

SMART HOME APPLIANCES USING IOT

Ms.Pawar Pallavi Tatyasaheb

¹Student IV SEM, M.E, VLSI AND EMBEDDED SYSTEM, SCOET, Pune, India

Mr. B.E. Shinde

²Assistant Professor, Department of Electronics and telecommunication, SCOET, Pune, India

ABSTRACT

Life is becoming easier and simpler with advancement of Automation technology. In today's world manual system are getting replaced by Automatic systems. As technology getting advanced number of internet users are increasing and Internet becomes a part of their day today life, and IoT is the latest and upgrading internet technology. Internet of things is a very rapidly growing network from industries to consumers that can share information and complete tasks while you are busy with other activities. Home Automation system (Wireless) using IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is used to save the electricity and human energy. User can operate the system from anywhere around the world through internet connection this make home automation system different than any other system.

Keyword Home automation System (HAS), Internet of Things (IoT), Cloud networking, Wi-Fi network, Arduino Mega 2560 & ESP8266 WiFi Module

1. Introduction:-

Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work Introduction related your research work

1.1 Overview

Homes of the 21st century will become more and more self controlled and automated due to the comfort it provides, especially when employed in a private home. A home automation system is a means that allow users to control electric appliances of varying kind. Many existing, well-established home automation systems are based on wired communication. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. But for already existing buildings the implementation cost goes very high. In contrast, Wireless systems can be of great help for

automation systems. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent past, wireless systems are used every day and everywhere.

1.2. Advantages of Home automation systems

Now a days, wireless systems such as Wi-Fi have become more common in home networking. Also in home and city (smart) automation systems, the use of wireless network gives us several advantages over wired network.

- 1) Installation cost is reduced : In this system no cabling is necessary so installation costs are significantly reduced. Wired systems require cabling, but the material used for wires and the professional laying of cables (e.g. into walls, under ground) is expensive.
- 2) System is easy to scalable and extent: Due to the use of wireless network, It is easy to extent our network according to changing requirement of the system, instead of wired installations, in which cabling extension is tedious. .
- 3) Home automation is very flexible: All the operations are combined at a time like switching on the bulb(lights) and they even control the music system. All these operations can be done on a single go. It is highly efficient. It is becoming easier to reduce the electricity bill by using the pro-active based home-automated appliances.
- 4) It is less time consuming. Home automation makes the work easier in a way that the work will be finished with the less time.
- 5) It is also called Assistive Domestics: It focuses mainly on making it possible for the elderly and disabled to remain at home, safe and comfortable.

Because of all these reasons, wireless technology is an attractive choice for new installations.

2. RELATED WORK

[1] Vinay sagar K N1, Kusuma S M2

The main purpose of this wireless Home automation System is to design a system that uses web server to remotely control the home appliances through anywhere around the world. This system uses Intel Galileo Micro controller as main working board, W-Fi network and cloud networking etc. for data storage.

[2] Sirsath N. S, Dhole P. S, Mohire N. P, Naik S. C & Ratnaparkhi N.S

The main objective of this paper is to design a Home Automation system that uses multi-touch mobile devices, cloud networking and wireless communication to remotely control various appliances within their house. In this system a mobile phone, wireless remote, and PC based program are used for controlling.

[3] Basil Hamed

The main purpose of this Paper is to design and implement such system which control and monitor smart home. Many systems which are included in smart home system are controlled by LabVIEW software as controlling system. Using LabVIEW connected to the internet we can monitor and control the home appliances from anywhere in the world.

[4] Deepali Javale, Mohd. Mohsin, Shreerang Nandanwar

The main objective of this paper is to guide handicapped and old aged people. It control various home appliances and provide a security using mobile(phone). The design consists of mobile(phone) with home automation application, Arduino Mega ADK. User can interact with the mobile (phone) and send control signal to the Arduino ADK which in turn will control other embedded devices and sensors.

[5] Basma M. Mohammad El-Basioni, Sherine M. Abd Elkader and Mahmoud Abdelmonim Fakhreldin

The main purpose of this Paper is to make a new design for the smart home using the wireless sensor network

system and the bio metric technologies like finger print,face recognition etc. This system uses the bio metric authentication at home entrance which increases home security as and easiness of home entering process. The structure of the system is described and the assimilate communications are analyzed, also an assessment for the whole system cost is given which is something missing in a lot of other smart house designs offers. WB-SH is designed to be capable of incorporating in a constructing automation system and it can be applied to offices, hospitals, and many other places. With an imagination for the future of the smart house when involve the bio metric technology in a larger and more comprehensive form this paper ends.

3. SYSTEM ANALYSIS

3.1. Problem Definition

Home automation systems face some main challenges, these are high cost of ownership, inflexibility, difficulty in achieving security and poor manageability. The main intention of this research is to design and implement a home automation system using IoT that is able to controlling and automating most of the house appliances through an easy possible web interface. By using Wi-Fi technology to interconnect its distributed sensors to home automation server the proposed system has a great flexibility. This will decrease the deployment cost and will increase the ability of upgrading, and system reconfiguration.

3.2. Proposed System Feature

The proposed system is a home automation system, consists of server, sensors. Server controls and monitors the various sensors, and can be easily configured to handle hardware interface module (sensors). The Arduino Mega 2560 development board, with ESP8266 WiFi Module acts as web server which create its own network. Automation System can be accessed from the web browser of any local PC or MOBILE in the same LAN using server IP, or remotely from any PC or mobile connected to the internet with proper web browser through server real IP (internet IP). WiFi technology is selected to the network that connects web server and the sensors. WiFi is chosen to improve security of the system (by using secure WiFi connection), and to increase system mobility and scalability.

4. SYSTEM DESIGN AND IMPLEMENTATION

4.1. Proposed Home Automation System

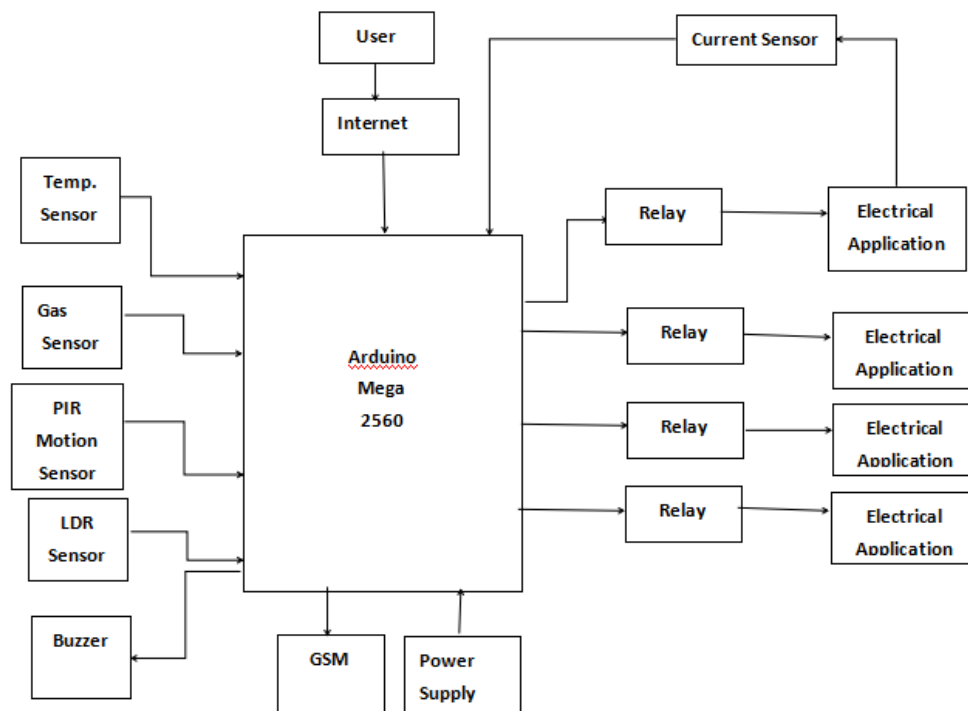


Figure 1: Proposed model of Home automation system

The advanced model of the home automation system is as shown in the figure1. The model consist of different sensors like temperature, gas, motion and LDR. Initially the Arduino Mega 2560 board connects to the internet through WiFi. When the connection is accepted it will start reading the parameters of sensors like p1, p2, p3 etc. The threshold levels for the sensors are set as t1, t2, t3 etc. If the sensor parameters are greater than the threshold level then the alarm a1, a2, a3 etc. will be raised respectively and the required actuation is done for the controlling of the parameters and the status of the appliances within home is known to the end user via sms using GSM module at home. In the proposed model the gas leakage, motion,temperature in the house is monitored. If the temperature exceeds the threshold level then the fan will turn on automatically and it will off when the temperature comes to control. Similarly when there is a leakage of gas in the home alarm is raised giving the alert sound. The user can also monitor the electric appliances through the GSM module via sms alert on their mobile. We will get energy consumption of each home appliances by using current sensor and also we can calculate energy bill of each appliance within home. If the lights or any electrical appliances are left on in hurry can be seen and turned off through simply typing the IP address of the web server.

4.2. Proposed Home Automation System Functions

The proposed home automation system has the abilities to control the following components in users home and monitor the following alarms:

1. Temperature and humidity
2. Motion detection
3. Fire and smoke detection
4. Light level
5. The proposed home automation system is designed to control the following appliance:
6. Lights on/off/dim
7. Fan on/off
8. On/off different appliance

4.3. Software design

HTML is used for displaying web page. The page is create using arduino 2560 and display information on your laptop or mobile screen. HTML language use for making this page. The markup tags used for Web browser displaying the webpage. There is no need an htm or html file extension. You can use directly ip address through any laptop or mobile in wifi area of wifi module.

4.4. Implementation Setup

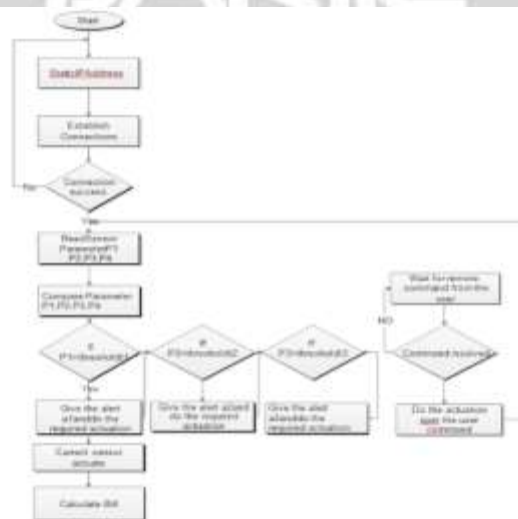


Figure. 2 sequence of activities in SHAS

Figure 2 illustrates the sequence of activities in the SHAS. When the connection is established it will start reading the parameters of sensors as p1, p2, p3 etc. The threshold levels for the sensors are set as t1, t2, t3 etc. The sensor data are sent to the wifi module. The data can be send to end user by sms through GSM module anywhere any time. If the sensor parameters are greater than the threshold level then the respective alarm a1, a2, a3 etc. will be raised and the required actuation is done for the controlling of the parameters.



Figure 3: Experimental setup of Home automation system

The experimental setup of Home Automation System is as shown in Figure 3. Here we are using four sensors i.e. temperature, PIR motion sensor, LDR and gas leakage sensor. Light will turn on automatically when light sensor detects the darkness. A cooler/Fan will turn on when the room temperature exceeds the set threshold and in turn reduces the room temperature. The gas sensor MQ-6 is placed to detect any gas leakage, if any leakage is detected the alarm in the hall is raised. Relay is used to switch the electrical appliances like light, fan etc. The Arduino mega 2560 board is placed in store room or garage. The Arduino mega 2560 board is connected with WiFi module 8266 for the connectivity with internet.

5.RESULTS



Figure 4: Web page on mobile of Home automation system



Figure 5: SMS on mobile through GSM system.

After the successful connection to the circuit, the data of sensor are sent to the wifi module for monitoring of the system. The figure 4 shows the web server page which will allow us to monitor and control the system. By entering the assigned IP address in the web browser this web server page will appear. The web server gives the information about the temperature in the house and motion state in the house. It also gives the status of the various electrical appliances like light, fan etc which we can control remotely. Figure 5 shows sms alert on mobile of end user so that he will get notification of the status of appliances at house.

6. CONCLUSION AND FUTURE WORK

6.1. Conclusion

The home automation using Internet of Things has been proven through an experiment to work satisfactorily by connecting simple appliances to it and the appliances were controlled with success remotely through internet. The designed system not only monitors the sensor data, like light, gas, temperature, motion sensors, but also actuates a process according to the requirement, for example turning on the light when it gets dark. It also sends the sms of current condition of appliances within house. This will help the user to analyze the condition of various parameters in the home anytime anywhere.

6.2. Future work

This system will be added various other options which would be use as home security feature like capturing the images of a person moving around the house and will store in cloud. It reduce the data storage than using the CCTV camera which is use for security. This will be used for energy monitoring, or weather stations. It kind of a device with respective changes can be used in the hospitals, hotels, societies or in industries where human entering is impossible or dangerous, and it can also be implemented for environmental monitoring.

ACKNOWLEDGEMENT

We acknowledge the hard work and efforts by the experts who have contributed towards advancement of the different home automation systems. We also grant the efforts Prof. B.E.Shinde, Assistant Professor and Prof.M.S.Biradar, HOD of E&TC Department, SCOET, Sudumbare, Pune for their constant support, modifications and suggestions to improve the quality of the paper and to help prepare the camera-ready copy of our paper.

REFERENCES

- [1] Vinay sagar K N1, Kusuma S M2, Student IV SEM, M.Tech, Digital Communication. Engg., MSRIT, Bangalore, India **“Home Automation Using Internet of Things”**
- [2] Sirsath N. S, Dhole P. S, Mohire N. P, Naik S. C & Ratnaparkhi N.S Department of Computer Engineering, 44, Vidyanaigari, Parvati, Pune-411009, India University of Pune, “Home Automation using Cloud Network and Mobile Devices”
- [3] Deepali Javale, Mohd. Mohsin, Shreerang Nandanwar “Home Automation and Security System Using Android ADK” in International Journal of Electronics Communication and Computer Technology (IJECCCT) Volume 3 Issue 2 (March 2013)
- [4] Charith Perera, Student Member, IEEE, Arkady Zaslavsky, Member, IEEE, Peter Christen, and Dimitrios Georgakopoulos, Member, IEEE “Context Aware Computing for The Internet of Things: A Survey”. IEEE COMMUNICATIONS SURVEYS & TUTORIAL
- [5] Charith Perera_y, Arkady Zaslavskyy, Peter Christen_ and Dimitrios Georgakopoulo Research School of Computer Science, The Australian National University, Canberra, ACT 0200, Australia yCSIRO ICT Center, Canberra, ACT 2601, Australia ” CA4IOT: Context Awareness for Internet of Things”
- [6] Bill N. Schilit, Norman Adams, and Roy Want, “Context-Aware Computing Applications”
- [7] Jayavardhana Gubbi, Rajkumar Buyya, Slaven Marusic, a Marimuthu Palaniswamia, “Internet of Things (IoT): A Vision, Architectural Elements, and Future Directions”
- [8] S.P.Pande, Prof.Pravin Sen, “Review On: Home Automation System For Disabled People Using BCI” in IOSR Journal of Computer Science (IOSR-JCE) eISSN: 2278-0661, p-ISSN: 2278-8727 PP 76-80
- [9] Basil Hamed, “Design & Implementation of Smart House Control Using LabVIEW” at International Journal of Soft Computing and Engineering (IJSCE) ISSN: 2231-2307, Volume-1, Issue-6, January 2012
- [10] Basma M. Mohammad El-Basioni1, Sherine M. Abd El-kader2 and Mahmoud Abdelmonim Fakhreldin3, “Smart Home Design using Wireless Sensor Network and Biometric Technologies” at Volume 2, Issue 3, March 2013
- [11] Inderpreet Kaur, “Microcontroller Based Home Automation System With Security” at IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 1, No. 6, December 2010
- [12] Rosslin John Robles and Tai-hoon Kim, “Review: Context Aware Tools for Smart Home Development”, International Journal of Smart Home, Vol.4, No.1, January, 2010
- [13] Hitendra Rawat, Ashish Kushwah, Khyati Asthana, Akanksha Shivhare, “LPG Gas Leakage Detection & Control System”, National Conference on Synergetic Trends in engineering and Technology (STET-2014) International Journal of Engineering and Technical Research ISSN: 2321-0869, Special Issue
- [14] Nicholas D., Darrell B., Somsak S., “Home Automation using Cloud Network and Mobile Devices”, IEEE Southeastcon 2012, Proceedings of IEEE.
- [15] Chan, M., Campo, E., Esteve, D., Fourniols, J.Y., “Smart homes-current features and future perspectives,” Maturitas, vol. 64, issue 2, pp. 90-97, 2009
- [16] Das, S.R., Chita, S., Peterson, N., Shirazi, B.A., Bhadkamkar, M., “Home automation and security for mobile devices,” IEEE PERCOM Workshops, pp. 141- 146, 2011
- [17] S.D.T. Kelly, N.K. Suryadevara, S.C. Mukhopadhyay, “Towards the Implementation of IoT for Environmental Condition Monitoring in Homes”, IEEE, Vol. 13, pp. 3846-3853, 2013
- [18] Rajeev Piyare “Internet of Things: Ubiquitous Home Control and Monitoring System using Android based Smart Phone” International Journal of Internet of Things 2013, 2(1): 5-11 DOI: 10.5923/j.ijit.20130201.02
- [19] G. Kortuem, F. Kawsar, D. Fitton, and V.Sundramoorthy, "Smart objects as building blocks for the internet of things," Internet Computing, IEEE, vol. 14, pp. 44-51, 2010.
- [20] S. Hilton. (2012, 14 January). Progression from M2M to the Internet of Things: an introductory blog. Available: <http://blog.bosch-si.com/progressionfrom-m2m-to-internet-of-things-an-introductoryblog/>
- [21] C.-H. Chen, C.-C. Gao, and J.-J. Chen, "Intelligent Home Energy Conservation System Based On WSN," presented at the International Conference on Electrical, Electronics and Civil Engineering, Pattaya, 2011.
- [22] R. Piyare and M. Tazil, "Bluetooth based home automation system using cell phone," in Consumer Electronics (ISCE), 2011 IEEE 15th International Symposium on, 2011, pp. 192-195.
- [23] Wikipedia. (2012, 12th December). Home automation. available:http://en.wikipedia.org/wiki/Home_automation
- [24]<http://www.smartcomputing.com/editorial/article.asp?article=articles%2F1995%2Fmar95%2Fpcn0323%2Fpcn0323.asp> retrieved 2010 09