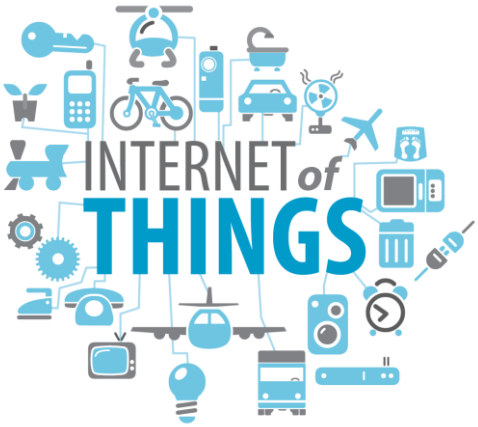
Innovians Technologies

Implementing New Ideas & Technology



IoT Workshop Manual

Organized By
Innovians Technologies
www.innovianstechnologies.com

Project 1: Simple LED Project

Exercise 1: LED On Project

Components Required:

1. Arduino UNO Board
2. One Red LED
3. Arduino USB Cable

Steps to Follow:

1. Connect +ve of LED on 13 Pin on Arduino & -ve of LED on GND.
2. Run Arduino Software.
3. Create Sketch for LED Project.
4. Connect the USB cable with Arduino & Computer.
5. Click on Upload Option to download the program in Arduino.

Program

```
 void setup ()
{
  pinMode (13, OUTPUT);
 }
void loop ()
{
  digitalWrite(13, HIGH);
}
```

Exercise 2: LED Blink Project

Components Required:

1. Arduino UNO Board
2. One Red LED
3. Arduino USB Cable

Steps to Follow:

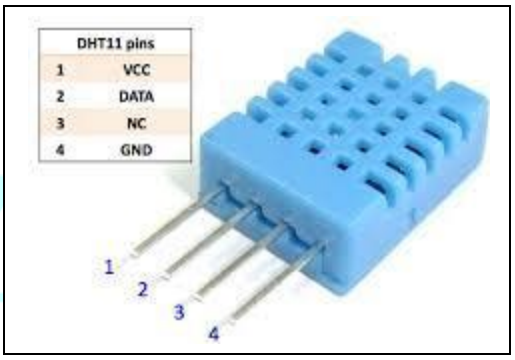
1. Connect +ve of LED on 13 Pin on Arduino & -ve of LED on GND.
2. Run Arduino Software.
3. Create Sketch for LED Blink Project.
4. Connect the USB cable with Arduino & Computer.
5. Click on Upload Option to download the program in Arduino.

Program

```
 void setup ()
{
  pinMode (13, OUTPUT);
}
void loop ()
{
  digitalWrite(13, HIGH);
```

```
delay(2000);
digitalWrite(13, LOW);
delay(2000);
}
```

Project 2: Integrating Temp & Humidity Sensor and Reading Enviormental Values



Components Required:

1. Arduino UNO Board
2. DHT11 (Temp. & Humidity Sensor)
3. Arduino USB Cable
4. 4.7K Ohm Resistor
5. Breadboard
6. Jumpers Wire M-M

Steps to Follow:

1. Connect DHT11 on **E10** to **E13** wherein **Pin 1** of DHT11 **on E10** and **Pin 4** of DHT11 on **E13**.
2. Connect a 4.7K Ohm resistor between **B10 & B11** of breadboard (Between VCC & Data Pin of DHT11).
3. Connect a jumper wire between **A13** of breadboard & **GND** of Arduino.
4. Connect a jumper wire between **A11** of breadboard to **Pin 5** on **Arduino**.
5. Connect a jumper wire between **A10** of breadboard to **+5V** on **Arduino**.
6. Import Library for DHTLib in Arduino IDE software.
7. Open Sketch for DHT11 Test in DHTLib Examples in Arduino IDE.
8. Connect the USB cable with Arduino & Computer and then upload the program.
9. Open the Serial Communication Window and check the values.

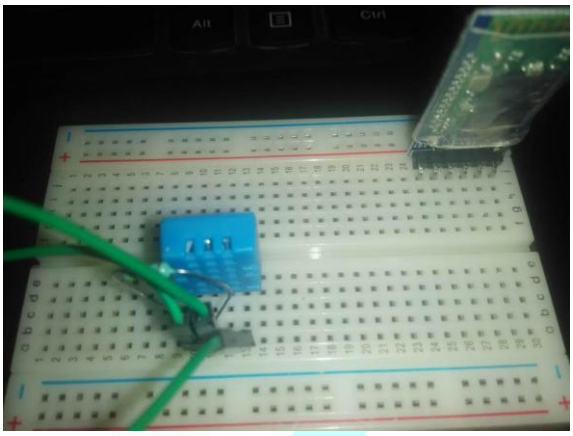
Project 3: Reading Enviornmental Values on Android Smartphone.

Components Required:

1. Arduino UNO Board
2. DHT11 (Temp. & Humidity Sensor)
3. Arduino USB Cable
4. HC-05 (Bluetooth Module)
5. 4.7K Ohm Resistor
6. 2.2K Ohm Resistor
7. 1K Ohm Resitor
8. Breadboard
9. Jumpers Wire M-M

Steps to Follow:

1. Please follow the same Steps from Step 1 to Step 4 of Project 2- Reading Environmental Values.
2. Connect a Jumper between A10 of Breadboard to +ve terminal of breadboard.



3. Mount the HC-05 Bluetooth Module between J25 to J30 wherein STATE Pin on J25 & EN Pin on J30.
4. Connect a 2K Ohm resistor between I26 & I28.
5. Connect a 1K Ohm resistor between H26 & D 26.
6. Connect a Jumper Wire between (GND) of Arduino to H28 of Breadboard.
7. Connect a Jumper between G27 to Rx (Pin 0) on Arduino.
8. Connect a Jumper between C26 to Tx (Pin 1) on Arduino.
9. Connect a Jumper Wire between G29 to +ve terminal of Breadboard.
10. Connect a jumper between +ve terminal of breadboard to 5v of Arduino.
11. Open Sketch for Ardudroid-DHT11 in Arduino IDE.
12. Connect the USB cable with Arduino & Computer.
13. Click on Upload Option to download the program in Arduino. **Note:** While downloading the program please disconnect the Rx & Tx Jumper wire from Arduino Board. Once you finish with the download then re connect the Rx & Tx Jumper Wire.
14. Download the ArduDroid App from Google Playstore in your Android Smartphone.
15. Run the ArduDroid App in your Android Smartphone.
16. App will ask you to enable the Bluetooth. Allow It.
17. Search for your Bluetooth Device HC-05-(Group No). Once Connected Red Led on Bluetooth module will blink once per second instead of fast blinking.

Project 4: Voice Controlled Home Automation

Components Required:

1. Arduino UNO Board
2. HC-05 Bluetooth Module
3. Three LEDs (Red, Yellow & Green)

4. One 1K Ohm Resistors
5. One 2K Ohm Resistor.
6. Arduino USB Cable
7. Breadboard
8. Jumper Wires M-M.

Steps to Follow:

1. Connect -ve of Red LED on C9 & +ve on C10.
2. Connect -ve of Yellow LED on C14 & +ve on C15.
3. Connect -ve of Green LED on C19 & +ve on C20.
4. Connect a jumper wire between **–ve** Terminal of Bread Board (GND) & A9.
5. Connect a jumper wire between **–ve** Terminal of Bread Board (GND) & A14.
6. Connect a jumper wire between **–ve** Terminal of Bread Board (GND) & A19.
7. Connect a Jumper Wire from Arduino GND to Bread Board **–ve** (GND) Terminal Strip.
8. Connect a jumper wire between Arduino PIN 13 & D10.
9. Connect a jumper wire between Arduino PIN 12 & D15.
10. Connect a jumper wire between Arduino PIN 11 & D20.
11. Please follow the same Steps from **Step 3 to Step 10** of **Project 3**- Reading Enviornmental Values on Smarphone.
12. Open the Sketch for **Voice-Activation-Arduino** Program.
13. Connect the USB cable with Arduino & Computer.
14. Click on Upload Option to download the program in Arduino. **Note:** While downloading the program please disconnect the Rx & Tx Jumper wire from Arduino Board. Once you finish with the download then re connect the Rx & Tx Jumper Wire.
15. Download the AMR_Voice App from Google Playstore in your Android Smartphone.
16. Run the AMR_Voice App in your Android Smartphone.
17. App will ask you to enable the Bluetooth. Allow It.
18. Search for your Bluetooth Device HC-05-(Group No). Once Connected Red Led on Bluetooth module will blink once per second instead of fast blinking.
19. Then control the devices from your Voice Commands on AMR_Voice App.
20. Voice Commands to be used: **light on, light off, fan on, fan off, ac on, ac of, everything on, everything of.**

Project 6: Control Devices using Localhost Web Server for Home Automation

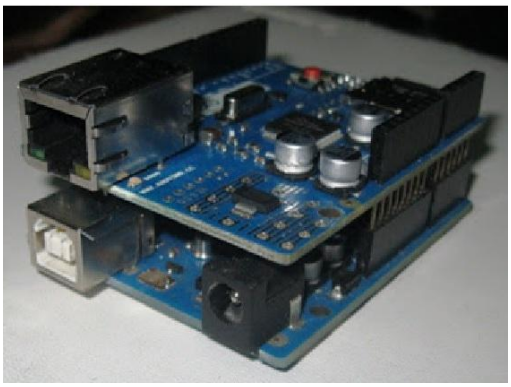
Components Required:

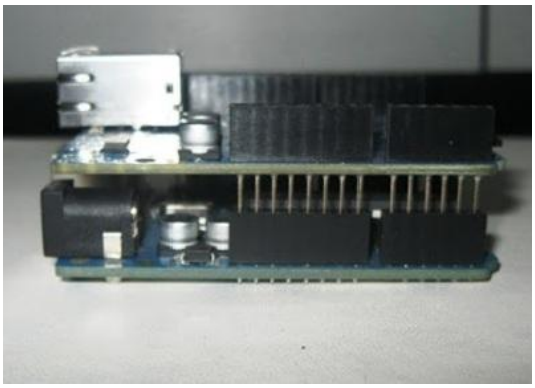
1. Arduino UNO Board
2. Ethernet Shield
3. Three LEDs
4. 5V Relay Module

5. USB Cable
6. Breadboard
7. Ethernet Cable
8. Jumper Wires M-M & M-F.

Steps to Follow:

1. Mount Ethernet Shield on Arduino UNO Properly.
2. Connect LAN Cable with Ethernet Shield & Laptop/Router.
3. Connect -ve of Red LED on C9 & +ve on C10.
4. Connect -ve of Yellow LED on C14 & +ve on C15.
5. Connect -ve of Green LED on C19 & +ve on C20.
6. Connect a jumper wire between **–ve** Terminal of Bread Board (GND) & A9.
7. Connect a jumper wire between **–ve** Terminal of Bread Board (GND) & A14.
8. Connect a jumper wire between **–ve** Terminal of Bread Board (GND) & A19.
9. Connect a Jumper Wire from Arduino GND (via Ethernet shield) to Bread Board **–ve** (GND) Terminal Strip.
10. Connect a jumper wire between Arduino PIN 6 & D10.
11. Connect a jumper wire between Arduino PIN 7 & D15.
12. Connect a jumper wire between Arduino PIN 8 & D20.
13. Connect GND of Relay to GND (-ve) Terminal Strip of Breadboard.
14. Connect I/P of Relay to PIN 9 on Arduino.
15. Connect+5V of Relay to +5V of Arduino.
16. Connect GND of Arduino to GND (-ve) Common Terminal Strip of Breadboard.
17. Connect Arduino to Laptop via USB Cable.
18. Open the Sketch of Home Server in Arduino.
19. Find Out the IP of Ethernet Module, MAC Address, Gateway IP, Subnet Value and then enter in the program accordingly.
20. Upload the Program into Arduino.
21. To Check your home server, simply enter the Ethernet Module IP in web browser.





Project 7: Being Social on Twitter & Update Status on Twitter through Arduino

Components Required:

1. Arduino UNO Board
2. Ethernet Shield
3. USB Cable
4. Ethernet Cable

Steps to Follow:

1. Sign Up for a New User Account for ThingSpeak - https://www.thingspeak.com/users/new
2. Link your Twitter account to the ThingTweet App – Click On Apps & then Select ThingTweet. Click on Link Twitter Account.
3. Copy the API Key generated after linking Twitter Account.
4. Mount Ethernet Shield on Arduino UNO Properly.
5. Connect LAN Cable with Ethernet Shield & Laptop/Router.
6. Connect USB Cable with Arduino & Laptop.
7. Open the Sketch of of Things-Tweet.
8. Enter the MAC address, Ethernet Shield IP Address, Default Gateway IP etc. in program.
9. Enter the thingstweet Api Key in the program under:
   String thingtweetAPIKey = "O2JS40WLY27Q5VSS"; ←---- Enter API here
10. Upload the program in Arduino.
11. Check your Twitter Account.

Project 8: Send Voltage or Analog Data on Cloud Server.

Components Required:

1. Arduino UNO Board
2. Ethernet Shield
3. 10K Ohm Preset
4. USB Cable
5. Ethernet Cable
6. Jumper Wire M-M

Steps to Follow:

1. Mount Ethernet Shield on Arduino UNO Properly.
2. Connect LAN Cable with Ethernet Shield & Laptop/Router.
3. Connect bottom two Pins of 10K Preset on I10 & I12 on breadboard & Center Top Pin on G11.
4. Connect a Jumper Wire from 5V of Arduino Ethernet Shield to J10 of breadboard.
5. Connect a Jumper Wire from GND of Arduino Ethernet Shield to J12 of breadboard.
6. Connect a Jumper Wire from F11 of Breadboard to A0 on Arduino Ethernet Shield.
7. Login to your ThingSpeak Account & Click on Channel. Then Click on Create New Channel.
8. Give a Channel Name, Select Field1 and write Voltage in Field1 Text Field then Save.

9. Note the Write API from API tab.
10. Connect USB Cable from Arduino to Laptop.
11. Open the Sketch for Voltage Upload & enter the API Key & MAC Address in program.
12. Upload the program to Arduino & then check your Things Speak Channel.

Project 9: Use Arduino to Upload free data from Environmental Sensors to Cloud Server.

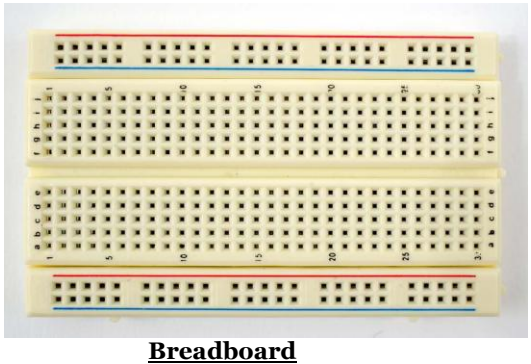
Components Required:

1. Arduino UNO Board
2. Ethernet Shield
3. DHT11
4. 4.7K Resistor
5. USB Cable
6. Ethernet Cable
7. Jumper Wire M-M

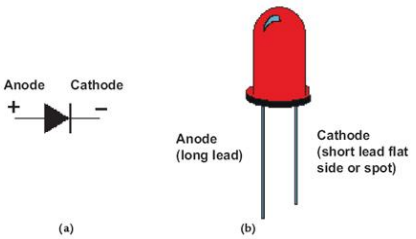
Steps to Follow:

1. Mount Ethernet Shield on Arduino UNO Properly.
2. Connect LAN Cable with Ethernet Shield & Laptop/Router.
3. Repeat Steps 1 to 3 & Step 5 of Project 2 – Reading Environmental Values.
4. Connect a jumper wire between A11 of breadboard to Pin 5 on Arduino Ethernet Shield.
5. Import DHT11 Lib in Arduino IDE software.
6. Login to your ThingSpeak Account & Click on Channel. Then Click on Create New Channel.
7. Give a Channel Name Weather Station, Select Field1 and write Temperature in Field1 Text Field. Select Field 2 & write Humidity in Field2 Text Field. Save.
8. Note the Write API from API tab.
9. Connect USB Cable from Arduino to Laptop.
10. Open the Sketch for Upload Sensor Data & enter the API Key & MAC Address in program.
11. Upload the program to Arduino & then check your Things Speak Channel.

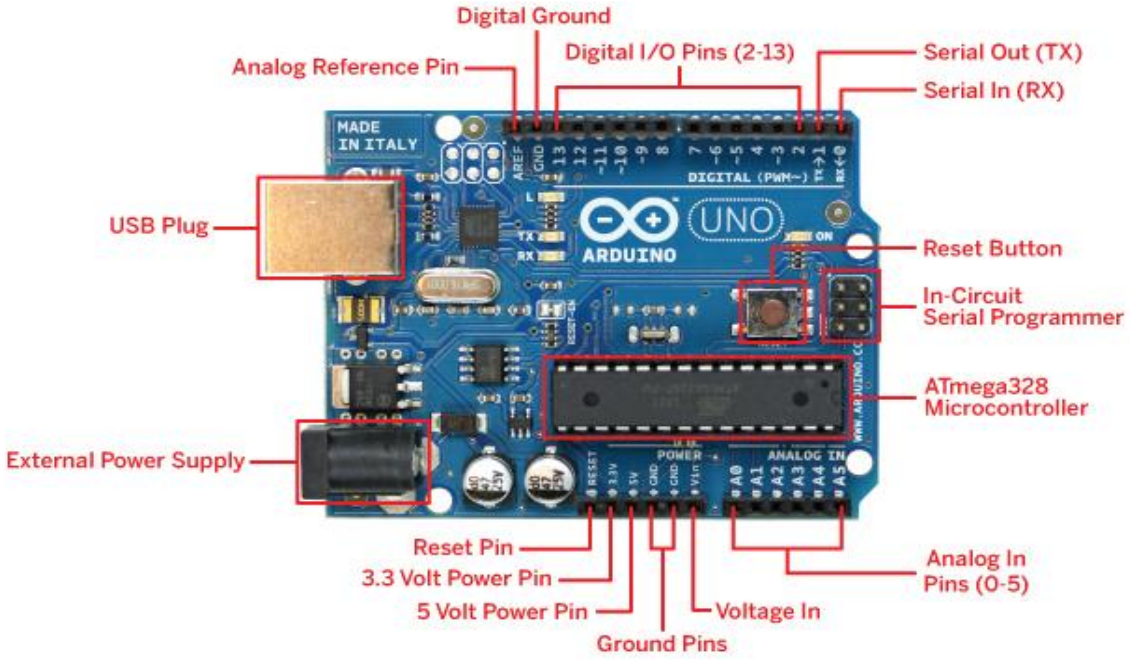
Major Electronics Components Images



Breadboard



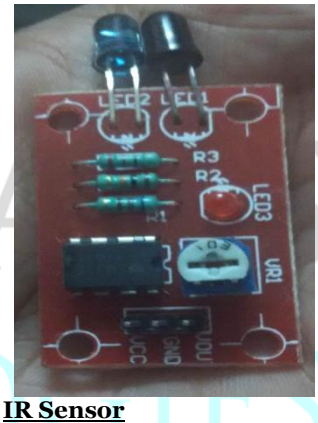
LED



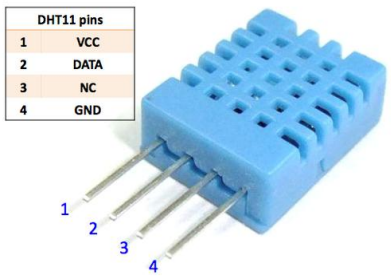
Arduino Uno

HC-05 Bluetooth Module

Ethernet Shield W5100



IR Sensor



DHT11 Temp & Humidity Sensor

MIT APP Inventor