Internet of Things and home automation using Arduino

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Agenda

- What is IoT
- Why IoT?
- Technology used for demonstration
- Q/A

What is IoT?

- Internet of Things
  - The Internet of Things (IoT) refers to a network of physical devices equipped with sensors, processing capabilities, software, and other technologies. These devices connect and exchange data with other devices and systems over the Internet or other communication networks
  - Internet connected objects (things) working together to solve a business problem
  - Has been around for quite a while, but only recently has become affordable for personal use

What are the “Things” in the IoT?

- Could be anything
  - Physical
    - Objects such as
      - Climate control
      - Security/Disaster alarm system
      - Energy/Resource metering (Electricity, Gas, Water)
      - Water boiler, Solar boiler
      - Car (OBDII, vehiclepi)
  - Virtual
      - Email
      - Twitter/FB
      - Online notification platforms

Why IoT?

- It reduces human effort for many activities, and provides tons of information.
- It enables constant connectivity, combined with data and analytics, providing new opportunities for companies to innovate products and services, as well as to increase the efficiency of operations.
- It makes it easier to automate everyday tasks and take control of behaviors.
- It brings information to people and provides actionable information.
- The use of internet-connected devices has become mainstream, and companies in diverse industries are adopting this technology so as to be more efficient, productive, and competitive.

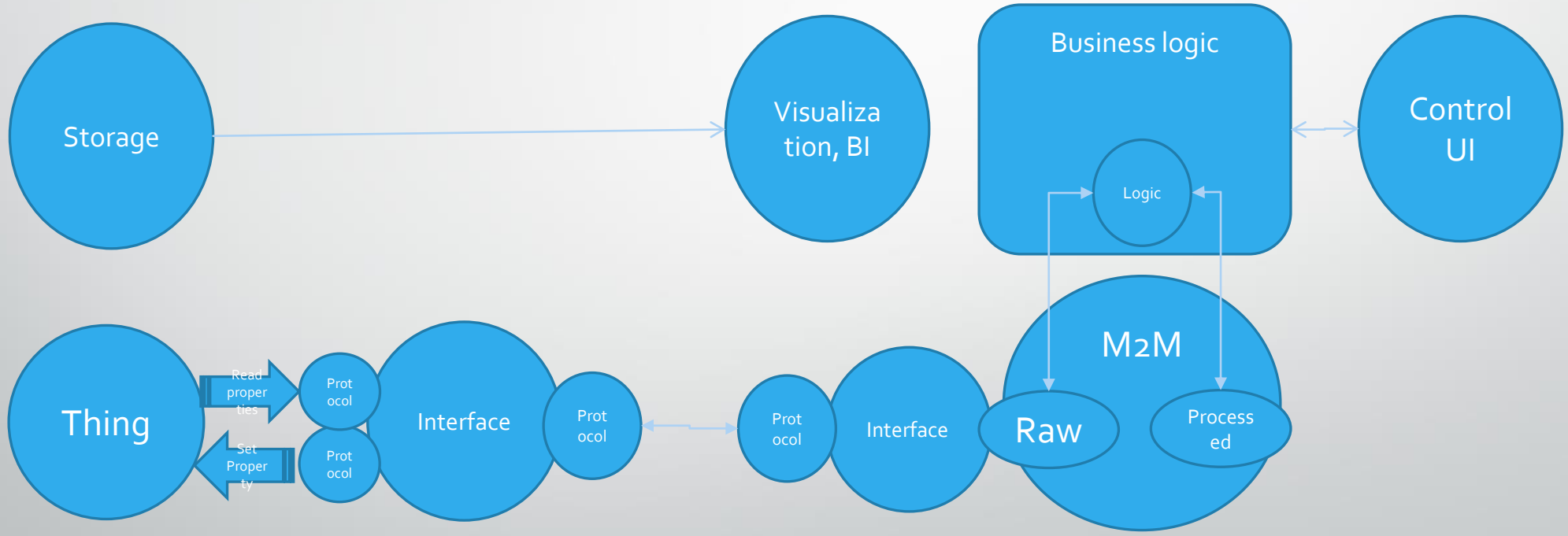
Smart objects: Make things that weren't meant to talk to each other interact smartly

- Phone → Location detection, presence detection → Thermostat
- Doorbell activation → CCTV takes picture→ Email + SMS + Tweet
- Fire Alarm → Email + SMS
- Security System→ CCTV → Email + SMS
- Climate control → presence @ home & weather forecast
- Hot water tank 1 ← → Hot water tank 2 ← → our presence, weather forecast
- Dog→ CCTV + Email
- Weather notifications → email

Challenges

- Global cooperation
  - Proprietary and incompatible protocols
  - Lack of APIs
  - Example: Common external power supply
- Technological challenges
  - Power usage
  - Scalability
  - Security
  - Communication mechanisms
- Ethics, control society, surveillance, consent and data driven life

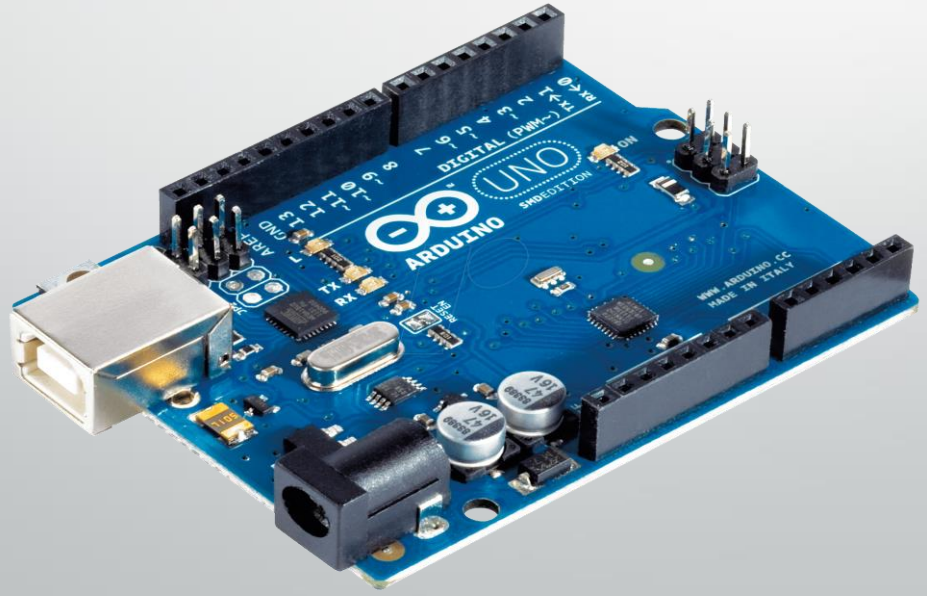
Overall Architecture



Technology used:

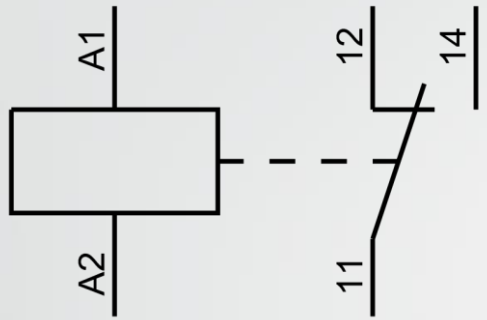
Arduino Uno

The main piece in this demonstration is an arduino ATmega328 kit attached by GPRS/GSM Shield.



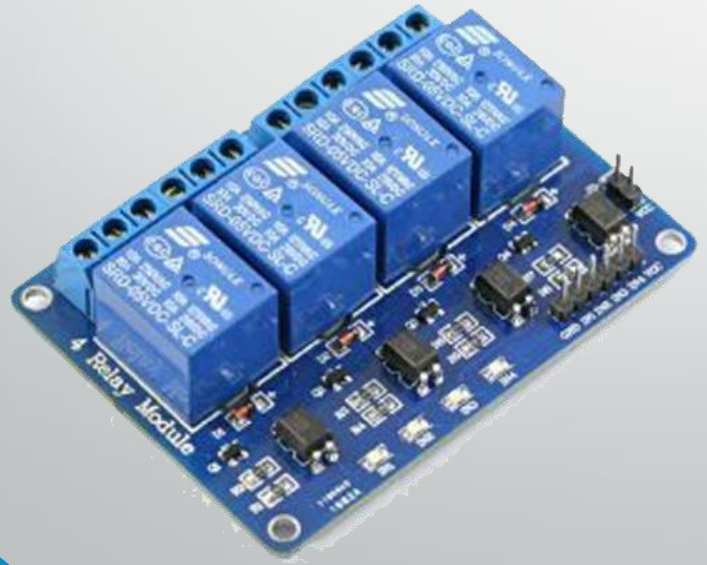
What is the Arduino Uno

- The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller (MCU) and developed by Arduino.cc
- Initially released in 2010.
- The microcontroller board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.
- The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable.
- It can be powered by a USB cable or a barrel connector that accepts voltages between 7 and 20 volts, such as a rectangular 9-volt battery.
- It has the same microcontroller as the Arduino Nano board, and the same headers as the Leonardo board.

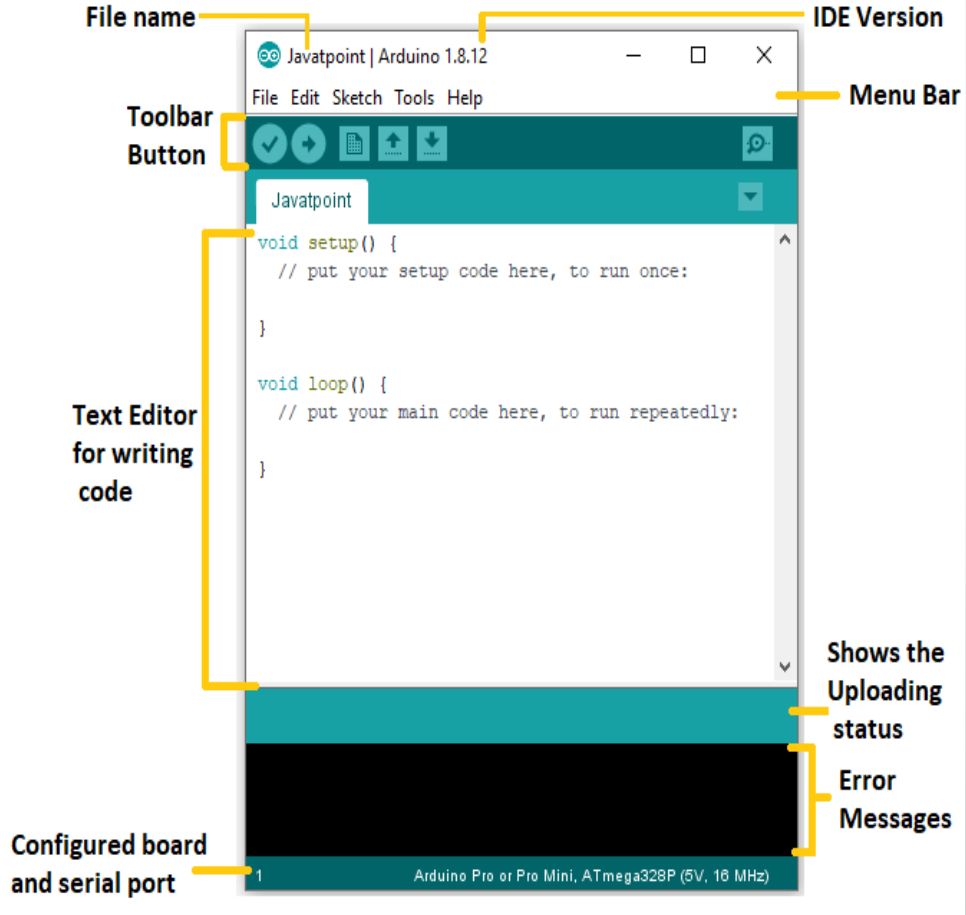


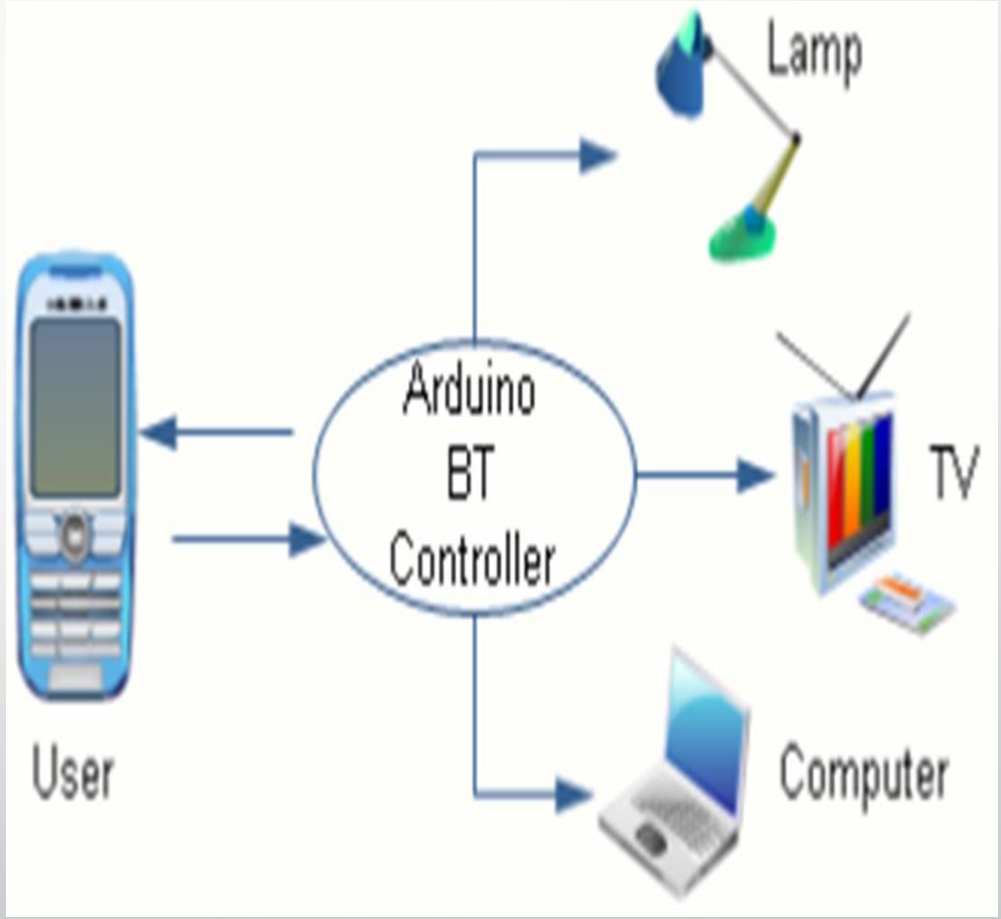
Relay :

- A relay is an electrically operated switch.
- Relays are used where it is necessary to control a circuit by a low-power signal.
- Relays protect electrical circuits from overload or faults.

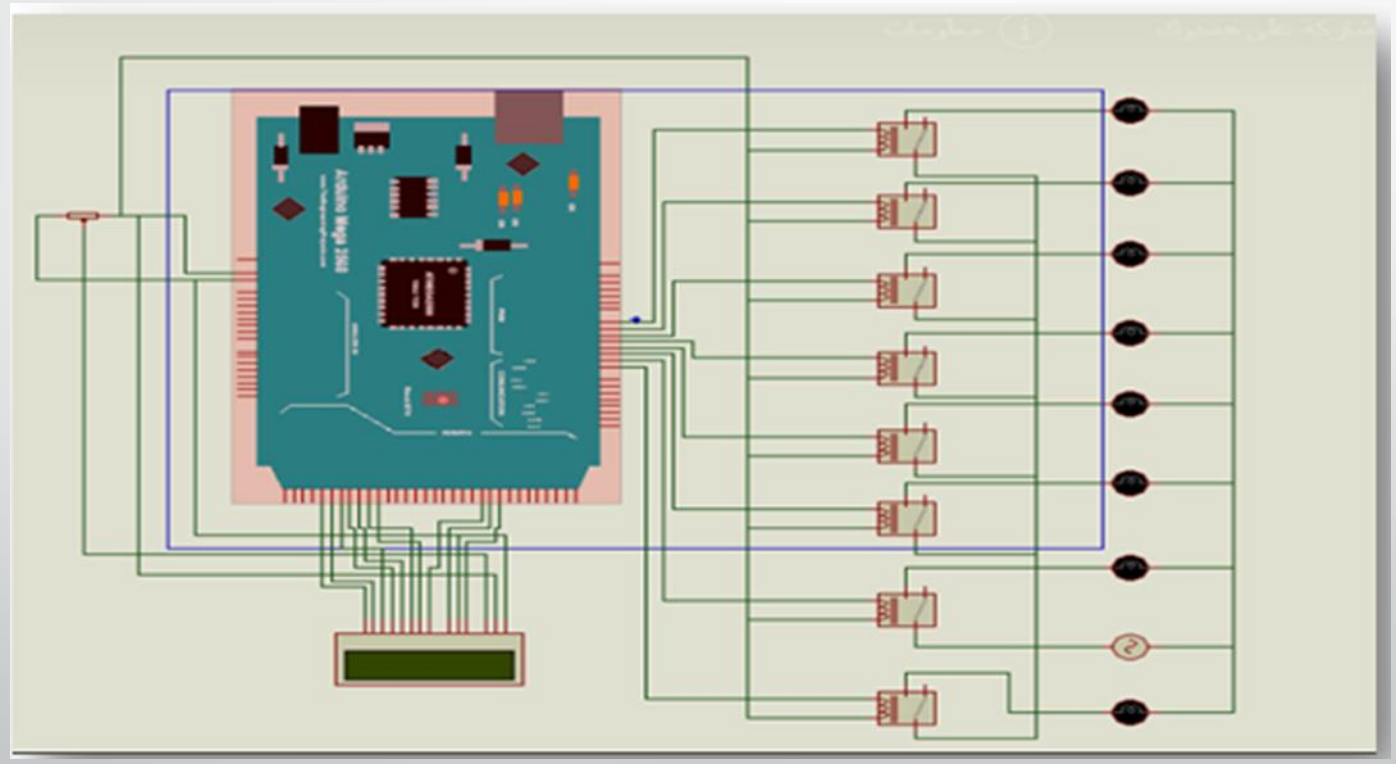


Interface :


File name
IDE Version
Javatpoint | Arduino 1.8.12
File Edit Sketch Tools Help
Menu Bar
Toolbar Button
Javatpoint
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}
Text Editor for writing code
Shows the Uploading status
Error Messages
Configured board and serial port
1
Arduino Pro or Pro Mini, ATmega328P (5V, 16 MHz)


Lamp
Arduino
BT
Controller
TV
User
Computer

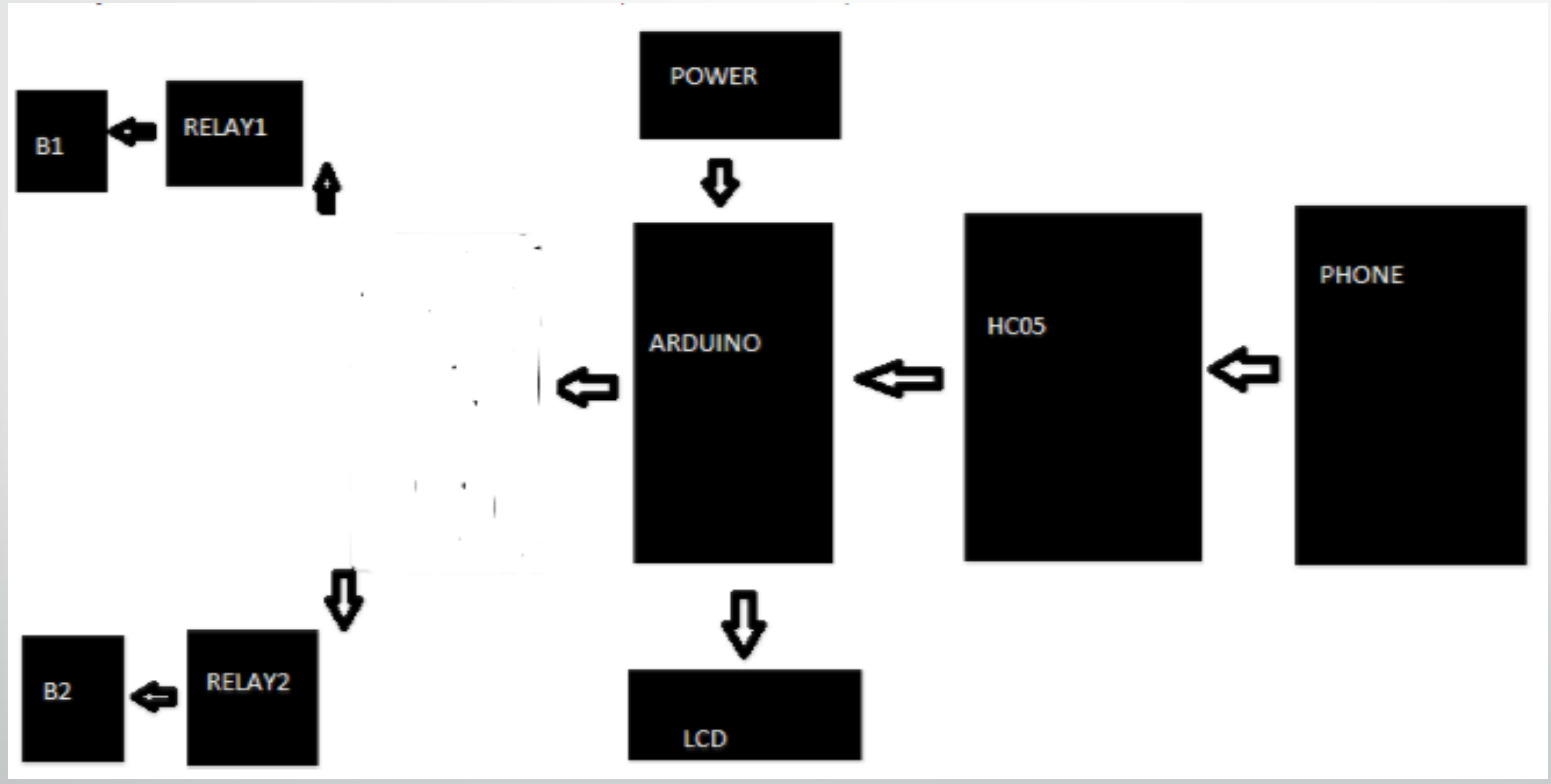
Connection (circuit diagram)



Working Explanation:

- First we need to download and install the **Bluetooth Terminal App** in our Android Phone from the Play Store and then pair it with **Bluetooth Module HC05** like we normally pair 2 bluetooth devices. .
- Now we have Bluetooth Terminal App installed in our Android phone through which we can send data to Bluetooth ModuleHC05. HC05 Bluetooth Module is connected to **Arduino Mega** to serially receive the data sent by Bluetooth terminal App through Android Smart Phone. A 16x2LCD is used to display the On and Off status of Electronic Appliances. And is used 8 Relay which are directly connected to 7 Buls.

Working Explanation:



Bluetooth App :

- Download and install Bluetooth Controller.
- Turned ON mobile Bluetooth.
- Now open Bluetooth controller app.
- Press scan.
- Select desired (BluetoothModule HC-05).
- Now set keys by pressing set button on screen.

Conclusion :

- Home automation undoubtedly offers the capability to automate a household environment. Individuals can manage their electrical appliances using these devices and establish control actions through mobile applications.
- In the future, Arduino possesses substantial potential for marketing within the realm of IoT.

End

- Thanks!

Questions?