# Iot Based Home Automation System

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*ABSTRACT:* "IOT based Home Automation System" focuses on designing an IoT base home automation system use ESP8266 microcontroller ant Flutter framework for develope cross-platform application. It allow user to remotely control all household devices like light, fan and electronic devices use mobile application. The system architecture Wi-Fi modul, microcontroller and cloud base server for communication between mobile application and home devices The advantages of system include comfort, energy efficiency and increase security. This automation system demonstrate potential of IoT base home automation to change way people interact with their living places. System use ESP8266 microcontroller and Flutter framework for develope cross-platform application for Android and iOS devices. It aim to enable user to easily and efficient control their home devices from anywhere and anytime. System consist of ESP8266 microcontroller connect to various sensors and actuators install in house. These sensor and actuators use to monitor and control household devices. Flutter app allow user to control and monitor their devices remotely through an easy use interface. System test and evaluate for performance. Result show it an efficient and reliable solution for home automation.

*Keywords:*Internet of Things, Flutter framework, microcontroller, web application

## I.INTRODUCTION

The advancement of the Internet of Things (IoT) have truly rocked the idea of automation. Home automation be one of the main applications of IoT technology which allows us controlling various home appliances from a remote location. In this project, we suggest an IoT-based home automation system that lets users control all home appliances via a smart phone application.

The system using the ESP6 microcontroller for controlling the devices and the Flutter framework to form a cross-platform application. The use of this system users with convenience, convenience, and energy savings as they easily monitor and control their devices at any time and from any place. The following sections offering a detailed description of the proposed system and its components. The purpose of this project is developing an IoT based home automation system using ESP8266 microcontroller and Flutter framework for its application. This automation system enabling remote control and monitoring of various household appliances via a mobile application. The ESP8266 microcontroller acting as a central hub, connecting household devices to the Internet using WiFi. Flutter framework being used for developing the mobile application that allows users remotely controlling and monitoring connected devices. The system also including a web server for storing and retrieving data from the cloud. It offering a convenient and effective solution for home automation, making the user's life easier and more comfortable.

## II.RELATED WORKS

" The Design of House robotization System Grounded on IoT and ESP8266" byK.D. Joshi etal.( 2020) presents an IoT- bases house robotization system that uses the ESP8266

microcontroller and mobile apps for control house bias. System include detectors for covering different environmental parameters like temperature, moisture, and light intensity.

" IoT- bases Intelligent House robotization System with ESP8266 Wi- Fi Module" byS.S. Patil etal.( 2018) describes IoT- bases house robotization system using the ESP8266 microcontroller and mobile operations for controls house bias. The system are including a web garçon for stored and recoup data from pall.

" Development of an IoT- bases house robotization system using ESP8266" byP.R. Bhavsar etal.( 2018) is representing an IoT- base house robotization system that uses the ESP8266 microcontroller and mobile operations for controls house bias. The systems are including detectors for observers colorful environmental parameters like temperature, moisture, and gas findings.

" A Low- Cost House robotization System Using Wi- Fi Grounded Wireless Sensor Network and Integrating Internet of effects," byVikram.N,Harish.K.S,Nihaal.MS, Raksha Umesh, Shetty Aashik Ashok Kumar. This papers display a system for planting a cost-effective house robotization system( HAS) using wireless dedication( Wi- Fi). This solidify the conception of networking smart bias. A Wi- Fi base wireless detector networks( WSN) is using for examiner and controls the environmental, security, and electrical parameters for connected smart house."

## III.PROPOSED ARCHITECTURE

### A.EXISTING SYSTEM:

There are currently several home automation systems on the market. Here are some examples:

Amazon Echo Plus: Amazon Echo Plus is a smart speaker that can control compatible smart home devices using voice commands. It has a built-in Zigbee hub and can control a variety of smart home devices including lights, locks, and thermostats.

Google Nest Hub: Google Nest Hub is a smart display that can control compatible smart home devices using voice commands. It has Google Assistant built-in and can control a variety of smart home devices, including lights, cameras, and speakers.

Samsung Smart Things: Samsung Smart Things is a home automation system that can control a variety of smart home devices via a smart phone app. It has a hub that connects to Wi-Fi and can control devices such as lights, thermostats and security cameras.

Apple Home Kit: Apple Home Kit is a home automation system that can control a variety of smart home devices via a smart phone app. It has Siri voice control and can control devices like lights, locks, and thermostats.

Wink Hub 2: Wink Hub 2 is a home automation system that can control a variety of smart home devices via a smart phone app. It has a hub that connects to Wi-Fi and can control devices like lights, locks, and thermostats.

### B. PROPOSED SYSTEM:

The hardware and software are the two main parts of this automation system. The appliances are controlled by an ESP8266 microcontroller, which is part of the hardware component. A multi-platform application for controlling the appliances is developed using the Flutter framework, which is part of the software component. The suggested system's component parts are explained in depth in the sections that follow.

### Hardware Component:

The ESP8266 microcontroller, which serves as the system's central processing unit (CPU), is the physical component of the system. An inexpensive, WiFi-capable microcontroller, the ESP8266 is simple to develop with the Arduino IDE. The ESP8266 can establish communication with household appliances using protocols like radio frequency (RF) and infrared (IR). The ESP8266 is attached to a relay board, which allows it to manage the household appliances by turning them on and off in response to user inputs. The devices are linked to the relay board, which is connected to the ESP8266 via GPIO pins.

**Software component**:

The software component of the system consists of the Flutter framework, which is used to develop a cross-platform application to control the devices. Flutter is an open- open-source mobile app development framework that assists programmers in producing aesthetically pleasing, incredibly fast apps for the iOS and Android operating systems. The goal of the app is to give consumers an intuitive interface for managing household appliances. Device schedules can be customized, timers can be set, and users can turn devices on and off. Through WiFi, the app and ESP8266 exchange data, and the ESP8266 turns on and off devices in response to user requests.

**System Architecture:**

This automation system architecture is based on the client-server model. The ESP8266 acts as a server and the smart phone app as a client. The smart phone app sends commands to the ESP8266, which processes the commands and turns the devices on or off accordingly. The system uses WiFi to establish a connection between the ESP8266 and the smart phone application.
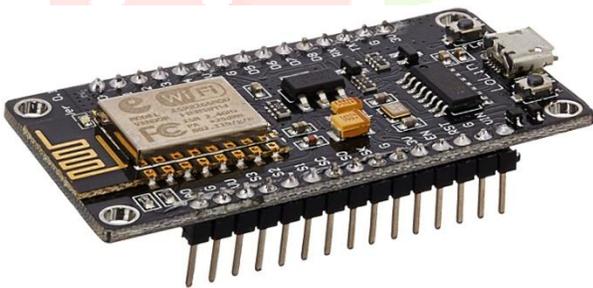


Fig: 1. Node MCU Development Board

## IV. SYSTEM OVERVIEW:

### A. FRAMEWORK

Generally speaking, developing an application for smartphones is an extremely difficult and complex job. For the creation of applications for smartphones, there are several frameworks that provide excellent functionalities. Whereas iOS offers a framework based around the Objective-C/Swift language, Android offers a native framework built on both the Java and Kotlin languages for developing mobile applications. Therefore, in order to create apps for both operating systems, we need two separate programming languages and frameworks. Several frameworks that enable desktop apps as well as operating systems have been released recently to get around this complication. Frameworks of such kind are referred to as cross-platform development tools.

The universal development framework is capable of writing code and deploying applications across desktop, mobile, and iOS environments. It saves a great deal of time and work for developers. Cross-platform development may be done using a variety of tools, including web-based ones like Adobe's Phonegap, Microsoft's Xamarin, Facebook's React Native, and Drifty Co.'s Ionic from 2013.The success of each of those structures in the mobile sector varies. Flutter is a new framework that Google has added to their family of cross-platform tools for development.

### B. FLUTTER ARCHITECTURE

Flutter consists of three architectural layers. Here's a quick breakdown of each:

Framework: This is the most "visible" part of Flutter technology. As mentioned above, this Flutter architecture layer is based on Dart. The extensive set of libraries at this level can be divided into several levels, e.g. E.g.: basic core classes, widget layers and rendering layers.

Engine: This level is written in C/C++. The engine provides a low-level implementation of the Flutter framework as well as other core APIs such as graphics, accessibility support, text layout, and plugin architecture.

Embedder: Embedder is a platform-specific layer that allows Flutter application to run on any operating system.

### C. FLUTTER FEATURES

Featuring a vast array of widgets and material themes, Flutter offers simple techniques for creating stunning mobile and desktop applications. In this section, we go over the key components needed to construct the mobile framework. Open-Source: A free and open-source framework for creating mobile apps is called Flutter.

Cross-platform: With this functionality, Flutter can write code only once, keep it updated, and use

it across several platforms. saves money, time, and effort for developers.

Hot Reload: During a hot reload, any code modifications made by the developer are instantly visible. This indicates that the application itself shows the changes right away. It's a really helpful feature that lets the developer quickly repair bugs.

Accessible SDKs and native features: This feature makes the app development process easy and enjoyable through native Flutter code, third-party integrations, and platform APIs. This means that we can easily access the SDKs on both platforms.
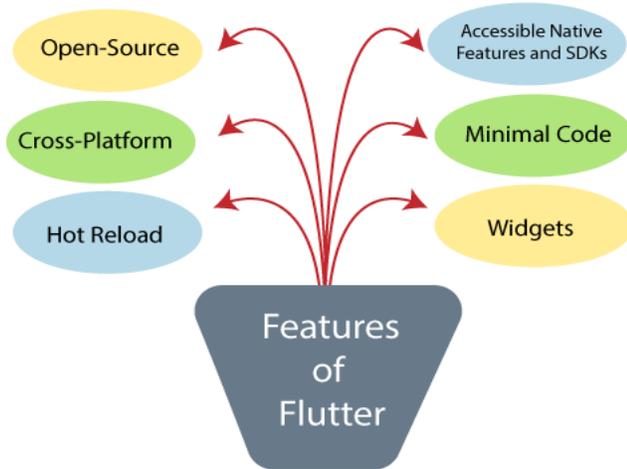


Fig: 2. Flutter Architecture

# V.IMPLEMENTATION:

The IoT-based home automation system consists of two main components: hardware and software. The hardware component includes the ESP8266 microcontroller, relay board and connected devices. The software component includes the smartphone application developed using the Flutter framework.

## i) SYSTEM DESIGN:

Hardware design includes connecting the ESP8266 microcontroller to the relay board, and then connecting the relay board to the home appliances. The microcontroller is programmed to receive commands from the smartphone app and accordingly controls the relay board, which in turn controls the home appliances.

The software design involves developing a smartphone application that can communicate with the microcontroller via WiFi. The app allows users to remotely control their devices, set custom schedules, and control settings such as temperature and humidity. The app also allows users to view the current status of their devices and receive notifications when a device turns on or off.

## ii) SYSTEM DEVELOPMENT:

System development includes enforcing the tackle and software designs and testing the functionality of the system. tackle development involves assembling the factors and connecting the ESP8266 microcontroller to the relayboard.The microcontroller is also programmed using the Arduino IDE and connected to the Wi- Fi network. The home appliances are connected to the relay board and the system is tested to insure that the microcontroller can control. Software development involves designing and developing a smartphone operation using the Flutter frame. The app is designed to be easy to navigate and use, with a simple interface and intuitive controls. The app is also tested to insure that it can communicate with the microcontroller over WiFi and control connecteddevices.Once the tackle and software factors are developed, the system is tested to insure that it functions as intended. Any crimes or problems are linked and corrected, and the system is meliorated until it's stable and dependable. Looking at the current situation, we can make across-platform system that can be stationed on different platforms similar as iOS and Windows. The limitation of only controlling multiple bias can be removed by expanding the robotization of all other ménage appliances.

The prototype may contain detectors to apply automatic control of ménage appliances,e.g. an LDR that can descry daylight and change the beacon consequently, a PIR that detects stir and can be used for security purposes by driving an alarm, or a DHT11 detector that detects the ambient temperature and moisture and the addict/ air conditioner acclimated consequently. The compass of this design can be expanded to numerous areas, not only home but also small services.

In summary, the design and development of an IoT- grounded home robotization system involves the integration of tackle and software factors to produce a scalable and stoner-friendly system for controlling home appliances. The system is

modular, allowing for easy conservation and unborn upgrades.

## VI.CONCLUSION

In summary, an IoT-based home automation system is a practical solution for homeowners who want to automate their home and control their devices via a smartphone app. By integrating the ESP8266 microcontroller with a relay board and developing a smartphone app using the Flutter framework, users can remotely control their home appliances and set custom schedules and control settings. The system's modular design allows for easy maintenance and scalability, and the use of Wi-Fi connectivity enables seamless wireless communication between the smartphone application and the microcontroller. This automation system offers several advantages including greater energy efficiency, greater comfort and better control. about household appliances.

By using NodeMCU and the IoT platform, these devices can be cost-effective.Above all, it offers great convenience to the user as the devices can be controlled from a remote location. By using a website or an application, the system has become platform independent. You do not need a specific operating system to operate this system. The system delivers optimal results. It also offers the opportunity for future improvements such as voice control, machine learning and energy monitoring.Overall, the IoT-based home automation system represents a practical and scalable solution for homeowners who want to automate their home and improve their quality of life.

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