

# A Survey on Home Automation Systems

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**Abstract** – Internet of Things (IOT) is nothing but connecting different real world objects to provide proper communication, synchronization, and inter-connecting between various devices or physical appliances is also known as “Things”. The Home Automation System (HAS) is extension of current activities performed inside the home and this Home Automation System (HAS) can be developed easily now a day’s, because of powerful computational devices and wireless sensor network(WSN), to provide user friendly and cost fairly home automation system. In Home Automation System (HAS), different technologies like WiFi, Bluetooth and Zigbee are used for communication, and different devices like smart phone, tablet and laptop used for controlling various appliances. In this paper we detailed a survey on different home automation systems considering parameters like type of communication, cost, technology and efficiency of system. A comparative analysis of home automation system is done. In future this system may have high demand and usage for automation of the “Things”. Using Home Home Automation System (HAS) our home will be smart home that can operate without any physical interference of human being.

**Keywords:** Home Automation, IOT, GSM, ZigBee, Bluetooth, SMS, Twilio, Android.

## I. INTRODUCTION

The purpose of this survey paper is to present the Home Automation Systems (HAS) currently available over the world. It is very useful to the user for control and handle all the appliances that are connected to the system, from a controlling devices. “EASY USE OF APPLIANCES” is main motive of this system. In this system home appliances can be monitored and controlled, and the user can interact with the system through a user friendly interface. The home appliances like fans, lights, switches are remotely controlled through a main control board. It becomes too tedious to every time manually turn the switches ON or OFF. According survey we found that this is a big problem in case of disabled or handicapped people. For that reason home automation system is useful.

## II. LITERATURE SURVEY

**1. Door Automation system for smart Home Implementation:** In this paper is presented the design and the prototype implementation of a pneumatic door automation system intended to be used for access control in smart homes. The structure of the developed application is realized around the PIC 16F877A microcontroller which operates together with a pneumatic actuator based on a double acting cylinder controlled through an air distributor with solenoid valve. In the basic mode, the door opening and closing actions can be initiated manually by the user, through password authentication. The main parameters of the system can be configured locally, but an indepth diagnoses and reconfiguration can be performed only through the serial interface which ensure the communication between the main module of the system and an external PC. Compared with other similar systems, the proposed implementation solution allows a high

operation speed and very good reliability due to the pneumatic actuation. In addition, the door automation module can be integrated in a centralized access control system dedicated to the smart homes that has all the appliances and other electricity based equipments connected into a local network. The door automation module presented in this paper can be integrated in any centralized access control system dedicated to the smart homes.

### **2. Equipment for power line communication based on single carrier system for Home Automation System:**

Systems for more automation into buildings (home, workplace or industrial) are in terms of communications primarily solved systems with external lines or wireless systems. Installing an external line may require greater intervention in parts of building. In the case that such intervention is not allowed and place of deploying, or part thereof is ineligible for wireless coverage, is the possibility of using data communication over the power-line for this communication section. The transmission channel thus forming copper lines of the built-in infrastructure of power-line. This paper describes prototype of smart-home system with intelligent features with manufactured devices.

### **3. Power Meter Monitoring for home appliances based on mobile data communication:**

In this study, we proposed a tool that can calculate the amount of electricity consumed by home appliances users and send the data in real time and online to the server. This way, users can see the usage of electrical energy periodically. This paper describes the design of a tool in the form of Smart Power Meter, where the tool can

measure the power used by consumers and also the measurement data can be accessed by users through online. The results of the discussion, we concluded that data sent can be received and stored in the database, and the monitoring page can display overall data readings. The accuracy of current readings was obtained in the range from 88.33% to 99.29%. The accuracy of the voltage readings was obtained in the range from 99.02% to 99.96%. This indicated the possibility of using the smart power meter for wider users.

#### **4. Design and Implementation of an Automated security system using Twilio Messaging service:**

This paper focuses on designing and developing a model of an IOT-Based security system for homes, banks and offices in need of security. The proposed system has provision for theft and fire detection and sends alerts to the user through a text message. It also captures a number of snapshots of the intruder and mails it to the user. This system also consumes less power as the camera is activated and takes snapshots only in the presence of an intruder, unlike the CCTV system, where live feed is recorded round the clock. This system not only notifies the user but also the neighbour so that immediate action could be taken.

#### **5. Solar Assisted Advanced Smart Home Automation:**

This paper proposes design and implementation of smart home automation using solar power. Solar Power has been interfaced with microcontroller and other house hold appliances. All these appliances can be controlled by the user with only one tap on mobile phone and wastage of energy can be curbed. Hence, an intelligent and smart control unit has been built with low energy consumption. The novelty of this work is development of a password oriented and a solar assisted smart home automation system. PROTEUS software has been used for simulation. The proposed technique has been implemented on hardware model and tested to control the loads with a wireless telephone.

#### **6. A Safe approach using Virtual Devices to evaluate Home Automation Architecture prior installations:**

This paper presents a solution based on virtual devices to evaluate home automation architectures without the need of deploying the corresponding physical devices. Our approach is focused on the specific situation of improving an existing installation, which consists of these steps: virtualize the installation and generates a software architecture, include the new elements as virtual devices, evaluate the behavior of the whole architecture, test the new components with the physical installation, and incorporate the new devices to the installation. The approach is validated using a case study of a real installation that must be updated.

#### **7. Smart Home Automation with a unique door monitoring system for old age people using python, opencv, Android, Rasperry pi:**

In this paper, smart home automation system particularly for old age people is proposed based on python, OpenCV, raspberry pi and android application. The appliances are controlled by the Raspberry pi server, which operates according to the user command (touch or voice) received from the mobile phone. A unique door monitoring system is designed based on face detection and recognition from a camera installed outside the main door, which can be accessed from the phone using android application. One interesting feature that has been added is that, all the appliances can also be controlled through the voice of user. For energy efficiency user can analyze the usage of each appliance from their phone. Moreover, user can also control the intensity of light as well as the speed of the fan. With all this features incorporated in a single system with good and simple user interface, this system is cost effective and perfect for old age people living alone in their houses.

#### **8. Bluetooth based Home Automation system using cell phone:**

This paper 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. Password protection is being used to only allow authorised users from accessing the appliances at home.

#### **9. Eyrie Smart Home Automation using Internet of Things:**

This paper describes the use of various open source hardware such as Arduino, Raspberry Pi, etc. to build smart and secure homes. The hardware is open source and hence cost efficient. This home automation system allows the end user to monitor his home or office with a smartphone, tablet, or any computer. This paper also explains the use of the security system for fire hazards that may occur due to a gas leakage and can be detected using a smoke sensor. It uses a low power NRF24L transceiver at each node around the house to create a mesh network that connects to a Linux based central hub. Users can monitor the house from anywhere and get periodic alerts. In the proposed work, the house can also be controlled using voice commands such as Google Voice, Apple Home Kit and Alexa.

#### **10. Embedded System for Home Automation using SMS:** This paper describes the design and development of a system for household appliance control using cell phone

through global system for mobile communication (GSM) technology. The cellular communications is a potential solution for such remote controlling activities. SMS (short message service) technology can be used to control household appliances from distance. Remotely, the system allows the home owner to monitor and control the home appliances via mobile phone set by sending commands in the form of SMS messages and receiving the appliances status as well. The proposed system makes use of wireless control hence can be effectively used in systems where unwired connections are desired. The system uses the user's mobile handset for control and therefore the system is more adaptable and cost-effective and also providing ubiquitous access for appliance control.

#### IV. RESULTS AND DISCUSSION

S.No	Title	Technology	Limitations
1.	Door Automation system for smart Home Implementation.	Pneumatic Control.	HAS suffers a certain lack of accessibility.
2.	Equipment for power line communication based on single carrier system for Home Automation system.	Combination of Wireless and PLC Technology.	Advanced measurement series is not available.
3.	Power Meter Monitoring for home appliances based on mobile data communication.	Current kWh Meter Technology.	
4.	Design and Implementation of an Automated security system using Twilio Messaging service.	Internet of Things.	Can't develop for face recognition to restrict access to the enclosed area.
5.	Solar Assisted Advanced smart home automation.	Smart home automation using solar power, PROTEUS software.	Cost Effective.
6.	A safe approach using Virtual Devices to evaluate Home Automation Architecture prior	Web Technology and Internet of Things.	High cost.

	installations		
7.	Smart Home Automation with a unique door monitoring system for old age people using python, opencv, Android, RasperryPi.	GSM/Zigbee module.	This system is not to predict Energy utilization in the household.
8.	Bluetooth based Home Automation system using cell phone.	Bluetooth Technology.	Cost is not flexible.
9.	Eyrie Smart Home Automation using Internet of Things.	Internet of Things.	Cost efficient.
10.	Embedded System for Home Automation using SMS.	Global System for Mobile Communication (GSM).	This system is not developed the audio or voice based remote home.

#### V. CONCLUSION

According to this survey, we understand that existing system has some problems and requires some of resources that cause system costly. Systems working on different environments and different resources causes user to adjust with the system. It is not as much popular in Asian countries, to increase the scope of these systems needs to be implemented with some user friendly interfaces which will help users and gives more efficient access to system.

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