



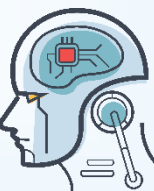
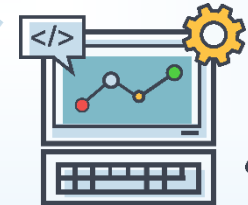
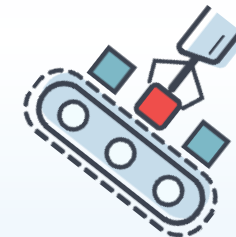
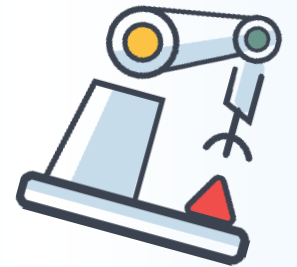
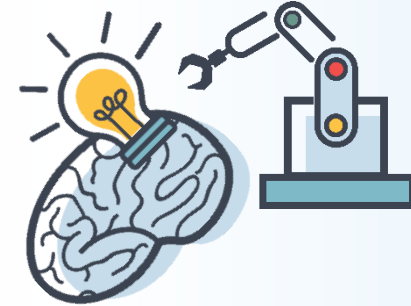
# Introduction to Sensors & Actuators





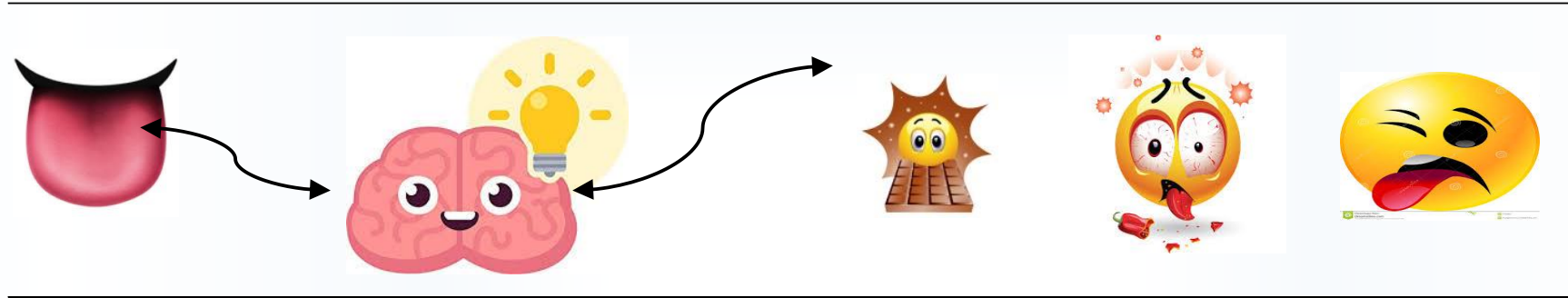
## Activity Time

Try eating the following and observe the facial reactions..!



# Analysis

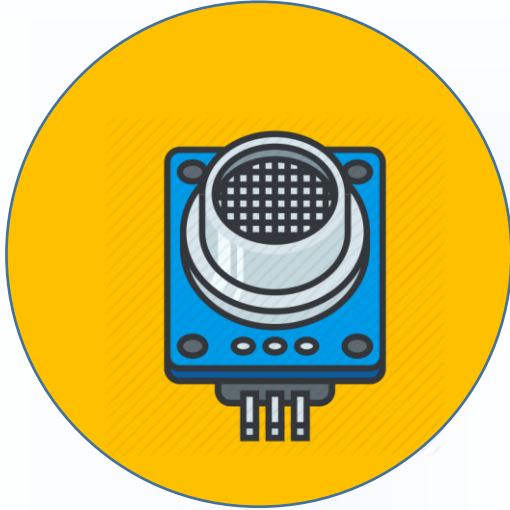
The tongue senses the taste and sends the message to the brain, and the brain sends the signal to the face.



By this activity we can understand what sensors and actuators are and how they work in signalling and transferring the message from sensors to the micro-controllers and from the micro-controllers to the actuators.

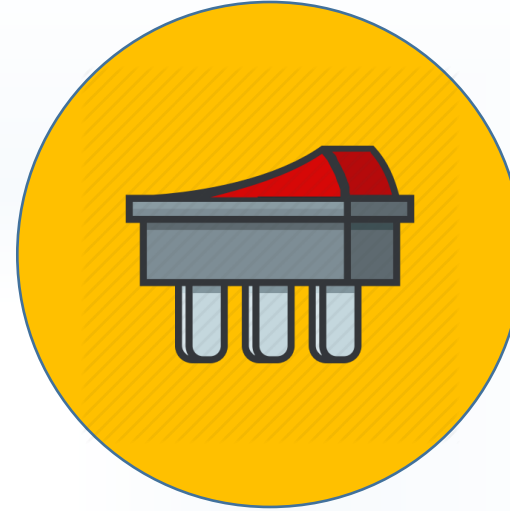


# Sensors and Actuators



## Sensor:


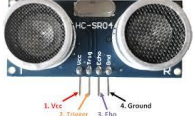




A sensor is a sophisticated device that responds to some type of input from the environment such as heat, light, motion, temperature, pressure, moisture etc and converts the physical parameters into signals, which can be measured electrically. In other words sensors are used to feel the surrounding.



## Actuator:








An actuator is a device that produces a motion by converting energy and signals going into the system. In other words, they are the parts which do the work. Example – wheels, pistons cylinders, motors etc.

# Types of Sensors




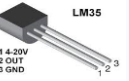



Sr. No.	Sensors	Description	Images
1	PIR Motion Sensor	PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range.	
2	Ultrasonic Sensor	An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal.	
3	Soil Moisture Sensor	The Soil Moisture Sensor is used to measure the volumetric water content of soil.	
4	DHT - 11	The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin	
5	GPS Module	The GPS module for Arduino is a small electronic circuit that allows to connect to your Arduino board to get position and altitude, as well as speed, date and time on UTC (Universal Time Coordinated). It uses the standard NMEA protocol to transmit the position data via serial port.	
6	Water Level Sensor	Water Level Sensors. Level sensors are used to detect the level of substances that can flow.	








# Types of Sensors

7	<b>Water Flow Sensor</b>	Water flow sensor consists of a plastic valve from which water can pass. A water rotor along with a hall effect sensor is present to sense and measure the water flow. When water flows through the valve it rotates the rotor.	
8	<b>IR Sensor</b>	An infrared sensor emits and/or detects infrared radiation to sense its surroundings.	
9	<b>LDR Sensor</b>	(Light Dependent Resistor) An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it.	
10	<b>Sound Sensor</b>	A sound sensor is defined as a module that detects sound waves through its intensity and converting it to electrical signals.	
11	<b>Force Pressure Sensor</b>	Force sensors are basically devices used to convert an applied force to a quantity that can be measured.	
12	<b>Flex Sensor</b>	A flex sensor or bend sensor is a sensor that measures the amount of deflection or bending.	
13	<b>Color Sensor</b>	The color sensor detects the color of the surface, usually in the RGB scale.	

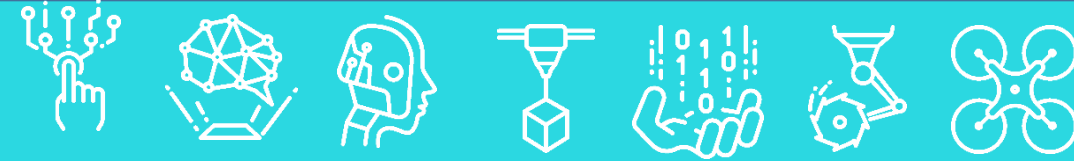
# Types of Sensors

14	<b>Raindrop Sensor</b>	The rain sensor module is an easy tool for rain detection. It can be used as a switch when raindrop falls through the raining board and also for measuring rainfall.	
15	<b>MQ</b>	The MQ series of gas sensors use a small heater inside with an electro-chemical sensor. They are sensitive for a range of gasses and are used indoors at room temperature.	
16	<b>Capacitive Touch Sensor</b>	In capacitive touch sensors, the electrode represents one of the plates of the capacitor. ... The sensor electrode is connected to a measurement circuit and the capacitance is measured periodically.	
17	<b>LM35</b>	LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in Centigrade (Celsius).	
18	<b>GSM Module</b>	A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system.	
19	<b>Pulse Rate Monitor</b>	that allows one to measure pulse rate	
20	<b>RFID</b>	Radio-frequency identification uses electromagnetic fields to automatically identify and track tags attached to objects.	

# List of Actuators

Sr. No.	Sensors	Description	Images
1	<b>Water pump module</b>	The water pump module is a portable device which can be used in several household applications. These are used to pump huge amount of water from one place to another.	
2	<b>DC BO Motor(plastic gear)</b>	The DC BO Motor converts DC current to mechanical energy which can be used to move objects by attaching wheels or any movable components and even varies with different rpm. It can come with a single as well as a dual shaft system. It come with "I" shaped as well as "L" shaped.	
3	<b>DC Motor(metal gear)</b>	The DC Motor converts DC current to mechanical energy which can used to move objects by attaching wheels.	
4	<b>Servo Motor</b>	The servo motor is commonly used for high technology devices in the industrial applications like automation technology. It is a self contained electrical device, that rotates parts of machine with high efficiency and great precision. Moreover the output shaft of this motor can be moved to a particular angle. Servo motors are mainly used in home electronics, toys, cars, airplanes and many more devices.	
5	<b>Stepper Motor</b>	A stepper motor is an electromechanical device it converts electrical power into mechanical power. Also, it is a brushless, synchronous electric motor that can divide a full rotation into an expansive number of steps. The motor's position can be controlled accurately without any feedback mechanism, as long as the motor is carefully sized to the application. Stepper motors are similar to switched reluctance motors.	



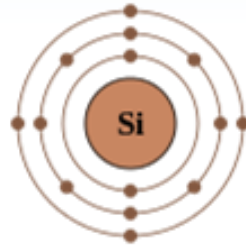


# Worksheet Time





**IoT is on track to connect 50 billion “smart” things by 2020 and 1 trillion sensors soon after, according to the National Science Foundation**



**Single crystal silicon is the most widely used semiconductor material as a substrate material due to its excellent machinability, mechanical stability, and the potential to combine sensing elements and electronics on the same substrate.**



**Mosquito Repellents don't repel. They hide you. The spray blocks the mosquito's sensors so they don't know you're there.**

