

# Innovative Home Automation System for Smart Living

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**Abstract** - This paper presents the general design of a low-cost wireless home automation system.

It is specifically focused on creating IOT-based home automation systems that can control many things over the Internet. The paper represents the use of wireless technology to provide remote access via smartphones. We use cloud server-based communication which allows users to access home equipment regardless of distance, thus increasing the effectiveness of the project with aspect of distance factor.

The document represents a system designed to control indoor devices and equipment, with a low-cost design, user-friendly interface and easy installation. Tools status and management dashboard will be available on the Android platform. The system is designed to help and provide support to the elderly and disabled people in meeting their needs at home. This remote control application will be useful in the spread of epidemic diseases such as Covid19 where manual touching of the device with the remote control is voluntarily reduced. In addition, the smart home concept increases the standard of living of people.

**Key Words:** Smart Home Automation, Arduino Cloud, Internet of Things, Wireless, Amazon Alexa, Voice Control

## 1. INTRODUCTION

The Internet can be defined as a communication network that connects people with information.

The Internet of Things (IOT) is a network of devices consisting of many different devices at different places having ability to collaborate and communicate collectively on the internet.

Therefore, the main goal of the Internet of Things is to enable the objects to get connected to other objects and people using internet anytime and anywhere.

Current Home automation faces the main problems like poor manageability and high cost. The main aim of this work is to design and implement a home automation system using the Internet of Things that can control and automate most home appliances in a simple and manageable way using arduino cloud technology so that problem of physical presence at home for controlling and monitoring electrical appliances will be completely eliminated.

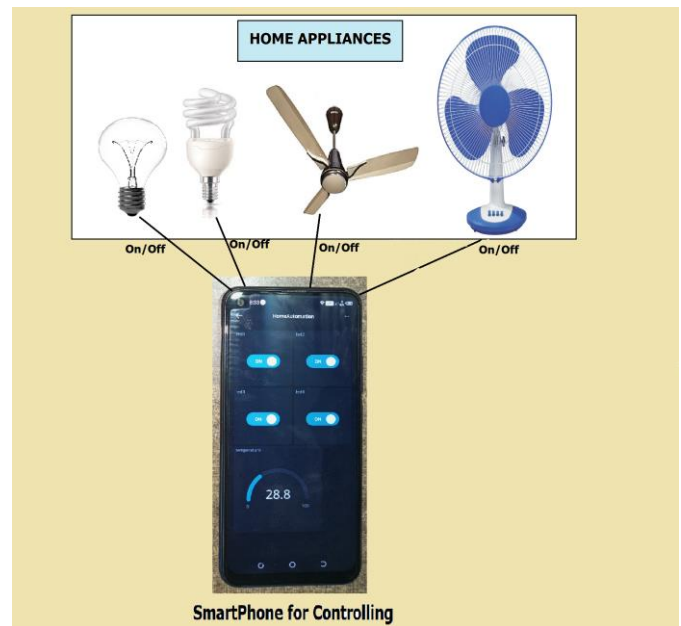


Fig -1: IOT Appliances

## 2. LITERATURE SURVEY

Current IOT home automation systems adopt Bluetooth, ZigBee, NFC, RFID and other technologies, which have limits (poor distance range) over remote control operations. The physical presence of people at home is mandatory here. The lack of latest cloud technology in the current system renders the home automation system ineffective and disabled or elderly people cannot control and monitor their home appliances remotely from the internet. Data Analysis of existing IOT systems

The technologies are as follows -

### 2.1 Bluetooth technology -

The Bluetooth is a popular wireless service used smartphone and computers. It has fast communication, high security and low cost features.

However this Bluetooth devices distance limitations (few feet's range only) and cannot be accessed from remote locations over internet. [2]

### 2.2 WLAN (Wireless Local Area Network).

The disadvantage of this system is that it has distance limit (few meters range only) and cannot be accessed from remote locations over internet. [4]

**2.3 GSM Technology —**

Some of current IOT smart home uses GSM (Global System for Mobile) technology to control home appliances via SMS service. In the GSM-based home automation system, communication between the main module and electronic devices is made via text SMS. [5]

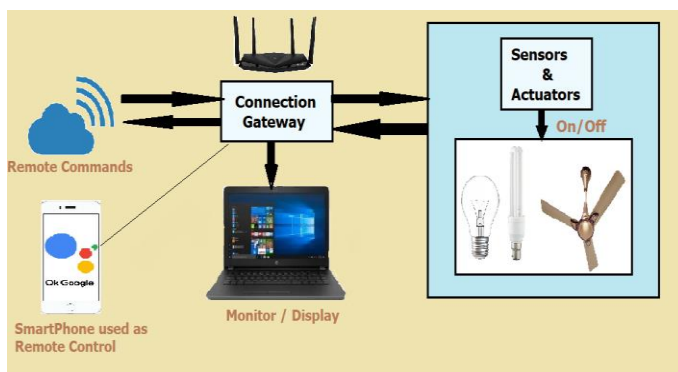
Disadvantages of GSM Based Home Automation Systems- It is not reliable as there is no guarantee that a message will always be sent to the system.

**2.4 Zigbee Technology**

ZigBee is a low-cost, reliable. The data transfer rate is low and the design is flexible. ZigBee belongs to IEEE 802.15.4 standard and having less power consumption. [6] The limitation of the current implementation of Zig-bee technology is distance limit (few meters range only) and cannot be accessed from remote locations over internet.

**3. SYSTEM ARCHITECTURE AND DESIGN**

The purpose of the smart home automation system is to access devices (switches) at home using cloud-connected Android applications.



**Fig -2: Architecture of Project**

Hardware components of IOT system –

**3.1 Arduino –**

Arduino UNO board is the standard board of Arduino. Arduino UNO is based on ATmega328P microcontroller. Arduino Mega board compared to other boards is easy to use. The arduino board has digital and analog input/output pins (I/O), expansion boards, and other circuits.



**Fig -3: Arduino UNO Board**

**3.2 NodeMCU –**

ESP8266 is the name of the microcontroller. It is an embedded WiFi module communications solution that acts as a bridge to WiFi from existing microcontrollers and can also run standalone applications. It can be monitored and controlled from anywhere in the world. Perfect for any Internet of Things system design.



**Fig -4: NodeMCU Pin Diagram**

**3.3 Relay –**

The multi-channel relay modules are available for switching and isolation mechanism in IOT system. These can be easily connected to microcontrollers with fewer components and connections.



**Fig -5: 4-Channel Relay**

**3.4 Temperature and Humidity Sensor –**

The DHT-11 is a convenient, ultra-low-cost digital temperature and humidity sensor. It sends a digital signal to the data pin (no analog input pin required) depending upon ambient temperature and humidity. It is easy to use, but it takes time to access information.



**Fig -6: DHT11 Pin Diagram**

#### 4. PROPOSED SYSTEM AND IMPLEMENTATION

The aim of this project is to design and develop a new IOT based smart home that can be controlled using a mobile application from anywhere in the world over internet and can be installed in any home and office at the lowest price. The main purpose of the project is to reduce human effort. Our goal in this project is to create and implement an automatic system. Thanks to the Internet of Things, a system that provides control from mobile phones where we control home appliances via the internet remotely from anywhere in the world.

Work Flow –

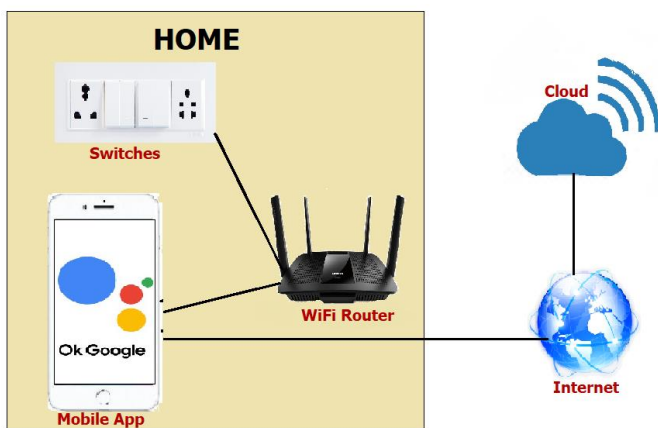


Fig -7: Working Flow

Three elements are used in this project: Android application, Wi-Fi node MCU and 4-channel relay module.

The Android application sends the serial data to the Wi-Fi node MCU by pressing the "On" button of android app. Wi-Fi NodeMCU with network configuration and device configuration via the Arduino cloud, reads the input data and operates according to the program loaded into it and produces output for 4 channel relay modules.

When the application button is on it turns on the home appliances, and when the application button is off, it turns off the home appliances.

Voice Command Control –

This is AI android feature as a controller to turn on/off electronic devices by replacing the Android app's function button with voice command via wireless modem and Internet. Google Assistant or Amazon Alexa are virtual assistant applications used by smart phones. Home appliances can be turned on and off just by voice, even if they are anywhere in the world.

If the voice command from the user's voice in the app says "OK Alexa SWITCH ON THE LIGHT", it will turn on the light and if user says "OK Alexa SWITCH OFF THE LIGHT", it will turn off the light.

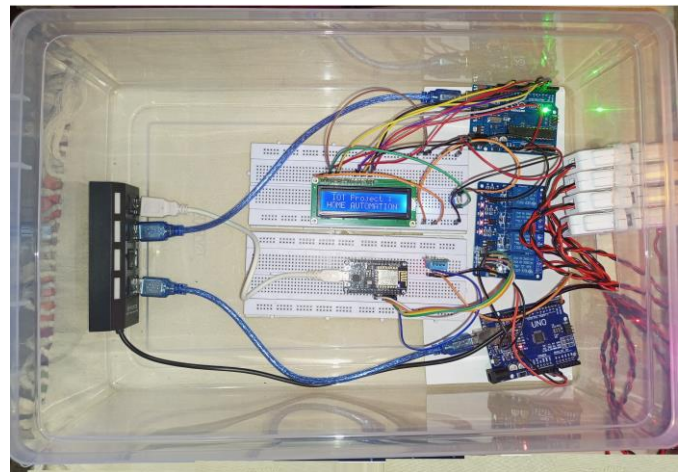


Fig -8: Practical Model (a)



Fig -9: Practical Model (b)



Fig -10: Android App Dashboard

#### 5. CONCLUSIONS

In this proposal, we focused on the process of remote operation or control of various devices, machines and other electrical and electronic equipment using arduino cloud technology. The way of running or managing these applications in such a way is called automation and has become an important part of human life.

The model is based on the arduino IOT platform and allows electrical devices to be synchronized with the IOT platform so that they can be controlled remotely.

In our smart home automation system, elderly and disabled people can use Google Assistant or Amazon Alexa to access home appliances like TV, fans, lights, etc, using mere voice commands.

This remote controlling of home / office appliances will be very useful in epidemics such as Covid19 as result of which manual touching of appliances by hands can be reduced. Thanks to Internet of things.

## REFERENCES

- [1] P.V. Dudhe, N.V. Kadam, R. M. Hushangabade, M. S. Deshmukh, "Internet of Things (IOT): An overview and its applications",  
Doi: 10.1109/ICECDS.2017.8389935
- [2] Shopan Dey, Ayon Roy, Sandip Das, "Home Automation Using Internet of Thing",  
Doi: 10.1109/UEMCON.2016.7777826
- [3] Kriti Chopra, Kunal Gupta, Annu Lambora, "Future Internet: The Internet of Things- A Literature Review",  
Doi: 10.1109/COMITCon.2019.8862269
- [4] Rakesh. K. Deore, Vijay R. Sonawane, Pooja .H. Satpute, "Internet of Thing Based Home Appliances Control",  
Doi: 10.1109/CICN.2015.177
- [5] Rozita Teymourzadeh, Salah Addin Ahmed, Kok Wai Chan, Mok Vee Hoong, "Smart GSM Based Home Automation System",  
Doi: 10.1109/SPC.2013.6735152
- [6] Chunlong Zhang, Min Zhang, Yongsheng Su, Weilian Wang, "Smart Home Design based on ZigBee Wireless Sensor Network",  
Doi: 10.1109/SPC.2013.6735152