Plan for the Session

- We will learn a bit about IoT first
- Then we will proceed to finding temperature using LM35/LM335 sensors and display the values on a serial monitor.
- We will also access the temperature sensor inside IMU of our board and display its values on the serial monitor
- We will then proceed to build a web server and display the output values of these sensors on a webpage over the internet using HTTP (Hypertext transfer Protocol - it's for transmitting hypermedia documents such as HTML)

What is Internet of Things?

- ❏ A network of devices such as vehicles, and home appliances that contain electronics, software, sensors, actuators, and connectivity which allows these things to connect, interact and exchange data.

- ❏ IoT transforms everyday physical objects that surround us into an ecosystem of information.

- ❏ We aim at automating everything that can be automated.

How does IoT work?

Sensors ---> Connectivity ---> Data Processing ---> User Interface

➔ An IoT system consists of sensors/devices which "talk" to the cloud through some kind of connectivity. Once the data gets to the cloud, software processes it and then might decide to perform an action, such as sending an alert or automatically adjusting the sensors/devices without the need for the user.

➔ But if the user input *is* needed or if the user simply wants to check in on the system, a user interface allows them to do so. Any adjustments or actions that the user makes are then sent in the opposite direction through the system: from the user interface, to the cloud, and back to the sensors/devices to make some kind of change.

Where do we apply IoT?

➜ **Consumer needs :**

        Smart home, Elder care

➜ **Commercial applications** :

        Medical and healthcare, Transportation, Office automation

➜ **Industrial requirements :**

        Manufacturing, Agriculture

➜ **Infrastructure spaces :**

        Energy management, Environmental monitoring, Living Labs

LM35 & LM335 Temperature Sensors

- These are linear temperature sensors that output a voltage value proportional to the temperature value

| Temperature Sensor	Output Voltage	Linearity
LM35 (LM35DZ)	proportional to temperature in **Celsius** (°C)	10mV/°C
LM335	proportional to temperature in **Kelvin** (°K)	10mV/°K

- LM35 outputs 10 mV per degrees **Celsius** rise in temperature.
- LM335 outputs 10 mV per degrees **Kelvin** rise in temperature.
- Say, if the LM335 outputs a voltage of 2980 mV = 2.98V, then the temperature value is 298K

LM35 datasheet   LM335 datasheet

LM35 & LM335 Temperature Sensors

- Pinout for LM35 and LM335
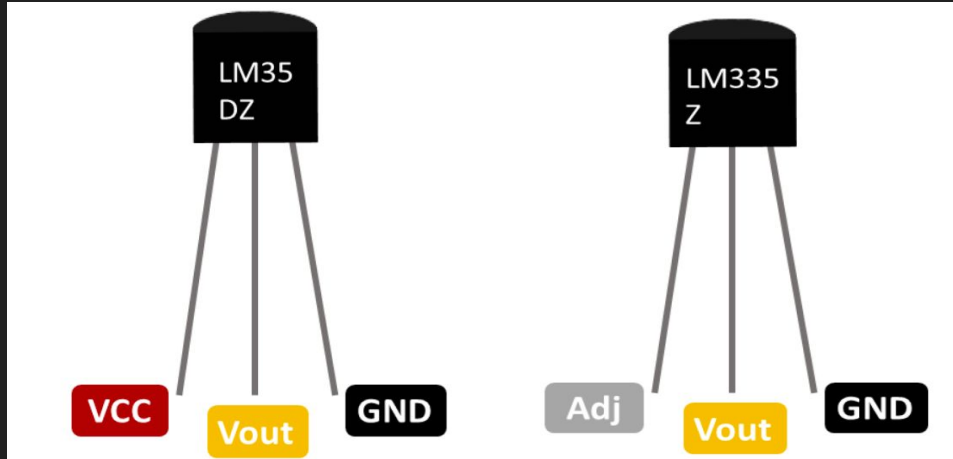
- For LM35, connect VCC to VCC of the board, Vout to any analogPin and GND to GND.
- For LM335, Leave the Adj unconnected. Connect GND to GND and Vout to any analogPin with a pull up resistor (330 Ohm)

Temp Sensor Inside MPU

- There is an internal temperature sensor inside MPU-6050, IMU sensor thats integrated in the board.
- To access this, you need to connect 21 to SDA and 22 to SCL using the jumper caps and refer to the code [here](#).
- However, the temperature sensor is now inside the board and is subjected to produce higher values as it will record the board's temperature and not of the surrounding.
- So, if you plan to use this, make sure you don't keep your board connected for long.

ELECTRONICS
CLUB

Task Time!

- Build a single LED web server that can let you control the LED through a webpage
- Build an LED web server - to control the internal RGB Led pins
- Try to design an alarm system by using the buzzer given to you in the kit

AMBITIOUS ENOUGH?

Try to design a web based music system, where you can produce notes of different frequencies using the buzzer.
You can also combine it with LEDs to make it visually lit!

Or how about using that RGB Led for the DJ effect?