



# Arduino Based Home Automation System

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## Abstract:

With advancement of Automation technology, life is getting simpler and easier in all aspects. In today's world Automatic systems are being preferred over manual system. With the rapid increase in the number of users of internet over the past decade has made Internet a part and parcel of life, and IOT is the latest and emerging internet technology. Internet of things is a growing network of everyday object-from industrial machine to consumer goods that can share information and complete tasks while you are busy with other activities. Home Automation system (HAS) using IOT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The home automation system differs from other system by allowing the user to operate the system from anywhere around the world through internet connection. The main objectives of this project is to design and implement a home automation system using IoT that is capable of controlling and automating most of the house appliances through an easy manageable web interface. In this project a home automation system employs cloud networking, wireless communication, to provide the user with remote control of various lights, fans, and appliances within their home and storing the data in the database. This system uses PC based program to provide a means of user interface to the consumer.

## I. INTRODUCTION

The Internet of Things (IoT) sometimes referred to as the Internet of Objects, will change everything including ourselves. The Internet has an impact on education, communication, business, science, government, and humanity [1]. Clearly, the Internet is one of the most important and powerful creations in all of human history and now with the concept of the internet of things, internet becomes more favorable to have a smart life in every aspect [2]. Internet of Things is a new technology of the Internet accessing. By the Internet of Things, objects recognize themselves and obtain intelligence behavior by making or enabling related decisions thinks to the fact that they can communicate information about themselves [3]. These objects can access information that has been aggregated by other things, or they can add to other services [3]. Figure 1 reviews that with the internet of things, anything's will able to communicate to the internet at any time from any place to provide any services by any network to anyone. this concept will create a new types of applications can involve such as smart vehicle and the smart home, to provide many services such as notifications, security, energy saving, automation, communication, computers and entertainment. By developing the IoT technology, testing and deploying products it will be much close to implementing smart environments by 2020 [6]. In the near future, storage and communication services will be highly pervasive and distributed: people, machines, smart objects, surrounding space and platforms connected with wireless/wired sensors, M2M devices, RFID tags will create a highly decentralized resources interconnected by a dynamic network of networks [7]. In the IoT, the communication language will be based on interoperable protocols, operating in heterogeneous environments and platforms [8]. IoT in this context is a generic term and all objects can play an active role to their connection to the Internet by

creating smart environments, where the role of the Internet has changed [9]. Wi-Fi's technology in home automation has been used primarily due to the networked nature of deployed electronics where electronic devices such as TVs, mobile devices, etc are usually supported by Wi-Fi [34]. Wi-Fi have started becoming part of the home IP network and due the increasing rate of adoption of mobile computing devices like smart phones, tablets, etc. For example a networking to provide online streaming services or network at homes, may provide a mean to control of the device functionality over the network [35]. At the same time mobile devices ensure that consumers have access to a portable 'controller' for the electronics connected to the network. Both types of devices can be used as gateways for IoT applications [36]. By the concept of the internet of things, homes and buildings may operate many devices and objects smartly, of the most interesting application of IoT in smart homes and buildings are smart lighting, smart environmental and media, air control and central heating, energy management and security.

## II. RELATED WORKS

Now a day's many more digital appliances are populated in our homes, it is necessary that all of them have to be networked in such fashion that they can be monitored and controlled from anywhere, at any time, by an authenticated person, this is called Smart Home Automation System (SHAS). [5] Dhawan S. Thakur and Aditi Sharma, This paper proposes a Voice control and Zigbee based Home Automation System, in this system user has to give a voice command to control the in-home appliances. Here Zigbee is used to communicate between base station and remote station. Both base station and remote station are placed in such a range that the Zigbee communication is possible. This system cannot be used outside the range of Zigbee

communication. [6] Akanksha Singh, Arijit Pal, Bijay Rai, This paper proposes a GSM based Home Automation System where user can control the in-home appliances by sending the SMS to an HAS placed in home environment. In this system user sends the message to the GSM modem which is interfaced with the microcontroller. Microcontroller in-turn turns on the required devices through the switching module. A GSM and ZigBee based communication and control for home appliances has been presented by many of researchers the drawback of these systems is that in ZigBee, range plays important role and in GSM, at remote places there should be proper coverage of GSM mobile signal. The above mentioned systems have made momentous endowment to the design and development of home automation systems. [2] Rajeev Piyare, This paper proposes an Arduino based Home Automation System, in this system various sensors are used to sense the data and this data is updated on a webpage through the Arduino processor and even user can control the device through internet. Drawback of this system is Arduino does not have Ethernet shield and compatibility of operating system for programming. To overcome this entire drawback we have used a Raspberry Pi as a core processing unit so as to satisfy the need of IoT.

### III. PROPOSED METHODOLOGY

In this model we have proposed an Ethernet based system that let users monitor real time switching information of the electrical devices and controlling them through an android app as well as monitoring the security of their homes in case of unwanted entry or fire. Our model uses temperature sensor and smoke sensors to check for fire at the users home, PIR motion sensors to check for the unwanted presence at their homes and also monitor and control the real time tracking and switching of all their electrical devices through an android based mobile app. The system is connected to this android app using internet connectivity for better and fast communication. The model has an option of controlling devices by either sending voice commands or by simple tap-to-toggle system, making the overall system user friendly and easy to manage.

#### Steps to be followed to implement the project:

- Connect Keyboard and Mouse to the Raspberry pi
- Connect the Monitor to the Raspberry pi
- Connect the power supply
- Connect Wi-Fi
- Power up your raspberry pi
- Run the VNC from Monitor
- Terminal Opens then Give Login Credential
- Raspberry OS is shown now, go to Home Auto Folder
- Run the Smart Home. Py File
- 10. In the Google Chrome use the Pi IP address, this displays the status of home appliances in Android phone

- Browse t on html
- Switch ON/OFF the Relays

### IV. ARCHITECTURE

In this model we have proposed an Ethernet based system that let users monitor real time switching information of the electrical devices and controlling them through an android app as well as monitoring the security of their homes in case of unwanted entry or fire. Our model uses temperature sensor and smoke sensors to check for fire at the users home, PIR motion sensors to check for the unwanted presence at their homes and also monitor and control the real time tracking and switching of all their electrical devices through an android based mobile app. we have temperature sensor which works along with smoke sensor to check the presence of fire at home, PIR motion sensor to detect the human movement in the house, and relay connected devices so that they can be easily toggled by the microcontroller. The brain of our model is an Ethernet based Intel Galileo 2nd Generation Board which let our devices and sensors connected to the internet. The 2nd generation Intel Galileo board provides a single board which is based on the Intel Quark SoCX1000, a 32-bit Intel Pentium processor- class system on a chip (SoC).It is Arduino certificated and designed to be hardware, software, and pin compatible with large range of Arduino Uno R3 shields.

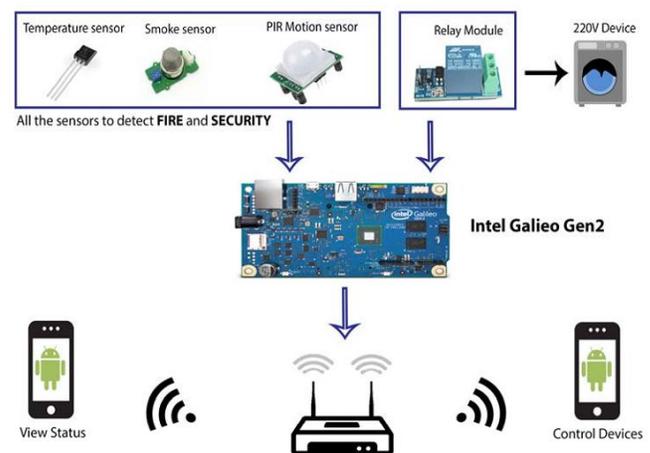
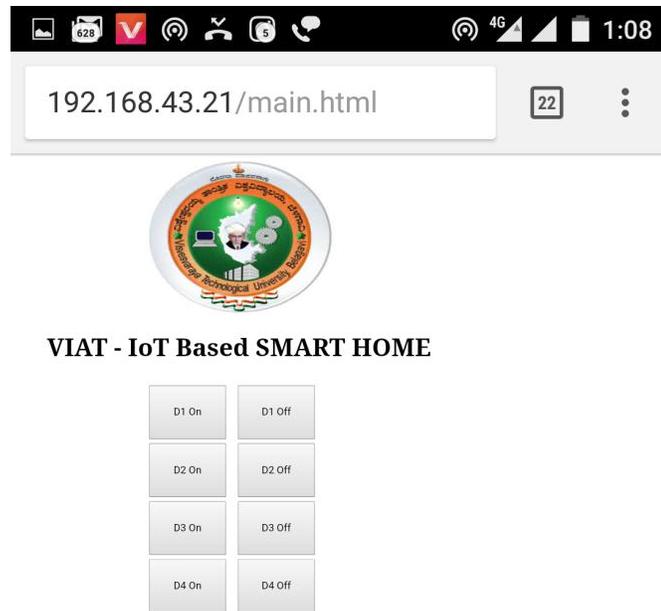


Figure.1. System architecture

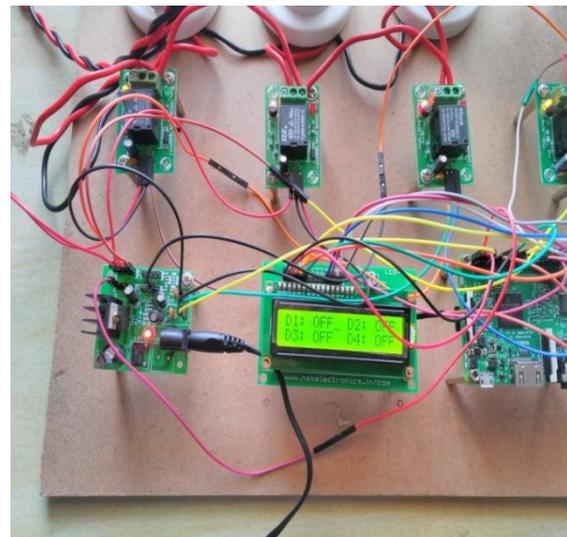
With respect to the above diagram the Infrared sensor (IR) is a low cost infrared object detection unit that we can be applied at home using IR LED's. It gets triggered when light is detected. When the sensor is sensed it sends a signal to raspberry pi. From the raspberry pi, by means of WIFI configuration and IoT concept we can turn ON/OFF the light & Tv. Similar to IR, the PIR sensor is used to detect the human being presence and accordingly the fans are turned ON/OFF. The lights and fans and television can be controlled by creating web server in personal computer, tablet or we can create an app in mobile.

**Information processing** In this step, the information engine provides appropriate threshold values according to collected data and sensor characteristics is processed into information which is lowlevel context. According to this process .in proposed system sensors sense data and process that data to the server .smart home system raspberry pi act as a server. In proposed system

other side smart devices give some input to the server that input process to the server.



**Figure.2. Showing the Status Home appliances and we can Read the Status and we can control the Home Appliances from any Where using Android Phone**



**Figure.3. Showing the LED Status Display it shows the Home Appliances status**

## V. CONCLUSION

In the proposed approach design and implementation of an Ethernet-based Smart Home intelligent system for monitoring the electrical energy consumption based upon the real time tracking of the devices at home an INTEL GALILEO 2ND generation development board, which can be used in homes and societies. The proposed system works on real time monitoring and voice control, so that the electrical devices and switches can be remotely controlled and monitored with or without an android based app. It uses various sensors to not only monitor the real time device tracking but also maintaining the security of your house. It is monitored and controlled remotely from an android

app using the Internet or the Intranet connectivity. From experimental result, it is clear that proposed system given has proved to be a better way of energy and security management.

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