



IOT BASED SMART HOME

A PROJECT REPORT

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In partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

In

**COMPUTER SCIENCE ENGINEERING (INTERNET OF THINGS AND
CYBER SECURITY**

INCLUDING BLOCKCHAIN TECHNOLOGY)

SNS COLLEGE OF ENGINEERING

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BONAFIDE CERTIFICATE

Certified that this project report “**IOT BASED SMART HOME**” is the bonafide work of “**BALAJI S, BHARTHA A, HARIHARAN V S, BHAVDHARANIV, DEEKSHAB, SHARANSKTHIVELMM**” who carried out the project work under my supervision.

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ACKNOWLEDGEMENT

I wish to express sincere thanks to our management for providing us the facilities to carry out this project work.

I'm greatly indebted to our Director Dr.V.P.Arunachalam, Ph.D and our Principal Dr.S.Charles, Ph.D for his continuous evaluation and critical suggestion given to complete the project work successfully.

I'm highly grateful to Dr.P.Gnanasundari, M.E., Ph.D., Head of the Department of Electronics and Communication Engineering for her valuable suggestions and monitoring during the course of our project work.

I'm highly grateful to our Project Guide Ms.D.Vishnu Priya, M.E., Assistant Professor, Department of Electronics and Communication Engineering for her valuable suggestions the course of our project work.

I express my heartfelt and deep sense of gratitude to our Design Thinking and Innovation subject handling faculty member Mr.Pavithra, Assistant Professor, Department of Electronics and Communication Engineering for his valuable advice and guidance.

By this, I express my heartfelt sense of gratitude and thanks to our beloved family and friends who have all helped in collecting sources and materials needed for this project and for their support during our course and project work.

ABSTRACT

This project presents the overall design of Home Automation System (HAS) with low cost and wireless system. It specifically focuses on the development of an IOT based home automation system that is able to control various components via internet or be automatically programmed to operate from ambient conditions. In this project, we design the development of a firmware for smart control which can successfully be automated minimizing human interaction to preserve the integrity within whole electrical devices in the home. We used Node MCU, a popular open source IOT platform, to execute the process of automation. Different components of the system will use different transmission mode that will be implemented to communicate the control of the devices by the user through Node MCU to the actual appliance. The main control system implements wireless technology to provide remote access from smart phone. We are using a cloud server-based communication that would add to the practicality of the project by enabling unrestricted access of the appliances to the user irrespective of the distance factor. We provided a data transmission network to create a stronger automation. The system intended to control electrical appliances and devices in house with relatively low cost design, user-friendly interface and ease of installation. The status of the appliance would be available, along with the control on an android platform. This system is designed to assist and provide support in order to fulfil the needs of elderly and disabled in home. Also, the smart home concept in the system improves the standard living at home.

TABLE OF CONTENTS

ChapterNo	SMART BLIND STICK	PageNo.
	ACKNOWLEDGEMENT	(i)
	ABSTRACT	(ii)
1	INTRODUCTION	1
2	LITERATURE SURVEY	2
3	EXISTING SYSTEM	3
4	PROPOSED SYSTEM	4
5	HARDWARE MODULE SOFTWARE REQUIREMENTS : ARDUINO IDE DIAGRAMS : 1.BLOCK DIAGRAM 2.CIRCUIT DIAGRAM	5
6	RESULTS&DISCUSSION	9
7	CONCLUSION AND FUTUREWORKS	10
	REFERENCE	11

1.INTRODUCTION

Internet of Things (IOT) is a concept where each device is assigned to an IP address and through that IP address anyone makes that device identifiable on internet. The mechanical and digital machines are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Basically, it started as the "Internet of Computers." Research studies have forecast an explosive growth in the number of "things" or devices that will be connected to the Internet. The resulting network is called the "Internet of Things" (IoT). The recent developments in technology which permit the use of wireless controlling environments like, Bluetooth and Wi-Fi that have enabled different devices to have capabilities of connecting with each other. Using a WIFI shield to act as a Micro web server for the Arduino which eliminates the need for wired connections between the Arduino board and computer which reduces cost and enables it to work as a standalone device. The Wi-Fi shield needs connection to the internet from a wireless router or wireless hotspot and this would act as the gateway for the Arduino to communicate with the internet. With this in mind, an internet based home automation system for remote control and observing the status of home appliances is designed. Due to the advancement of wireless technology, there are several different type of connections are introduced such as GSM, WIFI, and BT. Each of the connection has their own unique specifications and applications. Among the four popular wireless connections that often implemented in HAS project, WIFI is being chosen with its suitable capability. The capabilities of WIFI are more than enough to be implemented in the design. Also, most of the current laptop/notebook or Smartphone come with built-in WIFI adapter. It will indirectly reduce the cost of this system.

2.LITERATURE SURVEY

1.“Smart Energy Efficient Home Automation System using IOT”, by Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, Arun Kumar Mishra.

This paper presents a step-by-step procedure of a smart home automation controller. It uses IOT to convert home appliances to smart and intelligent devices, with the help of design control. An energy efficient system is designed that accesses the smart home remotely using IOT connectivity. The proposed system mainly requires, Node MCU as the microcontroller unit, IFTTT to interpret voice commands, Adafruit a library that supports MQTT acts as an MQTT broker and Arduino IDE to code the microcontroller. This multimodal system uses Google Assistant along with a web based application to control the smart home. The smart home is implemented with main controller unit that is connected with the 24-hour available Wi-Fi network. To ensure, that the Wi-Fi connection do not turn off, the main controller is programmed to establish automatic connection with the available network and connected to the auto power backup.

2.“IOT Based Smart Security and Home Automation”, by Shardha Somani, Parikshit Solunke, Shaunak Oke, Parth Medhi, Prof. P. P. Laturkar.

This paper focuses on a system that provides features of Home Automation relying on IOT to operate easily, in addition to that it includes a camera module and provides home security. The android application basically converts Smartphone into a remote for all home appliances. Security is achieved with motion sensors if movement is sensed at the entrance of the house; a notification is sent that contains a photo of house entrance in real time. This notification will be received by the owner of the house via internet such that app can trigger a notification. So owner can raise an alarm in case of any intrusion or he/she can toggle the appliances like opening the door if the person is a guest. The system uses Raspberry Pi, a small sized computer which acts as server for the system. The smart home consist two modules. Home automation that consists; fan light and door controller, and security module that consists; smoke sensor motion sensor and camera module.

3.EXSISTING SYSTEM

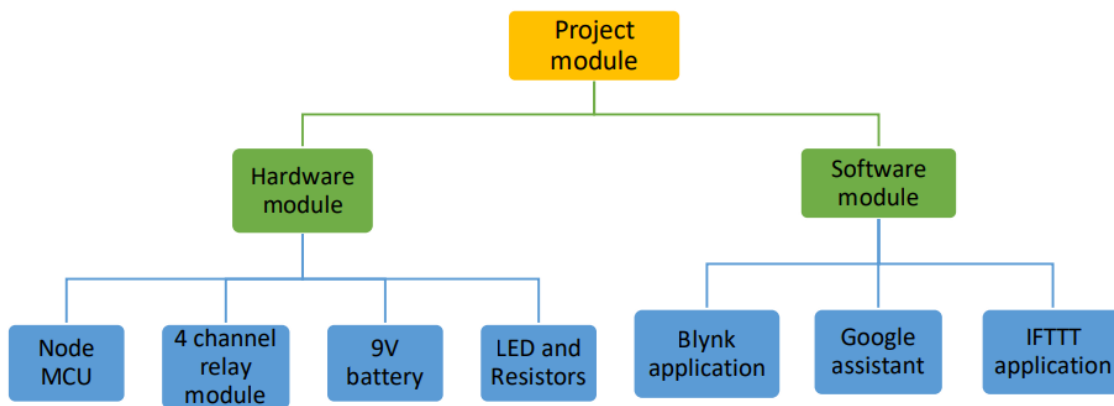
The concept of “Home Automation” has been in existence for several years. “Smart Home”, “Intelligent Home” are terms that followed and is been used to introduce the concept of networking appliance within the house. Home Automation Systems (HASs) includes centralized control and distance status monitoring 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. Mainly being, in the present day, end users especially elderly and disabled, even though hugely benefited, aren’t seen to accept the system due to the complexity and cost factors.

4.PROPOSED SYSTEM

The android OS provides the flexibility of using the open source. The inbuilt sensors can be accessed easily. The application used to control the system has the following features. Android Phone acts as a client and data are sent via sockets programming. The application takes command from user in two different modes.

- Switch mode: Switch mode uses the radio buttons that are used to control the home appliances. The radio button sends the status of the switch.
- Voice mode: Voice Mode is used to control the home appliances using voice command. Using the inbuilt microphone of Smartphone, the application creates an intent that fetches the speech data to the Google server which responds with a string data. The string data are further analysed and then processed.

5.HARDWARE MODULE



A. NODE MCU

Node MCU is the microcontroller unit in the prototype. It has an in built Wi-Fi module (ESP8266) that establishes wireless remote switching of home appliances.



Fig 1

B. FOUR CHANNEL RELAY

Four channel relay module consists 4 individual relays physically connected between Node MCU and the home appliances. It takes signals form GPIO pins of Node MCU and accordingly connects or disconnects home appliances from the supply. They act as the switching device.



Fig 2

C. LED AND RESISTORS

LED and resistors are used in this prototype to replace real appliances. They indicate power being turned on and off to the appliances. In real time operation they would be replaced by actual home appliances.



Fig 3

D. GOOGLE ASSISTANT

Google assistant is a system software present on the android phone. It interprets the voice commands by the user to turn on or off an appliances.



Fig 4

E. IFTTT

IFTTT application the voice commands interpreted by the google assistant isn't understandable by Blynk application thus unable to send to the hardware. IFTTT is an intermediate application that interprets commands from Google assistant and sends on and off signal to Blynk application Via Blynk server.

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Fig 5

SOFTWARE REQUIREMENTS

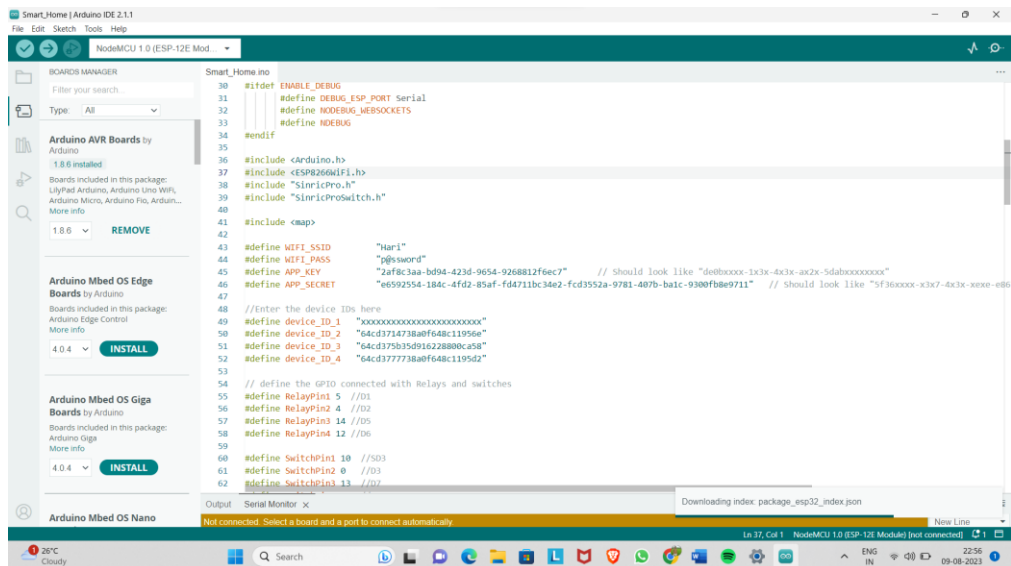


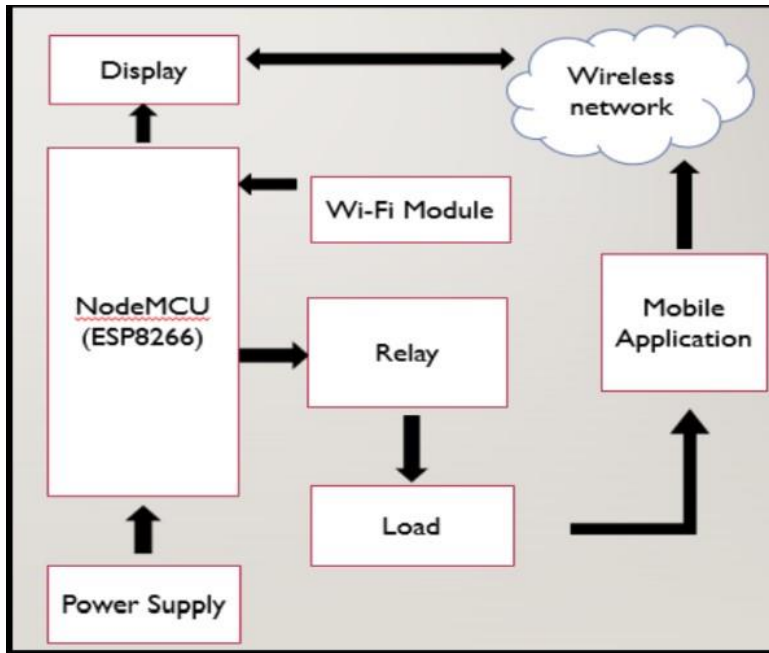
Fig 6

Arduino IDE(Integrated Development Environment)is the software for Arduino. It is a text editor like a notepad with different features.

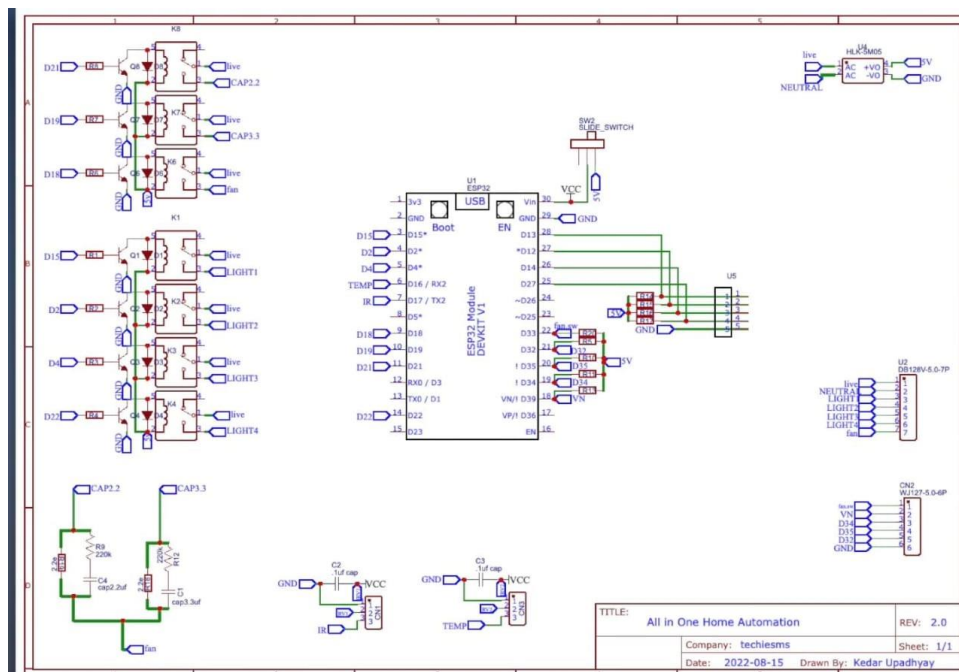
It is used for writing code, compiling the code to check if any errors are there and uploading the code to the Arduino.

BLOCK DIAGRAM AND CIRCUIT DIAGRAM

A.BLOCK DIAGRAM



B.CIRCUIT DIAGRAM



6.RESULTS&DISCUSSION

RESULT

The experimental model was made according to the circuit diagram and the results were as expected. The home appliances could be remotely switched over Wi-Fi network. Both the switch mode and the voice mode control methodologies were successfully achieved. The Blynk application was also successful in displaying the status of every application.

LIMITATIONS

Android devices having lower API version than 16 requires internet access to convert the speech data to string data. Currently, the application is made for Android Smart Phones; other OS platform doesn't support our application. During voice mode, external noises (voice) may affect our result. The speech instruction that we command in our voice mode may not give exact result as expected. There hence lies an ambiguity in result.

7.CONCLUSION AND FUTUREWORKS

FURTHER ENHANCEMENT AND FUTURE SCOPE

Looking at the current situation we can build cross platform system that can be deployed on various platforms like iOS, Windows. Limitation to control only several devices can be removed by extending automation of all other home appliances. The prototype can include sensors to implement automatic control of the home appliances like; an LDR that can sense daylight and switch lamp accordingly, a PIR to detect motion and be used for security purposes making an alarm buzz, or a DHT11 sensor that's senses ambient temperature and humidity of atmosphere and switch fan/air conditioner accordingly. Scope of this project can be expanded to many areas by not restricting to only home, but to small offices.

CONCLUSION

It is evident from this project work that an individual control home automation system can be cheaply made from low-cost locally available components and can be used to control multifarious home appliances ranging from the security lamps, the television to the air conditioning system and even the entire house lighting system. And better still, the components required are so small and few that they can be packaged into a small inconspicuous container. The designed home automation system was tested a number of times and certified to control different home appliances used in the lighting system, air conditioning system, home entertainment system and many more . Hence, this system is scalable and flexible.

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