VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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A Mini Project Report on

"PROTIUM- Smart Switch"

in

ELECTRONICS AND COMMUNICATION ENGINEERING

By

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UNDER THE GUIDANCE OF

"Dr. Arun S. Tigadi"

DEPARTMENT OF ELECTRONICS AND COMMNUNICATION ENGINEERING

K. L. E. Dr. M. S. SHESHGIRI COLLEGE OF ENGINEERING AND TECHNOLOGY
BELGAVI– 590008

(2020-21)

K. L. E. Dr. M. S. SHESHGIRI COLLEGE OF ENGINEERING AND TECHNOLOGY
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Department of Electronics and Communication Engineering

CERTIFICATE

Certified that the Mini Project work entitled **"PROTIUM- Smart Switch"(18ECMP68),** is carried out by **Yash B. Joshi (2KL18EC116), Vaibhav S. Alur (2KL18EC118), Varsha Mattur (2KL18EC109), Prashant M. Bhajantri (2KL18EC122)** are bonafied students of **Department of Electronics and Communication Engineering, K. L. E. Dr. M. S. Sheshgiri College of Engineering and Technology, Belagavi,** during the year **2020-21.** It is certified that all correction/suggestions indicated have been incorporated in the report and has been approved as it satisfies the academic requirements in respect to **Mini Project** prescribed by the Visvesraya Technological University, Belagavi.

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HOD
Dr. Rajashri Khanai

K. L. E. Dr. M. S. SHESHGIRI COLLEGE OF ENGINEERING AND TECHNOLOGY

Department of Electronics & Communication Engineering

Vision and Mission of the Department of Electronics and Communication Engineering are:

VISION

To be the center of excellence for education and research in Electronics and Communication Engineering

MISSION

1. To achieve academic excellence by encouraging active student-teacher relation.
2. To groom students with high moral and ethical standards.
3. To promote socially-relevant research and development activities.
4. To collaborate with institutions and industries for knowledge sharing, employability and entrepreneurship.
5. To encourage life-long learning in developing innovative products and services.

PROGRAM EDUCTIONAL OBJECTIVES (PEOs)

The educational objectives of the undergraduate program in Electronics and Communication Engineering are:

1. To impact the knowledge and skills to meet the needs of current and emerging technologies in Electronics and Communication Engineering.
2. To enable active pursuance of life-long study in Electronics and Communication Engineering in order to develop innovative technologies for quality products and services.
3. To cultivate the ethical and socially relevant research and development activities.
4. To impact effective communication skills for success in interdisciplinary and multicultural teams.

Program Outcomes: (POs)

1 **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2.**Problem Analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3.**Design/development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4.**Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5.**Modern Tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8.**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9.**Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10.**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11.**Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:(PSOs)

1. Demonstrate theoretical and practical knowledge of Electronic and Communication Engineering.
2. Exhibit the technical and soft skills leading to employability.
3. Actively pursue lifelong learning to develop innovative products and services.

K. L. E. Dr. M. S. SHESHGIRI COLLEGE OF ENGINEERING AND TECHNOLOGY
Department of Electronics & Communication Engineering

Project Group No: 31

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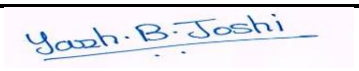
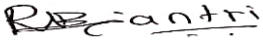
Yash B. Joshi	2KL18EC116		
Vaibhav S. Alur	2KL18EC118		
Varsha Mattur	2KL18EC109		
Prashant M. Bhajantri	2KL18EC122		

Mapping of Program Outcomes(POs):

Project Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
PROTIUM-SMART-SWITCH.	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

Mapping of Program Specific Outcomes (PSOs):

Project Title	PSO1	PSO2	PSO3
PROTIUM - Smart Switch	✓	✓	✓

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Abstract

Internet of Things is composed of things that have unique identities and are connected to each other over internet. It is simply connecting and monitoring various devices and sensors through Internet. This paved the way for home automation and monitoring which makes human life more comfortable and secured. This paper describes the overall notion of the IOT based sensing systems and monitoring systems for implementing an automated home. The proposed prototype uses Node MCU board with internet being remotely controlled by Android OS smart phone. Node MCU is the heart of this system and it can perform as a micro web server and it acts as an interface for the wide range of hardware modules. To control lights, fans and other home appliances which are connected to the relay system, the system offers switching functionalities. It is also used for environmental monitoring by sensing and analyzing data about temperature and humidity. Another notifying feature in this system designed is the intrusion detection which is offered by this system using motion sensor. All these activities are controlled by using Android mobile app-Blynk.

Acknowledgement

We owe my deep gratitude to our project guide Dr. Arun S. Tigadi, who took keen interest on our project work and guided us all along, till the completion of our project work by providing all the necessary information for developing a good system.

We would not forget to remember Dr. Rajashri Khanai HOD of E&C Department for her encouragement and more over for her timely support and guidance till the completion of our project work.

We would also be thankful to our principal Dr. Basavaraj Katageri of KLE Dr.MSSCET for providing all the required facilities in completion of this project.

Finally, as one of the team members, I would like to appreciate all my group members for their support and coordination, I hope we will achieve more in our future endeavours.

I. INTRODUCTION

The internet of things, or IOT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that 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. The IOT devices have the capacity to exchange the contents depending upon the control of function in a specified manner. The benefit of IOT networks is that they can separate and create information by designating, filtering, handling and extracting the data. The authorities predicted that by the year 2020, around 50 billion devices have internet connection . One of the major sides of IOT is a smart home. The era of never-ending growth of the internet and its application, smart home system or home automation system is highly increasing to provide comfort in life and improving the quality of life. The main objective of this smart home system is to make human life easy and comfortable by using IOT. Now a day as people are so busy with their work pressure so the will be looking for a smarter life style. Home automation or domotics is building automation for a home, called a smart home or smart house. A home automation system will control lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems. A home automation system typically connects controlled devices to a central hub.

2. LITERATURE SURVEY

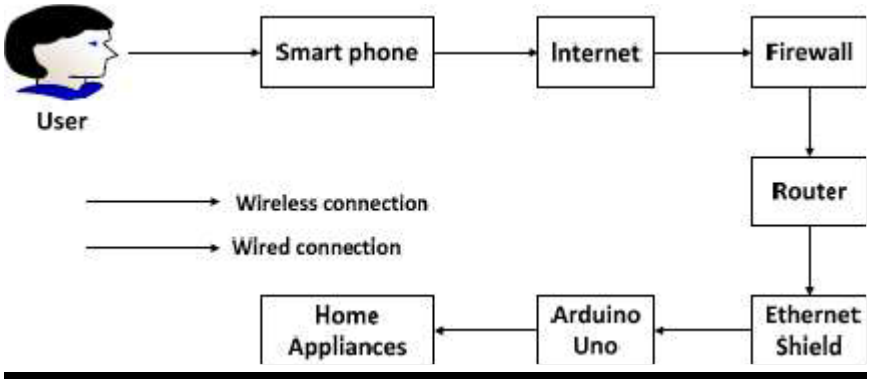
In developed and developing countries the more and more technologies are arriving every year. And of the most important is the IOT. IOT can be used in many sectors of the technology. IOT is also used in home automation which helps to make life easy as well as it is time saving. Smartphone Application can be utilize for the IOT communication protocols. Application can be used to monitor and control local switches via mobile phone. Many systems are reported in the literature based on single monitoring and controlling mode utilizing text, voice or gesture commands. The system has two different operation modes first mode make use of a mobile app interface with virtual switches and slider to monitor and control appliances. The second is chat-based that use text or audio command filter with natural language processing to monitor and control the home appliances. The proposed system is scalable in that it is able to add and remove rooms on demand. Most of the technologies which are in the developed are limited as some as feature of turning light and fan on and off while some has control over the gate. There is one technology in which website is use to control the home appliances and in another one there is only mobile application. Different technologies are developed in different way.Several remote controlled home automation systems have been studied. R.Piyare and M.Tazil research work provided full functionality to remotely control home appliances via wireless communication between the Arduino BT and cell phone using Bluetooth technology. Arduino BT board was connected with home appliance and it was controlled by a Symbian OS cell phone application. Symbian OS cell phone can only support the python language scripts and this system failed to support Java based application, nowadays mostly smartphone applications are developed in Java. Similarly,another study presented home automation system using Bluetooth and android application. However, this was designed only for 4 lights and it was not feasible to control more than 4 home appliances . In another research work , XBee based home automation system introduced for handicapped and elderly people. XBee transceivers was used for wireless communication between the master control panel board and the remote control device.A home monitoring and automation system was also studied,it was implemented by using Arduino Uno and Digilent chipKIT. Although this system mentioned as low cost system but it is much expensive than Bluetooth base home automation system . A low cost and wireless controlled automation system was designed by researchers . Bluetooth technology was used to provide remote controlled wireless access to user.Although this system achieved high accuracy but it only aimed to provide facilities and assistance to disabled and elderly.

3. Methodology and Implementation

Smart home automation is now a very important characteristic of IoT application. It reduces human efforts and increases comfort and convenience. Wireless technologies play an important role in automation system. Web of Things (WoT), Industrial Internet of Things (IIoT), Internet of Everything (IoE) defines IoT as "devices that are connecting to the internet, integrating greater compute capabilities, and using data analytics to extract valuable information". In building automation system (BAS) buildings can be equipped with IoT enabled device. Older homes can be made smart with minimum investments. Nowadays most smart homes are equipped with technologies like LTE, 4G, 5G, or Wi-Fi. Methodologies for making smart ho mes are categorized as below:

A.IOT Based:

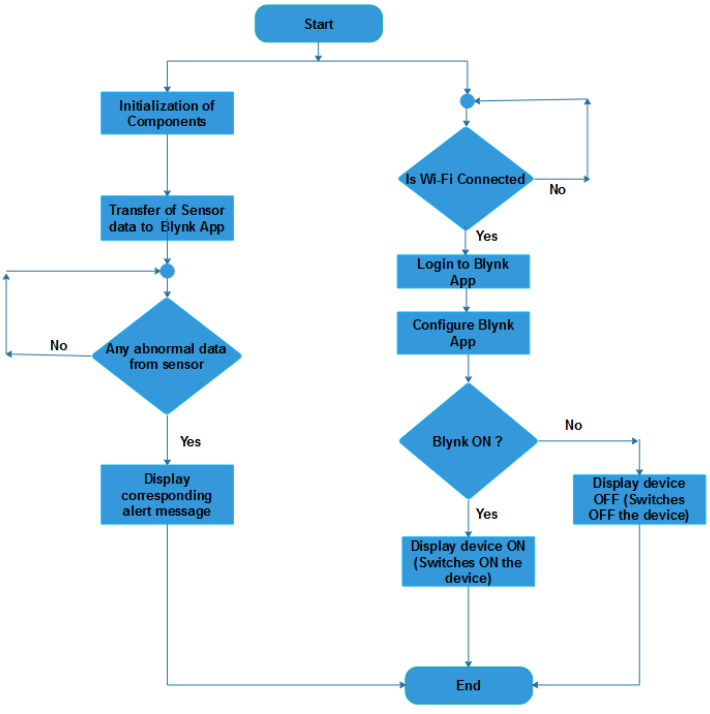
Rajeev Piyare has develop an IoT enabled automation system. It consist of micro web server, controlling devices, smartphone and a software application. Home environment, home gateway and remote environment are main components of the system.



B. Voice Recognition Based

S Sen et al has developed a system which consists of Arduino UNO and smartphone. Bluetooth has been used for communication between the smartphone and the Arduino UNO. Android OS based application has used for automation. Android based voice commands converts the user voice command into text, then it transmit that message to Bluetooth module HC-05 which is connected with Arduino UNO. This system reduces effort to manage smart ho me. You can add or delete new devices in the system. Its work efficiency is less due to existence of noise in the environment.

The home automation circuit is built around ESP8266, Blynk Android App, and a 4-channel relay board. The hardware set up should be according to the circuit diagram. AC mains appliances (Bulbs) will be connected to relays which are controlled by the ESP8266.Once Arduino IDE is installed on the computer, connect the board with the computer using the USB cable. Now open the Arduino IDE and choose the correct board by selecting Tools>Boards>NodeMCU1.0 (ESP-12E Module), and choose the correct Port by selecting Tools>Port. To get it started with the Node MCU board and blink the built-in LED, load the example code by selecting Files>Examples>Basics>Blink. Once the example code is loaded into your IDE, click on the „upload" button given on the top bar. Once the upload is finished, you should see the built-in LED of the board blinking User has to install and configure the Blynk App as per the above instructions. Node MCU to 4- Channel Relay Board Connect D0 pin of Node MCU to D1 pin of 4- Channel Relay board, Connect D1 pin of Node MCU to D2 pin of 4- Channel Relay board, Connect D2 pin of Node MCU to D3 pin of 4- Channel Relay board, Connect D3 pin of Node MCU to D4 pin of 4- Channel Relay board, Connect 3.3V of Node MCU to Vcc pin of 4- Channel Relay board, Connect GND pin of Node MCU to GND pin of 4- Channel Relay board. We are including ESP8266 WiFi library which provides ESP8266 specific WiFi routines and we are calling it to connect to the network. BlynkSimpleEsp8266 library establishes the communication between Blynk App and ESP8266.



4.RESULTS AND DISCUSSIONS

The main purpose of this smart home design is to control the electronic appliances in home like fans, lights, AC and forth remotely using smart phone. By using Blynk android app one can control the electronic appliances in home from any distance. All the persons in that family can share Blynk app so that, when one person switches a device either fan or light etc., remaining persons will get this information and are aware of usage of the respective equipment.

The overview step analysis form the user command to the task execution is mentioned below for the IoT based Home Automation System-
1) Initially, when Power is switched on, the Wi-Fi module searches for the specific SID and password configuration from the list of available connections. This runs in loop unless the listen connection is connected.
2) The Device then connects to the required/listed connection and waits for the server response.
3) The user sends the desired command in terms of switching on/off the listed devices.
4) The command is received by the microcontroller with intentional delay.
5) The Microcontroller triggers the op to coupler by providing an input depending upon the user command.
6) The op to-coupler triggers the gate terminal at Triac resulting in the device turning on/off.

The system was set-up as follows: the ESP8266 Wi-Fi module was configured, and its firmware was set-up using the ESP8266 Download Tool V3.6.4 and made ready to respond to AT commands. A serial monitor of the Arduino IDE was used to type in the commands, such as AT, AT+GMR etc. Note that all AT commands were entered in capital letters. AT was sent and the ESP8266 responded with „OK" to show that the AT commands are set and ready to be used. Furthermore, AT+GMR was sent and the ESP8266 responded with the AT version, SDK version and compile mode. To ascertain successful communication between the mobile application and the ESP8266 Wi-Fi module, the serial monitor of the Arduino IDE was used to view the actions between the Node MCU-App and the ESP8266, where the Node MCU-App Arduino code was run on the Arduino IDE and its Android code was run on Android studio while a compatible mobile phone was connected. An IP address was inserted in the Node MCU-App and an LED was turned ON/OFF. This proved that there was communication between the Node MCU-App and the ESP8266 which was through commands sent via HTTP. In addition, the LED turned on wirelessly from the commands sent from the Node MCU-App via Wi-Fi, and this code was integrated with the main code of the Android application and the Arduino.

5. Conclusion

In our planned model a high proportion of accuracy has been achieved through implementation. This method is capable of dominating the house appliances supported the users desired mode. All the modes work with sensible accuracy that was found throughout implementation. Users solely ought to choose modes from their smartphones and our system can do the remainder of controlling the appliances. This planned project is extremely reliable. Therefore it is aforesaid that this system has higher accuracy with nice potency. This system has immense opportunities to upgrade within the future. As mentioned earlier this is often the primary generation of home automation. It might be upgraded to the second generation by storing and analyzing knowledge on the cloud servers. Then victimization machine learning algorithms, we have a tendency to even ought not to select modes from smartphones. Rather it'd be ready to switch modes with its own computer science.

The key objectives of this work were to research, design, implement and evaluate a Smart Switch Control System (SSCS) using Wi-Fi technology, and evaluate the system in terms of its accuracy and time to control switches.

To achieve this, the following key components were delivered.

1. An Android mobile application was developed to control an Arduino UNO board.
2. A Wi-Fi module which facilitated the connection and communication between the mobile application and the actual device.
3. A programmable board/microcontroller which acted as the brain of the system and executed key functions.
4. An internal security system which protected the device from unauthorized users.

Finally, a survey was conducted on users of the system who were generally satisfied with its performance and indicated that they will recommend it to other users. The proposed SSCS may be improved by incorporating a system that can intelligently respond to demand response signals without jeopardizing customer satisfaction.

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