



Implementation of Campus Automation System using IoT

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ABSTRACT: This Paper focuses on implementing college automation using IoT along with classroom and Parking integration. Now today's automation, getting a lot of importance and IoT is becoming more popular and rapidly developing day by day. The IoT will also have a major implication in institute/college; this Paper focuses on classrooms automation in college by installing small internet connected devices in each classroom. Node MCU ESP 8266, is used as the brain of the whole controlling system. The IoT provides a wireless access to the system and the user can keep a track of the availability of the parking area. The parking information is sent to the user via notification. Thus, the waiting time for the user in search of parking space is minimised. In this paper android phone is used to control the various parameters using Blynk app.

KEYWORDS: IoT; Node MCU; Classroom Automation; Parking Automation, Blynk app.

I. INTRODUCTION

The Internet of Things is the interconnection of the various computing devices embedded in the daily appliances to the internet, thus enabling them to communicate with each other. This enhances the end user's quality of life and to improve efficiency and sustainability in the day to day activities. In shortly, many of the smart devices will be communicating over IOT the analyst firm Gartner predicts that by 2020 there will be more than 20 billion devices connected to the Internet of Things. As we will approach that value, it is predicted that around \$6 billion will flow into the various domains of IOT like application development, device hardware, system integration, data storage, security, and connectivity.

Nearly \$6 Trillion will be spent on IOT solutions by 2025. This report presents the designing an advanced Campus automation system using Node MCU ESP8266 module. The devices can be switched ON/OFF and read using mobile through Wi-Fi. The hunger for automation brought many revolutions in the existing technologies. These had greater importance than any other technologies due to its user-friendly nature. Wi-Fi is wireless technology that uses radio frequency to transmit data through the air. Wi-Fi transmit data in the frequency Band of 2.4 GHz. The range of Wi-Fi technology is 40-300 feet. Controlling devices for the automation of the project is Node MCU. The data sent from mobile over Wi-Fi will receive by Wi-Fi module connected to Node MCU. Node MCU reads the data and decides the switching action of electrical devices connected to it through Relays.

The concept of Internet of things (IOT) Creates a network of objects that can communicate, interact and cooperate together to Reach a common goal. IOT devices can enhance our daily lives, as each device stops acting as a single device and become part of an entire full connected system. This provides us with the resulting data to be analyzed for better decision making, tracking our businesses and monitoring our properties while we are far away from them. A system has been proposed to control electrical appliances anytime from anywhere in the world and efficiently utilize power by controlling appliances properly. Android app has been used to read data from sensor and feed into microcontroller so user can control electrical appliances based on these data.

II. LITERATURE SURVEY

Today is a new era of computing technology i.e. Internet of Things (IoT). IOT can be termed as a "universal global neural network" in the cloud which connects various things. Internet is a revolutionary invention, it has always been transforming itself into some or other new kind of hardware and software which makes it irresistible for anyone. Nowadays the communication is in the form of human-human or human-device. But the future of internet i.e. IoT promises a machine-machine type of communication. The IoT is a system comprising various devices or systems which are intelligently connected which interacts and communicates with other machines, environments, objects and



infrastructures. With the areas like business, transportation, medicine, energy, agriculture and others, the Internet of Things also finds a major implication in education. A university campus can be considered as the ideal place for the creation of a smart environment. The aim of the hereby paper is to describe a new concept called Smart University by providing a comprehensive overview of the IoT scenario and reviews its enabling technologies and the sensor networks[1]

In this digital era, the life of human beings is getting simpler as almost everything is being automatic, replacing the old manual systems. Nowadays internet has become an integral part of human's everyday life without which they are helpless. In this project Internet of Things (IoT) provides a platform where devices can be connected, sensed and controlled remotely across a network infrastructure. The IoT devices controls and monitors the electronic, electrical and the mechanical systems that are to work in a campus. Single admin controls the various devices connected to the cloud server and also facilitates a number of sensors and control nodes. The system designed is economical and scalable as it can be expanded by connecting and controlling of a number of different devices. The interconnected things have physical or virtual representation in the digital world, sensing/actuation capability, a programmability feature and are uniquely identifiable. The representation contains information including the things identity, status, location or any other business, social or privately relevant information [2]

This project focuses on achieving college automation along with smart classroom integration. In today's world automation, gaining a lot of importance and iot is becoming more popular day by day; this project focuses on smart class rooms in college by installing small internet connected devices in each classroom. Raspberry pi, is used as the brain of the whole controlling system. An embedded linux is used as the operating system and allows us to make the classroom smart, offering various software and teaching tools to be easily installed. Python, a high-level programming language is used to fetch data from cloud and implement the control logic for controlling the appliances in the classroom. Flask, a micro web framework is used to develop the backend server application. Sqlite3 is used to manage the data on cloud. The ui to control the appliances in the classroom is developed with materialize, a framework allowing to develop responsive material design [3]

New technology like (IoT) in recent years rapidly developing in a computing world. The Internet of things will change the real world, activities and objects from simple to most complex. Beside areas as Business, Cities, Transportation, Healthcare, Agriculture and different areas, The IoT will also have a major implication in institute/college. In digital era our College campus need of IoT technology for classy environment to utilize secured & modern technology for e-campuses activities in academic course of action. In general, campuses spread over a fairly large area and it's very difficult to control for management to track everything happens. This project focuses on need of adopting IoT technology in campus using Secured for (e-Educational)-Campus academics. In near future drastically make changes for students in highly enabled IoT. Starting from needs and advantages ending with a possible architecture based on smart objects [4]

This paper describes the development of smart campus using Internet of Things (IoT) technology. Through smart campus, it is possible that a campus is connected via online by the outside entity, so that the teaching approach based on technology can be conducted in real time. This research was conducted in smart education, smart parking and smart room. Observation and literature studies were applied as the research method with the related theme for the sake of system design of smart campus. The result of this research is the design of smart campus system that includes smart education development, smart parking and smart room with the sake of Universities PGRI Yogyakarta as the case study [5]

III. PROPOSED SYSTEM

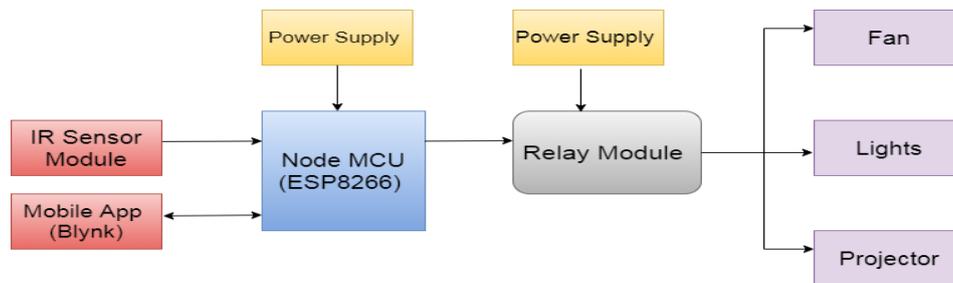
The designing of the system has two major portions: software design and hardware design. The hardware is designed by arranging microcontroller, sensors and actuators whereas software design includes programming that is written and uploaded in the microcontroller. The designed system shows microcontroller connected to sensor-modules and actuator-modules for monitoring and controlling campus electrical devices. This design section shows how different hardware components are set up. The specifications and information regarding various components are described below. The system is modeled to monitor data from three sensor-modules and control three loads by using mobile application.

3.1 Proposed System Feature:

The proposed campus automation system is a distributed into Classroom automation system and Parking automation System, it consists of server, hardware interface modules. Server controls hardware one interface module, and can be easily configured to handle more hardware interface module. The hardware interface module in turn



controls its alarms and actuators. Server is a normal microcontroller, with built in Wi-Fi card, acts as web server. Wi-Fi technology is selected to be the network infrastructure that connects server and hardware interface modules. Wi-Fi is chosen to improve system security (by using secure Wi-Fi connection), and to increase system mobility and scalability. Even if, user intends to add new hardware interface modules out of the coverage of central access point, repeaters or managed wireless LAN will perfectly solve that problem. The main functions of the server is to manage, control, and monitor distrusted system components, that enables hardware interface modules to execute their assigned tasks, and to report server with triggered events.



Class Room Automation using IoT

Fig 3.1 Block diagram of classroom automation system

3.2.1 Flowchart for classroom automation.

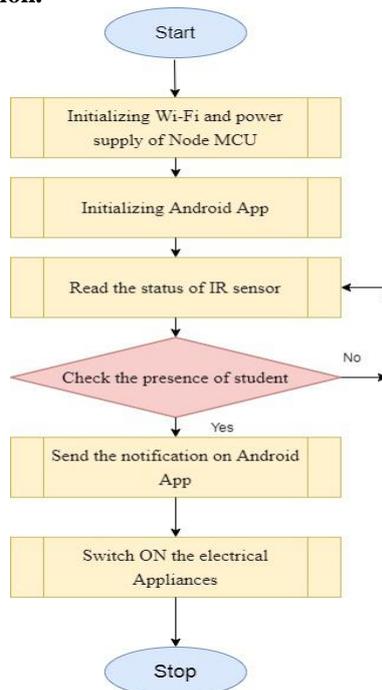


Fig 3.2.1 Flowchart of classroom automation system

3.2.2 Algorithm

- Step 1 : Start
- Step 2 : Initializing Wi-Fi and Power supply of Node MCU
- Step 3 : Initializing Android App
- Step 4 : Read the status of IR sensor
- Step 5 : Check the presence of students
- Step 6 : If student are detected Send the notification on Android App
- Step 7 : And if student are not detected then again go back and check the status of IR sensor
- Step 8 : Switch ON the electrical Appliances otherwise remain it as OFF
- Step 9 : Stop



3.3.1 Flowchart for parking automation.

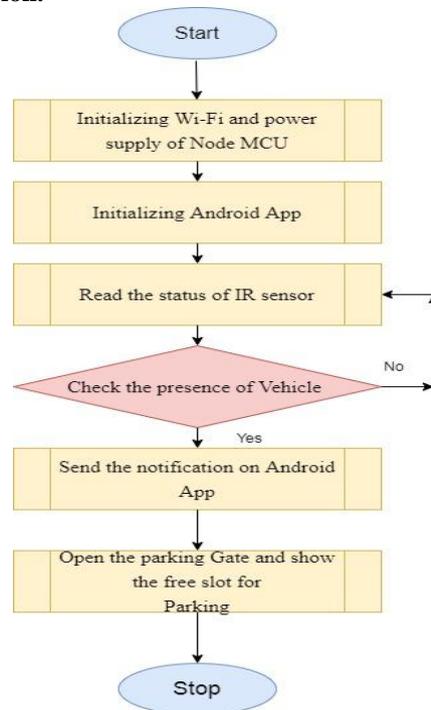


Fig 3.3.1 Flowchart of parking automation system

3.3.2 Algorithm

- Step 1 : Start
- Step 2 : Initializing Wi-Fi and Power supply of Node MCU
- Step 3 : Initializing Android App
- Step 4 : Read the status of IR sensor
- Step 5 : Check the presence of students
- Step 6 : If student are detected Send the notification on Android App
- Step 7 : And if student are not detected then again go back and check the status of IR sensor
- Step 8 : Switch ON the electrical Appliances otherwise remain it as OFF
- Step 9 : Stop

IV. WORKING OF CAMPUS AUTOMATION USING IOT SYSTEM

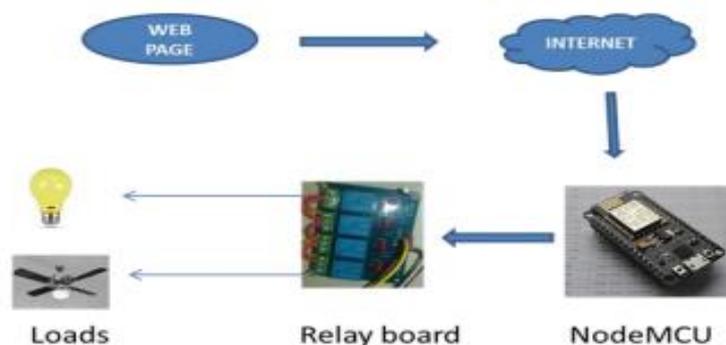


Fig 4.1 Campus Automation System



In the working process firstly, we have tested the campus automation part. For home automation we have used android app as input, node MCU as the controller and lights, Fan as appliances or output. In this process we have checked our system for short range communication and also from outside. We have used android application which is an open for beginners to test IOT stuffs. We have tested our campus automation modes from this app. For this case we needed this app installed in our phone. On the other hand, another controller Node MCU is added with the Arduino IDE, So the process is command was sent through the app to internet towards the Node MCU which is connected to internet via Wi-Fi. The Node MCU takes input from internet, and then works according to the campus automation algorithms. Like when instruction on is pressed in the app, the command is sent to Node MCU via internet. Then the Node MCU will make the pin high which is assigned to relays. So the Node MCU's output is the input of relay. Relay now gets an input pin high so the appliances will turn on, and when the input pin of relay gets low the appliances will turn off. This is how the appliances are controlled from app.

V. HARDWARE IMPLEMENTATION

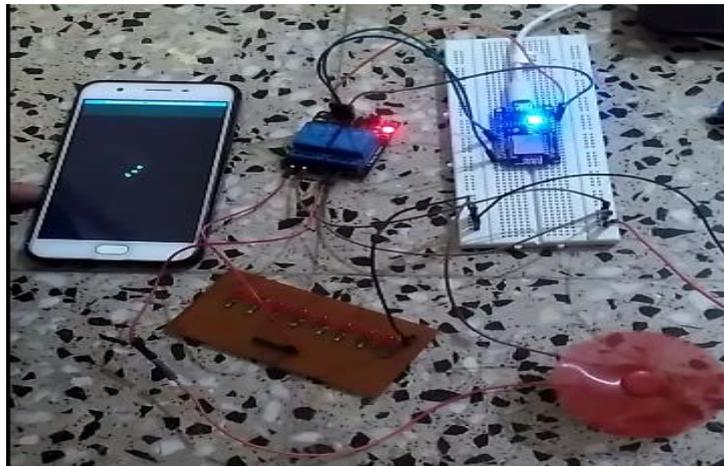


Fig.5.1 Hardware Implementation

VI. CONCLUSION

In this project we have introduced advance era for campus automation system using IoT to make human life more easy and luxuries. This system deals with problem faced by peoples in day to day life, the main motto of this project is to make things less complex and available in low prices. The approach discussed in the report is novel and has achieved the target to control electrical appliances remotely using the Wi-Fi technology to connect system parts, satisfying user needs and requirements. Wi-Fi technology capable solution has proved to be controlled remotely and is cost-effective as compared to the previously existing systems. Hence, we can conclude that the required goals and objectives of campus automation system have been achieved. Finally, the proposed system is better from the scalability and flexibility point of view than the commercially available campus automation systems. The designed campus automation system using IoT was tested a number of times to control different electrical appliances used in the lighting system, Parking system and many more. Hence, this system is scalable and flexible.

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