This report encompasses various procedures involved in construction of a smart home model. One of the initial definitions of smart home is provided by Lutolf, defining it as “an integration of different services within a home by using a common communication system.” Moreover, it should assure „an economic, secure, and comfortable operation of the home and includes a high degree of intelligent functionality and flexibility.” (Lutolf, 1992) A fresher definition by Satpathy states, that “a home which is smart enough to assist the inhabitants to live independently and comfortably with the help of technology is termed as smart home. In a smart home, all the mechanical and digital devices are interconnected to form a network, which can communicate with each other and with the user to create an interactive space.” (Satpathy, 2006) We consider this definition more proper, as it emphasizes the role of network in smart home systems, in contrast to the vaguer term ‘common communication system’ used by Lutolf.

According to Zielonka, one of the major development trends related to smart homes are healthcare and quality of life, security in data management and optimal energy management and sustainability. Presumably, the trend of energy management and sustainability is intertwined with recently rising ecological trend (Zielonka, et al., 2021). However, the graph in Figure 1 shows that advanced lightning and intelligent energy management are not among the hottest trends. However, upcoming paragraph underlines the significance of innovation in this sector.

A graph of blue bars

Description automatically generated

Figure 1 Graph of Leading Smart Home Innovation Trends Worldwide in 2023

The use of LEDs as an illumination component is crucial not only for lower energy consumption in comparison to conventional lightning bulbs. According to Schratz, “when compared to incumbent lighting technologies, most LED fixtures deliver at least a 50% improvement in energy savings, which translates directly into significantly lower carbon emissions and a much smaller environmental impact”, while they offer more advantages such as “less heat output, lower risk of ignition due to dust and particle accumulation, improved color rendering for a better quality of light, and negligible UV light output, which reduces insect infestation and product deterioration”. Remarkably, its life-span can reach “more than 100,000 operating hours”. (Schratz, Christine, Struhs, & Gray, 2016)

Although lights with movement sensors are commonly used nowadays, they could benefit from integration into a centralized system, bringing everything ‘under one roof’. The main advantage of a system with a centralized unit is its flexibility, as users would be able to manipulate light status manually inside the house as well as through communication with the centralized unit, for instance via a control panel. New features could be implemented, for example allowing the change of various thresholds according to user’s needs easily and any time.

However, many challenges emerged during the design process. The most significant problems can be summarized in several ‘how to’ questions:

1. How to construct the house?
2. How to adjust intensity or color of the light?
3. How to assemble and integrate the circuits?
4. How to structure the control panel menu?

Mentioned questions are answered in subsequent 8 sections. The third chapter includes detailed steps of the design process, where any decision is complemented by justification. The fourth section concerns the final product, possibly deviating from the planned design. The fifth section contains analysis of the results and its comparison with design. Moreover, the sixth section provides a concise conclusion on the whole project. References and appendices are placed in the last two sections.