

Getting Started with Arduino

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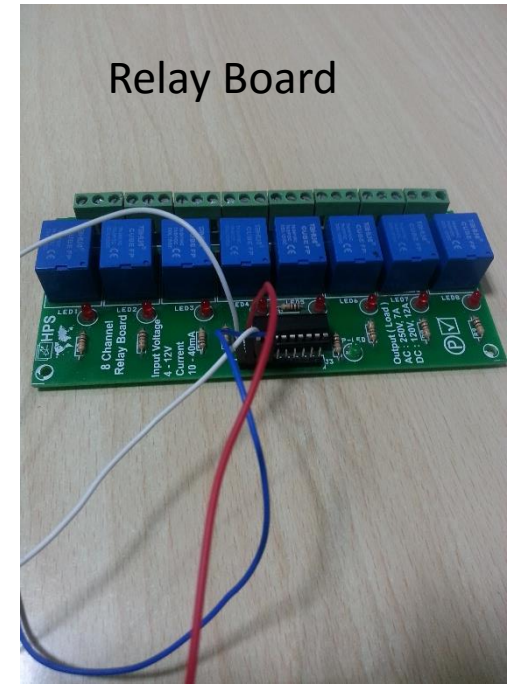
Hardware used

- Arduino UNO
- Ethernet shield
- 5V Relay board
- PC
- Ethernet cable
- A-B USB cable
- Wires

Arduino UNO



Relay Board



Wire

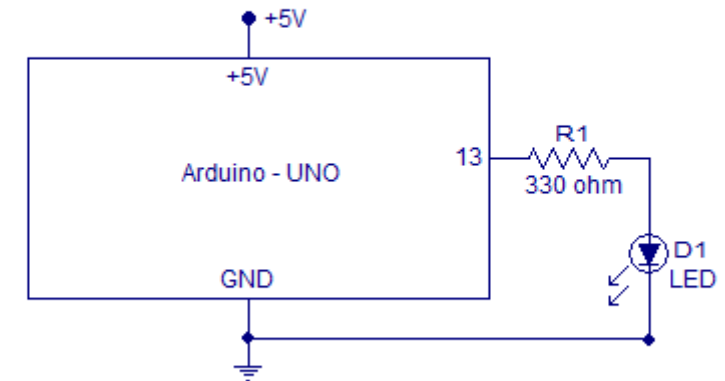
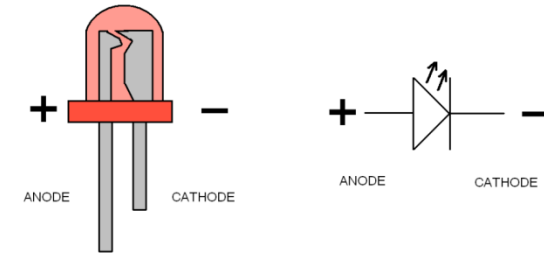
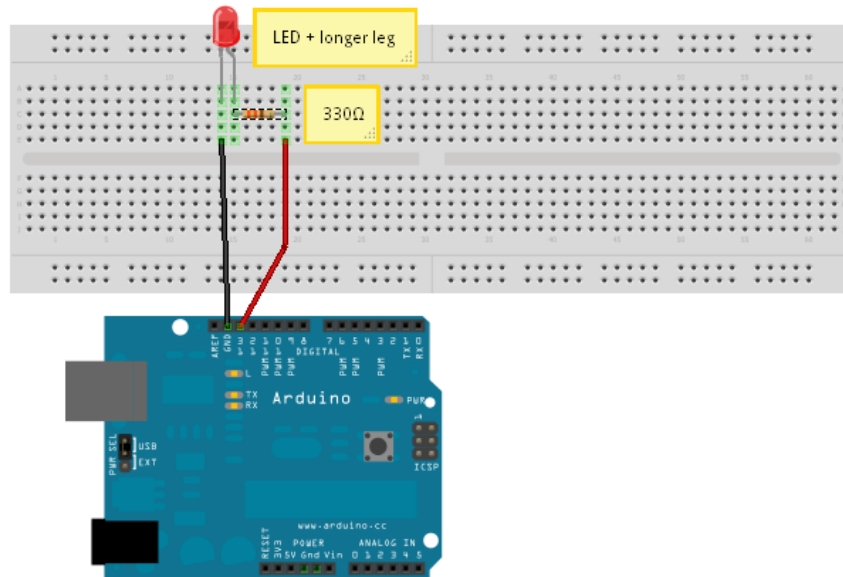


Ethernet Shield



First Program : Lets blink an LED

- Step 1: Connect the circuit as shown below

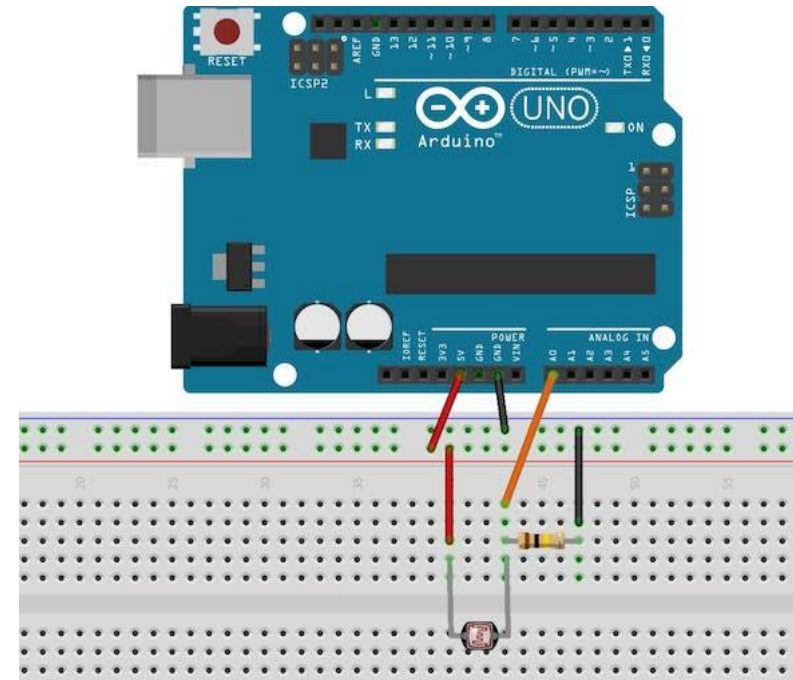


Blink Program

- Step 2: Connect the circuit as shown below
- Open File -> Examples -> Basics -> Blink
- Select Tools -> Board -> << Choose the name of the Arduino Board you have >>
- Select Tools -> Port -> << Select the COM port that connect Arduino boards"
- Now "Upload the program"

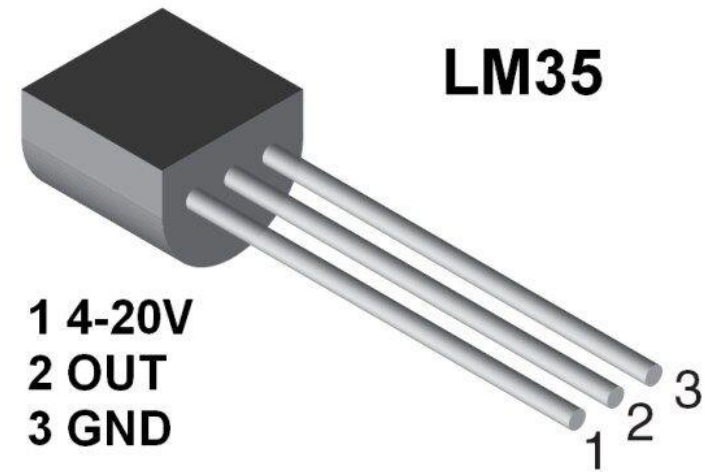
Program 2: LDR Sensor interface

- Connect the circuit as shown in figure
- Resistor is 100K
- Open File -> Examples -> Basics -> AnalogReadSerial
- See the output of LDR values
- Cover the LDR using your hand and see the value changes accordingly



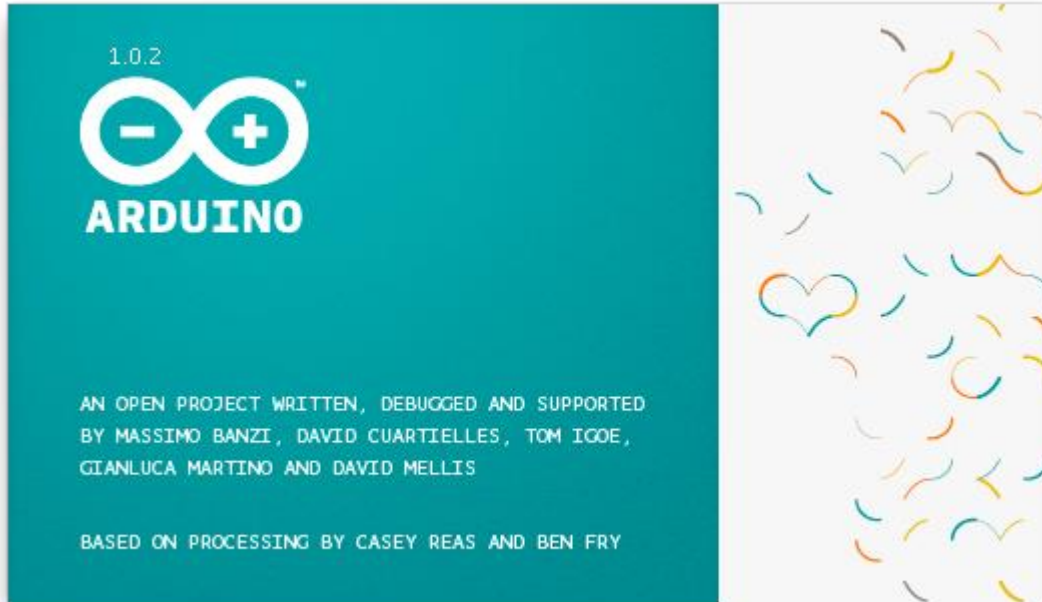
Program 3: LM35 Temperature Sensor

- Connect Pin 1 to +5V
- Connect Pin 3 to GND
- Connect Pin 2 to Analog Ports (A0)
- Get the code from <http://playground.arduino.cc/Main/LM35HigherResolution>



Software Used

- **Arduino Software (IDE)**
- **MIT app inventor (ai2.appinventor.mit.edu)**



Step 1

- Connect the Ethernet shield over Arduino board



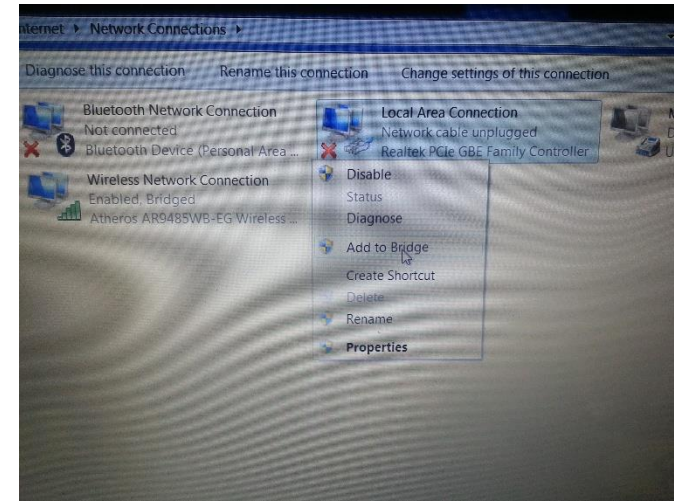
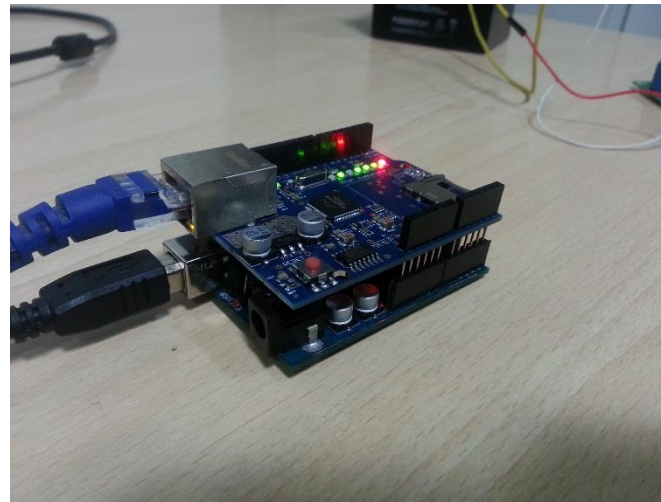
Step 2 (Power Up Arduino)

- Connect A-B USB cable between laptop and Arduino Uno to power up the board



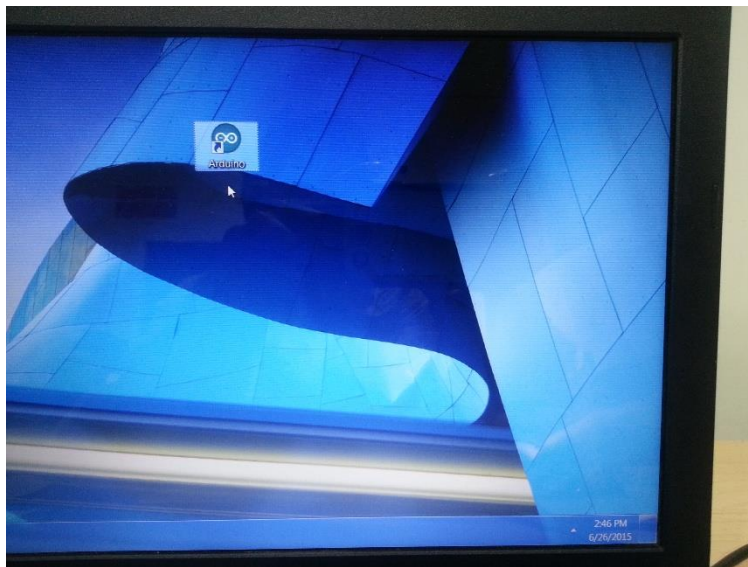
Step 3 (Connect Arduino to Wi-Fi network)

- Connect Ethernet cable between Ethernet shield and laptop
- Make a hotspot in your smartphone and connect your laptop to that hotspot.
- Open “Network and Sharing Centre” from start menu and click on change adapter settings.
- Now Select your LAN and Wireless Network and Select “Bridge Connections “

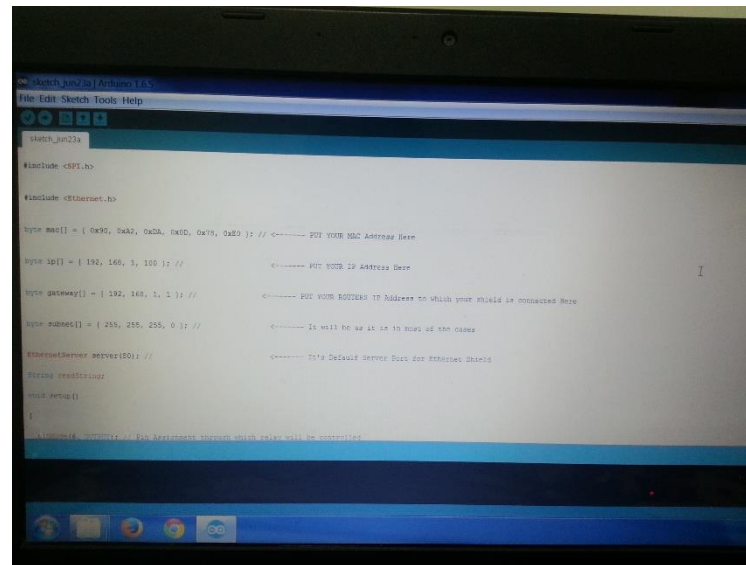


Step 4 (Modify the code and upload)

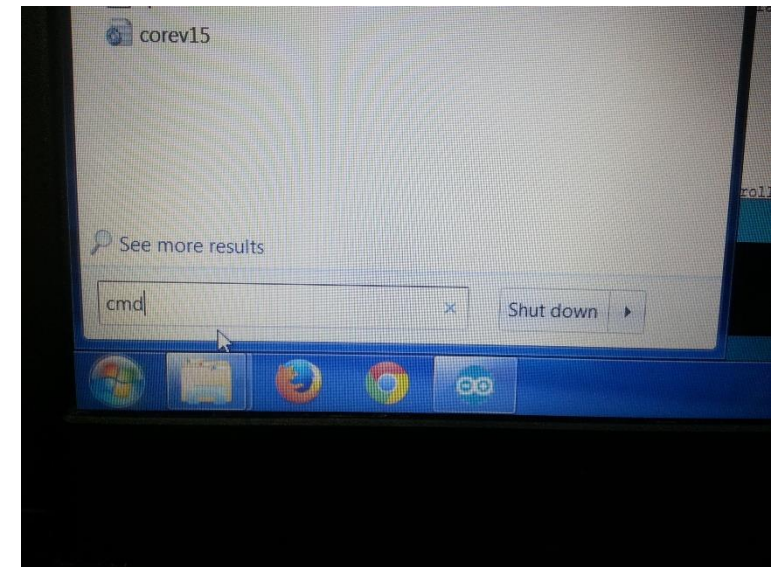
- A. Open the Hwjunction_Ethernet.ino (Download from Google Drive)
- B. Open cmd and type ipconfig
- C. See the IP address , Subnet mask and Default Gateway address of your PC
- D. Set the IP address of Arduino in the code as PC's IP address +2
(e.g. : if PC's IP address is 192.168.23.98 then set Arduino's IP address as 192.168.23.100)
- E. Set the Subnet mask and Default Gateway to be same as that of PC
- F. Choose the correct COM port and upload the file to Arduino.



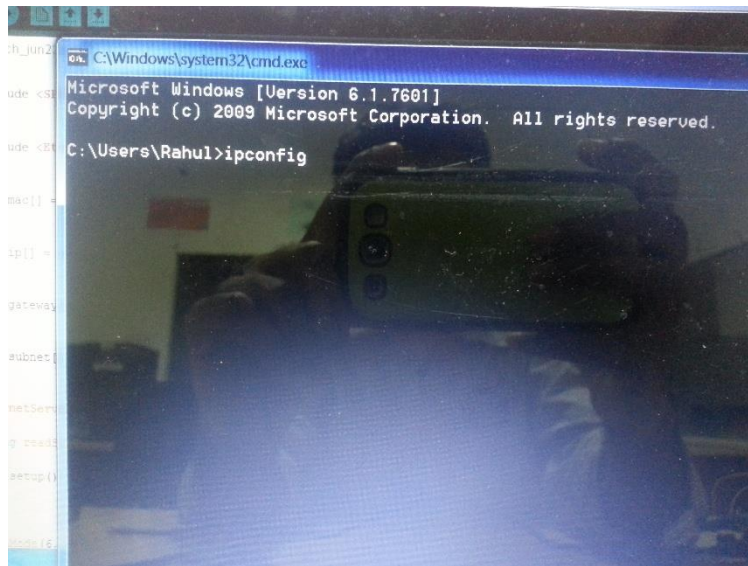
Arduino software



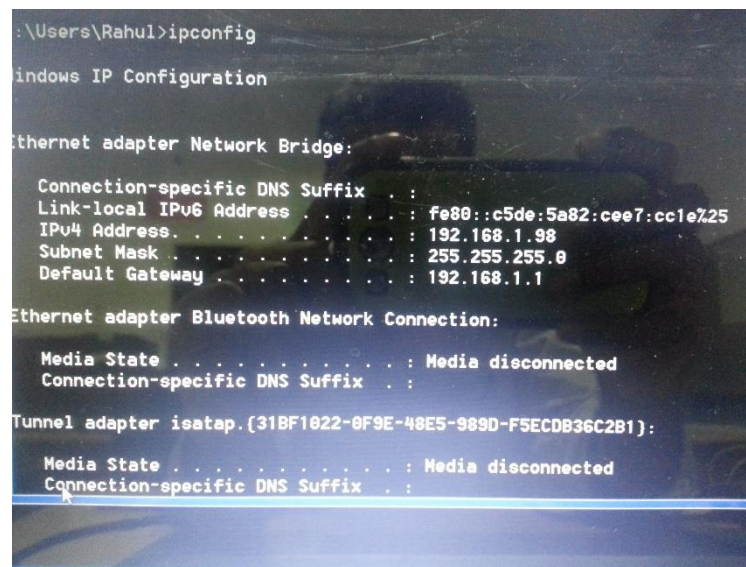
A.



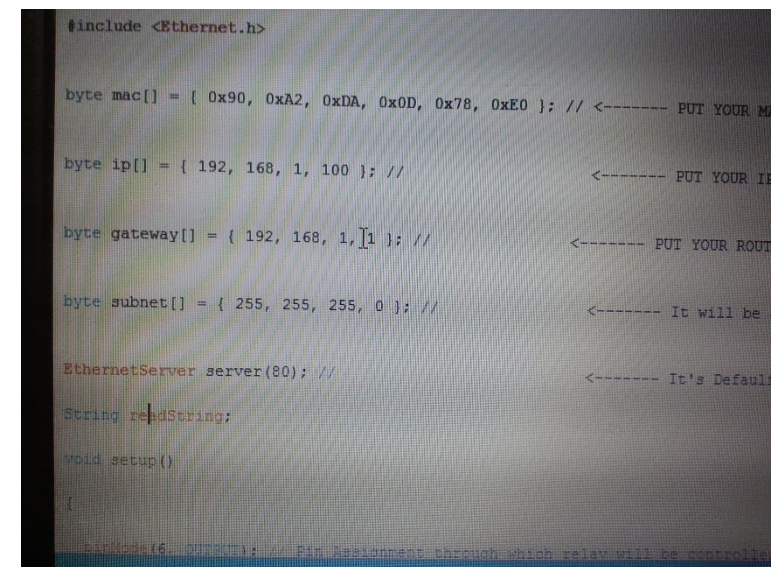
B.



C.



D.



E.

Step 5

- Connect an LED to Pin 7 with 330 ohm resistor
- Open Web Browser on your PC and type Arduino's IP address
- A web app will appear showing options for turning ON or OFF the LED
- Clicking ON will turn on the LED

Switch

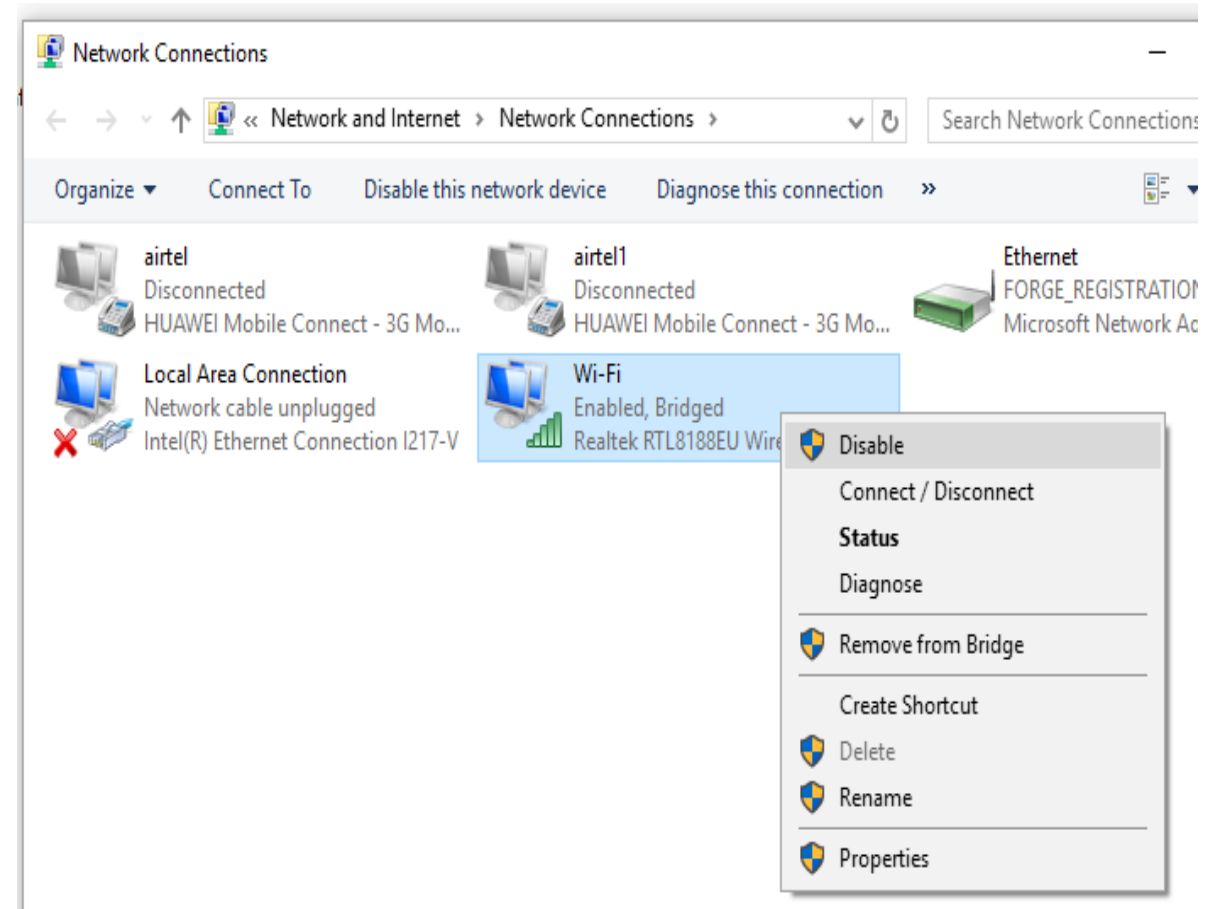
- It is a computer networking device that connects devices together on a computer network, by using packet switching to receive, process and forward data to the destination device.
- If computers can be networked in a simpler way, Switch is the simplest and cheapest solution
- **Remember we have to manually allocate IP Address to each PC / device that is connected to SWITCH**

Connect Arduino and your PC to Switch



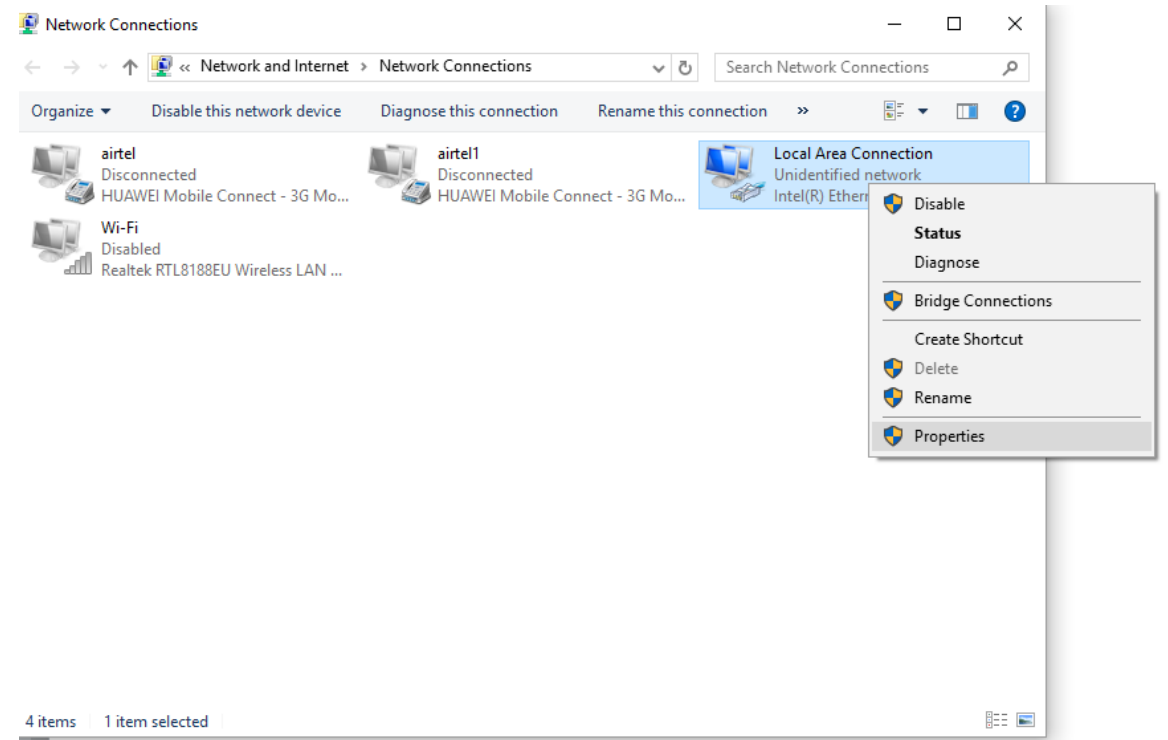
Using Switch

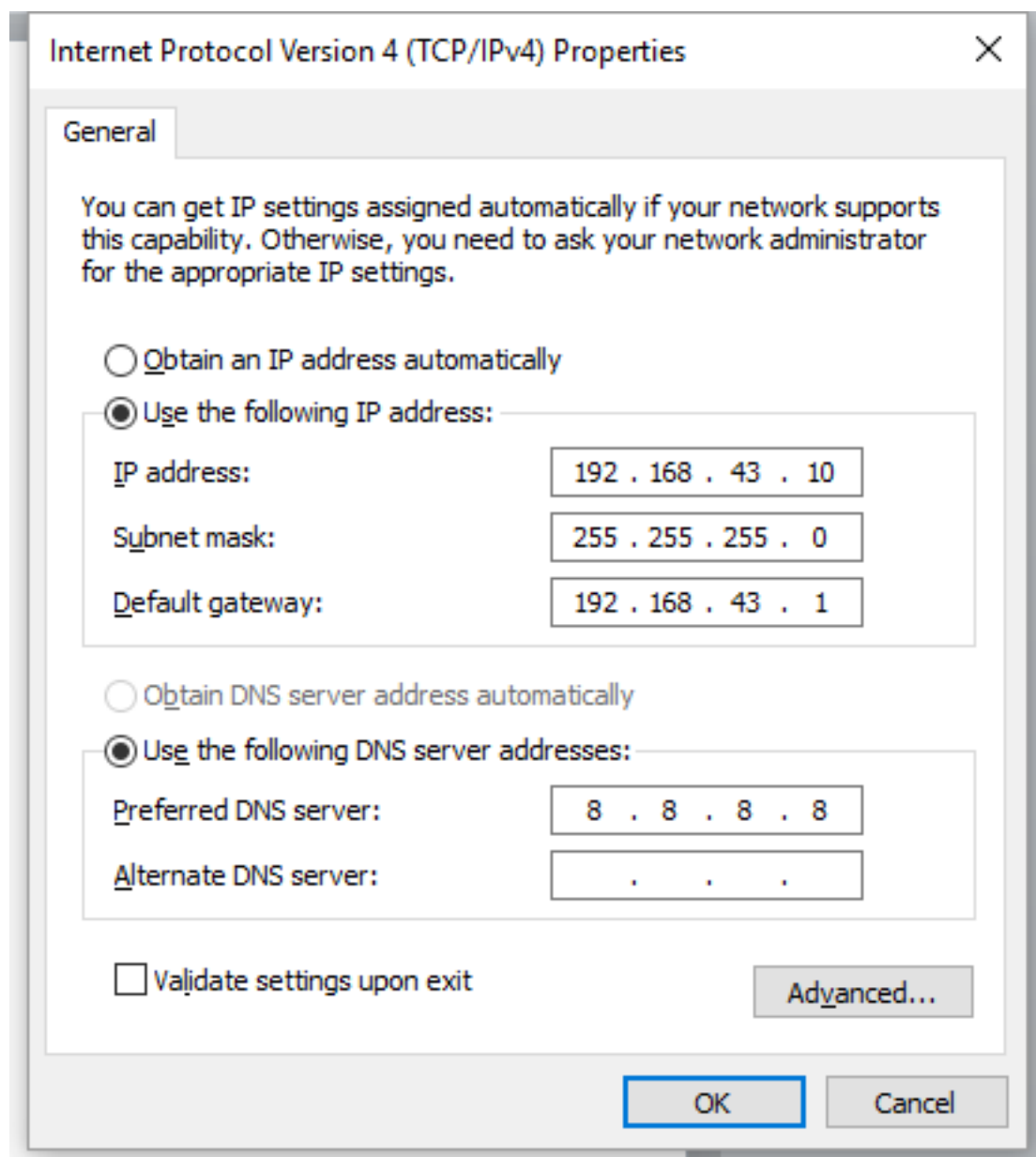
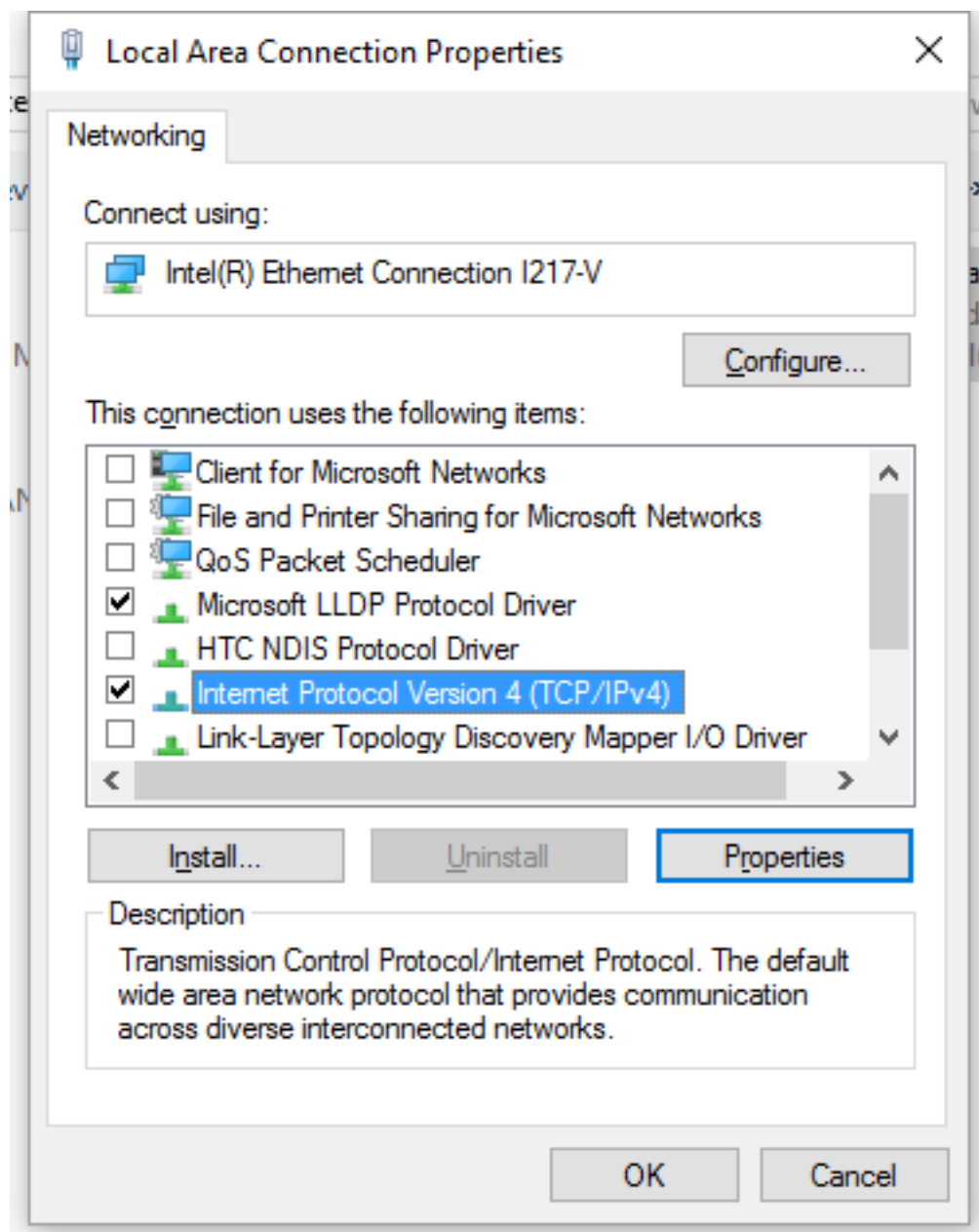
- Go to Control Panel -> Network and Internet->Network and Sharing Center -> Change Adapter Settings
- Right click on Wi-Fi and choose “Disable”



Using Switch

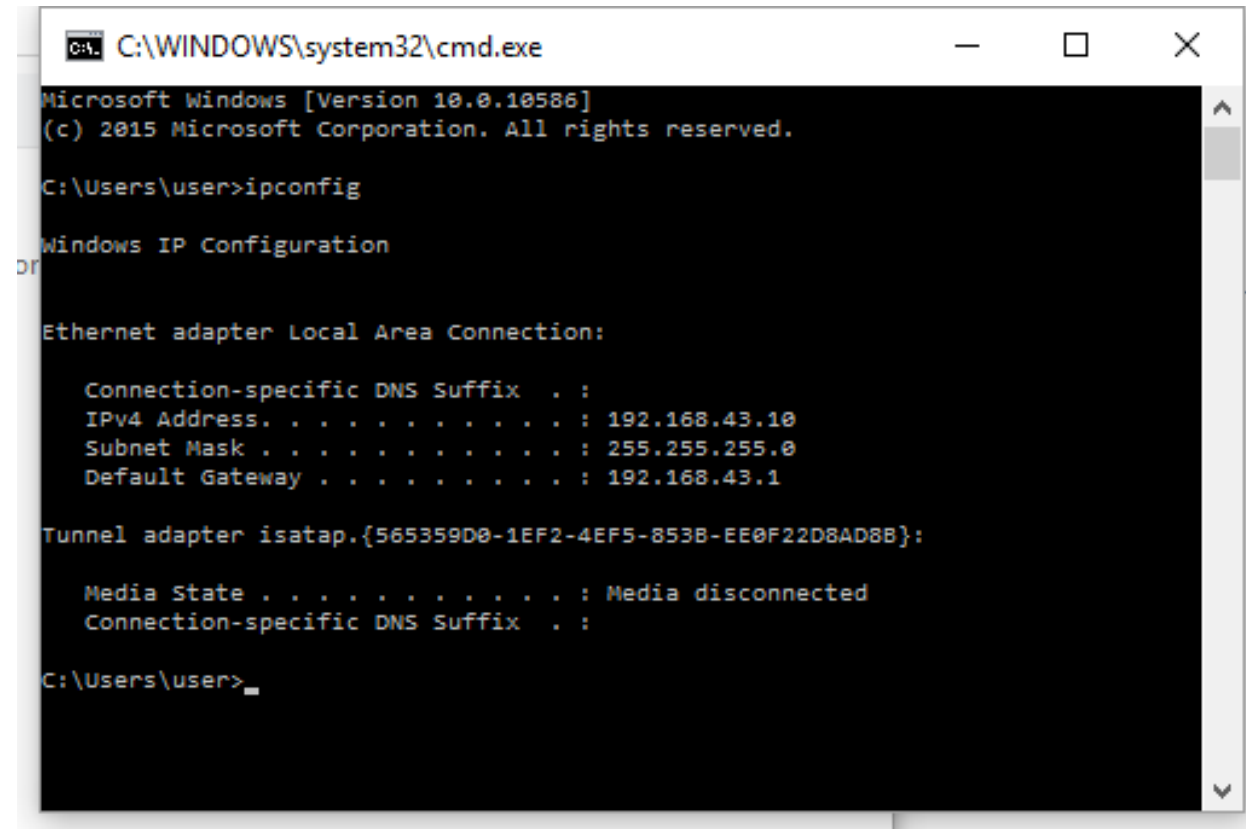
- Now Connect your PC and Arduino to CISCO Switch
- Right click on Local Area Network and choose Properties
- Choose Internet Protocol Version 4 (TCP/IPv4)
- Configure the IP as shown in next slide





Verification

- Press Windows button + R to get Run Command
- Type “cmd” and press enter
- Type ipconfig and press enter
- You should see your configured IP



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.10586]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\user>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : 
    IPv4 Address. . . . . : 192.168.43.10
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.43.1

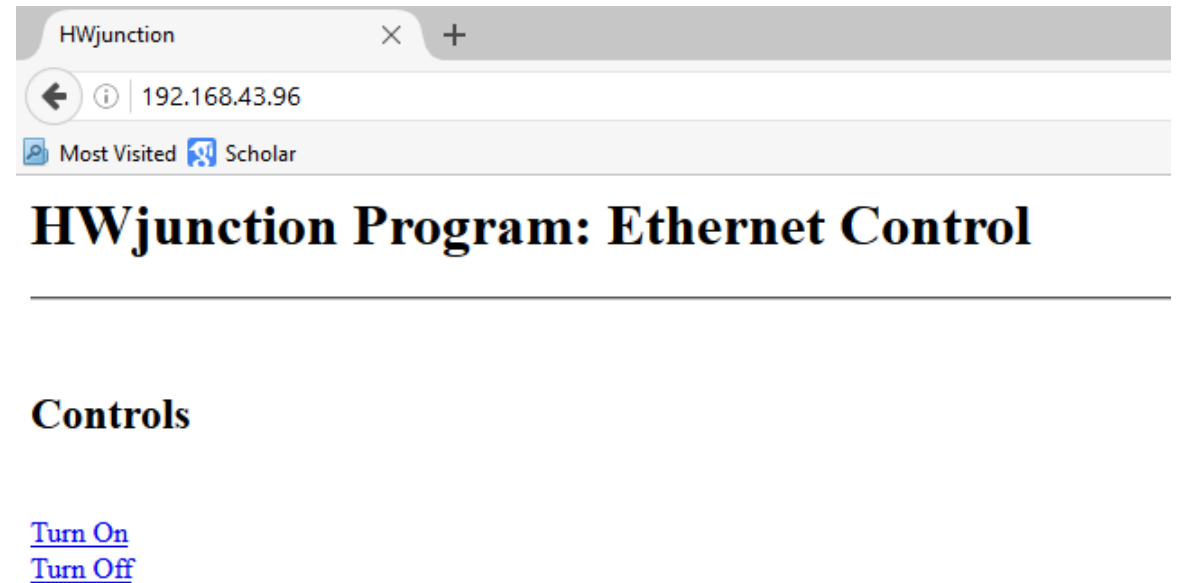
Tunnel adapter isatap.{565359D0-1EF2-4EF5-853B-EE0F22D8AD8B}:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

C:\Users\user>
```

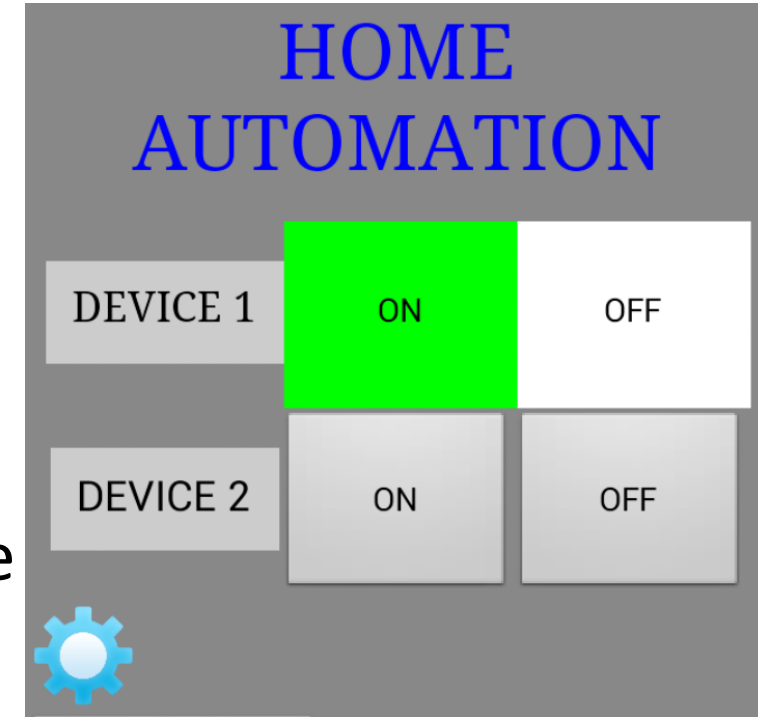
Web App

- Type the IP of your Arduino Web server
- Now you can control the Arduino I/Os through Web app



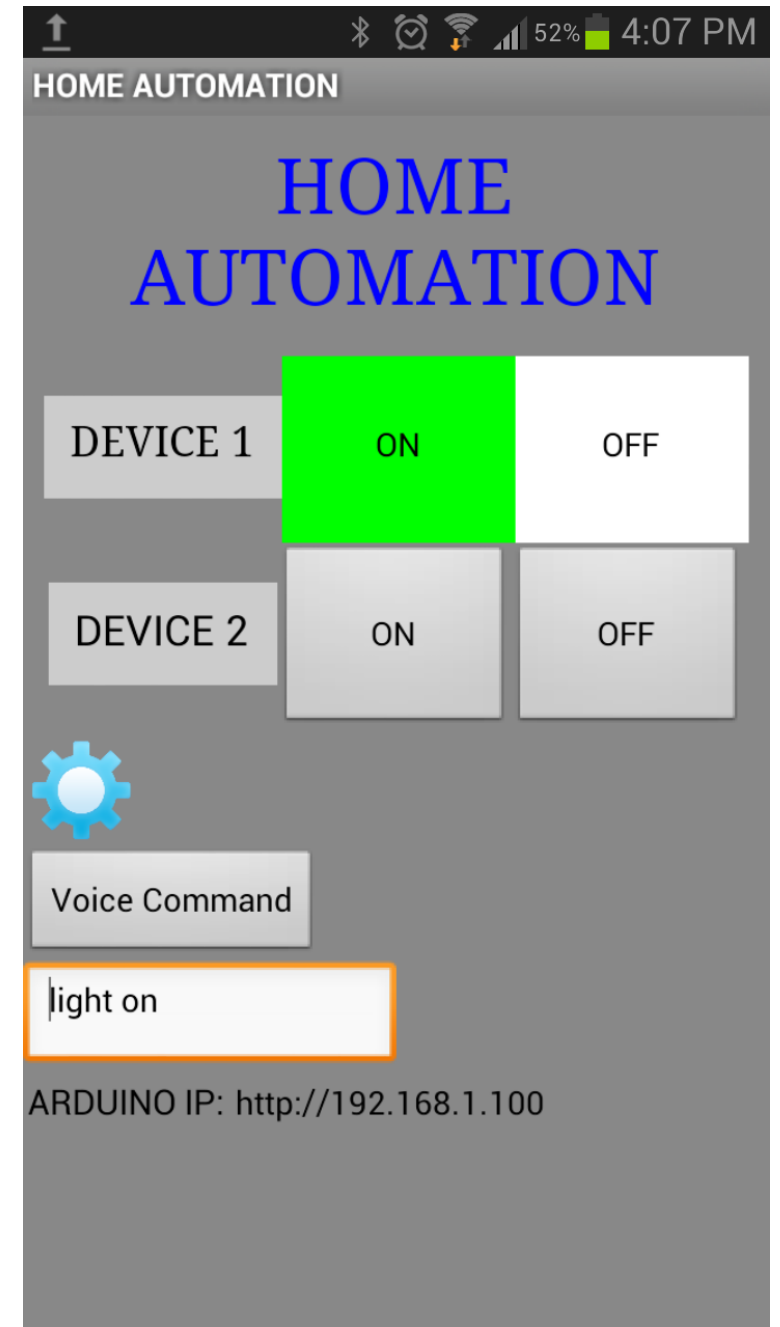
Advanced Home Automation (Mobile App)

- We can also control the switching through a smart phone app.
- Using MIT app inventor 2 , one can easily build an android app without any prior knowledge in coding.
- Here is one ready made app : (*put link*)
- Install it and you can control the loads through smart app !



Voice Controlled Home Automation

- We can give voice commands to control the circuit
- The code can be easily built using MIT app inventor 2 software



Thank You