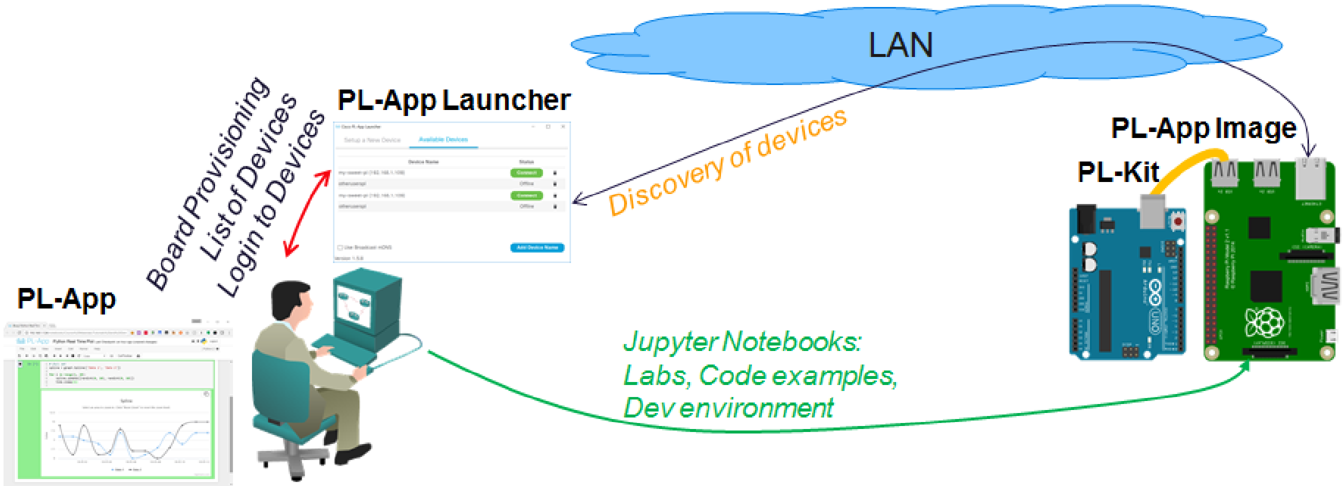
Lab no 02 part 2 – LM35 analog temperature sensor with Raspberry Pi

The purpose of This lab to connect LM35 analog temperature sensor with Arduino and read the temperature degrees in Raspberry Pi.

Parts: -

1. Connect LM35 sensor with Arduino.
2. Connect Arduino with Raspberry Pi.
3. Read Temperature Degrees in Raspberry Pi.



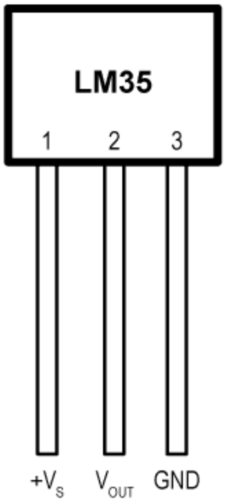
Required Resources

- LM35 Sensor.
- Arduino Uno.
- Breadboard.
- Jumper wires.
- USB cable type A/B.
- Wired Ethernet or Wi-Fi connection to the local-area network with DHCP.
- Raspberry Pi with a power adapter.
- Google Chrome.

Part 1: Connect LM35 sensor with Arduino:

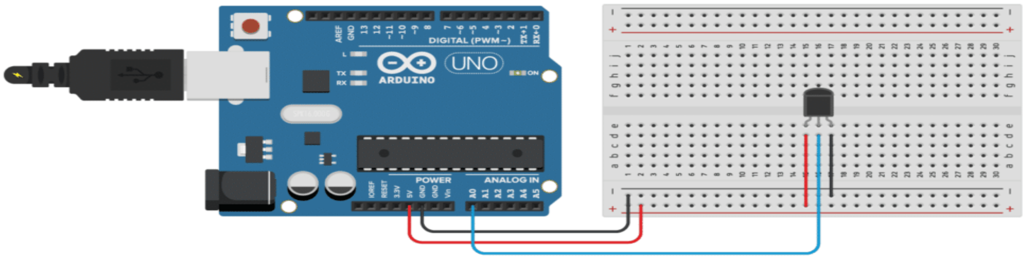
a) About the LM35

The LM35 is part of a series of analog temperature sensors. The pinout of the sensor is as follows:



Name	Pin	Description
$+V_S$	1	Positive power supply pin (4 – 30 V)
V_{OUT}	2	Temperature sensor analog output
GND	3	Device ground pin, connect to power supply negative terminal

b) Connecting LM35 analog temperature sensor to Arduino.

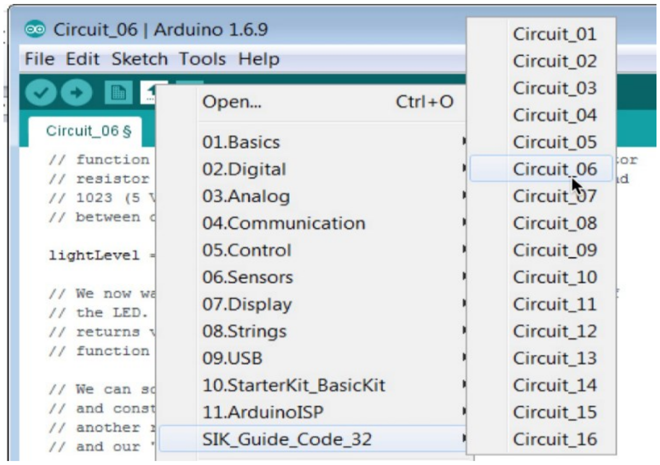


The connections are also given in the table below:

LM35	Arduino
Pin 1 (+V_S)	5 V
Pin 2 (V_{OUT})	Pin A0
PIN 3 (GND)	GND

With the following example code, you can read the temperature from an LM35 sensor and display it in the Serial Monitor. You can upload the example code to your Arduino using the Arduino IDE.

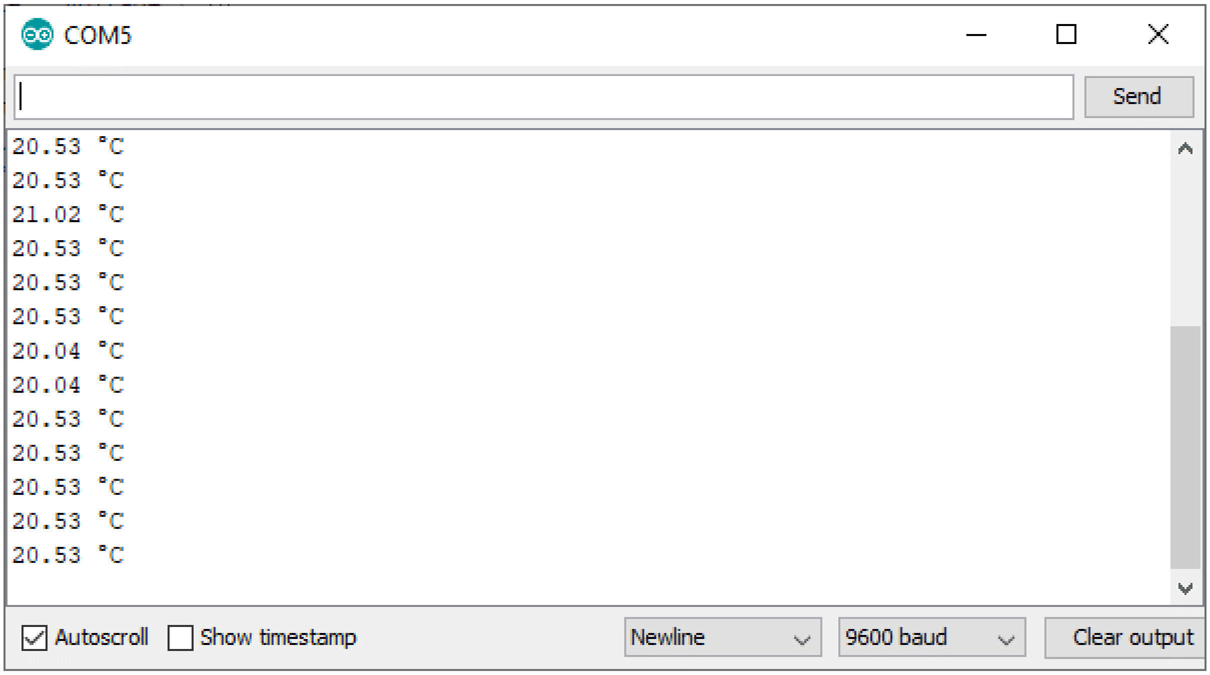
Note: The **SIK_Guide_Code_32** folder will only exist if the code has been downloaded from http://sparkfun.com/sikcode and copied to the examples folder located under the Arduino program files, typically **C:\Program Files\Arduino\examples.**



```
  // function
  // resistor
  // 1023 (5 V
  // between c

  lightLevel =

  // We now wa
  // the LED.
  // returns v
  // function

  // We can sc
  // and const
  // another r
  // and our '
```

```
    /*
    SparkFun Inventor’s Kit
    Circuit 1C-Photoresistor
    Use a photoresistor to monitor how bright a room is, and turn an LED on when it gets dark.
    This sketch was written by SparkFun Electronics, with lots of help from the Arduino community.
    This code is completely free for any use.
    View circuit diagram and instructions at: https://learn.sparkfun.com/tutorials/sparkfun-inventors-kit-experiment-guide---v40
    Download drawings and code at: https://github.com/sparkfun/SIK-Guide-Code
    */*Code designed by Sujay Alaspure in SA Lab */

const int sensor=A0; // Assigning analog pin A5 to variable 'sensor'

float tempc; //variable to store temperature in degree Celsius

float tempf; //variable to store temperature in Fahreinheit

float vout; //temporary variable to hold sensor reading

void setup() {

    pinMode(sensor,INPUT); // Configuring sensor pin as input

    Serial.begin(9600);

    }

void loop() {

    vout=analogRead(sensor); //Reading the value from sensor

    vout=(vout*500)/1023;

    tempc=vout; // Storing value in Degree Celsius

    tempf=(vout*1.8)+32; // Converting to Fahrenheit
Serial.print("in DegreeC=");

Serial.print("\t");

Serial.print(tempc);

Serial.print(" ");

Serial.print("in Fahrenheit=");

Serial.print("\t");

Serial.print(tempf);

Serial.println();

delay(500); //Delay of 1 second for ease of viewing
}
```

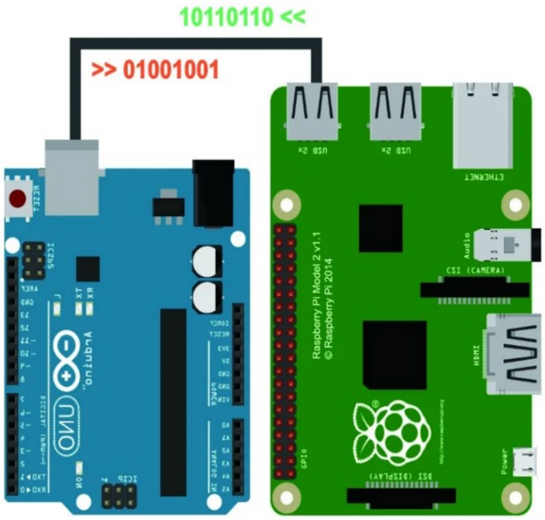
You should see the following output in the Serial Monitor:

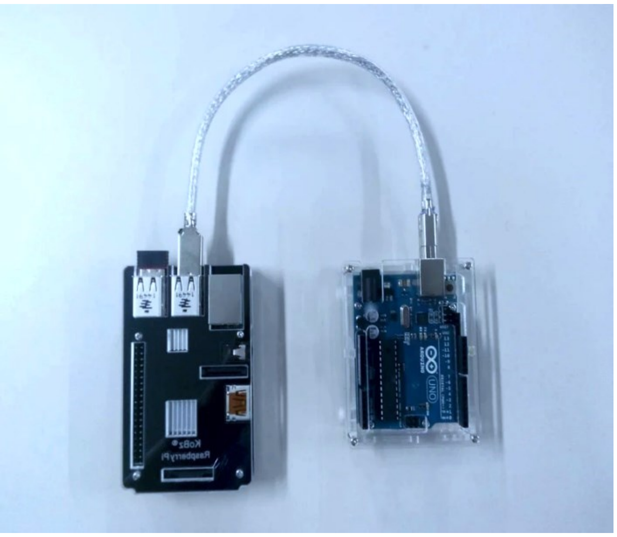


```
20.53 °C
20.53 °C
21.02 °C
20.53 °C
20.53 °C
20.53 °C
20.04 °C
20.04 °C
20.53 °C
20.53 °C
20.53 °C
20.53 °C
20.53 °C
```

Part 2: Connect Arduino with Raspberry Pi.

In common, the connections are easy. Just connect Arduino USB Plug to Raspberry PI with USB cable .



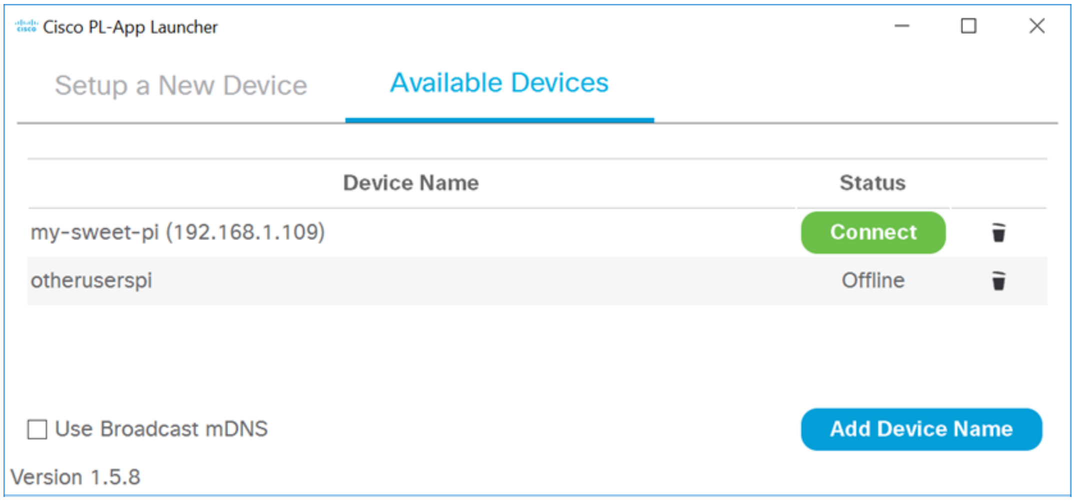


Part 3: Read Temperature Degrees in Raspberry Pi.

a) Connect the Raspberry Pi to the LAN. If you are using an Ethernet cable, connect the cable to the Raspberry Pi. If you are using Wi-Fi, make sure the signal from the access point is strong enough. Your computer and the Raspberry Pi must be in the same subnetwork for the PL-App Launcher discovery to work.

b) Power on your Raspberry Pi by connecting the µUSB cable with a proper power supply that provides enough current to the Raspberry Pi board. The recommended PSU provides 2.5A to power the Raspberry Pi 3 Model B.

c) Start the PL-App Launcher application. You should see the following screen with the Available Devices tab.



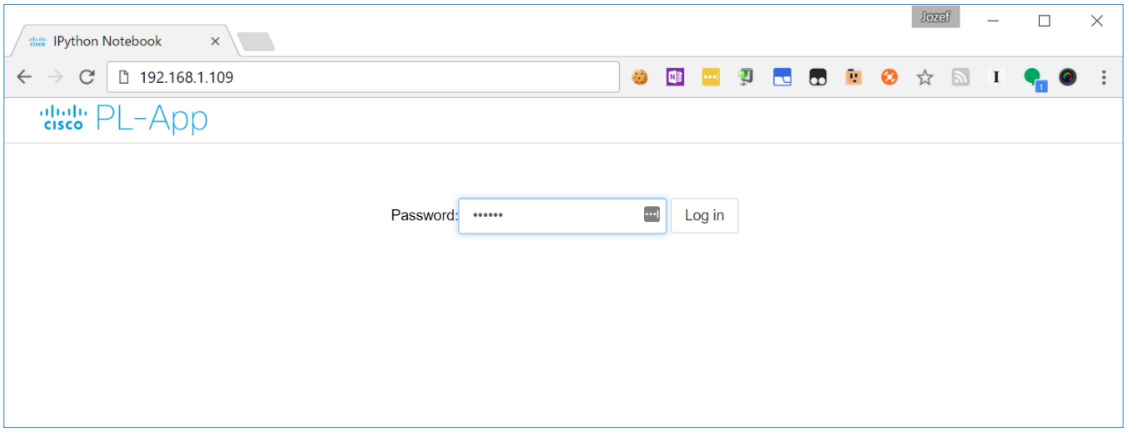
Device Name	Status
my-sweet-pi (192.168.1.109)	Connect
otheruserspi	Offline

Version 1.5.8

d) Click the green Connect button of your device in PL-App Launcher to directly connect to the local PL-App web interface running on your Raspberry Pi device. You can use the PL-App based web interface to access existing labs and to write and install new applications, access the Linux shell interface, etc**.**

e) First. log in to the web interface of PL-App. Use the password you specified in PL-App Launcher in the setup process of the µSD card.

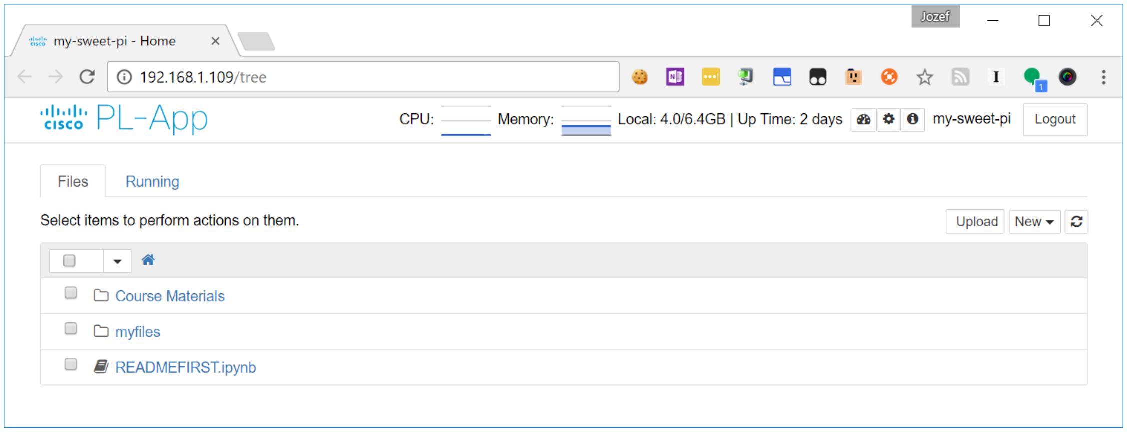
f) After a successful login, the PL-App directory browser opens the root directory of the notebooks:



192.168.1.109

Password: ••••••

This is the PL-App's representation of the notebooks folder that was created on the µSD card:



192.168.1.109/tree

Local: 4.0/6.4GB | Up Time: 2 days

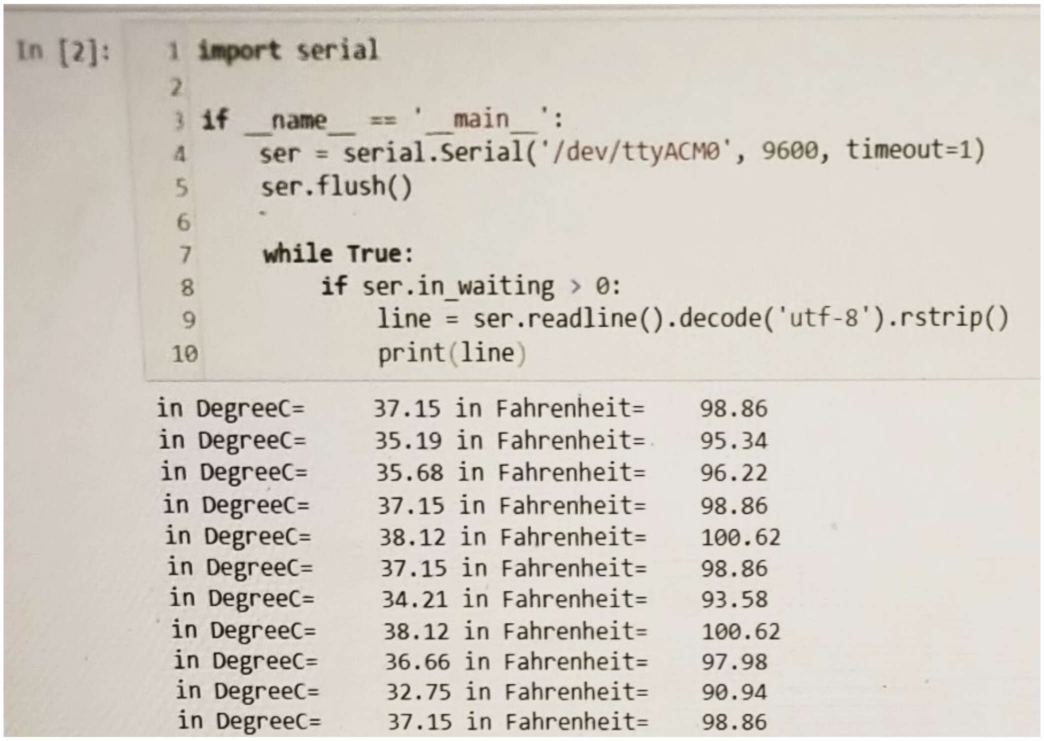
Select items to perform actions on them.

- Course Materials
- myfiles
- READMEFIRST.ipynb

g) Enter to **my files - new python code** and upload the python code as follow:

```
import serial

  if __name__ == '__main__':  // used to execute some code only if the file was run
  directly, and not imported
     ser = serial.Serial('/dev/ttyACM0', 9600, timeout=1)
     ser.flush()

     while True:
        if ser.in_waiting > 0:
           line = ser.readline().decode('utf-8') // read from serial and decode it
  print(line)
```

You should see the following output :



```
import serial

if __name__ == '__main__':
    ser = serial.Serial('/dev/ttyACM0', 9600, timeout=1)
    ser.flush()

    while True:
        if ser.in_waiting > 0:
            line = ser.readline().decode('utf-8').rstrip()
            print(line)
```

```
in DegreeC=     37.15 in Fahrenheit=    98.86
in DegreeC=     35.19 in Fahrenheit=    95.34
in DegreeC=     35.68 in Fahrenheit=    96.22
in DegreeC=     37.15 in Fahrenheit=    98.86
in DegreeC=     38.12 in Fahrenheit=    100.62
in DegreeC=     37.15 in Fahrenheit=    98.86
in DegreeC=     34.21 in Fahrenheit=    93.58
in DegreeC=     38.12 in Fahrenheit=    100.62
in DegreeC=     36.66 in Fahrenheit=    97.98
in DegreeC=     32.75 in Fahrenheit=    90.94
in DegreeC=     37.15 in Fahrenheit=    98.86
```