

# Smart Home Automation using IoT with Security Features

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**Abstract-** Technology is a big and very rapidly growing process. We can 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. This paper presents the design and implementation of a low cost but yet flexible and secure home automation system. The design is based on an Arduino board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the mobile phone and the Arduino board is wireless. system is designed to be less cost allowing variety of devices to be controlled with minimum changes to its core. Password protection is being used to only allow only home people users from accessing the electronic devices at home.

**Key Words:** Internet of Things, IoT, Home automation, Wi-Fi, Arduino

## 1. INTRODUCTION

The Internet of Things is the interconnection of the various computing devices embedded in the daily appliances to the internet, thus enabling them to communicate with each other. This enhances the end users quality of life and to improve efficiency and sustainability in the day to day activities. In shortly, many of the smart devices will be communicating over IoT. After few more years there will be more than twenty billion devices connected to the Internet of Things. As we will approach that value. We are living in a world that is rapidly evolving regarding automation. Automation is the ability to schedule events for the devices connected to the local network or the internet through time-related or stimulus-triggered programs. From large industries to small offices, everywhere the concept of automation is being implemented to reduce human intervention and to improve energy efficiency and productivity. Home automation or domestics is the process of automating the various appliances inside a house thus converting it into a smart house. It involves the automation of heating, lighting, ventilation, watering the garden as well as security system and various other embedded system devices that can be connected to the internet. Another major characteristic of the present generation of home automation is the remote monitoring and access of the automated appliances. With the evolution of smartphones and tablets and the development of various communication technologies like Wi-Fi and Bluetooth. We have gained the ability to connect to our home network while we are away indeed. There are many advantages associated with home automation. One of the advantages is the immense potential for energy conservation and cost saving. The efficient home automation system is proposed in this proposed paper.

## 2. RELATED WORKS

In the studies from [1] the author proposed that The Internet has changed drastically the way we live, moving interactions between people at a virtual level in several contexts spanning from the professional life to social relationships. The Internet of Thing has the power to add a new dimension to this process by enabling communications with and among smart devices, thus leading to the vision of “anytime, anywhere, any media, anything” communications. We came to know that the IoT should be considered as part of the overall Internet of the future, which is likely to be dramatically different from the Internet we use today.

In the [2] the author proposed the design and implementation of a low cost, flexible and wireless solution to the home automation. The system has been secured for access from any user or intruder. The users have to acquire password for pairing the Arduino BT devices and the cell phone to access the home appliances. This adds a protection from unauthorized users.

In [3] proposed the Remotely controlled home automation system in which the system can be easily incorporated with all kinds of home and office designs. The android application as well as the Admin control can be easily changed and edited to present the layout of any house or office block, and as such, the system can be easily add with all kinds of architectural designs.

In [4] Apriori algorithm for a smart home automation and metering system using IoT is presented. The main motive of this system is to control the home appliances and electronic devices with the help of a supervisory system. The supervisory system is designed in such a way that everyone can access it. The system provides users to control, manage the electronic devices, can monitor the consumption of electricity, and to pay the electricity bills, securely and reliably.

## 3. MOTIVATION

Home Automation has been on the rise in the past few years. Now every things are controlled by IoT ever-evolving technology, there have been smarter and more advanced solutions in the domain of home automation. To enhance the standard of living, the appliances need to be wholly automated without any user intervention in any form whatsoever. This enables the end user hassle-free interaction with the appliances as the appliances learn and react as per the user's requirements without him physically pressing a button. Wired sensor systems are more difficult to handle and also require much amount of wiring the sensors at different locations. Thus, the importance of wireless sensor node has been on the rise and is a critical factor for

efficient implementation of home automation. Energy saving is one of the significant advantages of automating home appliances. Thus, the user must be kept aware of the energy consumption of the automated appliances. In a developing country like India, where people have busy life schedules, providing efficient energy saving and comfort at low prices and higher efficiency is of utmost importance. Security of home is must have things because of the security breach in many home these days, if we have different type of security features we can live a secured life in home.

#### 4. PROPOSED SYSTEM

##### 4.1 System Overview

The proposed system is a distributed home automation system, consists of Arduino, micro controller, sensors and some electrical devices used in home. The Arduino controls and monitors the various sensors, and can be easily configured to handle more hardware interface module (sensors). Wi-Fi module is used to connect to the internet.



Fig-1: Home Automation

Automation System can be accessed from the web browser of any local LAN using server IP, or remotely from any PC or device connected to the internet with appropriate web browser through server real IP address. Wi-Fi is selected to be the network infrastructure that connects server with the sensors. Wi-Fi improves system security (by using secure WiFi connection), and is useful to increase system mobility and scalability. In this system we are implementing some security features like motion detection outside the house during unusual time like night. Some proximity sensors and alarm should be installed outside the home and programmed to trigger the alarm when someone cross the boundary. Some security camera should be installed inside as well as outside of home, So that the owner of the home can monitor the house any time by the help of remote management of home features

The proposed home automation system also has the capabilities to control the following components in user's home and monitor the following alarms: Temperature and humidity, Motion detection, Fire and smoke detection, Light level. The proposed home automation system can control the following appliance: Lights: on/off/dim, Fan: on/off, Door: open/close, television, refrigerator, air conditioner, some

security alarm and garden watering system and various other smart devices present inside the home

##### 4.2 System Architecture

Taking about the above mentioned figure, it is clearly shown that it has several components which help to build a smart home. The essential component of the system of smart home automation are:

- **Arduino:** It is the processor the system. It act like the middle man between the sensors and cloud/smartphone which control the different smart devices present in the home. All the sensor and electrical appliances are connected to the Arduino board.



Fig-2: Arduino

- **Node MCU ESP8266:** The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU capability produced by a Shanghai-based Chinese manufacturer, the low cost, compact size and the presence of an inbuilt Wi-Fi module were the reasons for selecting this microcontroller. This wi-fi chip help to connect the Arduino board to the internet and cloud server and mobile application.

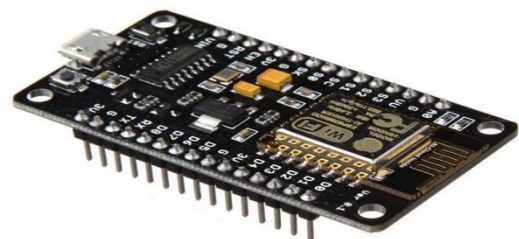


Fig-3: Node MCU ESP8266

- **Mobile Application:** This is an android app installed on the smartphone of owner the house, which enable to manage the home automation system remotely.
- **Cloud-Based Server:** Cloud goes about as a database to store every data generated by the sensors installed in the home. This cloud server helps to send email alert about different situation in home to the client.

- **Sensors:** A sensor is a device that detects and responds to some type of input from the physical environment. In this different type of sensors are used like temperature sensor, motion sensor, proximity, smoke and gas sensor which detect the change in environmental phenomena and send the data to the Arduino device.
- **Security devices:** It includes the Alarm and camera installed in the house, which help to monitor the house from remote location using the mobile application.

### 4.3 Network Architecture

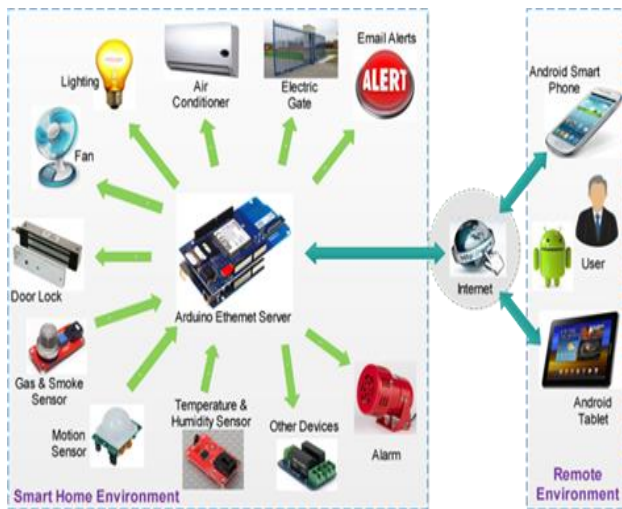


Fig-4: Architecture diagram

### 4.4 Data flow diagram

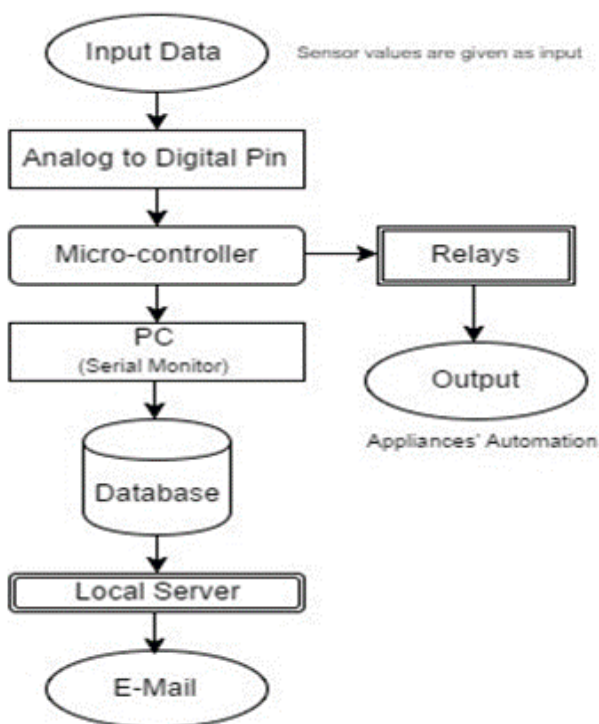


Fig-5: Flow chart of home automation

### 5. CONCLUSION & FUTURE SCOPE

In this paper, a prototype smart home automation using IoT is presented. This research work will be carried forward by integrating relays to Arduino board for controlling home appliances from a remote location in a real scenario. As an extension, authors propose a generic IoT framework and use cloud computing infrastructure for connecting and managing remote devices and also store sensor data. This plan is to productize proposed home automation solution so that more number of people can use IoT in a smart environment.

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