

IoT Based Smart Home

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ABSTRACT: *The project is target to solve problems of common people in day to day life. The rapidly advancing mobile communication technology and the decrease in cost make it possible to incorporate mobile technology into home automation systems. Wireless Home Automation system (WHAS) using IOT is a system that uses computers or mobile devices to control basic home objects and features automatically through internet from anywhere in the world, home is sometimes called a smart home. This project emphasizes on building a smart control on home system. It is meant to save the electricity and human energy. It differs from the other home automation system that allows the user to operate the system from anywhere, anytime in the world through internet. A mobile based smart home system that consists of a mobile phone with android ability and connected devices with Wi-Fi connectivity. The leverage is obtained by preferring this system over the existing systems is that home automation using GSM, Bluetooth. The Microcontroller used in the current project is the NodeMCU which comes with ESP8266 Wi-Fi microchip.*

Keywords—*IOT, WHAS, GSM, NodeMCU, ESP8266, Wi-Fi.*

We are living in the future one we thought was life time away is a part of new revolution Internet of Things (IoT). It is a system of systems that means all the electronic and communicating devices are connected in local network. These devices gather, share and process the data about how they are used and the environment they are operated in. Smart home is a part of Internet of Things. Using IoT, home appliances can interact, collaborate and learn from each other experiences just like we human do. It's all done using sensors, sensors are embedded in every physical device it can be your smart phone, electrical appliances and home appliances. A smart home is a technological solution that enables automating the bulk of electronic, electrical and technology base task within a home. This smart home system is implemented by using NodeMcu and Blynk app. NodeMCU is an open source IoT platform. It includes firmware which runs on ESP8266 Wi-Fi System on Chip (SoC) from Espressif System, and hardware which is based on ESP-12 module. Blynk is a new and around 400 supported hardware platform that allows to quickly building interfaces for controlling and monitoring hardware projects from your Android and iOS device.

The paper [2] discussed about designing a web-based control of home appliances which allowed user to switch appliances on/off by clicking on a webpage specially designed to interact with those devices, by being anywhere in the world with a computer or a smart phone connected with the Internet.

The paper [3] used Blynk app in her project of home management system and security. Different sensors were connected with NodeMCU. With the help of Wi-Fi, NodeMCU was

connected with Blynk app. On detection of any unwanted incident by different sensors, messages were sent to Blynk app.

The paper [1] discusses about the process of home automation using Bluetooth and Ethernet. When connectivity between Arduino and smart phone is established using Bluetooth, short range wireless communication is possible in an indoor environment. Ethernet module is used for connecting Arduino board from any part of the world.

The paper [4] discussed about his work on systems that uses smart central controller to set up 433MHz wireless sensor and actuator network (WSAN). A model of control modules, such as switch modules, radio frequency, control modules.

SYSTEM DESIGN

This project is based on both the hardware and software. Hardware part consist of NodeMCU, Relays, Load cell, Solenoid valve, Magnetic reed switch, Buzzer, various sensor such as IR sensor, Water sensor. All sensors and modules are monitored and controlled by NodeMCU. Software includes programming part which is done in Arduino and we used Blynk app as user interface to control and monitor household devices through smartphone, tablet or laptop.

Blynk app is used as third party which continuously provide status of home appliances on screen and also enable us to control the all appliances on our finger tips from anywhere in the world. The smart home system is modeled to control the light and fans using relays, it monitors water taps and also enables us to control water taps using solenoid valve, hence meet the saving of water. System provides 24X7 surveillance of home also ensures the security of home during our absence. The main objective of this system is to get continuous status of LPG cylinder and to notify us after cylinder reach some min level, so that we feel it on time and hence avoid our inconvenience and also ensures the full use of LPG hence meet the objective of conservation of energy.

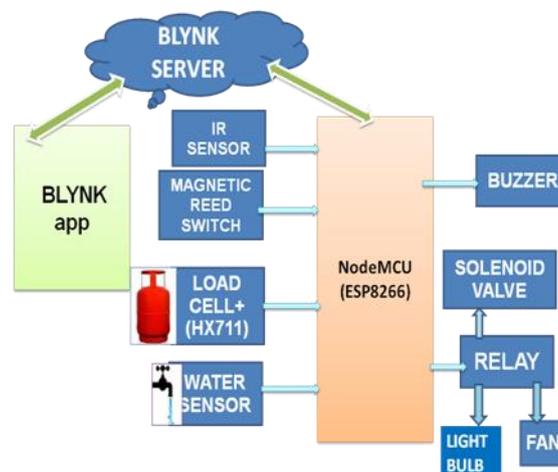


Fig.1

HARDWARE DESCRIPTION

Following are the components which we have used in this project:

Solenoid Valve

Solenoid valve is operated on a mechanism of the opening and closing of water flow in a valve. It is electromechanical component in which electric current is used to generate magnetic field which is responsible for ON and OFF the solenoid valve.

Load Cell

A load cell is used to measure object weight. Load cell generally consist of spring element on which strain gauge is placed.

Water Sensor

Water sensor is designed to detect the presence of water. It alerts the person to allow the prevention of water leakage. Water sensor is a small device in which it realizes the electrical conductivity of water to decrease the resistance across two contacts.

NodeMCU(ESP8266)

NodeMCU is an open source development board and generally used ESP8266 Wi-Fi module. It allows us to program the ESP8266 Wi-Fi module. With help of code we can establish a Wi-Fi connection and define input and output pins according to your needs.

Buzzer

A buzzer is generally audio signal device. It is electrical device used to make sound. For example, to take someone's attention.

Relay

Relay issued as switch that open and close circuit electronically. Relay is completed the circuit between input and output. Its basic function to allow a low power control operates as high power switch.

IR Sensor

IR sensor is an electronic device that used to sense the changes occur in surrounding. It consist three elements IR LED, Photodiode and Op-Amp. IR LED emit the infrared radiation and Photodiode is used to sense the IR rays.

Magnetic Reed Switch

The magnetic reed switch is used to control the electric current flow in circuit. It consists of a pair on which one consist pure magnet and in another consist the circuit.

HX711

HX711 is a load cell analog to digital converter. It is also act as amplifier to amplify the small signals coming from load cell. It has 24 bit resolution. It operates on clock signals which synchronized with NodeMCU.

Blynk Server

Blynk server is an open source platform which is freely available with blynk app. Blynk server Acts Bridge between blynk mobile application and NodeMCU which allows operating and monitoring sensors data.

RESULT



Fig.2

Fig.2 showing blynk app simulation result of LPG level of cylinder and loads are in off condition.

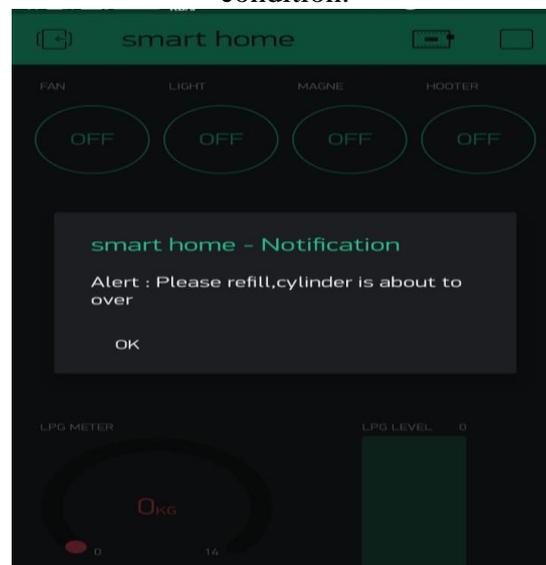


Fig.3

Fig.3 is showing the notification to refill the cylinder on user device.

CONCLUSION

The Project has proposed the idea of smart home which is a mobile based home automation system that consists of mobile phone with android ability and connected device with Wi-Fi connectivity. A smart home contains wireless communication between Wi-Fi module to Blynk cloud and cloud to mobile app. Also contains sensors, monitoring and tracking system. Smart home is huge system that includes multiple technologies and application that can be used to provide all kind of requirement.

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