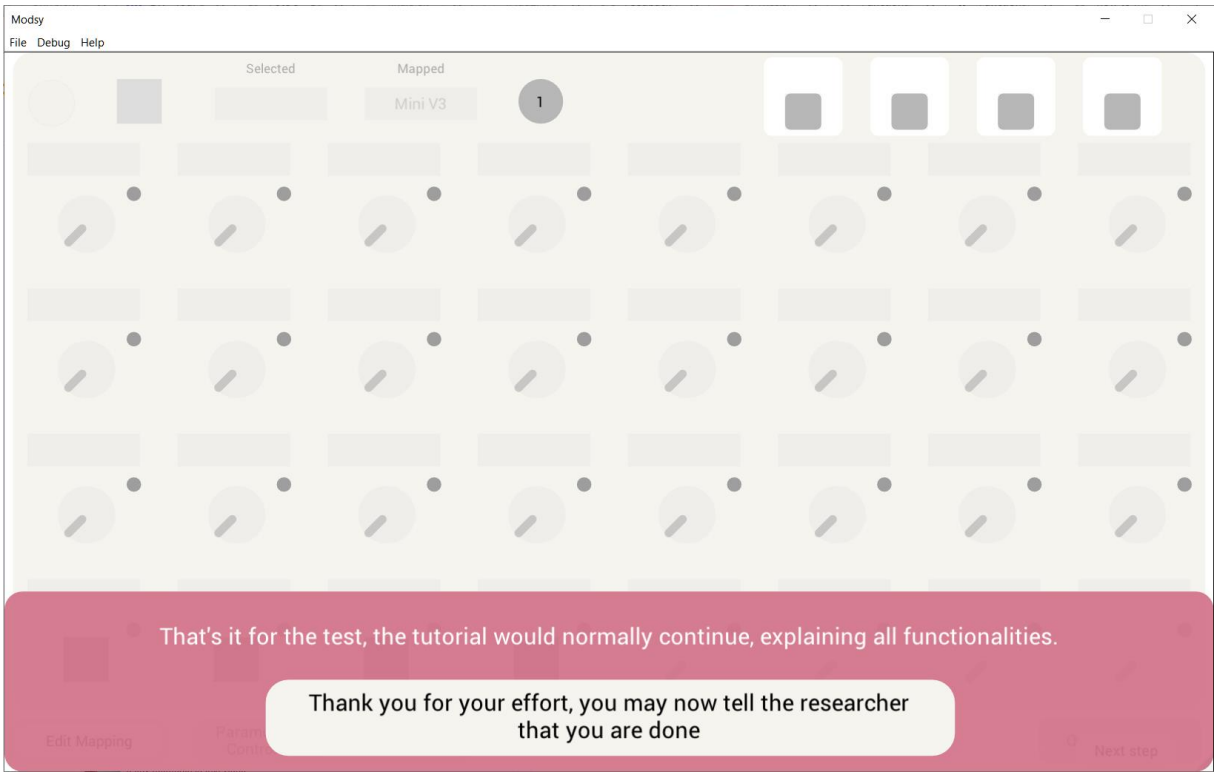

Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Modsy has a section with four function buttons, which can be assigned to different functions in Ableton through this plugin.
Leave tutorial
Record something by hitting the red function button on the controller
Previous step
Next step


Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Cool, let this clip play and let's throw an effect in the mix
Leave tutorial
Insert the Ableton Native Echo on the same track
Previous step
Next step


Modsy
File Debug Help
Selected
Mapped
Mini V3
1
You mapped the Echo now, let's have some fun with it.
Just turn some knobs and see what you like.
After playing around, press the record button again to record some automation
Previous step
Next step


Modsy
File Debug Help
Selected
Mapped
Mini V3
1
Okay, time to switch back to the other plugin in this track. Use the device selector and mapping button on the controller. You can use overlay 4 as a cheat sheet here.
Leave tutorial
Turn the device selector 1 click to select this other device and then map it by pressing the mapping button
Previous step
Next step


Modsy
File Debug Help
Selected
Mapped
Mini V3
1
And we're back at our good old first VST
Leave tutorial
Check the highlighted screens, these tell you what you have selected and what you are mapped to, just as on the controller
Previous step
Next step


Modsy
File Debug Help
Selected
Mapped
Mini V3
1
That's it for the test, the tutorial would normally continue, explaining all functionalities.
Thank you for your effort, you may now tell the researcher that you are done
Edit Mapping
Next step

Appendix I: Brochure for user tests

Background

The success of a product can be highly dependent on the user's understanding of the product. 40 to 90 per cent of new products fail "often due to consumers' lack of understanding of product features and benefits." (Feiereisen et al,. 2008). This pitfall is something that Weirdly Wired wants to avoid with their product called Modsy. Modsy is a hardware controller with knobs and buttons for digital producers and performers. It also has a software component. Both components need to be understood before a user can see the value of Modsy.

The goal of this project is to create an introductory tutorial that is engaging and gives the user the knowledge to use Modsy independently after completion. The playful image and focus on analogue feeling have to be reflected in this tutorial.

Research procedure

Through the means of a user test, feedback will be gathered to test and improve the design of the introductory tutorial.

In this letter, we explain what it means for you to take part in this research. You can decide whether to partake in this research. If you have any questions, don't hesitate to contact Robbert-Jan Berkenbos (r.berkenbos@student.utwente.nl).

Participation

Participation is entirely voluntary and you can quit this research at any moment without stating the reason why. Permission for participation only has to be granted once.

What happens during the test?

As mentioned, this user test is meant to gather feedback and to test the prototype. You will be asked to open the box with the Modsy controller in it and to follow the introductory tutorial. The tasks that you will perform will occur naturally and you will not be guided. After you have finished the introductory tutorial you will be asked to fill in a questionnaire. Afterwards, some questions will be asked about certain features.

Which data will be collected?

The test will be recorded to keep the option of transcribing it open. Statements that you make can be used as a base for this research. These statements can be anonymous if you prefer.

How will the data be stored?

The data and the video will be stored and partly anonymously processed according to the GDPR guidelines. All data will be stored for a minimum of 10 years, but in suiting cases for an undetermined time, appropriate to the current guidelines from the Vereniging van Universiteiten (VSNU).

Who has access to this data?

The video recordings and transcriptions of the test will be only accessible for people that are involved in this research. A list of names of people that have access to this data can be requested from Robbert-Jan Berkenbos.

How will the data be used?

The video could be transcribed later if needed. The video or transcriptions will not be shared publicly. If you as participant want to stay anonymous, any personal identifiable information will be deleted. The results of this test will be used to make claims or to reinforce claims and to validate the prototype.

Will any personal data be made public?

The video material will not be publicly showed. Statements you have made can be used as a source in the research. On the consent form, you can personally declare whether your name can be used as a source in the thesis or in possible future publications.

More information and independent advise

Would you like independent advice about participating in this research or do you have a complaint? Then you can contact the Ethics Committee (ethicscommittee-cis@utwente.nl). This committee consists of independent experts from the university and is available for questions and complaints regarding this research.

For any questions, you can contact the researcher, Robbert-Jan Berkenbos (r.berkenbos@student.utwente.nl) or the supervisor Wouter Eggink (w.eggink@utwente.nl).

Feiereisen, S., Wong, V., & Broderick, A. J. (2008). Analogies and mental simulations in learning for really new Products: The role of visual attention. *Journal of Product Innovation Management*, 25(6), 593–607. https://doi.org/10.1111/j.1540-5885.2008.00324.x

Appendix J: Consent form for user tests

INFORMED CONSENT

About

The University of Twente researches the optimal design of an introductory tutorial in the context of Modsy. You give permission to participate in a user test in which statements and information can be used for this research. More information about this research can be found in the information brochure.

Lead researchers:

Robbert-Jan Berkenbos (Supervisor: Wouter Eggink)

Contact information

For any questions, you can contact the researcher that is present at the user test, Robbert-Jan Berkenbos (r.berkenbos@student.utwente.nl) or the supervisor Wouter Eggink (w.eggink@utwente.nl). You can also contact the Ethics Committee (ethicscommittee-cis@utwente.nl). This committee consists of independent experts from the university and is available for questions and complaints regarding this research.

Research: Introductory Tutorial Modsy

☐ I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions or perform the tasks and I can withdraw from the study at any time, without having to give a reason.

☐ I understand the reason for this research, methods are explained and I have had the option to ask questions.

☐ I hereby give upfront consent to participate in this research

☐ I give permission for using my statements during this user test in text for research purposes

☐ I give permission for making video recordings of the user test for reference material to statements that I have made.

The video recordings and transcriptions of the interview will be only accessible for people that are involved in this research. A list of names of people that have access to this data can be requested from Robbert-Jan Berkenbos. The video will be stored and anonymously processed according to the GDPR guidelines. All data will be stored for a minimum of 10 years, but in suiting cases for an undetermined time, appropriate to the current guidelines from the Vereniging van Universiteiten (VSNU).

The following check is optional, meaning that you can still participate if the box below is not checked:

☐ I prefer to be referred to by my real name for quotes

Date: Place:

Name: Paragraph participant:

Appendix H: Answers for the semi-structured interview of the final user test

Participant 1

What motivated you to continue the tutorial?

He read something, did something and then there happened something. For instance with the LEDs and screens. That made it really interesting. He also wanted to know what you could do with Modsy. There were new concepts introduced. The setting of a test-setup with people around him made him continue. On his own he might have continued making music instead of following the tutorial.

What did you think of the paper overlays? (Fun? A waste of paper? Handy?)

Good concept, nice hands-on experience. It invites you to read the manual, which he would otherwise never do. It was in the way for a minute, but it could be put back on and that is no problem. Much better than a boring manual.

Did this experience remind you of something you have seen or experienced before?

In the form of MIDI controllers and instruments he has never seen it before. Is not familiar.

What would you think if this digital part would continue for twice as long, explaining other essential features (would you continue or would you want to start playing with the controller?)

The power of the Modsy it that you instantly get what you want and you can play with it. It might be better to explain some things later, as someone might not instantly be interested in all functionalities but just wants to play. Later these functionalities might come in handy, so you could explain these later.

How would you improve this introduction?

Not that he could think of. Was a nice experience.

Anything else you would like to mention?

Nothing.

Participant 2

What motivated you to continue the tutorial?

He thought that you should really follow the steps, because you were really walked through in an interactive way. Maybe he would have played a little longer on his own, but if you buy something you want to know how it works. So he thought it was nice to have a clear introduction.

What did you think of the paper overlays? (Fun? A waste of paper? Handy?)

Bit old fashioned maybe, but it did work. With a normal manual he would not have read it. The experience of taking those things off one by one did not work fluently.

Did this experience remind you of something you have seen or experienced before?

No never experienced something like this.

What would you think if this digital part would continue for twice as long, explaining other essential features (would you continue or would you want to start playing with the controller?)

Would maybe be a bit too long, so maybe make it an option to dive in to functionalities at a later stage

How would you improve this introduction?

A video in which you see someone doing it is stronger, because you see exactly what happens and that works.

Anything else you would like to mention?

If the little bugs and unfinished things would be fixed the whole experience would be nicer.

Participant 3

What motivated you to continue the tutorial?

He felt obligated to finish it for the researcher. At home he would not have followed the tutorial. He would have seen videos on YouTube before buying it and he would start playing and found out most things by himself.

What did you think of the paper overlays? (Fun? A waste of paper? Handy?)

Not needed, the participant wants to immediately see what the product looks like. It now takes away from the experience. Could look not really eco-friendly for a company

Did this experience remind you of something you have seen or experienced before?

He thought of analog synthesizers, there you have a sheet for writing down presets.

What would you think if this digital part would continue for twice as long, explaining other essential features (would you continue or would you want to start playing with the controller?)

He would skip the tutorial at home, normally he would have done a lot of research upfront and would be more familiar with the product. When he would be stuck he would have a look on the internet or in a manual where he only has to look for a certain topic of interest. A manual could work just as good, for instance with an image with numbers explaining which knob is for what. Not having to go through every step would be nice.

How would you improve this introduction?

How to fasten the screws might have been explained more clearly. Maybe some sections can be highlighted more clearly during the tutorial.

Anything else you would like to mention?

A nice way of explaining functionalities would be when you hover over something and it is explained as in Ableton.

Participant 4

What motivated you to continue the tutorial?

Participant did not continue the tutorial, he even skipped it. When he saw the lay-out of the Modsy plugin he thought he would immediately understand it.

What did you think of the paper overlays? (Fun? A waste of paper? Handy?)

Very awkward. He did not feel like flipping through multiple pieces of paper. Maybe try to do it on just one paper to get started or use a more traditional manual, but the more pages how less likely people are to read it. For the participant the product is already easy to understand, he feels like most of it does not need a long introduction. You could just start playing with Modsy.

Did this experience remind you of something you have seen or experienced before?

His friend has an Arturia MiniBrute and it has a sheet that you can put over it so you can mark the orientation of every knob. This is not for an introduction but for storing a preset, as it is an analogue synthesizer.

What would you think if this digital part would continue for twice as long, explaining other essential features (would you continue or would you want to start playing with the controller?)

He would immediately start playing and during this he would figure out what he knows and what he should still learn. After this he would search very focused on these things he still did not understand. This could be on YouTube or in the manual. If he is done playing he could still dive back in to the manual.

How would you improve this introduction?

No new improvements.

Anything else you would like to mention?

Tooltips would be nice, if you would keep hovering then the tooltip will pop-up, giving information about the point of interest.

Participant 5

What motivated you to continue the tutorial?

The test setup made him continue. If he was sitting at home he would try a lot and would probably not go back to the tutorial as easy as now. It is really nice that the physique and digital communicates and responses.

What did you think of the paper overlays? (Fun? A waste of paper? Handy?)

Maybe rather have a separate booklet, without holes. Because if you take it off the controller it becomes confusing. He wants to see the entire controller when unpacking Modsy. Immediately seeing the build quality and what you have bought is nice.

Did this experience remind you of something you have seen or experienced before?

He has seen it with other devices, but not exactly like this.

What would you think if this digital part would continue for twice as long, explaining other essential features (would you continue or would you want to start playing with the controller?)

A short tour would be nice and that more advanced functions have a "?" button or something.

How would you improve this introduction?

No new improvements.

Anything else you would like to mention?

Nothing.