Ethernet Based Home Automation Using Web Server

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ABSTRACT: In this system presents IOT architecture for embedded web server using Arduino ATmega328P for home automation which can control the on and off electrical devices at home using internet. The design mainly consists of Arduino Uno board, Ethernet card, four channel relay module, Sensors. In this design Ethernet shield is mounted on the Arduino Uno controller to facilitate a wireless connectivity through a SPI and UART protocol using IPv6 addressing scheme. After the designing the system, the system is tested and the results show that Ethernet is connected between the host and the Arduino and the data can be displayed on webpage. In this project by connecting Arduino Uno in a network and with the help of Ethernet module we are able to control the devices at home through web server.

KEYWORDS: Arduino, Ethernet card, PIC Microcontroller.

I.INTRODUCTION

Internet of things is the emerging technology bringing new set of technological changes in our daily lives, which in turn helping us to make our life simpler and more comfortable. With the rapid adoption of the internet the "anywhere and anytime" accessible home environment has been brought close to the reality. C.Nagarajan *et al.*[2,4,8] has proposed the IoT is a new era of intelligence computing and providing a privilege to communicate around the world. The objective of IoT is anything, anywhere, any network, any place, any server.

Arduino Uno board with ATmega328P

Arduino Uno is a micro controller board based on AT mega 328P board. It is an open source electronics platform based on easy to use hardware and software. It is intended for anyone for making projects and interactive objects that can sense and control objects in the physical world. The outputs from the analog sensors are given to Arduino analog output pin (A0) through 1-wire sensor networking and the controlled devices are connected to the digital pins.

IP Address:

IP address (Internet Protocol address) is a numerical label assigned to each device participating in a computer network that uses the Internet Protocol for comunication. Specifying the IP address is done by writing the line: byte ip[] = { 192, 168, 0, 178 };

MAC Address:
MAC address (media access control address) is a unique identifier assigned to each device participating in a physical network. Each piece of networking equipment has a unique serial number to identify itself over a network and this is normal hard-programmed into the equipment's firmware. However, with Arduino, we can define the MAC address our self.
 byte mac[] = {0xDE, 0xAD, 0xBE, 0xEF, 0xFE, 0xED}
You can set the subnet and gateway with the help of following commands:

byte subnet[] = { 255, 255, 255, 0 }; //assigning subnet mask
byte gateway[] = { 192, 168, 0, 1 }; //assigning gateway.

II. METHODOLOGY

Home automation describes a system of Ethernet is the traditional technology for connecting network wired local area (LANs) , enabling devices to communicate with each other via a protocol a set of rules or common network language. As a data link layer protocol in the TCP/IP stack, Ethernet describes how network devices can format and transmit data packets so other devices on the same local or campus area network segment can recognize, receive and process them. An Ethernet cable is the physical, encased wiring over which the data travels. Any device accessing a geographically localized network using a cable i.e., with a wired rather than wireless connection likely use Ethernet-whether in a Home, School or Office setting.
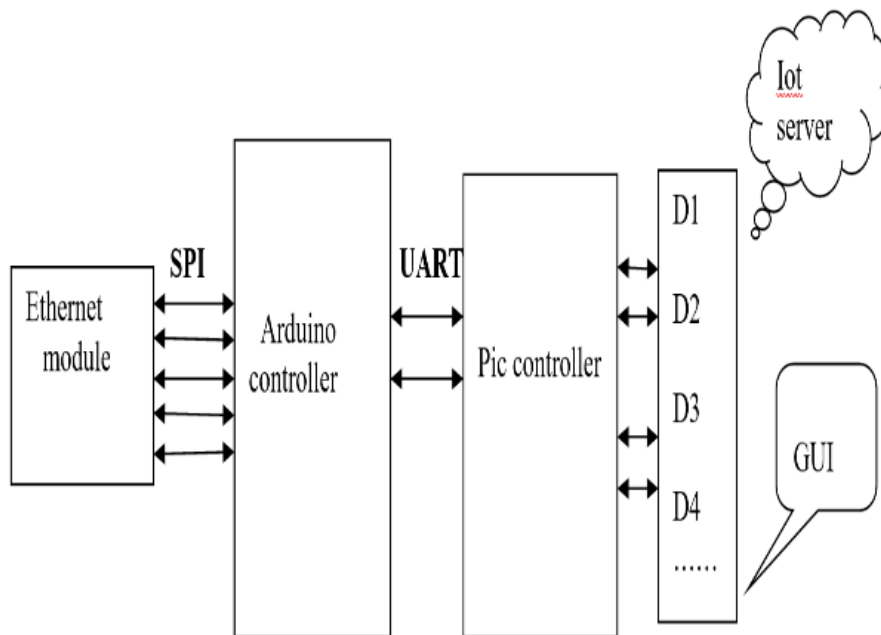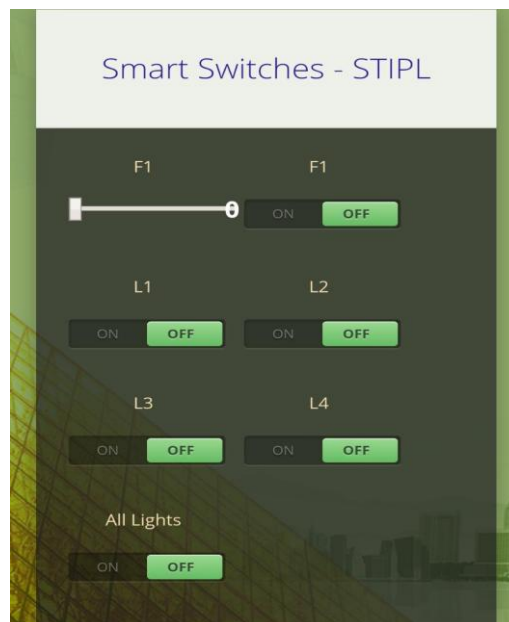

**Fig(a): Block Diagram for Home Automation**

Fig(b): Web Server Application

IV. DESCRIPTION OF HARDWARE

1.Arduino Uno:

Arduino Uno is a microcontroller chip dependent on the Atmega328(datasheet) with 14 computerized I/o pins, in which 6 pins can be utilized as yields, 6 pins are utilized as simple information sources .It has 16 MHz clay resonator ,a USB association, a power jack and a reset button. The microcontroller has 32kB of ISP flash memory, 2kB RAM and 1kB EEPROM. The board provides serial communication capability via UART, SPI and 12C.Because of well design in the form of arduino it is easy to understand. In Arduino we use high level of programming language like C language, C++ language ect. It is easy to understand and user friendly language. It has much advantage like multitasking, automation, time domain etc. Arduino Uno fig4 (a) is given below.
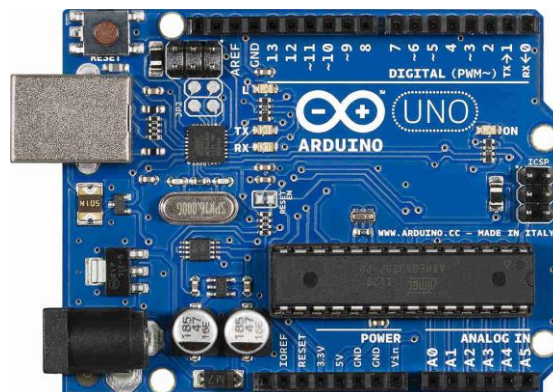
Fig(c): Arduino Uno

2.Ethernet Module:

Ethernet is a way of connecting computers together in a local area network or LAN .It has been the most widely used method of linking computers together in LAN .The basic idea of its design is that multiple computers have access to it and can send data at any time. Ethernet is a standard communication protocol embedded inis a computer network that interconnects a group of computers and share the information through cables or wires. An Ethernet cable is the most common type of network cable used on a wired network whether at home or in any other business establishment. This cable connected wire devices together to the local network for file sharing and internet access.

Fig(d): Ethernet Cable

3. PIC Microcontroller:

PIC Microcontroller are family of specialized microcontroller chips produce by microchip technology in pic stands for "peripheral interface controller " , although that term is rarely used nowadays a microcontroller is a compact microcomputer designed to govern the operation of embedded system in motor vehicles , robots , office machines , medical devices , mobile radios , vending machine ,home appliances and various other devices . A typical micro controller includes a processor, memory and peripherals. Every pic microcontroller as a set of register that also function as RAM(Random access memory).
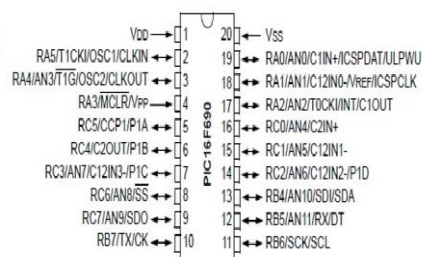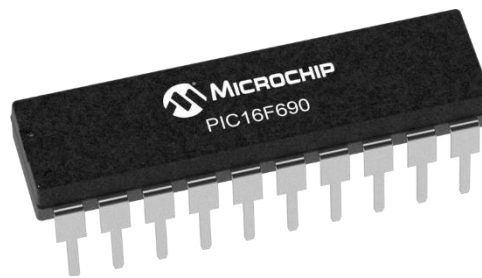

Fig(e):PinDiagram for PIC Microcontroller

Fig(f):PIC MICROCONTROLLER

4.Relay Drivers:

Relay is an electromagnetic switch which is used to defer two circuits electrically and connect magnetically. When arduinotransmit the signal then relay driver receive signal and start its work.They are frequently used to interface an electronic circuit (working at low voltage) to an electrical circuit which works at extremely high voltage. For instance, a hand-off can make a 5V DC battery circuit to switch 230V AC mains circuit. In this way a little sensor circuit can drive, say, a fan or an electric knob. A transfer switch can be separated into two sections: information and yield. The info area has a loop which creates attractive field when a little voltage from an electronic circuit is connected to it. This voltage is known as the working voltage. Generally utilized transfers are accessible in various arrangement of working voltages like 6V, 9V, 12v, 24Vand so on.In a basic hand-off there are three contactors: ordinarily shut (NC), regularly open (NO) and normal (COM). At no info express, the COM is associated with NC. At the point when the working voltage is connected the transfer curl gets charged and the COM changes contact to NO. Diverse transfer setups are accessible like SPDT and DPDT which have distinctive number of changeover contacts. By utilizing legitimate blend of contactors, the electrical circuit can be turned on and off. Relay circuit shown in fig4(c).
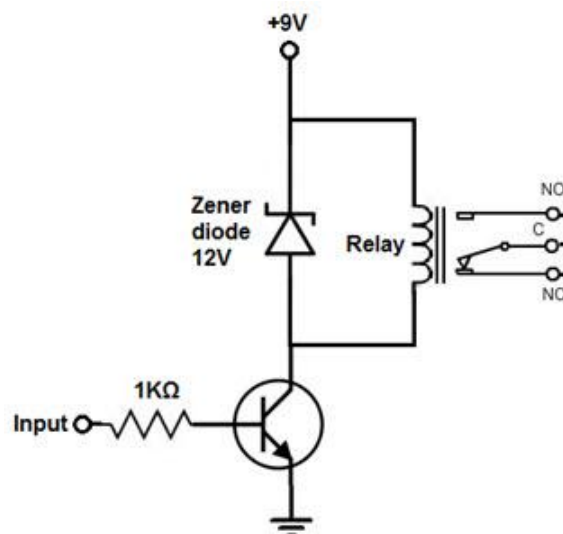
Fig(g): Relay circuit diagram

So as to drive the hand-off, we use transistor and just less power can be utilized to get the transfer driven. Since, transistor is an intensifier so the base lead gets adequate current to make increasingly current stream from Emitter of Transistor to Collector. In the event that the base once gets control that is adequate, at that point the transistor lead from Emitter to Collector and power the transfer. When the power is transmit to the relay works as a switch due to electromagnetic effect sothat we can switch ON or OFF our home appliances.
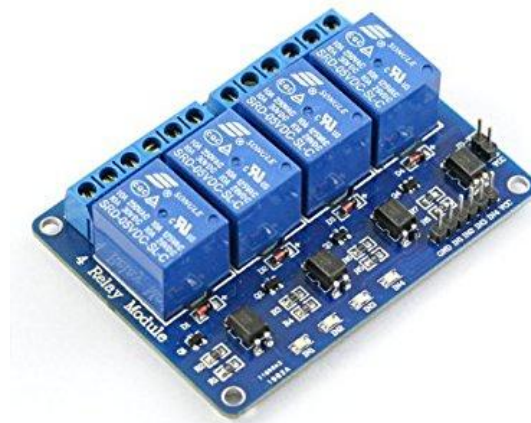
Fig(h):Relay Module

IV. ADVANTAGE

- Everything is automated so it is easy to use.
- It works on arduino based system so we can easily understand how it works.
- It saves our time.
- Every home appliance can control by one android application.
- Easy installation and user friendly.
- Increased energy efficiency.
- Home management insights.
- Maximizing home security.
- Managing all of your home devices from one place

V.RESULT

According to the proposed plan the final outcome of this paper leads to the development of a home automation. Through this project, an automation system has been created so that we can easily control home appliances like as light, fan, tube light, AC, bulb, etc. One of the objectives of this project is also to get us a smart automation and low cost project. In this paper we have also provided information about arduino Uno, Ethernet controller and relay module. And the information about their work is given. Along with the component of home automation, its advantage has also been discussed. The system is easy and secured for access from ant user or intruder.

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Fig(i):Kit Diagram for Home Automation[1]
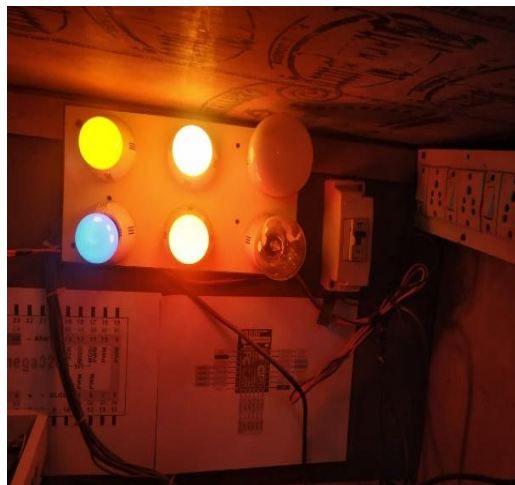
Fig(j):Kit Diagram for Home Automation

VI.CONCLUSION

Home Automation is undeniably a resourse which can make a home environment automated. People can control their electrical devices via these Home Automation devices and set up controlling actions through Mobile.In future this product may have high potencial for marketing.Further it can **be** demonstrated from computer instead of mobile phone for controlling the appliances of any larger places like industries, hospitals, institution, etc centrally.

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