

SMART HOME USING IOT

A Project Report

Submitted by:

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CANDIDATE'S DECLARATION

I, **Himanshu** Roll No **00955102715**, hereby declare that the work presented in the project report entitled “**Smart Home**” submitted by us in the partial fulfillment of the requirement for the award of “**Bachelor of Technology**” in “**COMPUTER SCIENCE AND ENGINEERING**” is an authentic record of my work carried out during the given time period.

The matter embodied in this project report has not been submitted elsewhere by anyone for the award of any other degree/diploma.

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Signature of the Student

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Date:

DECLARATION BY GUIDE

This is to certify that the project titled “**SMART HOME**” is the bona fide work carried out by HIMANSHU, a student of B.Tech (CSE) of Mahavir Swami Institute of Technology, affiliated to Guru Gobind Singh Indraprastha University, Dwarka, New Delhi during the academic year 2015-19, in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology (Computer Science and Engineering) and that the project has not formed the basis for the award previously of any other degree, diploma, fellowship or any other similar title.

Signature of the Guide

Place:

Date:

Acknowledgement

We would like to express our sincere gratitude to Ms. Shruty Ahuja (HOD Department of Computer Science Engineering MVSIT, Sonipat) for allowing us to undergo this project.

We take great delight in expressing our deep felt gratitude to Ms. Archana under whom supervision and guidance, we were able to develop our project. It was an honor and pleasure to work under her. Her valuable inputs and engaging discussions motivated us to deliver the best and enhanced our knowledge. I thank her for that in spite of being extraordinarily busy with her duties, took time out to hear, guide and keep me on the correct path and allowing me to carry out my project and extending support during the project.

Abstract

While the cost of living is going up, there is a growing focus to involve technology to lower those prices. With this in mind the Smart Home project allows the user to build and maintain a house that is smart enough to manage energy levels and human efforts down while providing more automated applications. A smart home will take advantage of its environment and allow seamless control whether the user is present or away. With a home that has this advantage, you can know that your home is performing at its best in energy performance.

By implementing this project we were able to explore a variety of different engineering challenges, including software programing, PCB design, Wi-Fi, TCP/IP protocols, and other aspects. This project provides great insights to the challenges of software and hardware engineering.

Functionalities of the software involved are as following:

- Control Water pump based on values pre-determined in the code
- Collect data from input sensors (Water, smoke, Infrared etc.)
- Manipulate relays

The server controls various hardware devices. Features of hardware are as follows:

- Servo motors are responsible for closing/opening of doors in the room and lid of smart dustbin.
- Sensors monitoring the temperature in a room.
- Sensors monitoring the presence of a person in a room.
- Distance measuring sensors that report back to the Arduino.
- Power Box Outlets controlled with a microcontroller.
- Relays and Wi-Fi modules controlled by the Arduino

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INTRODUCTION

Overview of Project

“Predicting Our Future is a podcast about the next revolutions in technology, as seen through the eyes of a serial entrepreneur”.

Today, we live in a world which is evolving rapidly in terms of technology. Our technology has been evolving much rapidly which has eventually led to growth of competition in the market. People nowadays have Become smart so in order to compete, our devices also needs to be smart. Today everyone want everything around them to be automated, and also there are so much examples like:

- People make use of escalators and lifts instead of stairs.
- We use fully automatic washing machines, so let the machine do all the work.
- Devices like google Alexa make our things easier.
- And any more....

For the sake of easiness and automation, we worked on the challenge of making people’s day to day life much easier by making our home fully automated.

So, we came up with the concept of **SMART HOMES....**



Figure 1 IOT

What is IoT

The **Internet of things (IoT)** is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these things to connect, collect and exchange data.

IoT involves extending Internet connectivity beyond standard devices, such as desktops, laptops, smartphones and tablets, to any range of traditionally *dumb* or non-internet-enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the Internet, and they can be remotely monitored and controlled. With the arrival of driverless vehicles, a branch of IoT, i.e. the Internet of Vehicles starts to gain more attention.

IoT devices are a part of the larger concept of home automation, which can include lighting, heating and air conditioning, media and security systems. Long term benefits could include energy savings by automatically ensuring lights and electronics are turned off.

A smart home or automated home could be based on a platform or hubs that control smart devices and appliances. For instance, using Apple's Home Kit, manufacturers can get their home products and accessories be controlled by an application in iOS devices such as the iPhone and the Apple Watch. This could be a dedicated app or iOS native applications such as Siri. This can be demonstrated in the case of Lenovo's Smart Home Essentials, which is a line of smart home devices that are controlled through Apple's Home app or Siri without the need for a Wi-Fi bridge. There are also dedicated smart home hubs that are offered as standalone platforms to connect different smart home products and these include the Amazon Echo, Apple's Home Pod, and Samsung's SmartThings Hub.

Applications of IoT

1. Smart Home

With IoT creating the buzz, 'Smart Home' is the most searched IoT associated feature on Google. But, what is a Smart Home?

Wouldn't you love if you could switch on air conditioning before reaching home or switch off lights even after you have left home? Or unlock the doors to friends for temporary access even when you are not at home. Don't be surprised with IoT taking shape companies are building products to make your life simpler and convenient.

Smart Home has become the revolutionary ladder of success in the residential spaces and it is predicted Smart homes will become as common as smartphones.

The cost of owning a house is the biggest expense in a homeowner's life. Smart Home products are promised to save time, energy and money. With Smart home companies like Nest, Eco bee, Ring and August, to name a few, will become household brands and are planning to deliver a never seen before experience.

2. Wearables

Wearables have experienced an explosive demand in markets all over the world. Companies like Google, Samsung have invested heavily in building such devices. Wearable devices are installed with sensors and software's which collect data and information about the users. This data is later pre-processed to extract essential insights about user.

These devices broadly cover fitness, health and entertainment requirements. The pre-requisite from internet of things technology for wearable applications is to be highly energy efficient or ultra-low power and small sized.

3. Connected Cars

The automotive digital technology has focused on optimizing vehicles internal functions. But now, this attention is growing towards enhancing the in-car experience. A connected car is a vehicle which is able to optimize its own operation, maintenance as well as comfort of passengers using on board sensors and internet connectivity.

Most large auto makers as well as some brave start-ups are working on connected car solutions. Major brands like Tesla, BMW, Apple, and Google are working on bringing the next revolution in automobiles.

4. Smart Cities

Smart city is another powerful application of IoT generating curiosity among world's population. Smart surveillance, automated transportation, smarter energy management systems, water distribution, urban security and environmental monitoring all are examples of internet of things applications for smart cities.

IoT will solve major problems faced by the people living in cities like pollution, traffic congestion and shortage of energy supplies etc. Products like cellular communication enabled Smart Belly trash will send alerts to municipal services when a bin needs to be emptied.

By installing sensors and using web applications, citizens can find free available parking slots across the city. Also, the sensors can detect meter tampering issues, general malfunctions and any installation issues in the electricity system.

5. IoT in agriculture

With the continuous increase in world's population, demand for food supply is extremely raised. Governments are helping farmers to use advanced techniques and research to increase food production. Smart farming is one of the fastest growing field in IoT.

Farmers are using meaningful insights from the data to yield better return on investment. Sensing for soil moisture and nutrients, controlling water usage for plant growth and determining custom fertilizer are some simple uses of IoT.

6. Energy Engagement

Power grids of the future will not only be smart enough but also highly reliable. Smart grid concept is becoming very popular all over world.

The basic idea behind the smart grids is to collect data in an automated fashion and analyse the behaviour or electricity consumers and suppliers for improving efficiency as well as economics of electricity use.



Figure 2 Application of IOT

7. IOT in Healthcare

Connected healthcare yet remains the sleeping giant of the Internet of Things applications. The concept of connected healthcare system and smart medical devices bears enormous potential not just for companies, but also for the well-being of people in general.

Research shows IoT in healthcare will be massive in coming years. IoT in healthcare is aimed at empowering people to live healthier life by wearing connected devices

8. Smart Retail

The potential of IoT in the retail sector is enormous. IoT provides an opportunity to retailers to connect with the customers to enhance the in-store experience.

Smartphones will be the way for retailers to remain connected with their consumers even out of store. Interacting through Smartphones and using Beacon technology can help retailers serve their consumers better. They can also track consumer's path through a store and improve store layout and place premium products in high traffic areas.

9. IoT in Poultry and Farming

Livestock monitoring is about animal husbandry and cost saving. Using IoT applications to gather data about the health and well-being of the cattle, ranchers knowing early about the sick animal can pull out and help prevent large number of sick cattle.

10. Industrial Internet

Industrial Internet is the new buzz in the industrial sector, also termed as Industrial Internet of Things (IIoT). It is empowering industrial engineering with sensors, software and big data analytics to create brilliant machines.

According to Jeff Immelt, CEO, GE Electric, IIoT is a “beautiful, desirable and investable” asset. The driving philosophy behind IIoT is that, smart machines are more accurate and consistent than humans in communicating through data. And, this data can help companies pick inefficiencies and problems sooner.

IIoT holds great potential for quality control and sustainability. Applications for tracking goods, real time information exchange about inventory among suppliers and retailers and automated delivery will increase the supply chain efficiency. According to GE the improvement industry productivity will generate \$10 trillion to \$15 trillion in GDP worldwide over next 15 years.

Here are some advantages of IIoT:

1. Efficient and Saves Time

The machine-to-machine interaction provides better efficiency, hence; accurate results can be obtained fast. This results in saving valuable time. Instead of repeating the same tasks every day, it enables people to do other creative jobs.

2. Saves Money

Optimum utilization of energy and resources can be achieved by adopting this technology and keeping the devices under surveillance. We can be alerted in case of possible bottlenecks, breakdowns, and damages to the system. Hence, we can save money by using this technology.

3. Better Quality of Life

All the applications of this technology culminate in increased comfort, convenience, and better management, thereby improving the quality of life.

4. Communication

IoT encourages the communication between devices, also famously known as Machine-to-Machine (M2M) communication. Because of this, the physical devices are able to stay connected and hence the total transparency is available with lesser inefficiencies and greater quality.

5. Automation and Control

Due to physical objects getting connected and controlled digitally and centrally with wireless infrastructure, there is a large amount of automation and control in the workings. Without human intervention, the machines are able to communicate with each other leading to faster and timely output.

6. Information

It is obvious that having more information helps making better decisions. Whether it is mundane decisions as needing to know what to buy at the grocery store or if your company has enough widgets and supplies, knowledge is power and more knowledge is better.

7. Monitor

The second most obvious advantage of IoT is monitoring. Knowing the exact quantity of supplies or the air quality in your home, can further provide more information that could not have previously been collected easily. For instance, knowing that you are low on milk or printer ink could save you another trip to the store in the near future. Furthermore, monitoring the expiration of products can and will improve safety.

8. Time

As hinted in the previous examples, the amount of time saved because of IoT could be quite large. And in today's modern life, we all could use more time.

9. Money

The biggest advantage of IoT is saving money. If the price of the tagging and monitoring equipment is less than the amount of money saved, then the Internet of Things will be very widely adopted. IoT fundamentally proves to be very helpful to people in their daily routines by making the appliances communicate to each other in an effective manner thereby saving and conserving energy and cost. Allowing the data to be communicated and shared between devices and then translating it into our required way, it makes our systems efficient.

10. Automation of daily tasks leads to better monitoring of devices

The IoT allows you to automate and control the tasks that are done on a daily basis, avoiding human intervention. Machine-to-machine communication helps to maintain transparency in the processes. It also leads to uniformity in the tasks. It can also maintain the quality of service. We can also take necessary action in case of emergencies.

FUTURE OF IOT:

IoT devices are becoming a part of the mainstream electronics culture and people are adopting smart devices into their homes faster than ever. By 2020, it is estimated that there will be up to 21 billion connected devices to the internet. IoT devices will be a huge part of how we interact with basic everyday objects.

In just one year alone, we went from having 5 million IoT devices connected to the internet to billions. The future is happening now, and these devices are getting smarter every day through machine learning and artificial intelligence. To prove that IoT is taking off rapidly, Target opened up a store in San Francisco that exclusively sells IoT devices. There is big money in the IoT space currently, and it will only continue to grow as technology improves.

The more data that IoT devices collect, the smarter they will become. Cities will transform into smart cities through the use of IoT connected devices. Think of smart

traffic lights that collect data on traffic, and use that data to sync lights to peak traffic times.

Overall, this improves cities overall efficiency and saves the government money since everything can be remotely managed. Smart homes, thermostats, lighting systems and coffee makers will all collect data on your habits and patterns of usage. All this data will be collected to help facilitate machine learning.

WHAT IS AUTOMATION?

Automation is the technology by which a process or procedure is performed with minimum human assistance. Automation or automatic control is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, aircraft and other applications and vehicles with minimal or reduced human intervention. Some processes have been completely automated.

Automation covers applications ranging from a household thermostat controlling a boiler, to a large industrial control system with tens of thousands of input measurements and output control signals. In control complexity it can range from simple on-off control to multi-variable high level algorithms.

In the simplest type of an automatic control loop, a controller compares a measured value of a process with a desired set value, and processes the resulting error signal to change some input to the process, in such a way that the process stays at its set point despite disturbances. This closed-loop control is an application of negative feedback to a system. The mathematical basis of control theory was begun in the 18th century, and advanced rapidly in the 20th.

Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, electronic devices and computers, usually in combination. Complicated systems, such as modern factories, airplanes and ships typically use all these combined techniques. The benefit of automation include labour savings, savings in electricity costs, savings in material costs, and improvements to quality, accuracy and precision.

The World Bank's World Development Report 2019 shows evidence that while automation displaces workers, innovation creates new industries and jobs.

The term *automation*, inspired by the earlier word *automatic* (coming from *automaton*), was not widely used before 1947, when Ford established an automation department. It was during this time that industry was rapidly adopting feedback controllers, which were introduced in the 1930s.

Smart Home:

Smart Home is a step toward what is referred to as the “Internet of Things,” in which everything has an assigned IP address, and can be monitored and accessed remotely.

Smart Home gives you access to control devices in your home from a mobile device anywhere in the world. The term may be used for isolated programmable devices, like thermostats and sprinkler systems, but smart home more accurately describes homes in which nearly everything — lights, appliances, electrical outlets, heating and cooling systems — are hooked up to a remotely controllable network. From a home security perspective, this also includes your alarm system, and all of the doors, windows, locks, smoke detectors, surveillance cameras and any other sensors that are linked to it.

The two main characteristics of smart home are:

- Automation
- Remote control

Automation

Automation is, unsurprisingly, one of the two main characteristics smart home. Automation refers to the ability to program and schedule events for the devices on the network. The programming may include time-related commands, such as having your lights turn on or off at specific times each day. It can also include non-scheduled events, such as turning on all the lights in your home when your security system alarm is triggered.

Once you start to understand the possibilities of smart home scheduling, you can come up with any number of useful and creative solutions to make your life better. Is that west-facing window letting in too much light? Plug your motorized blinds into a

“smart” outlet and program it to close at noon each day. Do you have someone come by at the same time each day to walk the dog? Program your smart home system to unlock the front door for them, and lock it up again when they’re done.

Remote Control

The other main characteristic of cutting-edge smart home is remote monitoring and access. With the right smart home system, you can use any Internet-connected device to view and control the system itself and any attached devices.

Monitoring apps can provide a wealth of information about your home, from the status of the current moment to a detailed history of what has happened up to now. You can check your security system’s status, whether the lights are on, whether the doors are locked, what the current temperature of your home is and much more. With cameras as part of your smart home system, you can even pull up real-time video feeds and literally see what’s going on in your home while you’re away.

Even simple notifications can be used to perform many important tasks. You can program your system to send you a text message or email whenever your security system registers a potential problem, from severe weather alerts to motion detector warnings to fire alarms.

In addition to arming and disarming your security system, you can reprogram the scheduling, lock and unlock doors, reset the thermostat and adjust the lights all from your phone, from anywhere in the world. As manufacturers are creating more and more “smart” devices and appliances all the time, the possibilities for smart home are virtually limitless.

Examples of smart home technologies

Nearly every aspect of life where technology has entered the domestic space (lightbulbs, dishwashers and so on) has seen the introduction of a smart home alternative:

- Smart TVs connect to the internet to access content through applications, such as on-demand video and music. Some smart TVs also include voice or gesture recognition.

- In addition to being able to be controlled remotely and customized, smart lighting systems, such as Hue from Philips Lighting Holding B.V., can detect when occupants are in the room and adjust lighting as needed. Smart lightbulbs can also regulate themselves based on daylight availability.
- Smart thermostats, such as Nest from Nest Labs Inc., come with integrated Wi-Fi, allowing users to schedule, monitor and remotely control home temperatures. These devices also learn homeowners' behaviors and automatically modify settings to provide residents with maximum comfort and efficiency. Smart thermostats can also report energy use and remind users to change filters, among other things.
- Using smart locks and garage-door openers, users can grant or deny access to visitors. Smart locks can also detect when residents are near and unlock the doors for them.
- With smart security cameras, residents can monitor their homes when they are away or on vacation. Smart motion sensors are also able to identify the difference between residents, visitors, pets and burglars, and can notify authorities if suspicious behavior is detected.
- Pet care can be automated with connected feeders. Houseplants and lawns can be watered by way of connected timers.
- Kitchen appliances of all sorts are available, including smart coffee makers that can brew you a fresh cup as soon as your alarm goes off; smart refrigerators that keep track of expiration dates, make shopping lists or even create recipes based on ingredients currently on hand; slower cookers and toasters; and, in the laundry room, washing machines and dryers.
- Household system monitors may, for example, sense an electric surge and turn off appliances or sense water failures or freezing pipes and turn off the water so there isn't a flood in your basement

Smart home benefits

One of the most touted benefits of home automation is providing peace of mind to homeowners, allowing them to monitor their homes remotely, countering dangers such as a forgotten coffee maker left on or a front door left unlocked.

Domestics are also beneficial for the elderly, providing monitoring that can help seniors to remain at home comfortably and safely, rather than moving to a nursing home or requiring 24/7 home care.

Unsurprisingly, smart homes can accommodate user preferences. For example, as soon as you arrive home, your garage door will open, the lights will go on, the fireplace will roar and your favourite tunes will start playing on your smart speakers.

Home automation also helps consumers improve efficiency. Instead of leaving the air conditioning on all day, a smart home system can learn your behaviours and make sure the house is cooled down by the time you arrive home from work. The same goes for appliances. And with a smart irrigation system, your lawn will only be watered when needed and with the exact amount of water necessary. With home automation, energy, water and other resources are used more efficiently, which helps save both natural resources and money for the consumer.

Energy Efficiency

One clear advantage of smart home is the unmatched potential for energy savings, and therefore cost savings. Your thermostat is already “smart” in the sense that it uses a temperature threshold to govern the home’s heating and cooling system. In most cases, thermostats can also be programmed with different target temperatures in order to keep energy usage at a minimum during the hours when you’re least likely to benefit from the heating and cooling.

At the most basic level, smart home extends that scheduled programmability to lighting, so that you can suit your energy usage to your usual daily schedule. With more flexible smart home systems, electrical outlets or even individual devices can also be automatically powered down during hours of the day when they’re not needed.

You could set up a “coming home” event that turns on lights and heating as you’re driving home after work, for example, and activate it all with one tap on your smartphone. An opposite “leaving home” event could save you from wasting energy on forgotten lights and appliances once you’ve left for the day.

Literature Survey

Objective of our Project

Most advance home automation systems in existence today require a big and expensive change of infrastructure. This means that it often is not feasible to install a home automation system in existing building.

The main objective of this project is to develop a home automation system with Android **application controlled** remote that required very very less or no change at infrastructure. As technology is advancing so houses are also getting smarter. Modern houses are gradually shifting from conventional switches to centralized **control** system, involving wireless **controlled** switches.

Our objective focusses on the elderly people or the disabled people of our society and making their life easier and comfortable is also one of our objectives.

The idea of smart home would be helpful in many ways:

1) For old ones in family:

Suppose there is an old member in the family and he/she is alone at home and cannot get up time by time to turn on/off the electrical switches for different home appliances!

What if all the devices get controlled wirelessly through an android app on our phone?

2) For physically disabled:

Same case goes for the physically challenged person of a home.

3) Security:

Imagine a case where there is an intrusion in your house when you are not present at home and your smart home is smart enough to notify you (via email, message, call, WhatsApp) that some intruder has entered your house and you get to know about that and also take actions accordingly as access to every device in your home is always with you i.e. your smartphone! Isn't it cool and helpful too? It definitely is.

4) Mistake:

Suppose all members of the house leave the house for a party and your mom has forgot to turn off the AC or TV or any other appliance and you have nothing to worry about as you can control your house from your phone.

And many more....

IoT has made homes smarter, so its application in energy conservation is more accessible. Smart appliances can inform homeowners of real-time consumption so that they can monitor their energy usage.

Sensors are installed so that when owners leave the house, appliances will automatically turn off to conserve energy.

Our Solutions

The home automation is a wireless home automation system that is supposed to be implemented in existing home environments, without any change in the existing infrastructure.

Home automation lets the user to control his home from his/her smart devices from inside and even from outside of his home.

To solve the above problems we came up with the idea of **SMART HOME**

Now what the solution actually is?

In simple terms, we have made our home completely automated in sense that:

- 1) Every appliance of our house could be controlled by us from anywhere in the world.

The appliances would be connected to internet and we can control it using a simple android application. This idea of us is helpful when: Suppose no one is at home and we are reaching home and we want our house to be cooled by AC so we can turn on the air conditioner 30 minutes before reaching the home so that when we reach home we find our house cooled.

- 2) Security is the foremost thing which is definitely needed by everyone in their house. So we came up with the concept of a **secure mode** in our app.

Now what is this secure mode?

Suppose we all are going out of the house and no one is at home , then we can turn our house into the secure mode which will notify us through calls, messages , emails or even through WhatsApp that if some intruder has entered your house.

The gates will be acquainted with certain sensors which can detect the opening or closing of the door and if some event like this happens, we will get notified to our phone.

Even if this is not the case, our rooms will also contain the pir sensors which are capable of sensing the human blood which can easily detect the presence of a person in a room.

In case the intruder tries to enter through some other way, the PIR will do its work and we will still get notified of unauthorized entry.

3) Another idea we came up for our smart home is **SMART WATER TANK.**

We all know that we need to save our electricity more and more but no one takes the initiative of that.

So, our water tank is smart enough to save the electricity!

How?

A motor is used to pull water to our water tank and that motor consumes lot of electricity, even if sometimes the water is not coming the motor remains on for no reason and it is continually consuming electricity which is a total wastage of electricity.

So, here comes our SMART WATER TANK which can detect if the water is coming from the pipe or not,

If it detects that water is not coming for a certain time say 1 minute or 2 minutes, it will automatically turn off the motor.

And also the case that the water tank is full and still motor is on , Our SMART WATER TANK will detect the levels of the tank and will automatically turn off the motor when it detects the tank is full.

Our sensors will detect the certain levels of the tank and will constantly notify us of the about the usage of tank.

4) Functionalities of devices and security system can be handled using specifically designed graphical user interface for windows and Linux O. S and an app for android O. S

- 5) In addition to all the above things one important aspect of healthy living is Quality of Air, hence it is equally important and necessary to check the quality of indoor air and keep it clean & safe. Therefore in order to achieve all this, our Smart Home is equipped with an Air Quality Management System which will monitor the quality of air and we can view them on a website of the android app.

Hardware / Software Analysis & Design

Required Hardware

- **Arduino** - Arduino senses the environment by receiving inputs from many sensors, and affects its surroundings by controlling lights, motors, and other actuators.

An Arduino is an open-

source microcontroller development board.

You can use the Arduino to read sensors and control things like motors and lights. This allows you to upload programs to this board which can then interact with things in the real world. With this, you can make devices which respond and react to the world at large

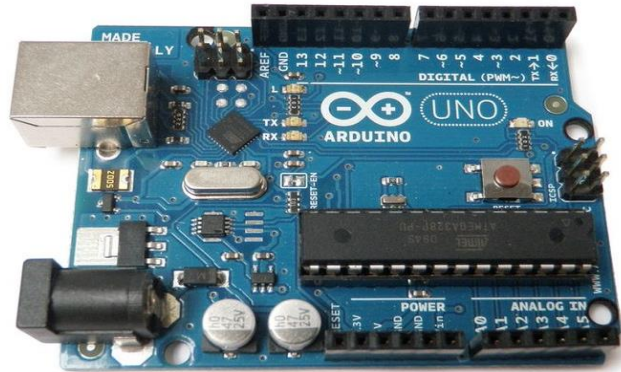


Figure 3 Arduino

- **Relay** – We can control high voltage electronic devices using relays. A Relay is actually a switch which is electrically operated by an electromagnet. The electromagnet is activated with a low voltage, for example 5 volts from a microcontroller and it pulls a contact to make or break a high voltage circuit

A **relay** is an electrically operated switch of mains voltage. It means that it can be turned on or off, letting the current go through or not.

A relay is an **electrically operated switch**. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have **double throw (changeover)** switch contacts

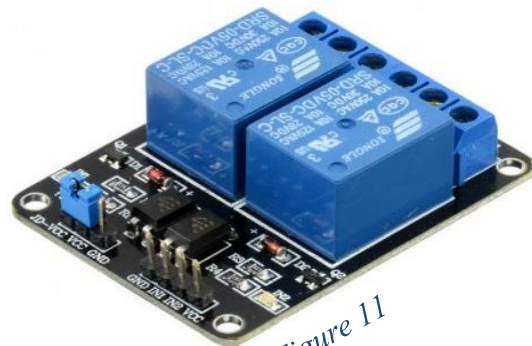


Figure 11
Relay

- **Water sensor** - This Water Sensor is designed for water detection, which can be used in sensing the water level and leakage. This sensor works by having a series of exposed

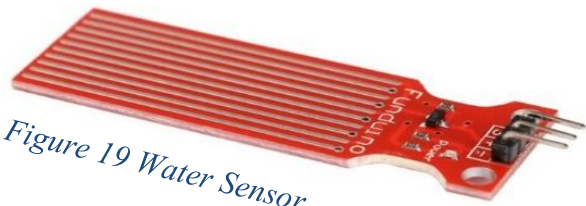


Figure 19 Water Sensor

copper traces which will turn on the transistor when water droplets shot the copper traces.

There are also continuous level sensors; however, these sensing modules can only detect the level of flow of a substance with a specific range.

A water sensor is a device used in the detection of the water level for various applications. Water sensors are of several types that include ultrasonic sensors, pressure transducers, bubblers, and float sensors.

- **Bluetooth** - The HC-06 is a class 2 slave Bluetooth module designed for transparent wireless serial communication. Once it is paired to a master Bluetooth device such as PC, smart phones and tablet, its operation becomes transparent to the user. All data received through the serial input is immediately transmitted over the air.



Figure 27 Bluetooth

When the module receives wireless data, it is sent out through the serial interface exactly at it is received. The Bluetooth module HC-05 is a MASTER/SLAVE module.

By default the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT COMMANDS. The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections. Master module can initiate a connection to other devices.

- **IR Sensors** - IR sensors consist of an IR transmitter and IR receiver. The transmitter outputs pulses of infrared radiation, while at the same time, the receiver detects any reflections. If the receiver does detect a reflection, it means that there is an object at some distance in front of the sensor.

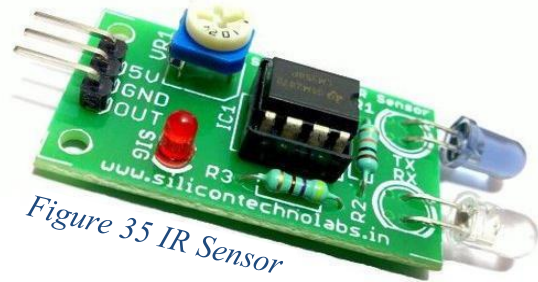


Figure 35 IR Sensor

If there is no reflection, then there is no object. An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion.

These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor.

The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED.

When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

- **LEDs** - A light-emitting diode is a two-lead semiconductor light source. It is a p-n junction diode that emits light when activated. When a suitable current is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons



Figure 43 LED

- **Buzzer** - A piezo speaker use piezo-electric material to bend a metal diaphragm which makes noise. It is the phenomena of generating electricity when mechanical pressure is applied to certain materials and the vice versa is also true.



Figure 51 Buzzer

The **piezo buzzer** produces sound based on reverse of the piezoelectric effect. The generation of pressure variation or strain by the application of electric potential across a piezoelectric material is the underlying principle.

These buzzers can be used alert a user of an event corresponding to a switching action, counter signal or sensor input.

They are also used in alarm circuits. The buzzer produces a same noisy sound irrespective of the voltage variation applied to it. It consists of piezo crystals between two conductors.

- **LCD** - The Liquid Crystal library allows you to control **LCD** displays that are compatible with the Hitachi HD44780 driver. There are many of them out there, and you can usually tell them by the 16-pin interface. LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications.

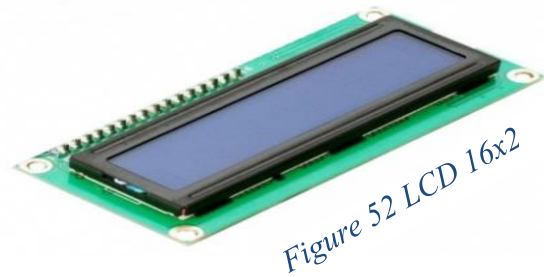


Figure 52 LCD 16x2

A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on

- **Servo Motor** - Servo motors are used to control the position of objects, rotate objects, move legs, arms or hands of robots, move sensors etc. with high precision. Servo motors are small in size, and because they have built-in circuitry to control their movement, they can be connected directly to an Arduino.

The servo motor is actually an assembly of four things: a normal DC motor, a gear reduction unit, a position-sensing device and a



Figure 60 Servo Motor

control circuit. It uses the position sensing device to figure out the rotational position of the shaft, so it knows which way the motor must turn to move the shaft to the instructed position.

The shaft commonly does not rotate freely around similar to a DC motor, however rather can just turn 200 degrees.

- **Smoke Sensor** - The MQ-135 can detect NH₃ and Alcohol gas concentrations anywhere from 10-300ppm and Benzene from 10-1000ppm. This sensor has a high sensitivity and fast response time. The sensitivity of the sensor can be adjusted by potentiometer.



Figure 68 Smoke Sensor

A **smoke detector** is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household smoke detectors, also known as **smoke alarms**, generally issue a local audible or visual alarm from the detector itself.

- **Ultra Sonic** - As shown the **HC-SR04 Ultrasonic (US) sensor** is a 4 pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver.



Figure 69 Ultra Sonic

The sensor works with the simple high school formula that **Distance = Speed × Time**. The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module. Since

we are using the Ultrasonic wave we know the universal speed of US wave at room conditions which is 330m/s.

The circuitry inbuilt on the module will calculate the time taken for the US wave to come back and turns on the echo pin high for that same particular amount of time, this way we can also know the time taken. Now simply calculate the distance using a microcontroller or microprocessor.

Software

- **Arduino IDE** - The Arduino integrated development environment is a cross-platform application that is written in the programming language Java. It is used to write and upload programs to Arduino board. The source code for the IDE is released under the GNU General Public License, version 2

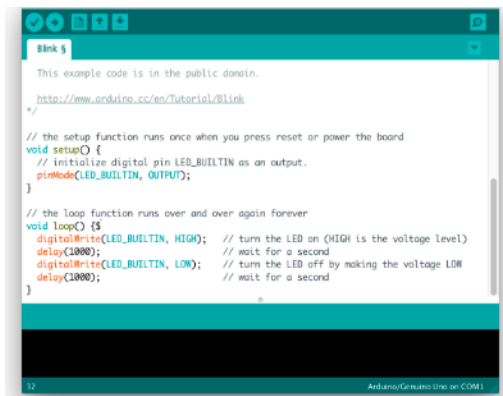


Figure 70 Arduino IDE

- **Web App** – It is one of the main feature in our project, Smart Home. It is used to control each and everything in our Smart Home. It is also used to show live stream of the front gate.

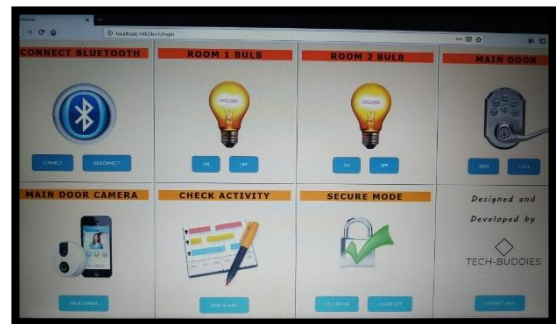


Figure 16 Web Application

- **JDK** - The Java Development Kit is an implementation of either one of the Java Platform, Standard Edition, Java Platform, Enterprise Edition, or Java Platform, Micro Edition platforms released by Oracle Corporation.
- **Arduino Bluetooth Controller App**

Design

Design is the creation of a plan or convention for the construction of an object, system or measurable human interaction. Design has different connotations in different fields.

Design is the first key factor that attracts the user to use the product and hence it is the most important to keep the design as simple, and clean as possible and at the same time it should give a futuristic look.

Design is one of the factor other than the performance and easiness to use which keep the customer loyal to the producer.

Hence here are some of our design and circuit at different stages:

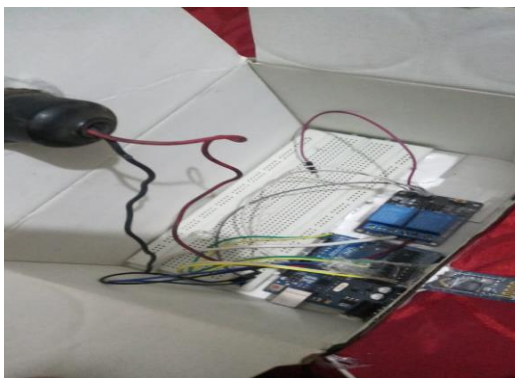
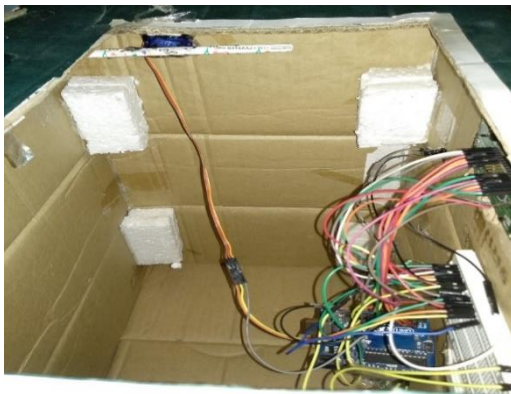


Figure 71 Design Phase

CODING

Smart Dustbin

```
/*  
  
  The circuit:  
  
  * LCD RS pin to digital pin 12  
  
  * LCD Enable pin to digital pin 11  
  
  * LCD D4 pin to digital pin 5  
  
  * LCD D5 pin to digital pin 4  
  
  * LCD D6 pin to digital pin 3  
  
  * LCD D7 pin to digital pin 2  
  
  * LCD R/W pin to ground  
  
  * LCD VSS pin to ground  
  
  * LCD VCC pin to 5V  
  
  * vee to ground  
  
  * 10K resistor:  
  
  * ends to +5V and ground  
  
  */  
  
#include <LiquidCrystal.h>  
  
#include<Servo.h>  
  
//#define trigPin 8  
  
//#define echoPin 9
```

```

Servo se;

Servo se1;


const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;

LiquidCrystal lcd(rs, en, d4, d5, d6, d7);


int IR = 7; //IR at pin 7

int buz = 8; //buzzer at pin 8

int POWER=13;// led which tells the ON/OFF status

float duration = 0, distance = 0; //initializing duration and dustbin at 0

int flg = 0;

int opened=A0;

int closeled=A1;


void setup()

{

    //pinMode(trigPin, OUTPUT);

    pinMode(buz, OUTPUT);

    //pinMode(echoPin, INPUT);

    pinMode(IR,INPUT);

    se.attach(10);

    //se1.attach(11);

```

```

pinMode(openled,OUTPUT);

pinMode(closeled,OUTPUT);

digitalWrite(IR,LOW);


pinMode(POWER,OUTPUT);

digitalWrite(POWER,HIGH);

digitalWrite(buz, LOW);

se.write(25);

// se1.write(25);


lcd.begin(16, 2);

lcd.clear();

lcd.setCursor(0,1);

lcd.print("READY TO USE");
}

void loop()
{

    delayMicroseconds(1000);

    if(digitalRead(7) == HIGH)

    {

```

```
se.write(120);

// se1.write(120);

lcd.clear();

lcd.setCursor(0,1);

lcd.print("IN USE");


digitalWrite(openled,HIGH);

digitalWrite(closeled,LOW);

digitalWrite(buz, HIGH);

delayMicroseconds(2000);

digitalWrite(buz,LOW);

delayMicroseconds(1000);

digitalWrite(buz,HIGH);

delay(2000);

digitalWrite(buz,LOW);

digitalWrite(openled,HIGH);

digitalWrite(closeled,LOW);


flg =1;

}

else if(digitalRead(7) == LOW)

{
```

```

//lcd.clear();

lcd.setCursor(0,1);

//digitalWrite(openled,LOW);

//digitalWrite(closeled,HIGH);

while(flag)

{

    delay(3000);

    digitalWrite(buz,HIGH);

    delay(1000);

    digitalWrite(openled,LOW);

    digitalWrite(closeled,HIGH);


    se.write(25);

    lcd.clear();

    lcd.print("READY TO USE");

    //se1.write(25);

    digitalWrite(buz,LOW);

    //digitalWrite(trigPin, LOW);

    //delayMicroseconds(2);

    //digitalWrite(trigPin, HIGH);

    //delayMicroseconds(10);

    //digitalWrite(trigPin, LOW);

    // duration = pulseIn(echoPin, HIGH);

```

```

// distance = (duration / 2) * 0.0344;

    flg=0;

}

/*if(distance >=3 && distance <=5)

{

    lcd.clear();

    lcd.print("Dustbin is Full");

}

else if(distance > 6)

{

    lcd.clear();

    lcd.print("Distance = ");

    lcd.print(distance);

}*/

//lcd.setCursor(0, 1);

}

}

```

Ac Appliance

```
int flag=0;
int state =0;

void setup() {

    pinMode(LED_BUILTIN, OUTPUT);

    Serial.begin(9600);
}
void loop() {

    if(Serial.available()>0)
    {

        delay(400);
        state=Serial.read();
        flag=0;
    }
    if(state=='0')
    {
        if(flag==0)
        {
            digitalWrite(LED_BUILTIN, LOW);
            Serial.println("off");
            flag=1;
        }
    }
    else if(state=='1')
    {
```

```
// myservo.write(90);  
  
if(flag==0)  
{  
    digitalWrite(LED_BUILTIN, HIGH);  
    Serial.println("on");flag=1;  
}  
}
```


Water Tank

```
#define LED 9
#define Grove_Water_Sensor 8

int flag=0;
int state =0;

void setup()
{
    pinMode(LED_BUILTIN, OUTPUT);
    pinMode(LED, OUTPUT);
    pinMode(Grove_Water_Sensor, INPUT);
    Serial.begin(9600);
}

void loop()
{
    if(Serial.available()>0)
    {
        delay(400);
        state=Serial.read();
        flag=0;
    }
    if(state=='0')
    {
        if(flag==0)
        {
            digitalWrite(LED, LOW);
            Serial.println("off");
            flag=1;
        }
    }
    else if(state=='1')
    {
        // myservo.write(90);
    }
}
```

```
    if(flag==0)
    {
        digitalWrite(LED, HIGH);
        Serial.println("on");flag=1;
    }
}

    if( digitalRead(Grove_Water_Sensor) == HIGH) {
digitalWrite(LED,LOW);
}
}
```

Login Action

```
import javax.servlet.http.*;

import javax.servlet.*;

import java.sql.*;

import java.io.*;

import java.util.*;

public class LoginAction extends HttpServlet

{

    Connection c;

    Statement s;

    ResultSet rs;

    RequestDispatcher rd,rd1;

    public void doPost(HttpServletRequest req,HttpServletResponse res) throws

    ServletException,IOException

    {

        res.setContentType("text/html");

        PrintWriter out=res.getWriter();

        out.println("<html><style>");

        out.println("html { background: url(f3.jfif) no-repeat center center

        fixed; -webkit-background-size: cover;-moz-background-size: cover; -o-

        background-size: cover; background-size: cover;}body{text-align: center;font-

        family: 'fontello'; border: 6px solid #f3efef; }");

        out.println("h1 { display: grid; width:100%;align-items: center; text-

        align: center; grid-template-columns: minmax(50px, 1fr) auto minmax(50px,

        1fr); grid-gap:50px;font-size:75px; font-weight: bold; letter-spacing:1px; line-

        height:1; text-align: center;color:white;});");

    }
```

```

String username=req.getParameter("username");
String password=req.getParameter("password");
String username_signup=req.getParameter("username_signup");
String password_signup=req.getParameter("password_signup");
String repeat_signup=req.getParameter("repeat_signup");
String email_signup=req.getParameter("email_signup");
String button_clicked=req.getParameter("enter");

try
{
    Class.forName("oracle.jdbc.driver.OracleDriver");

    c=DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe","system","mca6");

    s=c.createStatement();

} catch(Exception e){ }

if("Sign In".equals(button_clicked))
{
    try{
        rs=s.executeQuery("select * from web_users where
username='"+username+"' and password='"+password+"'");
        if(rs.next())
        {

            rd=req.getRequestDispatcher("frame.html");
            rd.forward(req,res);
        }
    }
}

```

```

        }

        else

        {

            rd1=req.getRequestDispatcher("error.html");
            rd1.forward(req,res);

        }

    }catch(Exception s){out.println(s);}

}

if("Sign Up".equals(button_clicked))

{

    if(password_signup.equals(repeat_signup))

    {try{

        int x=s.executeUpdate("insert into web_users values
        ("'+username_signup+'','"+password_signup+'','"+email_signup+'")");}catch(
        Exception se){}

        }

        else

        {

            out.println("both passwords do not match");

        }

    }

    out.println("</body></html>");

}}

```

Mailing Servlet

```
import javax.servlet.http.*;

import javax.servlet.*;

import java.io.*;

import java.util.Properties;

import javax.mail.*;

import javax.mail.internet.*;

import javax.activation.*;


public class MailingServlet extends HttpServlet

{

    MimeMessage message;

    Multipart body;

    MimeBodyPart part1;

    public void doPost(HttpServletRequest req,HttpServletResponse res)
    throws ServletException,IOException

    {

        String to="hk651997@gmail.com";

        PrintWriter out=res.getWriter();

        res.setContentType("text/html");

        ServletContext ctx=getServletContext();

        String gate=ctx.getInitParameter("gate");

        String light=ctx.getInitParameter("light");

        String door=ctx.getInitParameter("door");
```

```

String btn1=(String)ctx.getAttribute("btn1");
String btn2=(String)ctx.getAttribute("btn2");
System.out.println(btn1);
System.out.println(btn2);
String btn=req.getParameter("btn");
/*out.println("aaya");
out.println("aaya");
out.println("aaya");
out.println("aaya");
out.println(z3+"this");*/
System.out.println(" mail pe aaya");
//getting session object
Properties props=new Properties();
props.put("mail.smtp.host","smtp.gmail.com");
props.put("mail.smtp.socketFactory.port","465");

props.put("mail.smtp.socketFactory.class","javax.net.ssl.SSLSocketFactory");

props.put("mail.smtp.auth","true");
props.put("mail.smtp.port","465");

try
{
    Session session=Session.getInstance(props,new
MyAuth());

    //compose mail
    System.out.println(" mail try pe aaya");
    message=new MimeMessage(session);

```

```

        message.setFrom(new
InternetAddress("techbuddies60@gmail.com"));

        message.addRecipient(Message.RecipientType.TO,new
InternetAddress(to));

        body=new MimeMultipart();
        part1=new MimeBodyPart();

        //out.println("sbki initialization done");

    }catch(Exception e){out.println("initial "+e);}

    // out.println("mail");

    if("ON".equals(btn1))
    {

        // out.println("Enter this");

        try{

            message.setSubject("ALERT!");

            part1.setText("Someone turned on light of room1 ");

            // out.println("Enter this tryyyyyyyyyyy");

            body.addBodyPart(part1);

            //MimeBodyPart part2=new MimeBodyPart();

            message.setContent(body);

            Transport.send(message);

            System.out.println("message sent");

        }catch(Exception gate_E){

            // out.println(" "+gate_E + " catch aaya");

```



```

        gate_E.printStackTrace();

    }

}

else if("OFF".equals(btn1))
{

    try{

        message.setSubject("ALERT!");

        part1.setText("room1 light turned off ");

        // out.println("Enter this tryyyyyyyyyy");

        body.addBodyPart(part1);

        //MimeBodyPart part2=new MimeBodyPart();

        message.setContent(body);

        Transport.send(message);

        System.out.println("message sent");

    }catch(Exception gate_E){

        // out.println(" "+gate_E + " catch aaya");

        gate_E.printStackTrace();

    }

}

else if("ON".equals(btn2))
{

    try{

        message.setSubject("ALERT!");

```

```

        part1.setText("room 2 light turned on");
        body.addBodyPart(part1);
        //MimeBodyPart part2=new MimeBodyPart();
        message.setContent(body);
        Transport.send(message);
        System.out.println("message sent");
        out.println("light message sent");
    }catch(Exception light_E){ }
}

else
{

    try{
        message.setSubject("ALERT!");
        part1.setText("room 2 light turned off");
        body.addBodyPart(part1);
        //MimeBodyPart part2=new MimeBodyPart();
        message.setContent(body);
        Transport.send(message);
        System.out.println("message sent");
        //out.println("door message sent");
    }catch(Exception door_E){ }
}
}
}

```

```
class MyAuth extends javax.mail.Authenticator
{
    protected PasswordAuthentication getPasswordAuthentication()
    {
        return new
        PasswordAuthentication("techbuddies60@gmail.com","TechBuddies@5");
    }
}
```

Excel Servlet

```
import javax.servlet.http.*;

import javax.servlet.*;

import java.io.*;

import java.sql.*;

public class ExcelServlet extends HttpServlet

{

    public void service(HttpServletRequest req,HttpServletResponse res) throws
    ServletException,IOException

    {

        res.setContentType("application/vnd.ms-excel");

        res.setHeader("Content-
Disposition","attachment;filename=users.csv");

        PrintWriter out=res.getWriter();

        try{

            Class.forName("oracle.jdbc.driver.OracleDriver");

            Connection

c=DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe","system",
"mca6");

            Statement s=c.createStatement();

            ResultSet rs=s.executeQuery("select * from appliance");

            //out.println("S.No.\t Appliance name\t current status\t time\t");

            out.println("Appliance name\t current status\t time");
```

```
        while(rs.next())
        {
            String r1=rs.getString(1);
            String r2=rs.getString(2);
            String r3=rs.getString(3);
            //String r4=rs.getString(4);

            out.println(r1+"\t"+r2+"\t"+r3);
        }
    }catch(Exception er){}
}
}
```

Connect

```
import javax.servlet.http.*;

import javax.servlet.*;

import java.io.*;

import java.util.Date;

import java.text.*;

import java.lang.*;

import java.io.IOException;

import java.io.InputStream;

import java.io.OutputStream;

import java.util.logging.Level;

import java.util.logging.Logger;

import javax.bluetooth.DeviceClass;

import javax.bluetooth.DiscoveryAgent;

import javax.bluetooth.DiscoveryListener;

import javax.bluetooth.LocalDevice;

import javax.bluetooth.RemoteDevice;

import javax.bluetooth.ServiceRecord;

import javax.bluetooth.UUID;

import javax.microedition.io.Connector;

import javax.microedition.io.StreamConnection;

import java.util.*;

import java.text.SimpleDateFormat;
```

```

import java.util.Date;

import java.sql.*;

import gnu.io.CommPortIdentifier;

import gnu.io.SerialPort;

import gnu.io.SerialPortEvent;

import gnu.io.SerialPortEventListener;

import java.io.BufferedReader;

import java.io.InputStreamReader;

import java.util.Enumeration;

import gnu.io.NRSerialPort;


public class Connect extends HttpServlet

{

String hc05Url =

"btspp://0018E503D49E:1;authenticate=false;encrypt=false;master=false";


        boolean scanFinished = false;

        StreamConnection streamConnection;

        OutputStream os;

        InputStream is;

        BufferedReader input;

        //ServletOutputStream out;

        //static byte[] b= new byte[200];;

        //int a;

```

```

SimpleDateFormat sdf=new SimpleDateFormat("dd/MM/yyyy HH:mm:ss");

Statement s;

Connection c;

int z1,z2;

String hk;

RequestDispatcher rd1,rd2,rd3,rd4,rd5,rd6,rd7,rd8;

BufferedReader bReader;

public void doPost(HttpServletRequest req,HttpServletResponse res) throws
ServletException,IOException

{

    Connect con=new Connect();

    ServletOutputStream out=res.getOutputStream();

    res.setContentType("text/html");

    String button=req.getParameter("button1");

    String button2=req.getParameter("button2");

    //ServletContext ctx=getServletContext();

    try

    {

        Class.forName("oracle.jdbc.driver.OracleDriver");

        c=DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:xe","system","mca6");

        s=c.createStatement();

        //System.out.println("dfb connection");
    }
}

```



```

        }catch(Exception e){ out.println(e+".....db");}

        System.out.println(button);

        System.out.println(button2);

        //database logic

        if("CONNECT".equals(button))

        {

                System.out.println("connect");

                //ctx.setAttribute("connect","connected");

                try

                {

                        streamConnection=(StreamConnection)Connector.open(hc05Url);

                                os=streamConnection.openOutputStream();

                                is=streamConnection.openInputStream();

                                //bReader=new BufferedReader(new

InputStreamReader(is));

                                //

                                rd4=req.getRequestDispatcher("frame1_disconnect.html");

                                rd4.forward(req,res);

                }

                catch(Exception ex)

                {

```

```

rd5=req.getRequestDispatcher("error_connecting.html");

rd5.forward(req,res);

}}

else if("OPEN".equals(button))
{

System.out.println("OPEN");

try{

os.write("4".getBytes());

System.out.println("OPEN");

out.println("OPEN");

Thread.sleep(200);

}

catch(Exception e)

{

rd7=req.getRequestDispatcher("blue_not_connected.html");

rd7.forward(req,res);

}

rd8=req.getRequestDispatcher("frame4.html");

rd8.forward(req,res);

}

```

```
else if("SECURE ON".equals(button))

{

    System.out.println("SECURE ON");

    try{

        os.write("6".getBytes());

        System.out.println("OPEN");

        out.println("SECURE ON");

        Thread.sleep(200);

    }

    catch(Exception e)

    {

        rd7=req.getRequestDispatcher("blue_not_connected.html");

        rd7.forward(req,res);

    }

    rd8=req.getRequestDispatcher("frame7.html");

    rd8.forward(req,res);

}

else if("SECURE OFF".equals(button))

{

    System.out.println("SECURE OFF");
```

```

        try{

            os.write("10".getBytes());

            System.out.println("secure off");

            out.println("SECURE OFF");

            Thread.sleep(200);

        }

        catch(Exception e)

        {

            rd7=req.getRequestDispatcher("blue_not_connected.html");

            rd7.forward(req,res);

        }

        rd8=req.getRequestDispatcher("frame7.html");

        rd8.forward(req,res);

    }

    else if("CLOSE".equals(button))

    {

        try{

            os.write("5".getBytes());

            System.out.println("OPENclose");

            //out.println("OPENclose");

            Thread.sleep(200);} catch(Exception

e){rd7=req.getRequestDispatcher("blue_not_connected.html");

            rd7.forward(req, res);

```

```

        }

        rd8=req.getRequestDispatcher("frame4.html");

        rd8.forward(req,res);

    }

    else if("ON".equals(button))

    {

        //ctx.setAttribute("btn1",button);

        System.out.println("ON");

        try{

            os.write("1".getBytes());

            //Thread.sleep(200);

        } catch(Exception

e){rd6=req.getRequestDispatcher("blue_not_connected.html");

        rd6.forward(req,res);}

        // System.out.println("in try");

        //int read=bReader.read();

        //int read12=Integer.parseInt(lineRead);

        //String lineRead=bReader.readLine();

        //System.out.println(lineRead);

        //int read=is.read();

        //System.out.println(read);

```

```

//remove from here after

//////////myhk

//serial++;

//String num=String.valueOf(serial);

String app_name="BULB";

String current_status="ON";

Date date=new Date();

String d=sdf.format(date);

try{

    int x=s.executeUpdate("insert into APPLIANCE2
values ('"+app_name+"','"+current_status+"','"+d+"')");

    //out.println("Coming till here");

} catch(SQLException
sql){ System.out.println(sql+".....sql button---ON");}

//////////hk

rd3=req.getRequestDispatcher("frame2_off.html");

rd3.include(req,res);

rd1=req.getRequestDispatcher("/mail");

rd1.include(req,res);

//res.sendRedirect("/mail");

}

```

```

else if("ON".equals(button2))
{
    System.out.println("ON2");

    //ctx.setAttribute("btn2",button);

    try{

        os.write("2".getBytes());

        //Thread.sleep(200);

    }catch(Exception
e){rd6=req.getRequestDispatcher("blue_not_connected.html");

        rd6.forward(req,res);}

    /* byte read=(byte)is.read();

    System.out.println(read);*/

    // String lineRead=bReader.readLine();

    //      System.out.println(lineRead+"ye wala");

    //Integer z1=(Integer)is.read(b);

//    int person=Integer.parseInt(z1);

    //ctx.setAttribute("counter",m1);

//    out.print("persons =" + z1+" ==");

    ////////////myhk

    //serial++;

    //String num=String.valueOf(serial);

    String app_name="BULB 2";

```

```

        String current_status="ON";

        Date date=new Date();

        String d=sdf.format(date);

        //out.println("yaha tak aya");


        //out.println("mail k bad");

        try{

            int x=s.executeUpdate("insert into
APPLIANCE2 values ('"+app_name+"','"+current_status+"','"+d+"')");

            //out.println("Coming till here");

        }catch(SQLException
sql){ System.out.println(sql+".....sql button2---ON");}


        //////////////////////////////////hk

        rd3=req.getRequestDispatcher("frame3_off.html");

        rd3.forward(req,res);

        rd1=req.getRequestDispatcher("/mail");

        rd1.include(req,res);

        //res.sendRedirect("/mail");

    }

    else if("OFF".equals(button))

    {

        //out.println("OFF");
    }

```



```

        //out.println(a+"a");

        //out.println(streamConnection+" stream");

        //out.println(os+" os");

        //out.println(is+" is");

        //ctx.setAttribute("btn1",button);

        try{

            os.write("0".getBytes());

            Thread.sleep(200);}catch(Exception
e){rd7=req.getRequestDispatcher("blue_not_connected.html");

            rd7.forward(req,res);}

        //is.read(b);

        // z2=is.read();

        //out.println(z2);

        //con.is.close();

        //serial++;

        //String num=String.valueOf(serial);

        String app_name="BULB";

        String current_status="OFF";

        Date date=new Date();

        String d=sdf.format(date);

        try{

            int x=s.executeUpdate("insert into
APPLIANCE2 values ('"+app_name+"','"+current_status+"','"+d+"')");

```

```

        // out.println("Coming till here");

        }catch(SQLException
sql){System.out.println(sql+".....sql button---OFF");}

        rd2=req.getRequestDispatcher("frame2_on.html");

        rd2.include(req,res);

        rd1=req.getRequestDispatcher("/mail");

        rd1.include(req,res);

    }

    else if("OFF".equals(button2))

    {

        //ctx.setAttribute("btn2",button);

        //out.println("OFF");

        //out.println(a+"a");

        //out.println(streamConnection+" stream");

        //out.println(os+" os");

        //out.println(is+" is");

        try{

            os.write("3".getBytes());

            Thread.sleep(200);}catch(Exception
e){rd7=req.getRequestDispatcher("blue_not_connected.html");

            rd7.forward(req,res);}

        //is.read(b);

```

```

        // z2=is.read();

        //out.println(z2);

        //con.is.close();

        //serial++;

        //String num=String.valueOf(serial);

        String app_name="BULB 2";

        String current_status="OFF";

        Date date=new Date();

        String d=sdf.format(date);


        try{

            int x=s.executeUpdate("insert into
APPLIANCE2 values ('"+app_name+"','"+current_status+"','"+d+"')");

            // out.println("Coming till here");

        }catch(SQLException
sql){System.out.println(sql+".....sql button2---OFF");}


        rd2=req.getRequestDispatcher("frame3_on.html");

        rd2.forward(req,res);

        rd1=req.getRequestDispatcher("/mail");

        rd1.include(req,res);

    }

    /*

    else if("OPEN".equals(button))

```

```

        {

            System.out.println("OPEN");

            try{

                os.write("4".getBytes());

                System.out.println("OPEN");

                out.println("OPEN");

                Thread.sleep(200);

            }

            catch(Exception e)

            {

                rd7=req.getRequestDispatcher("blue_not_connected.html");

                rd7.forward(req,res);

            }

        }

        else if("CLOSE".equals(button))

        {

            try{

                os.write("5".getBytes());

                System.out.println("OPENclose");

                out.println("OPENclose");

                Thread.sleep(200);}catch(Exception

e){rd7=req.getRequestDispatcher("blue_not_connected.html");

```

```

        rd7.forward(req,res);

    }

}*/

else if("OPEN CAMERA".equals(button))

{

    res.sendRedirect("http://192.168.43.1:8080/video");

}

else

{

    os.close();

    is.close();

    streamConnection.close();

    //out.println(streamConnection+" stream");

    //out.println(os+" os");

    //out.println(is+" is");

    rd5=req.getRequestDispatcher("frame1.html");

    rd5.include(req,res);

}

}}

```

Dashboard

```
<HTML>

<HEAD>

<TITLE>Dashboard</TITLE>

</HEAD>


<style>

.center {

    display: block;

    margin-left: auto;

    margin-right: auto;

    width: 95%;

    height:300px;

}

</style>


<FRAMESET cols="25%,25%,25%,25%">

    <FRAMESET rows="50%,50%">

        <FRAME src="frame1.html">

        <FRAME src="frame5.html">

    </FRAMESET>

</FRAMESET>
```

```
<FRAMESET rows="50%,50% ">
```

```
    <FRAME src="frame2_on.html">
```

```
    <FRAME src="frame6.html">
```

```
</FRAMESET><FRAMESET rows="50%,50% ">
```

```
    <FRAME src="frame3_on.html">
```

```
    <FRAME src="frame7.html">
```

```
</FRAMESET><FRAMESET rows="50%,50% ">
```

```
    <FRAME src="frame4.html">
```

```
    <FRAME src="frame8.html">
```

```
</FRAMESET>
```

```
</FRAMESET>
```

```
</HTML>
```

CONCLUSIONS / RECOMMENDATIONS

Technologies to Be Used

- **Infrared** - the information is shared between devices or systems through the IR radiation.
- **Mobile phone** - used to turn on/off various applications in our home.
- **Wi-Fi** - we used a Wi-Fi module in our project to connect the devices to internet
- **Bluetooth**
- **Android**

The future of IoT is more fascinating than this where billions of things will be talking to each other and human intervention will become least. IoT will bring macro shift in the way we live and work.

This project work is complete on its own in remotely and automatically switching on or off of an electrical appliance not limited to household appliances and sends a feedback message indicating the new present state of the appliance.

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