ADVANCED HOME AUTOMATION AND MONITORING SYSTEM

S.Ramu 1,M. Nishitha 2, N. Divya 3 ,M.G. Ashfaq 4

1 *Associate Professor, 2,3,4 Student*

1,2,3,4 Dept .of Electrical and Electronics Engineering

Sreenidhi Institute of Science and Technology, Hyderabad -501301.

ABSTRACT

Home Automation is a way to have things around your home happen automatically. Generally all think home automation means robots, flashing lights, complicated electronics and more of a cold science experiment; however, in most homes today, you can easily find some simple forms of automation. You may not think of a dishwasher or light switch as home automation, however, each of these things was designed to help us do some complicated, strenuous or repetitious action automatically. The term home automation today applies to the next level of automating home electronics. In this we designed an automation controller that can control the household devices automatically based on sensor data, this can also be controlled using a mobile application. The microcontroller is the heart of the circuit which connects to the internet through a WiFi module. The microcontroller takes sensor data from light level sensor, temperature sensor and motion detector. The speed of the fan is controlled automatically to give moderate room temperature. The light level sensor automatically switches on/off the room lighting based on light level inside the room. The motion detector senses the movement of car and automatically opens the garage door. The temperature sensor switches on the air conditioning in the presence of humans accordingly. A flame sensor is used to detect fire in home and automatically operate the water sprinkler as well as send an alert to mobile application. All the devices can also be manually operated from mobile application and their status can also be known. This novel project improves our day to day life by efficiently controlling the electrical appliances and operating them in a very economical manner.

1.0 Introduction

An internet based home automation system focuses on controlling home electronic devices whether you are inside or outside your home. Home automation gives an individual the ability to remotely or automatically control things around the

home. A home appliance is a device or instrument designed to perform a specific function, especially an electrical device, such as a refrigerator, for household use. The words appliance and devices are used interchangeably. Automation is today's fact, where things are being controlled automatically, usually the basic tasks of turning on/off certain devices and beyond, either remotely or in close proximity. Automation lowers the human judgment to the lowest degree possible but does not completely eliminate it.the concept of remote management of household devices over the internet from anywhere, any time in the world today can be a reality. Assume a system where from the office desk, the user could view the status of the devices and decides to take control by tuning his TV set to his favourite channel, turns on the cooling system, say the air conditioner, and switches on or off some of the lights. This user could walk back home and only finds a very comfortable, pleasant home.

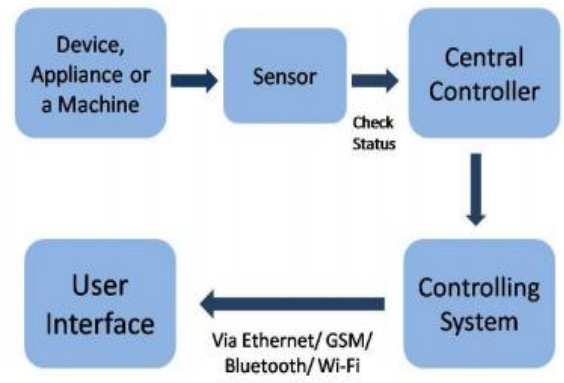


Figure: Basic architecture of a Home Automation System

Need of Home Automation:

Electronic and Electrical environment with respect to context is any environment which consists of appliances such as fans, television sets, air conditioners, motors, heater, lighting systems, etc. A remotely accessible environment is an environment in which each appliance can be remotely accessed and controlled using software as an interface, which includes an Android application and a Web application. Such remotely accessible systems are already available in the market, but have a number of drawbacks as well.

Challenges in Home Automation:

Today's homes require sophistication control in its different gadgets which are basically electronic appliances. This has revolutionized the area of home automation with respect to an increased level of affordability and simplicity through the integration of home appliances with smart phone and tablet connectivity. Smart phones are already feature-perfect and can be made to communicate to any other devices in an ad hoc network with a connectivity options like Bluetooth. With the advent of mobile phones, Mobile applications development has seen a major outbreak. Utilizing the opportunity of automating tasks for a smart home, mobile phone commonly found in normal household can be joined in a temporary network inside a home with the electronic equipment's. Android, by Google Inc. provides the platform for the development of the mobile applications for the Android operated devices. Home automation system is a mobile application developed using Android targeting its vast

market which will be beneficial for the masses. Android maintained its leadership position in global market share.

2.0 Literature review

Naik S. C & Ratnaparkhi N.S in 2014[1], This paper proposes a Home Automation system that employs the integration of multi-touch mobile devices, cloud networking, wireless communication, and power-line communication to provide the user with remote control of various lights and appliances within their home This system uses a consolidation of a mobile phone application, handheld wireless remote, and PC based program to provide a means of user interface to the consumer

Basma M. Mohammad El-Basioni, Sherine 2015 [2] this paper proposes a new design for the smart home using the wireless sensor network and the biometric technologies. The proposed system employs the biometric in the authentication for home entrance which enhances home security as well as easiness of home entering process. The structure of the system is described and the incorporated communications are analyzed, also estimation for the whole system cost is given which is something lacking in a lot of other smart home designs offers.

Ozcan, and Ali Ziya Alkar in 2006 [3] In this paper A GSM, Internet and Speech Controlled Wireless Interactive Home Automation System in which system uses the GSM network along with an AVR microcontroller. This is also an SMS based system. The user enters the commands .These are sent via SMS. However, this system uses a standardized AVR code that can be easily interpreted by the microcontroller. In this system a GSM module that is attached to the AVR.

3.0 Circuit Diagram & Working

The Home automation mainly focuses on comfort, security and to reduce man power. It includes centralized control of appliances, ventilation, lighting, heating and air conditioning, resource management systems such as energy and security systems. Internet of thing is growing network of everyday object, from industrial machine to consumer goods that can share the information and complete task while you are busy with other activities Because of the advanced development in computer technology, the microprocessors are not only on the desktop but also exist everywhere Home automation allows us to control household appliances like light, door, fan, AC etc. It also provides home security and emergency system to be activated. Home automation not only refers to reduce human efforts but also energy efficiency and time saving.

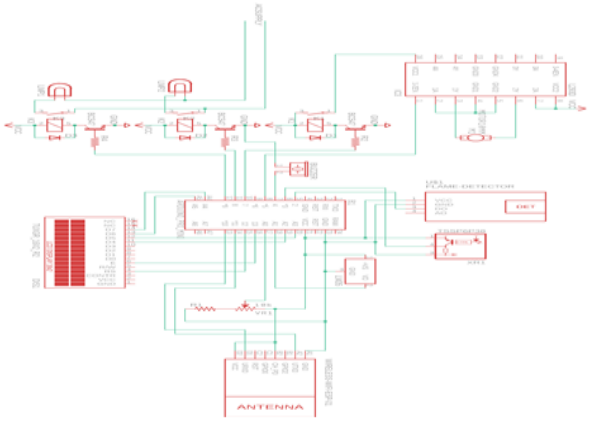


Figure: Circuit Diagram

Circuit Working

Above figure is the basic circuit diagram of Smart Home Automation. It consists of six main components like a microcontroller, digital energy meter, connector IC, LCD etc. Micro controller is the brain and most important part of our circuit. Each and every part is either directly or indirectly connected to the microcontroller. LCD is connected to the microcontroller. ESP8266 is connected serially to microcontroller through pins 10 and 11. The Motion sensor, Flame sensor, Light sensor and temperature sensor are connected to the pins 2, 3, A0 and A1. Relays are connected to pins 7, 8, 9. When we turn on/off a relay from application, the data is sent to the ESP8266. The ESP8266 sends the data to the microcontroller serially. The microcontroller checks the data and accordingly turns on/off the particular relays. The setup can be set in automatic mode in which the turning ON of appliance depends on sensor data. When temperature crosses 30 degrees centigrade the fan turns ON. When intensity of light is below 30% the led light turns ON. When motion is detected the lamp turns ON. When there is fire then the Alarm will turn ON. Thus the complete home is automated and also remotely controlled through the application.

Home automation system using cell phones: The smart home concept in the system increases the standard of living .In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication.

Microcontroller:

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

LCD Display:

This section is basically meant to show up the status of the project. This project makes use of Liquid Crystal Display to display / prompt for necessary information.

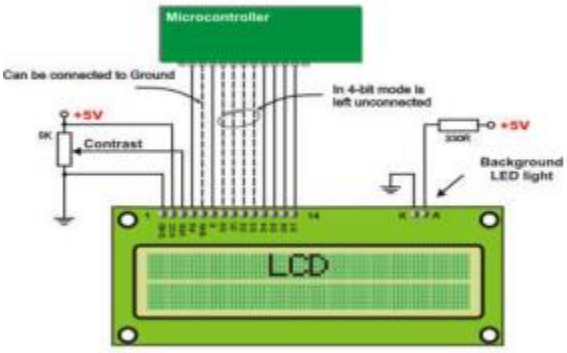


Figure: LCD display

Temperature sensor:

Thermistors are a temperature sensing devise. It is used to sense the temperature. In

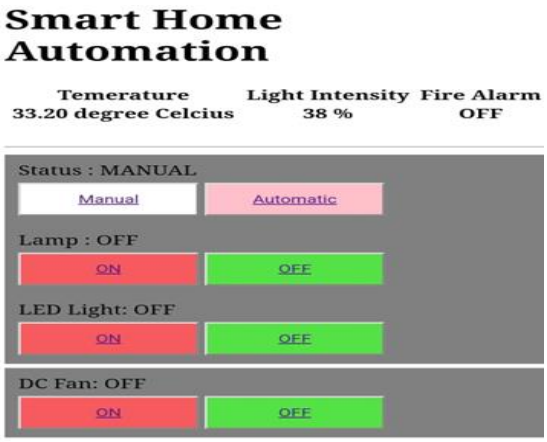
this project by depends on the value of temperature the exhaust fan will run.

4.0 Results

The existing communication networks strive to increase the exchange of information among utilities, home appliances, and users. The diverse directionality and complexity of the existing communication devices represent a challenge. Home automation refers to the use of computer and information technology to control home appliances and features (such as windows or lighting). Systems can range from simple remote control of lighting through to complex computer/micro-controller based networks with varying degrees of intelligence and automation. Home automation is adopted for reasons of ease, security and energy efficiency. This project argues that home automation can make a difference regarding better energy management and usage of renewable energy sources. People are more sensible to the need of using energy and other resources more rationally but do very little to that end on their daily lives at home.

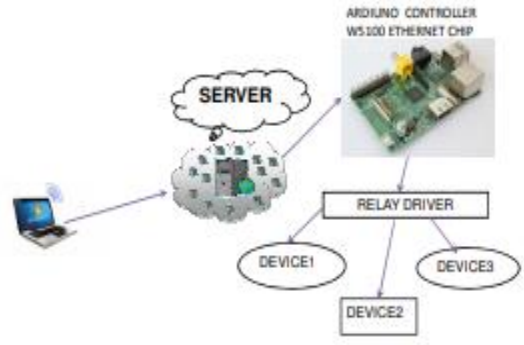
Table: automatic mode observation

S.NO	LIGHT INTENSITY	TEMPERATURE IN CELSIUS	DC FAN	LED LIGHT	FIRE ALARM
1.	38%	33.20	ON	OFF	OFF
2.	25%	35	ON	ON	OFF
3.	30%	28	OFF	ON	OFF
4.	40%	39	ON	OFF	OFF
5.	20%	24	OFF	ON	OFF



- When light intensity is below 30% then the LED light is switched ON or else it is remains OFF.
- When temperature is above 30 degrees then the DC fan is turned ON or else it remains OFF.
- The fire alarm buzzes when fire is detected by flame sensor.

Implementation: For the implementation of our model, firstly we had developed a Webpage and tested successfully. The flow model for the control of appliances with a Webpage was given below:



This complete system has two parts. One is web page to control and other is the appliance to be controlled like motor, bulb etc. The web page consists of the login page, which is used for authentication of a particular appliance to particular user. Once we logged into it we can control the

particular device, which is associated to that user.

Application:

- Lighting control system
- Heating ventilation and air conditioning(HVAC)
- Appliance control with a smart grid
- Indoor positioning systems
- Home automation for elderly and disabled people

Conclusions:

The home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuates a process according to the requirement, for example switching on the light when it gets dark. It also stores the sensor parameters in the cloud in a timely manner. Based on surveyed study the comparison of home automation systems is presented. Microcontroller, user interface, a communication interface and their performance factor are compared. There are a number of do-it-yourself (DIY) platforms available that allow to create Home Automation system quickly and easily with low cost and high performance e.g. Raspberry pi, Arduino, other microcontrollers, etc The next phase for the home automation will occur based on a few key improvements in the technology available in automation, such as improvements in wireless automation solutions as well as lowering of price points as the market begins to accepthome automaton usage in larger volumes. Some trends that we foresee for this phase of the industry are big companies like philips, Siemens & scheider will eventually bring out fairly mass market automation products with appealing user interface but at a lower price point today, and more people will be able to afford the products. Some foreign players will have niche in high and automation and focus fun the premium market.

Future scope:

Using this system, the system can be expanded to include various other options for home security feature like capturing the photo of a person moving around the house and storing it onto the cloud. This will reduce the data storage than using the CCTV camera which will record all the time and stores it. The system can be expanded for energy monitoring or weather stations. This kind of a system with respective changes can be implemented in the hospitals for disable people or in industries where human invasion is dangerous and also for environmental monitoring. Limitation to control only several devices can be removed by extending automation of all other home appliances.

Reference:

[1] Naik S. C & Ratnaparkhi N.S in (2014) "Home Automation using Cloud Network and Mobile Devices" at International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-1, Issue-6,

[2] Basma M. Mohammad El-Basioni, Sherine (2015) "Home Automation and Security System Using Android ADK" in International Journal of Electronics

Communication and Computer Technology (IJECCT) Volume 3 Issue 2

[3] Ozcan, and Ali Ziya Alkar (2006) Integrated solution to home automation, security and monitoring through mobile phones", Third International Conference on Next Generation Mobile Applications, Services and Technologies,

[4] I. K. Hwang et al.(2009) "Home network configuring scheme for all electric appliances using Zig Bee-based integrated remote controller", IEEE trans. Consumer Electronics, vol. 55, no. 3, pp. 1300-1307