Central Point Smart System

Author name: Jelte Overzet

Bachelor program: Industrial design engineering, University of Twente, Netherlands

Topic: a central product for a smart garden system

Background

Roel Holding is a company closely related to Velda B.V and they are interested in setting up a new brand for (smart) garden products. A smart system for gardens is currently being developed, which can control devices for both electrical and irrigation systems. With the help of sensors and appropriate software, the system will become smart. The assignment Roel Holding offered was to explore a potential central point for such a system. The focus is on exploring the design, components, and placement of this central point while ensuring it serves as a foundation for the further development of the product and overall system. The software required for this system is being developed by an electrical engineer at Roel Holding; therefore, this aspect of the system has not been researched extensively in this project.

Relevance

There is a clear trend toward smarter products. Although some smart lighting systems are available on the market, there is no system that combines this together with devices related to irrigation.

Assignment objective and research question

The objective of the assignment was to develop a concept design for a central control unit that can manage both irrigation and electrical components in a smart garden system.

This resulted in the following research question: What design requirements are required to develop a central control unit for a smart garden system capable of regulation both irrigation and electrical functions?

Approach and intermediate results

To start with the project, internal input and wishes of Roel Holding were gathered first. Potential competitors and their products—divided into electrical and irrigation categories—were analyzed. This helped in determining aesthetic features such as the use of dark aluminum material to convey a premium look. Additionally, analyzing competitor products provided insights into manufacturing approaches and useful features.

The stakeholder analysis identified key users: Landscape gardeners and the end-users, also considered as the buyers/consumers. A survey was conducted among 19 landscape gardeners who were asked to identify their own preferences and those of their customers. This revealed preferences such as having a single control app and a system that is reliable and error-proof.

Because of mixed answers concerning the customers of the landscape gardeners, the target group profile was enhanced with the help of statistical data. This indicated a target demographic of 35–65 years old, with an average garden size of 125 m^2 and generally consistent soil type across Dutch gardens. This data helped with deciding on installation assumptions and

sizing decisions for both the product and the system. With a better understanding of the target group a style analysis was created so it could guide the design process. All findings were used to make a (partial) list of requirements.

Figure 1: style collage

Before concepts could be developed, technical aspects were researched. This included general concerns such as regulations, and design solutions such as the installation of the product. In addition to controlling multiple devices, it was decided that the product should also include an additional water tap and temporary-use electrical sockets. Finally, a list of potential components was made that would ensure that the product would be capable of fulfilling the stated requirements. It was found that the product has a wide target group, so to cover all needs, it was decided that the product should have configurations. With several employees of Roel Holding, possible configurations were considered, and valuable feedback was given in a configuration session. Most important was that it was decided that there would be configurations with and without irrigation. To emphasize that the product is modern and smart, it was decided that the pole would have a modern tap without a classic turn mechanism. Furthermore, this session served as opportunity to give feedback on the research conducted so far.

When the technical aspects were turned into requirements, four rough concepts were created with an aluminum extrusion profile in mind. The two most promising concepts were developed further, to finally choose the best concept with the help of a design table. With a selected concept, design aspects could be refined further. It was decided to provide the electrical internal components in a preassembled holder, and include a partition wall between the irrigation and electrical components. Additional detailing was done and a method for mounting the product to the ground and wall was selected. Finally, the choice of material and manufacturability were checked. Both aspects seem to be good.

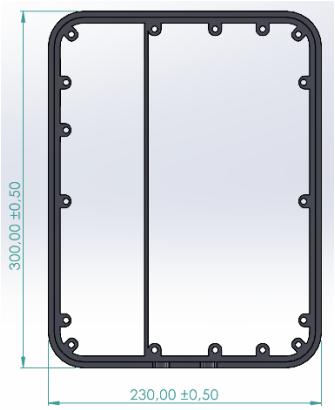

Figure 2: Extrusion profile with partition wall

Conclusions and recommendations

The assignment meets its primary goal of exploring factors such as aesthetics, component selection and installation of the product. The design choices that were made are supported by the research provided, ensuring that the final concept aligns with the ambitions of Roel Holding and the needs of different stakeholders.

Recommendations for the next potential steps are:

- The optimization of the product and its components.
- The development of an application that controls the system
- Prototype development and testing