Cargo Bike Accessories for Bakfietsclub

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Image 1: Working prototype

Bakfietsclub is a new initiative in Rotterdam, started by Michel Ubert. He wants to introduce third-party cargo bike accessories to the market. The insights of the bachelor's student in Industrial Design Engineering are consulted to give the initiative a successful start. To fulfil the goal of the client, the thesis answers the following research question:

What product design is preferred for developing the chosen cargo bike accessory?

The process was divided into two phases. Phase I was the research phase. One of the goals of the research phase was to make a well-grounded choice of which cargo bike accessory to establish. To understand the market of cargo bikes and cargo bike accessories, market research was performed. 18 different cargo bike brands were identified which lead to the identification of 36 existing cargo bike accessories. These were added to a large list with possible cargo bike accessories to work out in phase II, the development phase.

Looking at third party accessories together with a creative process to think of yet not existing accessories, led to a total list of 69 potential accessories. This list formed the basis of a large online user research. Over 100 cargo bike users filled in a questionnaire to find out about the needs and wishes of the target group.

At the same time, a cargo bike event was visited. Different kinds of cargo bikes were tested and interviews were held with experts and users. The result of the research phase could be concluded in three personas that draw the image of three average cargo bike users. This information was yet not available at the company and formed the basis of knowledge about the market for which it wants to develop products. From the user research and field research, it was chosen to further develop turn signals for cargo bikes.

This was the start of phase two, where a new diverging approach took place with additional research to this market, legislation and light properties. After that, ideation was done for the development of the lights and controller. Here it was concluded that designing universal cargo bike turn signals was hardly possible, because of the wide variations of cargo bike designs that exist. Therefore, based on the user research outcomes, a design was developed for the Urban Arrow Family cargo bike.

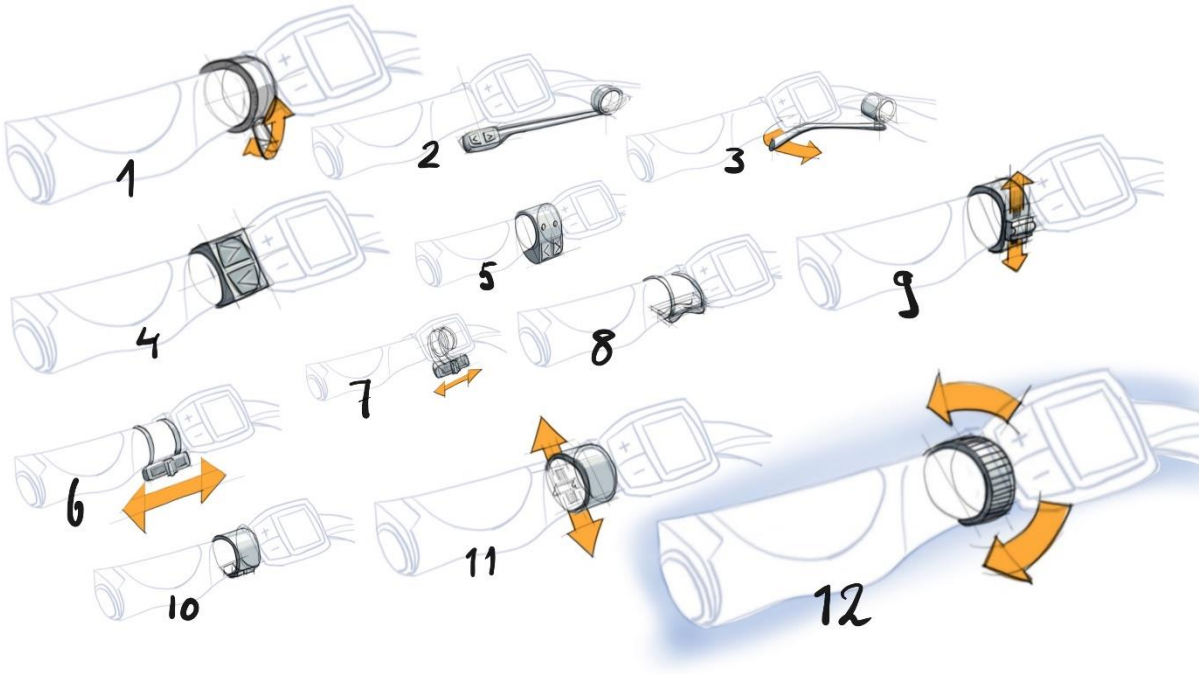

Image 2: Ideation controller

The design of the controller was explored by making several ideation sketches, see image 2. Based on a desk research, design 12 was chosen. However, after visiting a local cargo bike shop, there was more space available on the left handlebar compared then previously expected. Eventually, the preferred design 7 could be further developed.

The design of the lights was chosen based on visual harmony with the Urban Arrow design, but mostly based on safety, evaluated with expert Kees Bakker from the Dutch Fietersbond. This was done by determining the shape and location of the lights on the cargo bike first. When this was determined, the concept phase started.

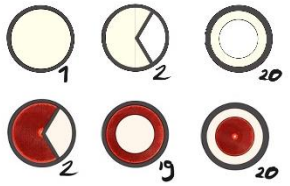

Image 3: preferred face designs based on user research

24 design faces were drawn and a selection was aesthetically tested on the urban arrow design. To make a good grounded choice of the face design, this was further underpinned by an user research conducted with over 60 Urban Arrow owners. This user research revealed aesthetic and functional preferences of the target group. In this way, design 2 was chosen and further developed.

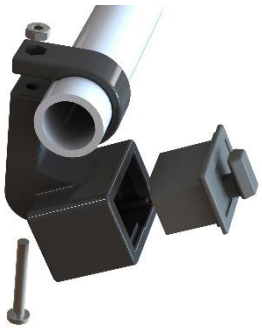

Image 4: Controller design

For the controller, design 7 was chosen. Different designs were built using additive manufacturing technology. A switch was selected to be inserted. The fit and ergonomics were tested in the local cargo bike shop. After several iterations, the final design can be seen in image 4.

At the same time, a solution for powering the device was developed. Cables were mapped through and below the cargo bike frame. Easy assembly and aesthetics were taken into account. Finally, the concept would be powered by an existing power output by the motor for the front light.

To provide a proof of concept, a prototype was developed. Electronics design was created including a dimming function based on outside light conditions. The electronics development revealed developing heat in the two LEDs, so extra cooling was added in the lamp designs. The overall lamp design was updated based on new insights such as these which lead to the designs shown in image 5.

Image 5: Prototype lamp designs, front and back

The answer to the research questions are the outcomes of phase I and II. Phase I gave answer to the question what product is preferred. Phase II gave answer to the question what design is preferred. The result is the working prototype design of the cargo bike turn signal. This is together with additional steps that are needed to be taken to come to a product that can eventually be put on the market.