

# WIRELESS HOME AUTOMATION TECHNOLOGY (WHAT) USING INTERNET OF THINGS (IOT).

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**Abstract**— IoT (Internet Of Things) is fast emerging technology which involves interaction among things through internet without human interference. It has made human life easier and comfortable. Now-a-days digital devices in home are increasing rapidly due to which there is a need of accessing and controlling the devices remotely. This paper represents an affordable and flexible home control system using an Arduino, web server with IP connectivity for interacting with devices and appliances remotely using Android based Smart phone app. It demonstrates the usefulness of the system using devices such as light switches, temperature sensors, and water-level sensors. In addition to remote control it also provides reminders, voice commands functionality. This project is very useful for people with physical disability. It also plays a vital role in maintaining living standards and provide secure and flexible environment.

**Index Terms**— Automated Home, IoT, Android, Web-server, Arduino, Wireless Technology, Voice commands, Applock.

## I. INTRODUCTION

To enhance the lifestyle of people through the provision of different services, smart home or automated home comes into picture. It aims at providing leisure and ease of work. The goal of this project is to operate home devices smartly through an android app using IoT(Internet Of Things).IoT is the network of “things” or physical objects which includes electronics, software, sensors, actuators and network connectivity. All these things collect and transfer data between themselves. IoT has increased significantly in the last few years since it has added a new dimension to the world of information and communication technologies.

For digitalizing home appliances such as lighting, heating, security, audio, video etc. IoT in home automation is the best commercial solution these days. With the increasing use of personal computing, media players, android mobile phones etc. people have more knowledge about these technologies and are more comfortable with its use. Thus home automation will be easily accepted by the people.

The paper will further tell about the proposed system which uses wireless technology for automated home. It comprises of 3 main components i.e. Arduino, web-server and android application.

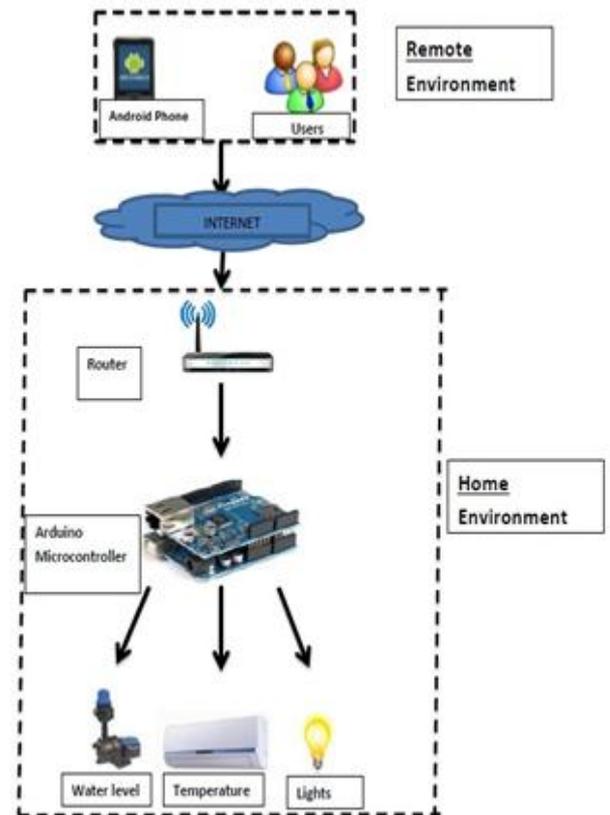


Fig 1. Overview of concept

## II. EXISTING SYSTEM

There has been a significant increase in home automation in recent years due to higher affordability and advancement in smart phones and tablets which allows vast connectivity. With the introduction of IoT the research and implementation of home automation are

getting more popular [1]. Various wireless technologies that can support some form of remote data transfer, sensing and control such as Bluetooth, Wi-Fi, RFID and cellular networks have been utilized to embed various levels of intelligence in the home [2]. The studies have presented Bluetooth based home automation systems using Android smart phones without the internet controllability. The devices are physically connected to a Bluetooth sub-controller which is then accessed & controlled by the smart phone using built-in Bluetooth connectivity [3]. As the range of Bluetooth is limited, operation system can only be controlled within that particular area. Controlling the home appliances through the radio frequency or Bluetooth have some disadvantages due to which it is not always feasible for the devices that are at far distance. A GSM and ZigBee based communication and control for home appliances has also been presented by [7] where the device is connected to a ZigBee Transceiver and it communicates with each and every node present inside home. From the mobile phone(GSM), command can be send via SMS to the Controller, which in turn interprets the command and then activates the required 'switch' to control the electrical item. The drawback of this system is that at remote places there should be proper coverage of GSM mobile signal.

The above mentioned systems have made significant contributions to the design and development of home automation systems. However, the existing works were mainly focused on switching and controlling home appliances or connected devices rather than remotely monitoring of home environment [9].

Home automation should provide a user-friendly interface on the host side, so that the devices can be easily setup, monitored & controlled. Furthermore the overall system should be swift enough to realise the true power of wireless technology. The system should also be cost effective so as to justify its application in the field of home automation.

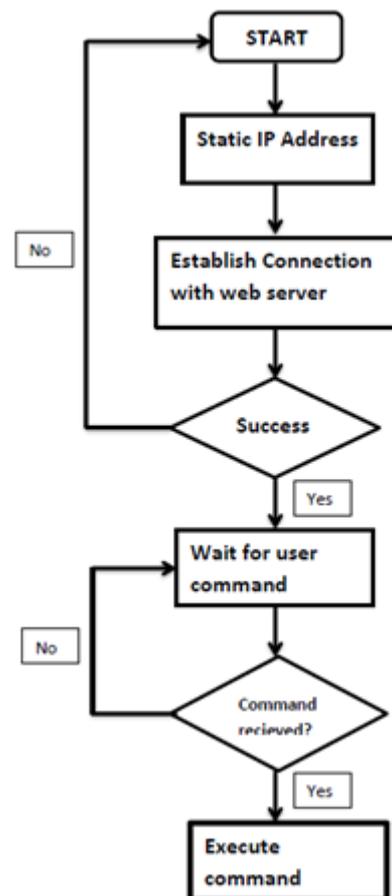
### III. SYSTEM ANALYSIS AND DESIGN

This section describes the proposed architecture and design of flexible and low cost home controlling and monitoring system. The three basic building blocks of this project are Arduino microcontroller, Web server and Android application. The basic idea is to control different appliances and devices using the mentioned components. Sensors will be used to sense different factors such as water level, temperature and send corresponding messages to the android application. On receiving alert messages the user can instruct the devices to behave accordingly. Web server will help the user to access the devices remotely. Such an application is very useful but less secure, anyone can share that application or access it if no security is provided. So to make the app more secure we can provide a password protection for the android app or we can make it unshareable / shareable to a limited number of users as per the requirements.

The designed app for the home automation system provides the following functionalities to the user:

- Remote connection through internet to the Web server.
- Provides IP and user authentication.
- Controlling and monitoring of Home Appliances.
- Scheduled reminders or messages.
- Password change option.
- Android app lock.
- Provides voice commands.

Sensors also play an important role in this concept. Different sensors keep track of their corresponding stimuli. The system is proposed to provide a cost efficient home automation technology.



. Fig 2. Flowchart for connection establishment and command execution

#### 1) Arduino

Arduino is a popular open-source single-board microcontroller, which is designed to make the process of using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open hardware design for the Arduino board with an Atmel AVR processor and on-board input/output support. The software consists of a standard programming language compiler and the boot loader that runs on the board. The Arduino board is a hardware interface allowing you to

control and monitor hardware devices with your computer. We are going to make a home automation system using the Arduino boards and the RS part components. There are many functions in our home automation system. These are some features about our system.

- **Temperature sensing System**
- **Automatic Lighting System**
- **Air-conditioning control**
- **Scheduled Reminders**
- **Water level sensing**

For the whole system, it will setup based with the Arduino Uno.

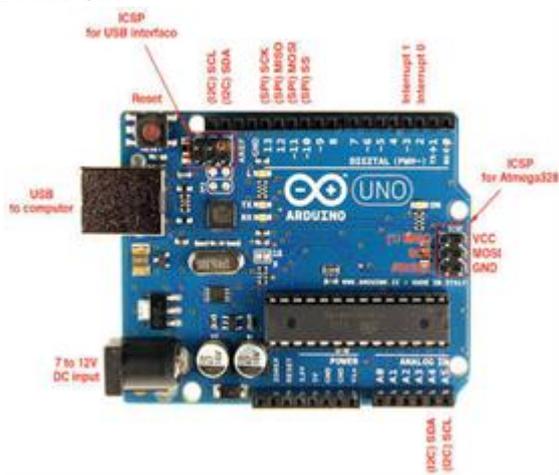


Fig 5. Arduino Uno

### 2) Web-Server

The web server is used for storing the signals and user records and serves to the other components in the system. It manages the communication between the Arduino and mobile smart device and is used for supporting the bidirectional communication between them, local device and web server and also mobile device and web server. In our project web server is developed to connect the hardware devices and the microcontroller and then to android application. To successfully connect and access the web server in the home automation system the user has to enter the real IP address. If a web server grant access to home automation system the command containing the response code is received. The android application process the command to determine the web server's response.

### 3) Android Application

The mobile device, either a smart phone or a tablet, needs to run Android operating system since the user system involves an Android application. Android application simply receives the users' requests, transfers request to the web server using HTTP POST method. To maintain the security of the app we will be also providing a lock for the app. The lock can be any lock such as pin, pattern, password or we can use a more complex one as given in [8]. The android app provides a graphical user interface (GUI) for accessing and controlling the devices at home through server real IP. Voice commands and

scheduled reminder are additional features included. Different voice commands will be provided to control different devices. When the user will give those commands, the application will recognize it, decode it and then perform the respective action.

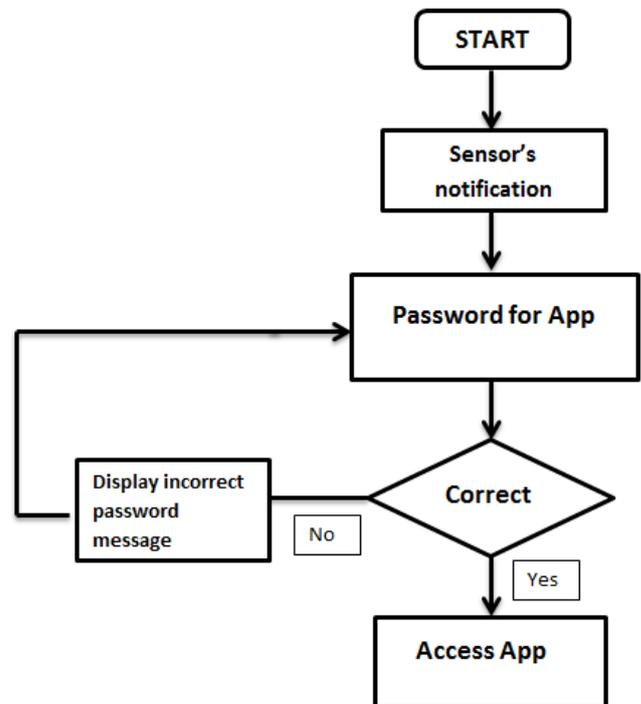


Fig 4. Steps to access app.

Another concept of scheduled reminder or messages will be provided. Whenever a message need to be broadcasted in the house , let it be any message such as “ gather in living room” or “ come for dinner”, we can make use of scheduled messages. The message will be provided through the android app, which in turn will announce the message in the house with the help of speakers or send it to phones of all members as a popup notification. Another use of scheduled reminder is if no one is in the house and any task need to be performed, then one message can be kept with schedule time such that the message get convey to members present in the house at specified time.

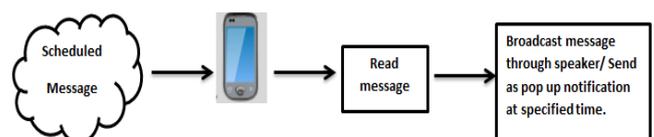


Fig 5. Scheduled messages

#### IV. CONCLUSION

In this paper, a novel architecture for low cost and flexible home control and monitoring system using Android based Smart phone is proposed. Any android based mobile can be used to control different devices using web server. Such project can be very useful for old and physically disabled people. The project has vast scope for development. Many different features can be added later. Voice controlling enables users a sense of comfort as no direct operation with the home automation system is required. The proposed system reduces the wiring by using wireless networks.

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