Energy Efficient Smart Home Automation

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Abstract - *Living in digital age, various things are getting available for us in an instant click. It has become essential for us to conserve energy we consume on daily usage through electrical appliances by handling it the effective way. For that purpose, we have come up with an IOT based system to control electrical appliances with the help of various sensors and a central microprocessor that is with a NodeMcuESP8266 or a generic Arduino-UNO. A Blynk server has been used in the process to obtain data from the sensor and process it accordingly. It this system we have made sure not only to control the electrical appliances based on the data received from the sensor and acting accordingly, we have also left a scope to control it manually as per user's convenience for remote control access. Based on the data received from the sensors, various actions can be taken further like emergency alerts.*

*Key Words***: Blynk, sensors, NodeMcuESP8266, Electrical appliances, Arduino-UNO**

1. INTRODUCTION

In traditional approach of operating the electrical appliances it is hard for us to keep a track of the ongoing processes in our appliances. So, in this approach we have came up with a way to collect this data with the help of sensors and process it accordingly. With the advancement in the wireless technologies, Wi-Fi has become one of the most important part of our lives. We can use this as a tool to act as a bridge between us and the appliances for controlling it manually. Similarly, with the help of GSM, sensors can send emergency alerts (if any) to the user's device. With the help of an easy GUI on the app, it is easy for the user to control manually and also through a remote location. Keeping our appliances connected to the home Wi-Fi makes the process lot easier. Various sensors like LDR sensor, flame sensor, infrared sensor, etc. collect data for initiating the further process. So, with the user being able to control the above processes and other actions being automated the whole process becomes a lot easier. The whole system is low cost and based upon system's efficiency and user's ease of operation.

1.1 Phase 1: Assembly of the sensors.

In this phase, we need to connect our sensors to their respective microprocessors. For instance, for the door to unlock automatically whenever a person enters, for that we need to connect the IR sensor to a specific location alongside the door to ensure the IR sensor detects the person and sends the data to the microprocessors. after the data is sent for a delayed amount of time the door remains unlocked

with the help of the servo motor and then closes immediately. Similarly, another sensor that we have added is the rain sensor on the roof top. For our garage, we have we have placed one ultrasonic sensor alongside our garage main door. So, whenever a car is detected in front of our garage, the door gets unlocked for a specified time to allow our user to enter through the premises and then shutdown immediately in a specified time. In our main hall we have attached a smoke detector sensor and a fire sensor. Through this sensor we are taking precaution against any gas leakage or fire caused in the area. So, with user notified with the help of GSM we have installed in the circuit immediate action can be taken by sending him a message regarding the mishap. In the garden, we have installed an LDR sensor, this sensor is used to detect day and light. Whenever daytime arrives it can automatically switch off the garden lights and vice versa. For the fan, lights and other devices we operate it manually through our phase 2 and phase 3 which we are going to talk later. Following some pictures regarding the sensor installation process.
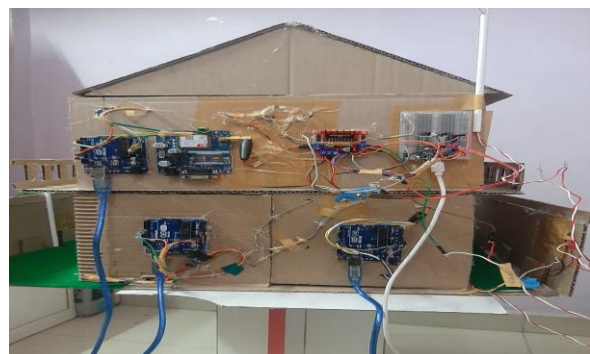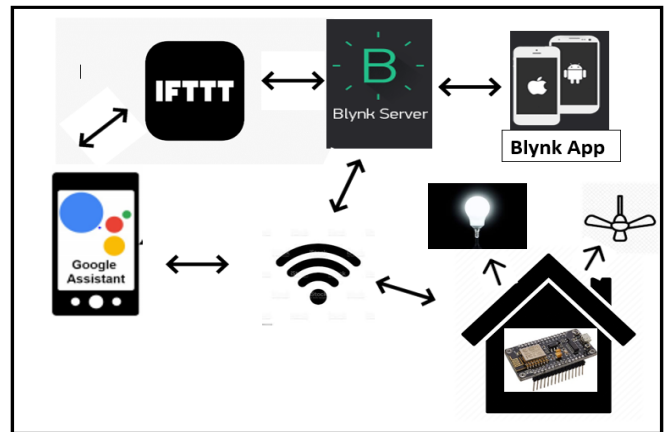

Fig 1. Smart Home Model

Fig 2. Connection IOT Device to Various sensors

1.2 Phase 2: Operating with the Blynk application.

For setting up manual operations for our appliances, we have to get started with the Blynk app. For this, after opening the app we have to select new project, then enter the project name and the board we are operating on (in our case that is NodeMcu or Arduino). Then we get an authentication token sent to our email for confirmation. Now through widget box we can select the sensor through which we want to manually operate on. In our case that will be fans and lights. For lights, we select lcd light and then further in the lcd settings we can apply required customizations. Similarly for fans, the process is same .

Adding some screenshots below

Fig 3. GUI of Blynk App

1.3 Phase 3: Operating with the Google Assistant

The Google Assistant has been used in this system to control electric appliances individually through voice commands. Google Assistant is connected to IFTTT (If This Then That is a service that allows a user to program a response to events in the world of various kinds) which is further connected to blynk Cloud. For instance, when we command google assistant to turn ON lights, then applet (chains of simple conditional statements) is triggered which makes blynk server to update the condition of the NodeMcu Pin to which lights are connected.

2. ADVANTAGE:

With our system proposed we have advantages such as Convenience of the user, total control over appliances, energy saving, comfort of the user, etc. Energy can be saved by properly monitoring the appliances. In case if any device is left turned on it can be switched off through the app manually by the user without any hassle even through a remote location. It gives peace of mind to the users since they don't have to worry about appliances being left turned on and can spend more time with their loved ones. It gives additional scope for installation of smart home devices to be integrated within the system.

3. FUTURE SCOPE:

The system can be further enhanced by adding security measures which can tighten security of the house. When big corporations like Siemens, Philips, etc. start working on mass producing the smart products, it can be easily be attached to our existing system further enhancing the usability of our system. Improving the Wireless technologies can play a major rule in improving mechanization of the house.

4. CONCLUSION:

With Home Automation system we can control devices automatically and also manually. Users can control the electrical devices through their smartphones. In future, they have the potential to be used by the mass consumers and to make the most out of it.

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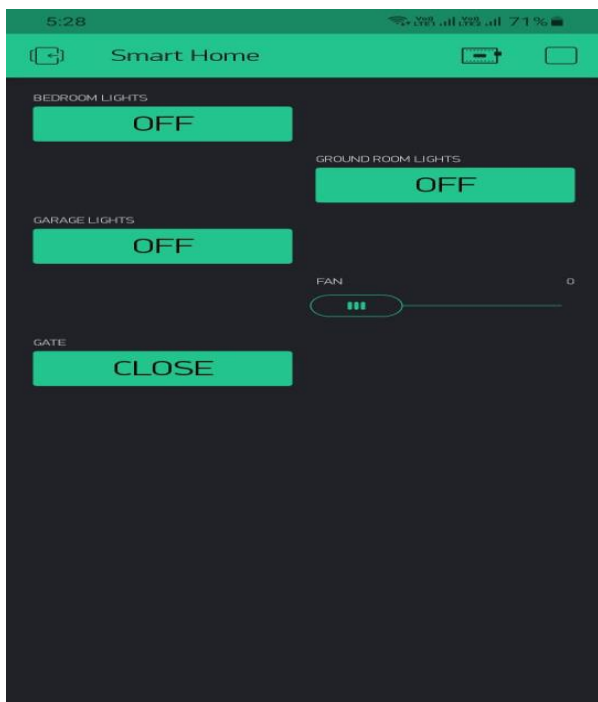
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