

RESEARCH PAPER CASA AUTOMATICO –AN AUTOMATED HOME SYSTEM

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Abstract - Home automation system achieved great popularity in the last decades and it increases the comfort and quality of life. In this paper an overview of current and emerging home automation systems is discussed. Nowadays most home automation systems consist of a smartphone and microcontroller. A smart phone application is used to control and monitor the home appliances using different type of communication techniques. While the potential benefits of smart home technology are widely recognized, a lightweight design is needed for the benefits to be realized at a large scale. We introduce the CASAS “Smart Home automation system”, a lightweight smart home design that is easy to install and provides smart home capabilities out of the box with no customization or training. We discuss types of data analysis that have been performed by the CASAS group and can be pursued in the future by using this approach to designing and implementing smart home technologies. Technology is a never ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. It presents the design and implementation of a low cost but yet flexible and secure cell phone based home automation system. The design is based on a stand alone Arduino BT board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Arduino BT board is wireless. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core.

- To develop a Bluetooth based home automation system with Arduino UNO Board and an Android application.
- Remote controlled home automation system provides a simpler solution with Android application technology.
- Remote operation is achieved by any smartphone/Tablet etc., with Android OS, upon a GUI (Graphical User Interface) based touch screen operation

Keywords. Home automation, CASAS, Arduino, Smart Home

I. INTRODUCTION

1.1 Overview

Home automation system is growing rapidly, they are used to provide comfort, convenience, quality of life and security for residents. Nowadays, most home automation systems are used

to provide ease to elderly and disabled people and they reduce the human labor in the production of services and goods [1-2]. Home automation system can be designed and developed by using a single controller which has the ability to control and monitor different interconnected appliances such as power plugs, lights, temperature and humidity sensors, smoke, gas and fire detectors as well as emergency and security systems [3]. One of the greatest advantage of home automation system is that it can be controlled and managed easily from an array of devices such as smartphone, tablet, desktop and laptop [4]. The rapid growth of wireless technologies influences us to use smartphones to remotely control and monitor the home appliances around the world [5-

6]. Several home automation systems use smartphones to communicate with microcontrollers using various wireless communication techniques such as Bluetooth [7].

Smartphone applications are used to connect to the network so that the authorized users can adjust the setting of system on their personal devices. Different type of home automation systems offer a wide range of functions and services, some of the common features are appliance control, thermostat control, remote control lighting, live video surveillance, monitor security camera, real time text alerts [10-13].

This paper describes the implementation and working principles of some existing home automation techniques and it compares their cost, speed, real time existence and other functionalities. There are different home automation technologies accessible in market but guidelines about these technology is very low, in this research work a comparison of some existing home automation technologies is discussed so users can choose their own choice of technology. This paper also discuss the comparison of some popular home automation techniques and highlight their advantages and drawbacks.

1.2 OBJECTIVE

- To develop and gathering knowledge on home automation and smart living.
- To improve inhabitant experience, made easy and convenient.
- To achieve cost savings by energy savings.
- To enhance home security with all day interconnecting.

1.3 ADVANTAGES

- It is a robust and easy to use system.
- There is no need for extra training of that person who is using it.
- All the control would be in your hands by using this home automation system.
- This project can provide the facility of monitoring all the appliances with in the communication range through Bluetooth.
- By using this system the users can check the status of the appliances at whatever time of the day
- Manual control is also given in this project so the unskilled person can easily change the status.

1.4 DISADVANTAGES

- Bluetooth is used in this home automation system, which have a range 10 to 20 meters so the control cannot be achieved from outside this range.
- Application is connected after disconnect of the Bluetooth.
- when the new users want to connect the first download application software then the code and configuration must be done.

II. RELATED WORK

In the last few years, the interest for developing new Home Automation System (HAS) architectures has been continuously growing. This phenomena is mostly due to the desire of integrating the newly developed concepts into HAS.

In [1] a home automation system is proposed, which employs the integration of wireless communication, mobile devices, cloud networking and power-line communication in order to provide the user with remote control over their appliances and various devices around and within their home.

Another similar solution is proposed in [2], which makes use of the LabView software to remotely control the smart devices in the HAS.

Javale et al. describe in [3] a home automation system and an Android based application, which comes to help the elder people. The system contains a hardware device acting as gateway and interface between the targeted devices and the Android powered devices used for accessing the system. Paper [4] shows the need of extending the classical HAS architectures as the one in [3], by enhancing the communication and the mobility. It highlights the potentials of using the Hierarchical Mobile IP in this sense. This approach offers the owner an autonomous control of the appliances and devices even if he changes location or network provider, since the system is installed with IP addresses.

Another approach is presented in [5], where a hierarchical architecture for a wireless HAS is proposed. The system uses an Intel Galileo board and a router to connect a series of devices to the internet. The system also uses a web based application to control the devices and cloud storage to store the data collected from the sensors.

Article [6] pushes the architecture development a little further by proposing a scalable general architecture for a better integration of the Internet of Things with the Cloud Computing. Basically, this architecture, called CloudThings, offers its functionalities as cloud based services.

Architectures like the one in [6] can be a bridge for even more complex systems like the one proposed in [7, 8] for smart cities.

Thus, the HAS system architectures have been in continuous development in recent years, making this systems to go beyond independent architectures, becoming parts of greater interconnected systems. Thus, HAS can interconnect with healthcare systems [9], with energy management systems [10] or smart cities, as already mentioned.

III. METHODOLOGIES

3.1 Methodologies

Home automation systems using smartphone, Arduino board and Bluetooth technology are secured and low cost. A Bluetooth based home automation system proposed by R.Piyare and M.Tazil [14]. The hardware architecture of this system consists of the Arduino BT board and a cell phone, the communication between Arduino BT board and cell phone is wirelessly using Bluetooth technology. The Arduino BT board has a range of 10 to 100 meters, 3 Mbps data rate and 2.4 GHz bandwidth. In this system home appliances are connected to the Arduino BT board via relay. The cell phone use a software application which allows the user to control the home appliances.

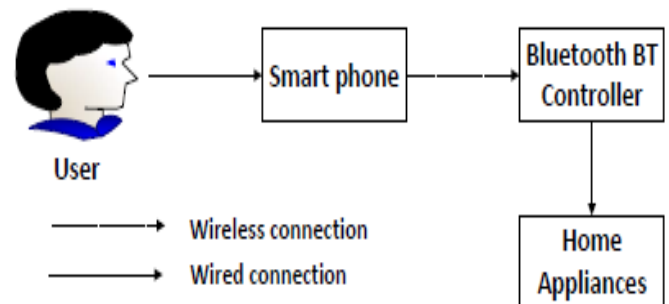


Fig. 1. Block diagram of home automation system

Similar research was carried out by [15]. A low cost and user friendly, smart living system is presented which also use android application to control home appliances. The wireless

connection between android device and home appliances is developed via Bluetooth technology.

3.2 Project Implementation

Today in this century home and offices are equipped with various machineries. Besides, people have various devices for surfing in web. That's why we have introduced a system that can be accessed from all sorts of devices and database can be updated from anywhere. If particular device works on, the other means of devices will be easily operated. The database is developed such a way that can be accessed from any sort of device that supports internet. In this regard motion and vibration sensor is brought here because of its high quality sensing. The system is very easy to install. For this, just need HD spy camera connection for recording and for motion detection a motion sensor and vibration sensor, the ultrasonic range detector is to detect the distance of the object, temperature and humidity sensors to maintain the room temperature. Water level sensor to filling the overhead tank. These are controlled by arduino controller. Home Automation is definitely a resource which is capable of make a home setting automated. People can be in command of their electrical devices via these Home Automation devices and set up the controlling actions in the workstation. We think this device have high potential for marketing in the future.

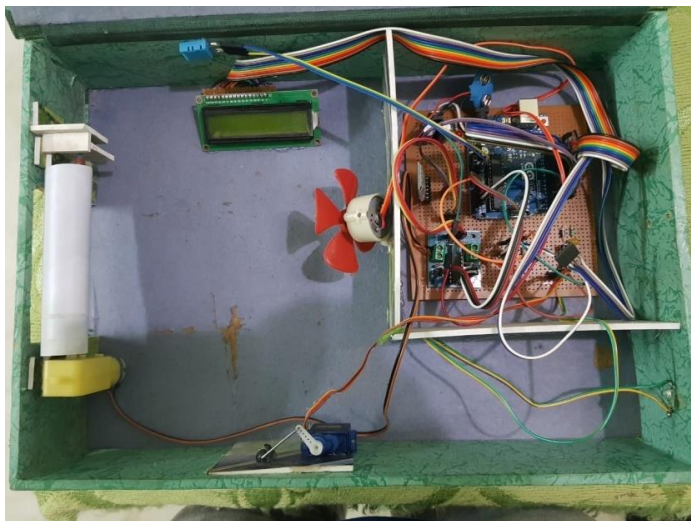


Fig 2: Picture of the whole project using arduino depicting home automation

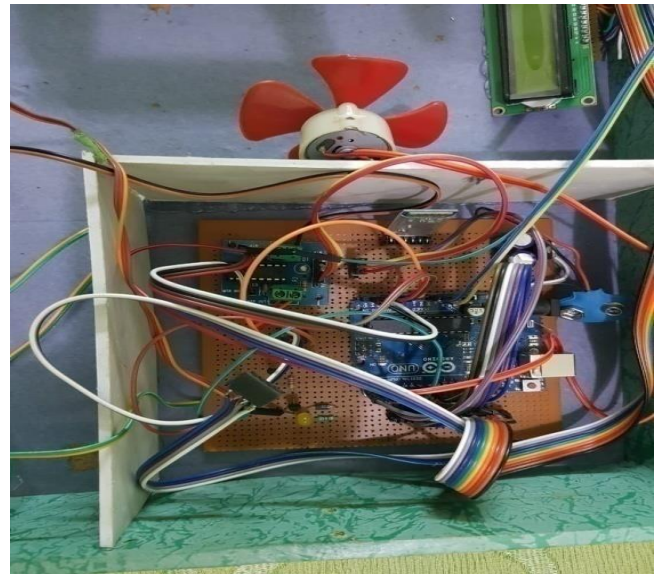


Fig 3: Details about how to connect different devices to arduino through wire.

3.3 HARDWARE

- SERVOMOTOR
- HC-05
- ARDUINO
- DHT 11
- DC MOTOR
- L293D
- CAPACITORS
- Transistor
- LED
- LM 7805

3.4 SOFTWARE

- ARDUINO IDE

IV. RESULT AND DISCUSSION

The final outcome of this project is a prototype for a simple home automation system which can control home appliances with a touch of a finger on a button corresponding to different devices. On the front end, there is an android app to control the home appliances and PCB board to which a number of home appliances are connected thereby controlling the appliances.

The results of this project have been up to the mark as expected when the project began initially. The user can remotely control the appliances on the same mobile app.

Hence, the target we set were successfully reached on time effectively.

KEY POINTS

- The app we are using is BluControl. In this there are 8 keys A,B,C,D,E,F,G,H and directions button UP, DOWN, RIGHT, LEFT. The key should be multiple of 1200 .here it is 9600.
- To switch on and off LED you have to use A and B button respectively.
- To open and close door you have to use C and D button respectively.
- To switch on and off button you have to use L and R button respectively.
- To open and close garage u have to use U and D button respectively.
- LCD displays humidity and temperature recorded by DHT11.
- If temperature goes beyond 30 , then fan automatically is switched on. If it is sitched off once then it is manually controlled by buttons.

V. CONCLUSION

Hence, the idea to create a fully working home automation system with facility to control and monitor appliances has been finally realized. The output of this project is an array of home appliances that are controlled over the internet with the help of a mobile app . This project is a successful outcome of continuous and tireless effort from supervisors, college faculty, colleagues and other helping hands.

This project has been a really great experience and opportunity to learn and to experiment. Moreover, the authors got the chance to closely experiment and learn about what goes into designing and developing home automation systems. We are very much delighted that we explored this topic as our major project title and in a way, created a version of home automation system of our own, and to be closely related with the technology that is of a great interest of study and research today and is sure to revolutionize the way of living of people in the days to come.

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