**INTRODUCTION AND BACKGROUND STUDY SMART HOME SYSTEM**

Ubiquitous nature of communication technologies like Wi-Fi, 4G and more recently 5G, coupled with advancements in fields like IoT and Machine Learning, have garnered significant interest in Smart Home solutions. It generally refers to an interconnected network of some smart home devices installed within a home premise which can be controlled and monitored by the user.

These smart home solutions provide various benefits including but not limited to the following:

* life safety (Ex: fire alarms, intrusion detection, duress calls etc)
* energy conservation, by controlling the energy usage of home appliances
* Regulate the room conditions by taking parameters like temperature, humidity, CO level etc into consideration.
* Surveillance of the premise using cameras.
* Automation of various daily activities like switching on lights, refilling the inventory based on the content in refrigerator, controlling window blinds based on weather, feeding pets, watering plants, dish washing etc.
* Automate solar panels and rainwater harvesting based on the weather conditions.
* Dispatch security professionals in case of emergencies
* Monitor the health condition of the elderly/sick people.

In the beginning, X10 which is a protocol for Powerline Carrier Systems (PCS) is used for automating some of the home appliances by sending codes through powerline. These legacy home automation systems used wired networks. Since it used powerline to send signals it was more susceptible to interference [3].

With the advancement in technology and developments in various wireless protocols like WiFi, Zwave [4], Zigbee[5] etc more sophisticated smart devices aka IoTs emerged. These IoTs can be integrated and controlled using a gateway/controller to provide various smart home solutions [2]. Also, the advancement in accessibility methods like voice assistants, mobile apps etc made these intelligent solutions much more user friendly.

There are wide range of smart home solutions available in market. Starting from DIY home automation using raspberry pi to more sophisticated solutions provided by different vendors. Most of the available solutions support only a set of devices and the customer are forced to use those even when better alternatives are available, and all customers are not tech savvy enough to build their own home automation projects. Hence, we propose a product which can be tailored as per the customer’s individual requirements. The proposed product will be compatible with most of the latest communication protocols and can learn and integrate with any new devices with minimal manual intervention.

Based on this study we could realise that there is no single solution that suits the needs of every home and its residents. We therefore came up with a set of questions attached below to better understand the needs of our end users. The questionnaire was prepared keeping in mind the provided project description by the solution owners, which primarily focussed on 6 dimensions: **Accessibility (highly desired)**, **Environmental considerations**, **Energy Efficiency**, **Security**, **Media/Entertainment** and **Automation** of routine tasks [1].

The questionnaire was designed to be as unbiased as possible by providing some commonly accepted choice of technologies used in smart home solutions and at the same time providing end users a freedom to specify any out of the box technology of their preference. Questionnaire helped us in gaining better insights on the living lifestyle of our end users and thereby provide a solution which aligns well with their needs.

While keeping our focus on the above mentioned 6 dimensions we attempted to factor out the commonalities among various existing smart home solutions in the market and come up with following set of basic needs and technologies in each dimension:

* Accessibility
* Environmental considerations
* Energy Efficiency
* Security: with references
* Media/Entertainment

**References:**

1. <https://en.wikipedia.org/wiki/Home_automation>

2. Mi Jeong Kim, Myung Eun Cho, and Han Jong Jun (2020). Developing Design Solutions for Smart Homes Through User-Centered Scenarios.

3. Rosslin John Robles and Tai-hoon Kim (2010). Applications, Systems and Methods in Smart Home Technology: A Review

4. <https://www.z-wave.com/learn>

5. <https://zigbeealliance.org/solution/zigbee/>