

IoT Based Power Control

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Abstract- Technology is growing with internet of thing IoT. Basically, with in the universal the thing having sensor capability decent power offer and connectivity to internet makes feel like internet of things IOT possible. old manual systems are replaced with automatic one which is based on IOT. At the same time, people are also fully dependent on the internet for day-to-day activities. In this paper we are proposing an automated tool which controls the operation of home appliances such as lights, fans through the use of mobile phone. This operation could be done through wifi automatically as well as manually plus there are motion sensors even if we don't control it through wifi cause of motion sensors if there is a motion the devices will automatically will turn on and when there is no motion devices will turn off. This system uses the hardware device such as PIC16F88886 Microcontroller, relay board, PIR sensors, temperature sensors. Internet of things (IOT) provides a platform that allows devices to connect and control remotely across a network infrastructure. In this paper we have proposed an automated system using NodeMCU Wi-Fi-Module that employees the integration of cloud networking, Wireless communication to provide the user with remote control of various home appliances. The system will automatically change the status of the home. appliances on the basis of sensors. This system is designed to be a low cost and expandable to other appliances.

Keywords- Wireless power control of devices, IOT, Android smart phone, ESP8266, Sensors.

I. INTRODUCTION

The internet of things can be defined as connecting the various types of objects like smart phones, personal computer and Tablets to the internet, which brings in very newfangled type of communication between things and people and also between thing. The IOT has made our life very easy in all aspect like giving compact, giving safety it even helps us, to reduced the electricity consumption by using wireless automation. We can easily control devices through wireless automation from anywhere by our smartphone. Hence, this paper utilizes ESP8266 and some sensors to make it easy the way is control the home appliances. An IOT system controls electronic devices at home whether you are inside or outside the house. Here in this project we are controlling devices

through wifi via internet even though we are not using wifi device will sense human motion cause of motion sensors and will turn on and off. This method is intend to be low priced and expandable permitting a range of devices to be controlled. ESP8266 Wi-Fi module is a wireless communication technology, which is used to provide a hotspot through which device can connect. The router will assign a unique IP address to the module for establishing a connection between smartphone and ESP8266.

1.2 Aim and Objectives

The project aims at designing an advanced home automation system using a normal Web server and Wi-Fi technology.

The devices can be switched ON\OFF and Sensors can be read using a android smart phone through Wi-Fi.

Even if we are not using wifi for switching on devices, the device will get automatically turn on because of PIR MOTION sensor.

Controlling Home Appliances via Applications;

To develop an application that includes the features of switches and appliances. Switch mode can be used to control the switches of home appliances.

Controlled by any device capable of Wi-Fi (Android, IOS, PC);

To make the home appliances flexible to control any device capable of Wi-Fi connectivity and will be able to control the home appliances from the remote location.

Extensible platform for feature enhancement;

The application is to be highly extensible, with the possibility of adding features in the future as required.

II. COMPONENTS AND SOFTWARE USED

Regulator IC 7805, Driver IC ULN2003, PIC16F886 – 8-bit microcontroller, Liquid crystal Display (LCD), Relay,

SMPS (Switched mode power supply), LM 35 Temperature sensor, PIR motion sensor, LDR (Light dependent resistor), Node MCU wifi – module, ESP8266.

III. BLOCK DIAGRAM

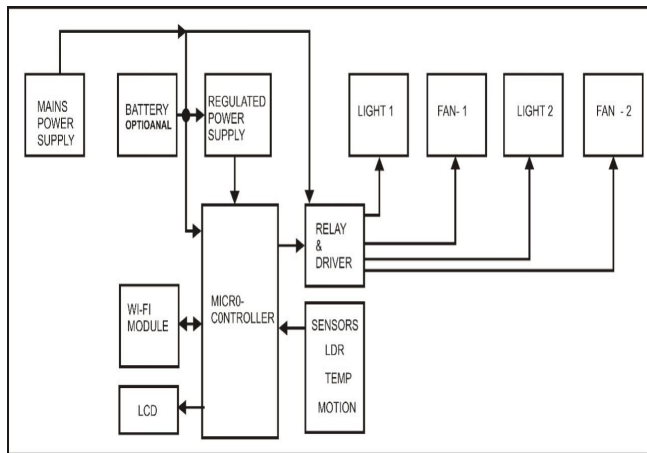


Figure 1: Block diagram of IOT based power system

IV. SPECIFICATION OF COMPONENTS

4.1. Regulator IC 7805

Voltage regulators are very common in electronics circuits. They provide a constant output voltage for different input voltages. The name 7805 signifies to meaning, “78” means that it is a positive voltage regulator and “05” means that it provides 5 volts as output so our 7805 will provide a +5 V output voltage.

+5 Volts regulated power supply



Figure 2: Regulator IC 7805

4.2. Driver IC ULN2003

ULN2003 IC is most commonly used motor driver IC. This IC is commonly used to drive relay modules, motor, high current LEDs and even stepper motors. So, if you have anything that anything more than 5V 80mA to Work, then this IC would be the right choice for you.

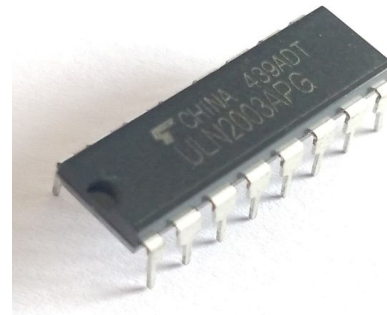


Figure 3: Driver IC ULN2003

4.3. PIC16F886 – 8Bit Microcontroller

PIC16F886 is Microcontroller from ‘PIC16F’ family. It is an 8- bit CMOS Microcontroller. This microcontroller is popular among hobbyists and engineers due its features and cost. The controller has 16Kbytes flash memory which is enough for many applications.



Figure 4: PIC16F886 – 8Bit Microcontroller

4.4. Liquid Crystal Display (LCD)

Liquid Crystal Display are very common and used in most of the projects. It’s because its price is cheap and its easily available at the same time it is programmable friendly. 16*2 LCD is named because it has 16Columns and 2 rows as shown in figure.

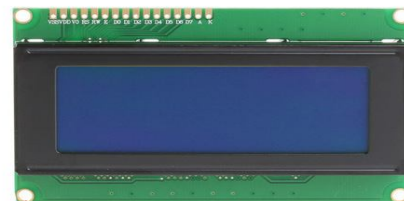


Figure 5: Liquid Crystal Display

4.5. Relay

Relays are most commonly used switching device in electronics and electrical projects. There are two important parameters of relay, first is the trigger voltage, this is the voltage required to turn on that relay that is to change the contact from common – NC to common _ NO.



Figure 6: Relay

4.6. LM35 Temperature Sensor

LM35 is an integrated circuit Temperature sensor, whose output voltage changes, based on the temperature around it. It is a small and cheap IC which can be used to measure temperature anywhere between -55°C to 150°C.

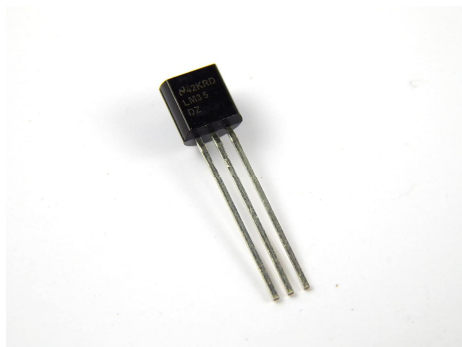


Figure 7: LM35 Temperature Sensor

4.7. PIR Motion Sensor

The PIR Sensor stands for passive inferred sensor. This one is a low-cost sensor which can detect the presence of human beings as well as animals. The PIR stands for passive infrared sensor.



Figure 8: PIR Motion Sensor

4.8. LDR (Light Dependent Resistor)

The light dependent resistor (LDR) is also a type of resistor. This resistor has no polarity. Meaning they can be connected in any direction. They are breadboard friendly and can be easily used on a perf board also. It can be used to sense the light. It is small and cheap and easily available.



Figure 9: Light Dependent Resistor

4.9. ESP8266 wifi-Module

The NodeMCU ESP8266 development board comes with the ESP-12E module containing ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built wi-fi / Bluetooth and deep sleep operating features make it ideal for IOT projects.



Figure 10: ESP8266 Wi-Fi-Module

4.10. SMPS (Switched-mode power supply)

SMPS stands for switch mode power supply. It converts wall voltage ac power to lower voltage dc power. SMPS transfer power from dc or ac to to dc loads.



Figure 11: Switched-mode power supply

V. EXPERIMENTAL SETUP OF HOME AUTOMATION DEVICES SETUP



Figure 12: Experimental Setup

This work is performed in two different modes such as touch mode and motion mode. In touch mode, the interface application is opened by the help of smart phone and click on/off of the corresponding home appliances. In motion mode the PIR Sensors will sense the motion and will make appliances turn on/off.

In touch mode there is small microcontroller that is additionally capable as functioning as a micro net server and also the interface for all the hardware modules. All communications and controls during this system labour under the microcontroller. It offers the change functionalities to regulate lights, fans and different home appliances connected to the relay system, and every one of these are often controlled by the android smart phone or other net appliances. Home automation is that the method of dominant home appliances mechanically exploitation varies system techniques. The controlling devices for the automation in the project is a microcontroller. The data sent from android phone over Wi-Fi

will be received by Wi-Fi module connected to microcontroller. Microcontroller reads the data and decide the switching action of electrical devices connected to it through Relays. The microcontroller is programmed used embedded 'C' language.

In motion mode there is a PIC16F886 Microcontroller which will receive the data through PIR Motion sensors and will decide switching action of relays, the relay will be automatically turn on when there is a motion. In the absence of motion relays will get automatically turn off. The microcontroller controls the appliances on the basis of value given by sensors.

VI. CONCLUSION

The proposed design of power control devices is very flexible and can be easily expanded and applied to any home, larger buildings, offices by increasing the number of sensors, measured parameters, and control devices. More functionality and smartness could be also added to the existing system for making this automation grow, adapt, and evolve by itself using advanced artificial intelligence.

At last we can note that, IOT leads to become universal in every aspect. This paper will be very beneficial in our normal day to day life and will bring much needed innovation in this fast-changing world of technology where people prefer to have control over things using the smartphone which will bring ease to their routine life. It is user friendly and its cost is effective.

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