HOME AUTOMATION USING WIFI (ATMEGA328P)

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Abstract —: **This** *paper represents the design and implementation of a low cost yet compact and secure WIFI based home automation system using ATMEGA. This design is based on the ATmega328p controller board where the sensors and electrical appliances are connected to the respected I/O ports. In order to enhance the system performance to make it more dynamic,.we have made it just using controller instead of whole arduino board and has a capability to switch to emergency mode in case of system failure. Devices like light switches, fan or variious plugs, temperature sensors, have been integrated in the system to demonstrate the effectiveness and possibility of the proposed smart home system.*

Keywords : ATMEGA328P, WIFI .

INTRODUCTION

. In the recent years there has been an exponential growth and advancements in computing technology. There has also been an increase in use of these technologies, even, among non-technical users.Instead, there has been increasing trend towards ubiquitous computing that integrates seamlessly into peripheral environment.

In many cases, end-users are not aware of this network of devices as they seamlessly serve required information. Several standards are been proposed each day promising to solve other standards issues. Home automation is no different. At a very basic level, home automation has been around as early as 19th century with the introduction of water supply and energy distribution systems. Since then, several solutions were presented by both the industry and the academia but the progress has been relativity slow.

Few systems aim to solve issues such as ease of access and scalability, while others look into making several different standards communicate with each other seamlessly. The use of wired standards or technologies, such as X-10, has been slowing losing the momentum to wireless standards. Wireless standards also offer solutions that simplify retrofitting existing homes with new features for a reasonable cost. There have been several advances in both hardware technologies and wireless communications which enable development of robust wireless sensor networks (WSN) that can be used in home automation.

1.1   Motivation

Home automation results in a smarter home and is used to provide a higher & healthier standard of living. The beauty of a home automation system is that it is highly scalable, flexible and its capabilities are limited only by our imagination. With the IoT revolution just around the corner, it is high time we move towards widespread adoption of such a system.

1.2   Problem definition

Home automation system face four main challenges, these are high cost of ownership, inflexibility, poor manageability, and difficulty in achieving security. The proposed system has a great flexibility by using Wi-Fi technology to interconnect its distributed sensors to home automation server. This will decrease the deployment cost and will increase the ability of upgrading and system reconfiguration The concept of home automation has been around for a long time and products have been on the market for decades, though no one solution has broken through to the mainstream yet. Home automation for the elderly and disabled can provide increased quality of life for persons who might otherwise require caregivers or institutional care. It can also provide a remote interface to provide control and monitoring via a smart phone or web browser. This paper will describe the approach which we are implementing to control various home appliances with web interface through Smartphone tablets, pc or any other wifi based device.

1.3   Objective

The main objective of this project is to design and implement a cheap and open source home automation system that is capable of controlling and automating most of the house appliances. This application is an easy and manageable web interface for user to run Home Automation System. In this project we have integrated technologies like Arduino with Wi-Fi to execute Home Automation System. The aim to take Wi-Fi as platform is because people are familiar as many applications and uses. In this application, we used fans, bulbs etc depicted graphically for better understanding of the users. Users can switch ON/OFF any appliances like fan, tube lights etc as per their convenience through mobile. This application is scalable to add or delete appliances as per user' s requirement. The project aims at designing an advanced home automation system using Wi-Fi technology. The devices can be switched ON/OFF using a Personal Computer (PC) through Wi-Fi. Automation is the most frequently spelled term in the field of electronics.

1.4   Existing system

The literature related to the research topic has been reviewed for last twenty years in order to find out work carried out by various researchers. There are many systems for remote monitoring and control designed as commercial products or experimental research platforms. It is noticed that most of the research carried out belongs to the following categories

A. Internet based Monitoring using Servers, GPRS modems, etc. with different approaches.

B. GSM-SMS protocols using GSM module individually or in combination with Internet Technologies.

C. Monitoring using Wireless Sensor Networks.

D. Wireless Monitoring using Bluetooth, Wi-Fi, Zigbee and RF.

E. Applications have varied widely like Home Automation, Security Systems, Bio-medical applications, Agriculture, Environment, Reservoir, Bridge health monitoring, etc.

III.   RELATED WORK

Smart home is not a recent term for science society but still far more away from people' s audition and vision. As electronic technologies are approaching the field of home automation is elaborating. Manifold smart systems have been proposed where the control is done via, internet, short message service (SMS) base, Bluetooth etc. Bluetooth capabilities are better and almost all current laptop/notebook, cell phones and tablets have built-in adaptor that will indirectly diminished the cost of the system. However it restricts the control within the Bluetooth range of the environment while most other systems are not too feasible to implement as low cost solution. Existing system is based on Arduino Ethernet, which is used to eliminate the use of a personal computer (PC) keeping the cost of the overall system to a minimum although voice activation is incorporated for switching functionalities.

Pattern based password protection is implemented for allowing only authorized users to control the appliances. Another inclusive integration of Google' s voice recognition feature is used to recognize users" voice commands for controlling appliances. This paper presents the automated approach of controlling the devices in a household that would ease the tasks to use the traditional method of the switch. Bluetooth, which is the most efficient and famous technology for short range wireless communication is used here to automate the system In this modern era, everybody uses smart phones which are a part of our day-to-day life. They use all their daily uses like daily updates, social networking, newspaper reading and all the apps like vehicle security, home automation control, health maintenance, human body anatomy etc. has been designed in the form of applications that can be easily installed in their hand held smart phones. This project approaches a robotic movement control through the smart phone.

III.   PROPOSED SYSTEM

A.   The proposed system is based on wifi with the help of atmega328 as it is compatible with arduino uno and nano. And using arduino the project cost simply gets cheaper and efficient.

B.   For receiving and transmission we are using ESP8266 wifi module and its is open source and community supports and its has some dedicated websites for any kind of help or support

C.   We will build a web server which can be accessed by any device which have wifi and then we can monitor and control different system

D.   Then we will interface different types of sensor for receiving inputs to the microcontroller and depending on the values we will control our system and maintain a database at the server and controlling

E.   The server which we will design will keep us updated on the current system status and we can then on/off those system.
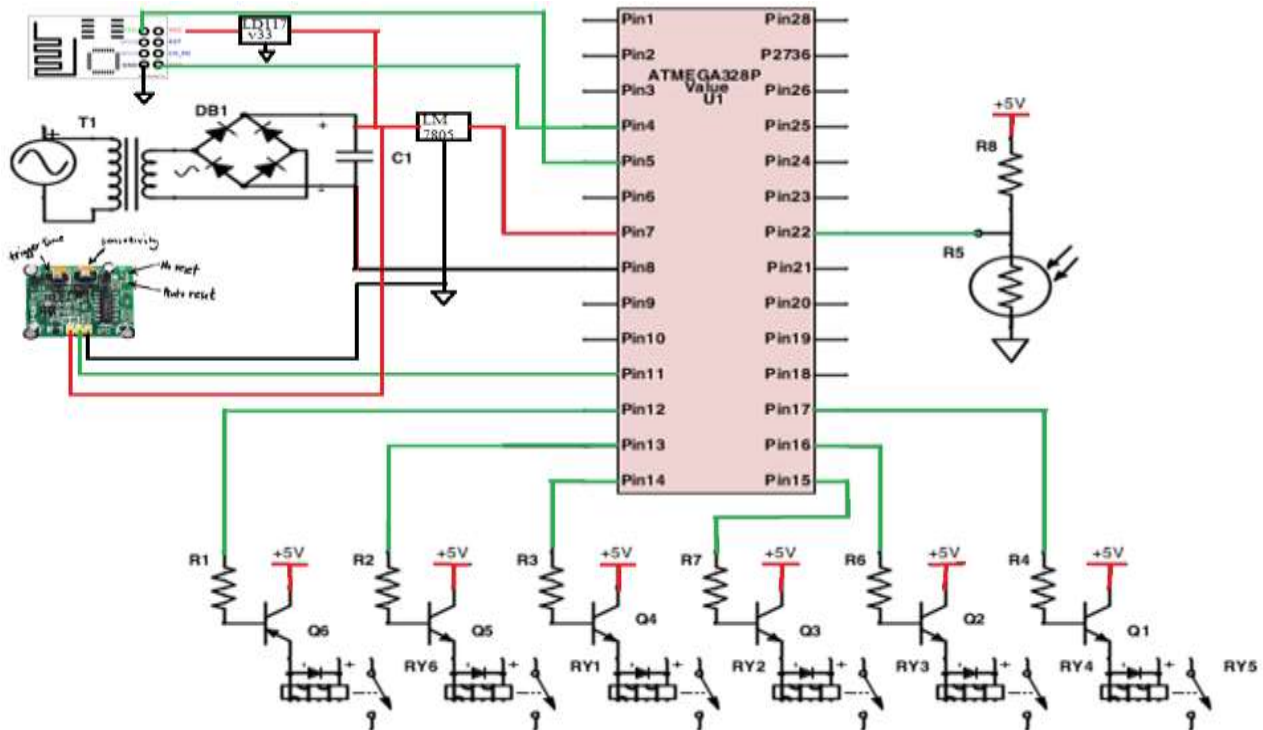
Figure 1:Actual Circuit.   Figure 2: Bulb turned ON when dark and displayed on LCD
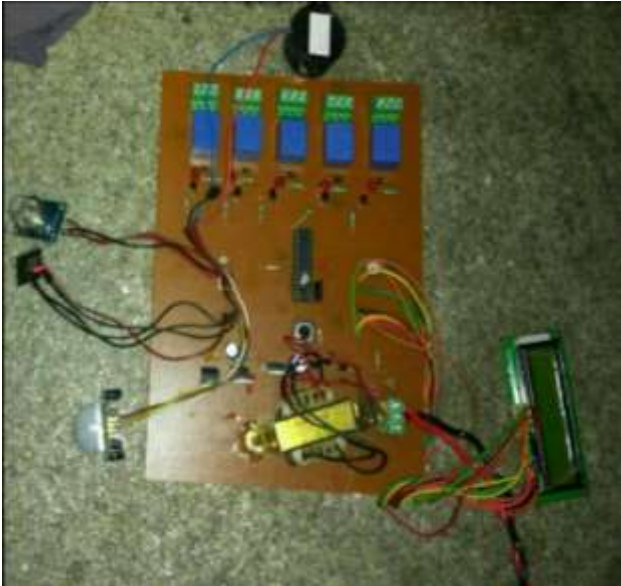
IV.   BLOCK DIAGRAM AND CIRCUIT WORKING
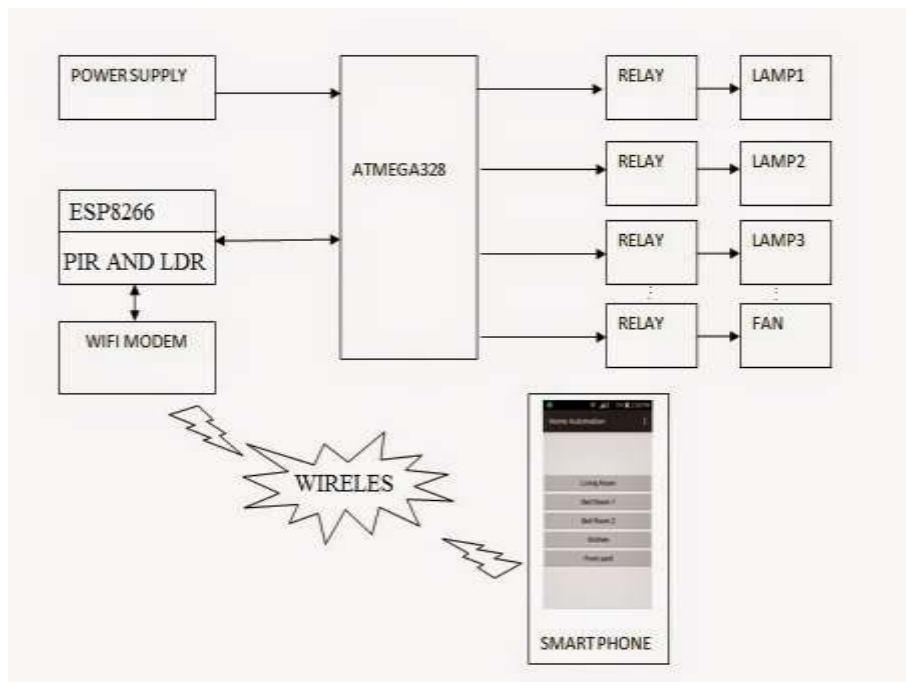
Circuit Diagram:

Circuit Working Principle:

A. The entire appliance attached to relay are controlled by Microcontroller.

B. ESP8266 is a wifi module interface to Microcontroller for wireless communication.

C. PIR motion sensor is a Passive Infrared sensor which is use to detect motion.

D. LDR is Light Dependent Resistor use to track the changes occurring in light condition in a particular area.

E. We create a web server using ESP8266 and monitor all changes by PIR and LDR along with controlling relays.

F. There is a webpage which can be access through any device connected to home wifi router, that page can be access by putting IP address of ESP8266.

G. When we switch ON or OFF the button from web server wifi router gives command to wifi module and then it gives command to Microcontroller.

H. We can add other sensors like temperature or gas sensor also in future development

V.   CONCLUSION

It is evident from this project that an individual control home automation system can be cheaply made from low cost locally available components and can be used to control multifarious home appliances ranging from the security lamps, the television to the air conditioning system and even the entire house lighting system. And better still, the components required are so small and few that they can be packaged into a small conspicuous container.

The designed home automation system was tested a number of times and certified to control different home appliances used in the lighting system, air conditioning system, heating system, home entertainment system and many more (this is as long as the maximum power and current rating of the appliance does not exceed that of the used relay).

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