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Smart Hostel Automation System using IOT

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Abstract: The main objective of the project is to develop a IOT based hostel automation system. Most of us, habituated towards leaving the hostel room without switching off the lights and Fans, which leads to unnecessary consumption of energy for the institution and paying a huge amount of bill from their budget. We are developing Automatic switching and controlling using Arduino for the efficient use of energy in the hostel room. This system will control the switching off lights and fans in the hostel room based on the presence of human using relay control. In addition to relay control, we have also provided a remote control system using Android mobile Application to control the switching. We have also added voice control technique. By giving a voice command to the Google Assistant we can control the electrical equipment. The technical fault will be identified and it will Send Short Message Service to the Electrician/Operator.

Keywords- Arduino, Node MCU, Sensors, Relays.

I. INTRODUCTION

The automation system is characterized by the ability of the system to perform tasks to initiate or control appliances. Automation is the technology by which a process is performed with minimum human assistance. Nowadays, the appliances available in the market is increased day by day. Thus, the controlling of the devices is getting more and more complex. From a long time ago mostly the controlling is done by manually such as walking to the switch and switching it on and off. But time passed the arrival of remote control that gives a man to control such an appliance without the need for human power. Nowadays automation is used for a wide range of applications. Various automation technique has been used in the earlier days.

Automation technology is performed with minimum human assistance. Now a days automation is used for a wide range of applications. Various automation technique have been used in the earlier days. Some of them are methods are discussed. Without internet connection we can monitor and control the home appliances through Java-based home automation. The software used to control the home appliances is Java Beans. The software algorithm was developed by high level languages. A program was developed to control the appliances locally and remotely[1]. After that java, automation systems are discovered by worldwide web. In past days information was shared by using world wide web.

II. EXISTING SYSTEM

A. Literature Survey

In current situation hostel automation system is developed using many technology like IoT and cloud etc. There are many systems in market.

B. Sensor Based Hostel Automation and Security System

This is a web based hostel automation system in which user can interact with the system through a web-based user interface over the Internet. The system connected to hostel appliances. The main processor interacts with external components, viz. sensors, appliances and devices.

C. I - Learning IOT

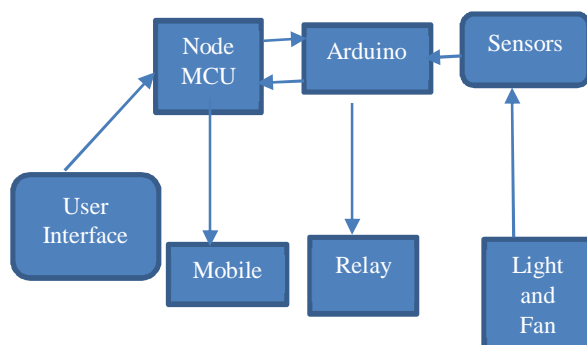
In i-Learning IOT, Home automation system is done on cloud principle. By using of different sensors, monitoring is to be done. System is used to report that problem to Cloud Server. Cloud platform will store the information into the database and will take actions according to output.

D. Java-Based Home Automation System

In Java based home automation, home appliances can be monitored and controlled with the embedded system board through a web browser. The system can add any appliances and it is also secured by password.

III. PROPOSED SYSTEM

The proposed system has an advantage of sending Short Message Service(SMS) to the operator/electrician when the system is not in working condition.



Implementation Details

A. Software Implementation

We used the BLYNK app that is online arduino application tool. In this tool we use individual button for turning ON/OFF the appliance, after clicking the button it will automatically get Toggle. We will also use the voice recognition to control the appliances. Commands are sent through the web viewer object to the Wi-Fi module. Web viewer passes the commands through the address of Wi-Fi Network.

B. Hardware Implementation

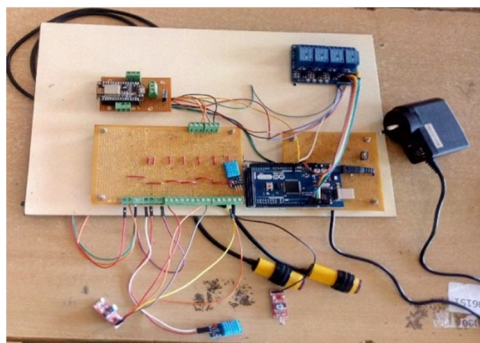
In hardware implementation we are using arduino mega as a controller. It has 14 digital input/output pins. The Arduino comes preprogrammed with boot loader that allows you to upload a new code to it without the use of an external hardware programmer. Arduino does not have any wireless connection that's why we are using Wi-Fi module for wireless communication. ESP8266 Wi-Fi module is used for communication between android mobile app and arduino board. Here Arduino receives the command and control the relay board. Instead of switching control we use relay that is connected to arduino. Here in our system four relays are used to controlling the fan and light. Then we use ultrasonic sensor to control the water flow with its particular level reached. Flame sensor is use to detect the fire extinguishment level when it occurs. PIR sensor is used to detect the temperature level of human beings. All these sensors would be connected through the arduino mega with its coding functions. LDR is used to control the light appliances for our basic needs.

C. Specification of Components

- 1) **Arduino Mega Board:** The Arduino Mega is a microcontroller kit. It has 54 digital input/output pins , 16 analog input pins, a 16 MHz crystal oscillator, a USB connection, a power jack and a reset button. It should support the microcontroller kit, and then simply connect it to a computer with USB cable.
- 2) **5v Relays:** A relay is an electrically operated switch. It is used to control the electrical appliances. It has three ports. They are I/P, Ground and Vcc pin. I/P pin is used to give the 5V supply.
- 3) **Wi-Fi Module:** The ESP8266 WiFi Module is an integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. It is capable of hosting an application with Wi-Fi networking functions from another application processor.ESP8266 has a powerful on-board processing and storage capability.
- 4) **Flame Sensor:** A flame sensor "senses" a weak DC signal from the AC power sent to the igniter which via the phenomenon of flame rectification in which the polarity of power sent through a flame is rectified to DC. This sensor is used to detect the fire. It will sent an alert through Buzzer.
- 5) **Ultra Sonic Sensor:** Ultra Sonic Sensors are used to detect the level of substances that can flow. Such substances include liquids, slurries and powders. This sensor is used to measure the distance from actual level.
- 6) **PIR Sensor:** A passive Infrared sensor is an electronic sensor that is used to detect the human being. When a PIR sensor is configured in a differential mode, so it becomes as a motion detector device.
- 7) **LDR Sensor:** LDR stands for Light Dependent Resistor or Photoresistor, which is a passive electronic component, basically a resistor which has a resistance that varies depending of the light intensity.

D. Experimental Setup

Our paper consists of three important parts such as sensing, monitoring, and controlling the system. The first part sensing is done by sensors like flame sensor, ultrasonic sensor etc. the monitoring task is done by the system and the controlling part is done by our microcontroller unit i.e. is Arduino Mega. The sensors, appliances and Wi-Fi module are interfaced with Arduino Mega. The value of sensors brings a change in the status of our appliances. The ultrasonic sensor detects the water level, if it reaches the desired level, then the signal will sent to the relay. In an effect the motor will power off. The flame sensor alerts us if there is fire in the hostel. The status of our appliances are uploaded on the system and the user can see the status on his laptop and smart phone as well. Then we will use the BLYNK app to control the fan and light connections. If the fan and light gets fault, then we will use the PIR sensor to monitor the status and send the message to mobile with the help of Wi-fi module (Node MCU ESP8266).



IV. MOTIVATION

In some cases the peoples are in hostel and they are not able to frequently controlling appliances in hostel, so using hostel automation system these people can easily control all the appliances. Hostel automation system also improve the standard of living and provide easy, flexible and interactive user interface. Hostel Automation provide all functionalities in low cost and flexible environment so we need to apply modern technology and devices.

A. Future Scope

Our system we are providing limited access to user that is limited to only same network. So in future we are providing access to system remotely via system and IoT technology.

V. CONCLUSION

IOT provides numerous benefits to the society. In our paper, we can provide and prove the strength of IOT. It is capable to contribute the service for the purpose of building vast number of applications and help to implement them on the public platform. Our design provides moderate and less expensive way of sensing, monitoring and controlling system in the field of domestic and as well as industrial standard to implement IOT. At a final note, we conclude that IOT leads to become universal in every aspect. Our normal day to day life we will control all the appliances using the smart phones which will bring ease to their routinelife.

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