

## 1.Introduction

The concept of “Home Automation” has been in existence for several years. “Smart Home”, “Intelligent Home” are terms that followed and have been used to introduce the concept of networking appliances within the house. Home Automation Systems (HASs) includes centralized control and distance status monitoring of lighting, security system, and other appliances and systems within a house. HASs enables energy efficiency, improves the security systems, and certainly the comfort and ease of users. In the present emerging market, HASs is gaining popularity and has attracted the interests of many users. HASs comes with its own challenges.

The Internet arrived at homes at the end of the 90s, taking the first step to bring home automation closer to reality. Some years later, smartphones appeared in 2007, which combined with the Internet of Things (IoT) make it possible to control functions of other devices from a cell phone. Currently, people use apps or virtual assistants based on artificial intelligence (AI) systems such as Siri, Google, and Alexa.

Home Automation refers to the integration of smart devices and systems within a household, enabling users to control, and automate various functions through the Internet. When combined with IoT, these systems become even more powerful, as they leverage the connectivity of devices to create a cohesive and intelligent network here are several automation systems and architectures to automate a home or building. According to the characteristics of the system, these can be:

- Wireless home automation systems: They work with radio frequency waves and are easy to install given that they don't require any work to install wiring.
- Wired home automation system: The signal is transmitted through dedicated cables, which guarantees that it's secure, efficient, and stable. The installation of cables may require some work

**Objectives:**

To develop a mobile application to control and automate home functions.

To develop IOT enabled hardware using Arduino.

To integrate the IOT enabled hardware system with the developed mobile application

## **2. System Requirements**

### **2.1 Hardware-based Requirements: -**

In a Home Automation System, we need a combination of hardware equipment like ESP8266 Node MCU, Relay Module, Breadboard, Wires, Switches, 5V Power Supply.

### **2.2 Software Requirements:**

**Automation Software:** Software that enables programming and automation of devices based on triggers and conditions.

Software used: - Arduino IDE

**Mobile App:** A mobile app allows users to control and monitor the home automation system from their smartphones.

Languages used in app: - Flutter, Dart (flutter)

**Integrated Development Environment (IDE):** Visual Studio Code to write, debug and test the code.

### **3. Software requirement analysis:-**

#### **3.1 Problem:**

Based on the analysis of the home automation system, it showed problems like

- The purpose of the HAS is to define the functional and non-functional requirements for a home automation system using IOT.
- Home automation software can act as a central hub, providing a common platform for device integration and management, facilitating seamless communication between diverse devices.
- Designing a unified, intuitive user interface that consolidates control over various devices into a single application enhances user experience and accessibility.
- It will Implement robust security measures, including encryption and secure authentication, and ensure transparent privacy policies to protect user data and device integrity.
- It will develop a scalable system, with the ability to efficiently handle a growing number of devices and users.
- It will Ensure the software is reliable and includes fault tolerance mechanisms to handle errors gracefully and maintain operation even when some components fail.
- Home Automation will Incorporate energy management features that optimize device operation for energy savings, such as scheduling and learning user behaviors to adjust settings automatically.
- It will provide secure remote access through the software, enabling users to view device status and control them via the internet.

### 3.2 Modules and their functionalities:

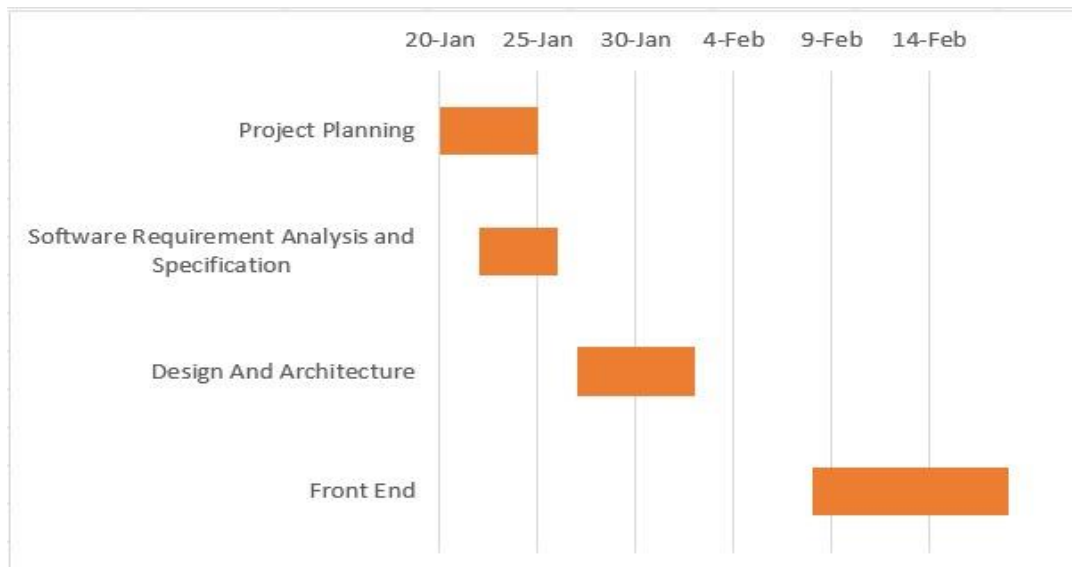
Creating a home automation system using Flutter involves integrating various modules, each responsible for different functionalities to manage devices and services within a smart home environment. Below are some key modules you might consider for a comprehensive home automation system:

- **Authentication Module:** Manages user accounts, authentication, and authorization. It ensures that only authorized users can access the home automation system. This module could support various authentication methods, such as email/password, social media logins, and biometric authentication.
- **Device Control Module:** Allows users to control smart home devices such as lights, thermostats, cameras, and locks. This module communicates with devices over protocols like MQTT, HTTP, or WebSocket, sending commands and receiving device statuses.
- **Energy Management Module:** Monitors and manages energy usage of connected devices, providing insights and recommendations to reduce energy consumption and save costs.
- **User Interface (UI) Module:** Provides the graphical user interface of the app, designed using Flutter's widgets. It should offer a user-friendly and intuitive way to interact with all functionalities of the home automation system.
- **Notification Module:** Sends alerts and notifications to the user's device. This can include security alerts, device status changes, or reminders. Implementations might leverage Firebase Cloud Messaging (FCM) for push notifications.

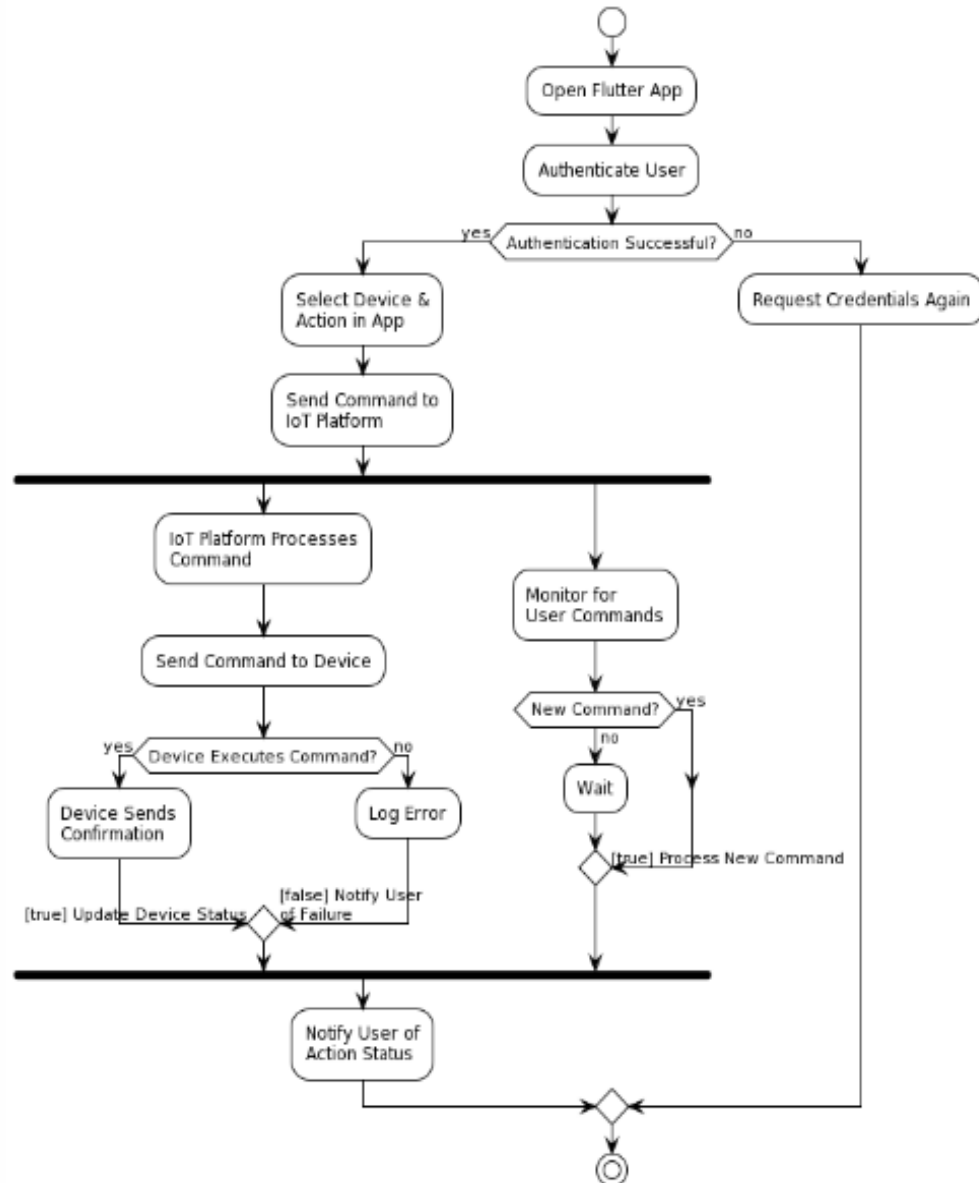
## 4. Software Design:

### 4.1 Gantt chart

- Project planning 20 January 2024 –23 January 2024)
- Software Requirement Analysis and Specification (22 January 2024 – 26 January 2024)
- Design and Architecture (27 January 2024 -7 February 2024)
- Front End (8 February 2024 – 18 February 2024)



## 4.2 Flow chart: -



### 4.3 Sequence Diagram: -

