IoT Based Home Automation

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Abstract: IOT consists of things that have distinct identities and are connected to internet. This project deals with remote control of electrical appliances, gas monitoring system and water level monitoring system, therefore it can be called as IOT based home automation. These facilities can be used to save energy. This project uses Blynk application to control electronic appliances and GSM is used to get notification about water level as well as gas leakage.

Keywords: Blynk application; GSM model; Node MCU; LCD display

I. INTRODUCTION

In this dynamic world there's a need for innovations and scientific advancement for a less tedious lifestyle. As in the lifestyle is getting more workaholic the need for small tech innovation is the need of the hour. People in this busy schedule tend to forget to do small things like to turn off the lights fan and go to work or turn on the light in the evening or the water pump. So here in this paper, the solutions to simple daily problems are answered. To design a prototype that establishes wireless remote control of home appliances. The application can be run on a Android device with features like switch mode control and monitoring the status of the device in the application.

This home automation includes connection via wireless fidelity or Wi-Fi connection to interact with IOT platform. The smart phone should be equipped with Blynk application as a control unit for node MCU.

The MCU kit has a built in ESP8266 Wi-Fi receiver that able to process and analyze. Wi-Fi signal is given as input to the microcontroller. This system can be implemented in small offices and malls as well as being in charge of control of electrical appliances. The project is low cost and saves energy.

II. PROPOSED SYSTEM ARCHITECTURE

Node MCU is connected to the input device and output device. Input devices are gas sensor, ultrasonic sensor, three-channel relay and output devices are 16*2 LCD display, GSM model. The power supply is supplied to the node MCU. node MCU works as a main microcontroller which as inbuilt ADC. Wi-Fi is the integral part of IOT platform. Gas sensor is senses the gas. GSM module is used to send alert message to mobile phone. Ultrasonic sensor which is used to detect the water level in the water tank. Relay is connected to bulb, fan and water pump to turn ON\OFF the electrical appliances. 16*2 display is used to display the message.
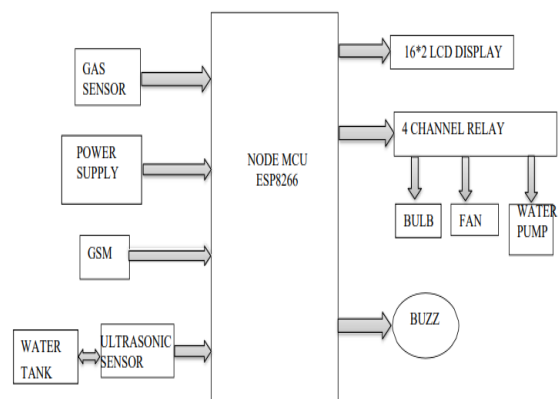

Fig 1. Block diagram of the IOT based home automation

III. MATERIALS

A. Node MCU ESP 8266

It is low cost open source IOT microcontroller unit. Which runs on Wi-Fi.

B. MQ2 (Gas sensor)

It is electronic sensor used for sensing concentration of gas (LPG, CMG smokes etc).In home if any gas leakage is detected it will show a notification in the mobile phone.

C. LCD display

It is used display the status of the device.

D. Relay

Three channel relay is used to ON and OFF of the Bulb, Fan and Water pump.

E. GSM

It is used a standard communication interface RS232, USB.

F. Ultrasonic sensor

It is a integral part in water level monitoring system. It detects the level of water in the tank.

IV. METHODS

This project involves a light and fan control, gas monitoring system and water level monitoring system.

A. Light and fan control

By using Blynk application the home appliances like fan and bulb can be controlled from remote places. The node MCU microcontroller is connected to the Blynk application via Wi-Fi and relay. Relay module is used for switching ON/OFF of appliances.it is connected to the node MCU. As node MCU is connected to Wi-Fi a command from Blynk application to switch ON/OFF the light/fan is sent. The node MCU process the information by the Blynk application. The programing code used in building this application control is embedded C language. The processed information is transferred to the relay model which does the action (ON/OFF of appliances). The relay used in this project is three-channel relay which is in turn connected to the el light, fan and water pump. The main function of the relay is switching on and off of the electrical appliances like bulb and fan.

Fig 2.   Light and fan control system

B. Gas monitoring system

This system is required as the cooking gas used are highly inflammable. As it uses Liquefied Petroleum Gas (LPG), Compressed Natural Gas (CNG) which are highly inflammable. The gas monitoring system consists MQ2 sensor, GSM model, node MCU, relay, fan and blynk application which are connected in a systematic manner to bring an efficient output. To monitor the leakage of gas the MQ2 gas sensor is used. This gas sensor is analog sensor which senses the gas like LPG, CNG, smokes etc. if the gas in the home reaches its threshold value the microcontroller compares the signal with the threshold value and sends an alert message to the user by using

GSM model. If there is no gas leakage then the 16*2 LCD displays "NO GAS LEAKAGE" and if the gas leakage is present then the 16*2 LCD displays "GAS LEAKAGE". Here 16*2 LCD display is used to display the status of gas leakage. Soon as the user receives the alert message from the GSM model the user can turn ON the fan by using blynk application in this android phone.

Fig 3.   Gas monitoring system

C. Water level monitoring system

This water level monitoring system consists of ultrasonic sensor, GSM model, node MCU, relay and water pump which are connected in a systematic manner to bring an efficient output. The water pump is used to fill water whenever the water is low, relay is used to turn ON\OFF of the water pump. Where relay is connected to node MCU, ultrasonic sensor is used to detect the level of water in the water tank, where ultrasonic sensor and GSM model is connected to node MCU. Whenever the ultrasonic sensor senses the level of the water, ultrasonic sensor sends the signal to node MCU which in turn sends signal to the GSM model to submit the alert message to the user. GSM model sends the alert message of the water in the water tank to the user.

Fig 4.   Water level monitoring

V. RESULTS

As per the block diagram shown in the Fig. 2 to 4, the result can be expected. The electrical and home appliances   can be remotely controlled using Wi-Fi. In the Blynk application successful pairing is done with the Node MCU. Hence the methodology is successfully achieved.

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