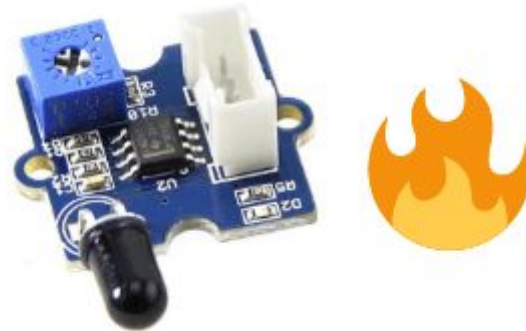


# Lesson 5 – Coding Sensors - 3



## **Sensor No 7 – Touch Sensors**

## Touch sensor

Touch Sensors are electronic sensors that can detect touch.

They operate as a switch when touched.

These sensors are used in lamps, touch screens of the mobile, etc...

Touch sensors offer an intuitive user interface.



Touch sensors are also known as **Tactile sensors**.

These are simple to design, low cost and are produced in large scale.

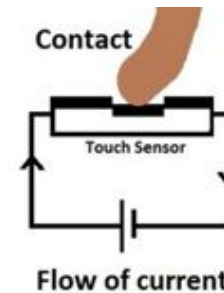
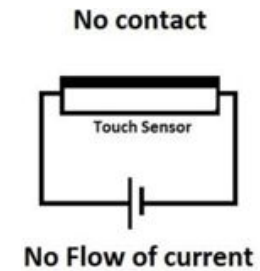
With advances in technology, these sensors are rapidly replacing the mechanical switches.

A touch sensor works like a switch

When there is no contact, no current flows through the circuit

.

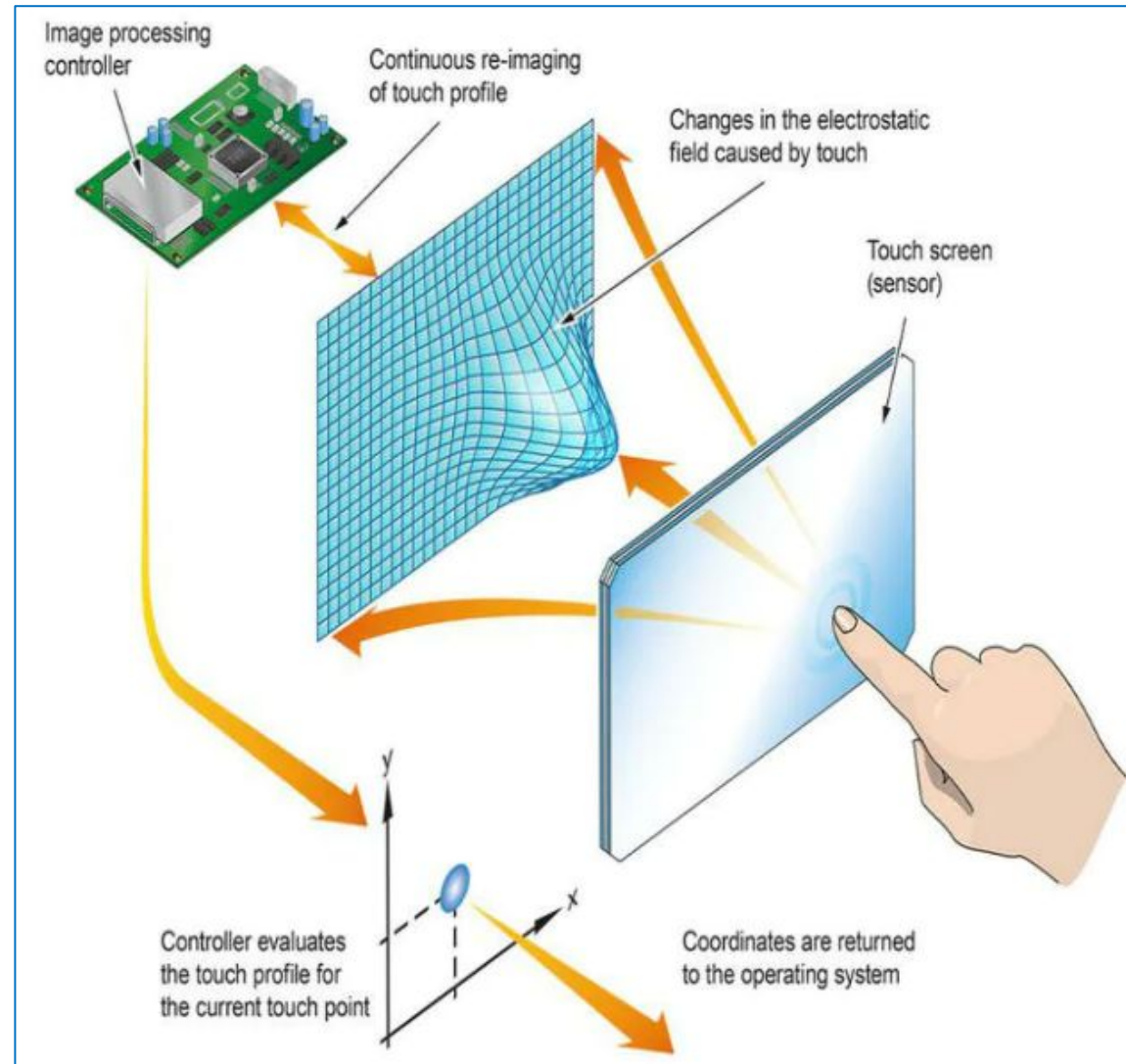
where when there's contact, touch, pressure or force on the surface of a touch sensor it opens up an electrical circuit and allows currents to flow through it.



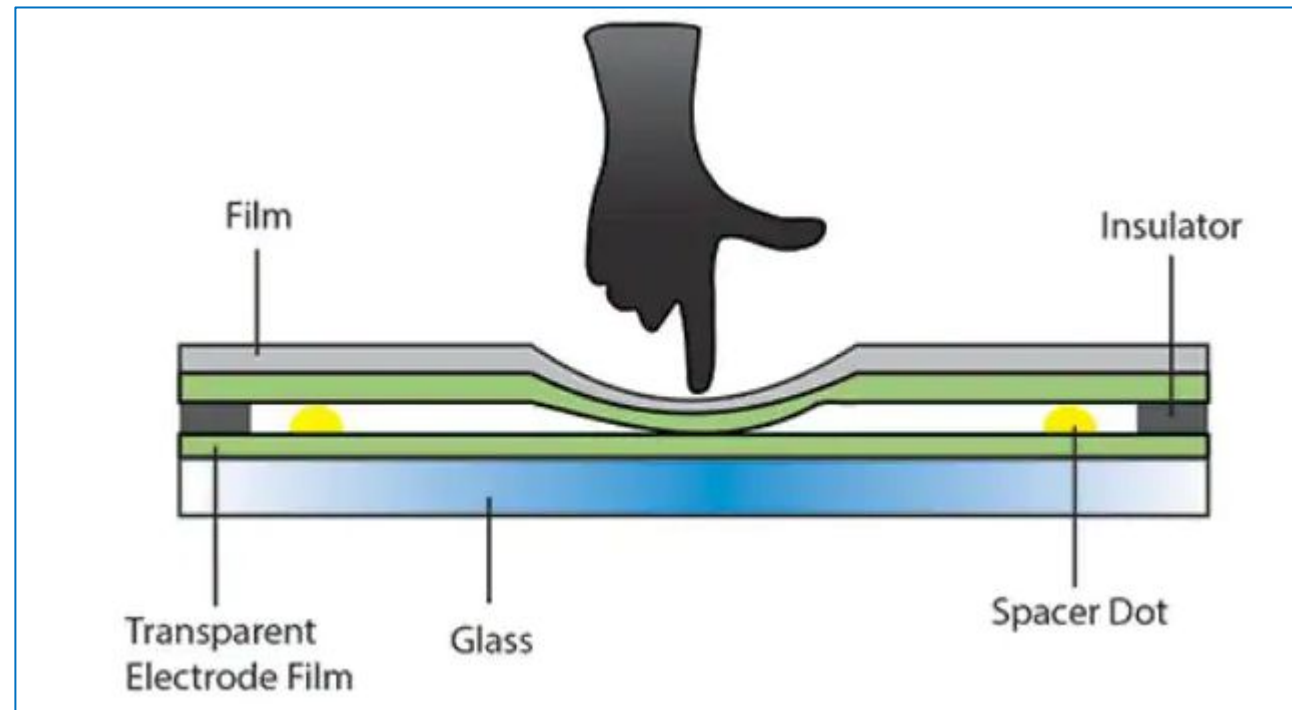
They are two main types:

- Capacitive Touch Sensors are used in smartphones, home appliances, automotive & other industrial applications.
- Resistive Touch sensors are used in musical instrument, keypads, old mobile phones & Foot pronation monitoring.

## Working Schematic of Capacitive Touch Screen



Working Schematic of  
Resistive Touch Screen





## Project with Touch Sensor

The aim is to see how HaloCode 4 touch sensors will control its 12 LED'.

The story line is:

When HaloCode starts up and we touch sessor:

- 0 - it displays light animation Meteor.
- 1 - it displays light animation rainbow.
- 2 - it displays light animation spindrift.
- 3 - it displays light animation firefly.



## Final Code Touch Sensor



## **Sensor No 8 – Soil Moisture Sensor**

## Soil Moisture Sensor

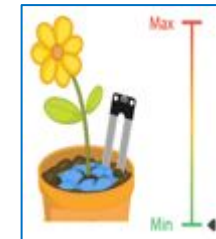
This is a simple sensor.

The fork-shaped probe with two exposed conductors.

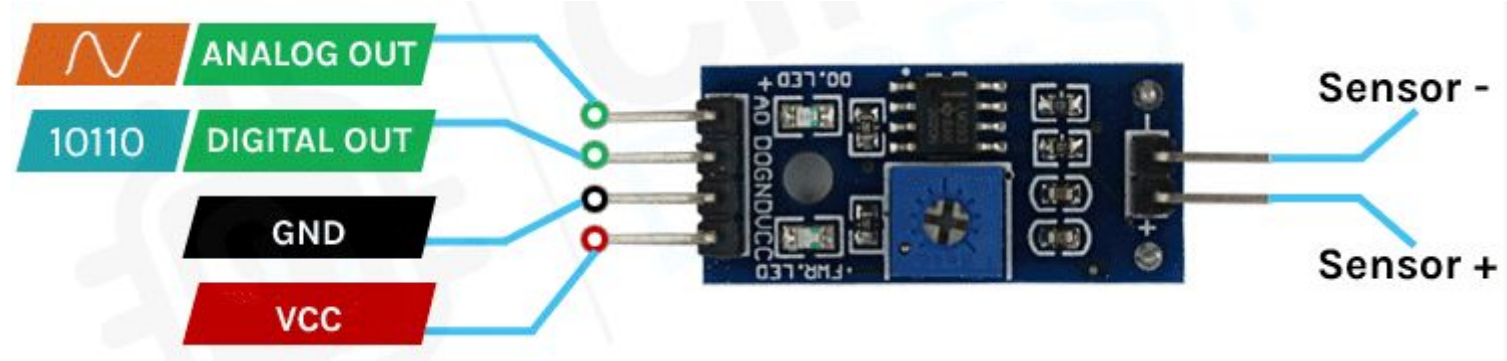


These act as a variable resistor whose resistance varies according to the water content in the soil. Resistance is inversely proportional to soil moisture:

- More water means good conductivity & lower resistance
- Less water means poor conductivity & higher resistance.



The sensor produces an output voltage according to the resistance helping us determine the moisture level.



## Project with Soil Moisture Sensor

Proper watering is critical to farming. Too much and too little are both bad. Visually it is difficult to ascertain the right watering time.

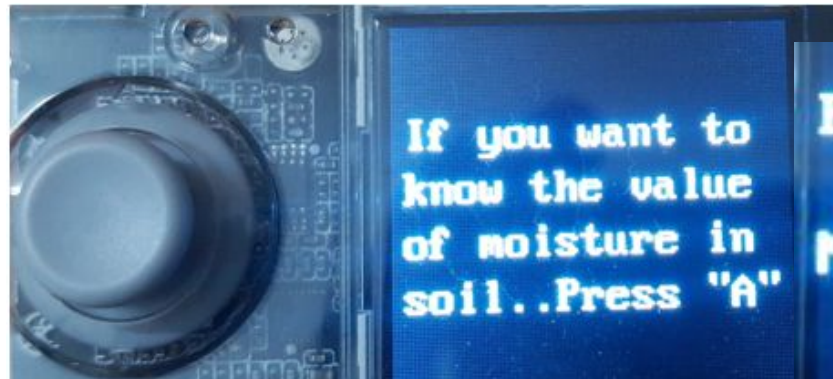
Soil sensor tells us the moisture content at the most critical part of a plant – its root.

In this project we are using Cyber Pi with a moisture sensor probe to do this work for us. Story line is:

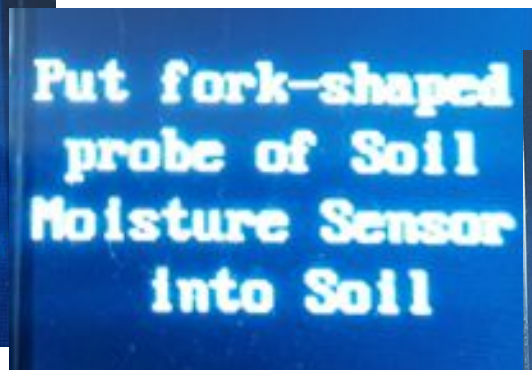
- When Cyber Pi starts up it displays 'If you want to know the value of moisture in soil then press A button'.
- When you press button A, it displays 'Put fork probe of Soil Moisture Sensor into Soil'.
- When you put that probe into soil/water then it will detect the amount of moisture in soil/water and displays on the screen of Cyber Pi.

## The three steps of the code as seen in Cyber Pi

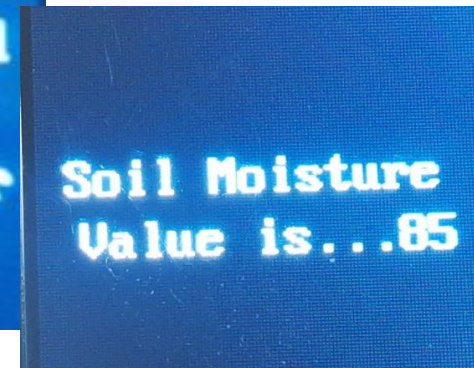
Screen 1



Screen 2



Screen 3



## Final Code Soil Moisture Sensor

when CyberPi starts up

show If you want to know the value of moisture in soil..Press "A" at center of screen by (16) medium pixel

wait until button A pressed?

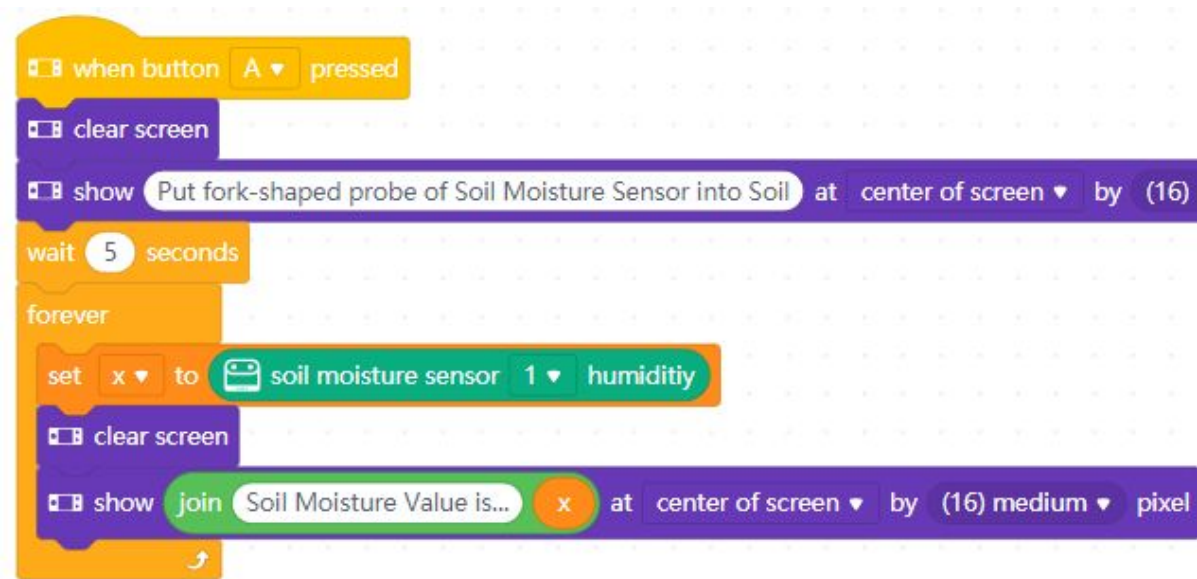
Continued

set x to soil moisture sensor 1 humidity

clear screen

show join Soil Moisture Value is... x at center



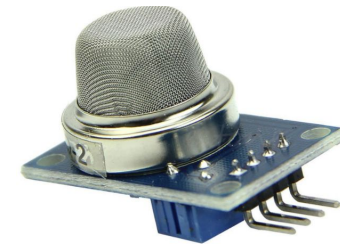


## **Sensor No 9 – Gas Sensors**

## Gas Sensor

The most commonly used gas sensors is part of MQ series.

It is a Metal Oxide Semiconductor (MOS) type Gas Sensor also known as Chemiresistor.



Its detection is based upon change of resistance of the sensing material when the Gas comes in contact with the material.

Using simple voltage divider network concentration of gas can be detected.

The most common units of measurement is parts-per-million.

For example, 1,000ppm of CO means that if you could count a million gas molecules

1,000 of them would be of carbon monoxide  
and 999,000 would be some other gases.

**Project with Gas Sensor.** Gas leakage can be catastrophic. Ever wonder Why? Engineers have devised ways of being warned of such leaks.

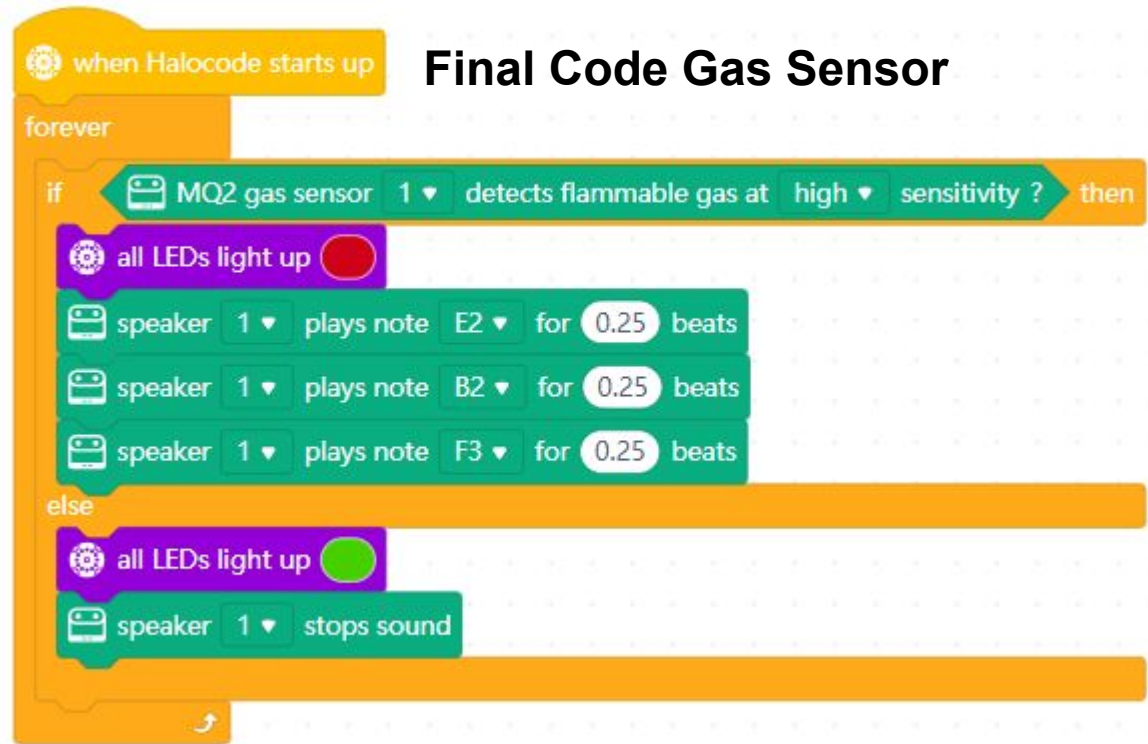
We shall examine how HaloCode & MQ2 gas sensor can do it for us. Story is:

- When things are normal LED's of HaloCode will be green.
- When it crosses a threshold they will turn red.

The system of being warned could include audible alarm, SMS or many others.



## Final Code Gas Sensor



## **Sensor No 10 – Flame Sensor**

## Flame Sensor

A flame sensor is a detector designed to detect and respond to the presence of a flame or fire, allowing flame detection.

- Responses to a detected flame depend on the installation but can include sounding an alarm, deactivating a fuel line and activating a fire suppression system
- These sensors detect flames with wavelength within the range of 760 nm – 1100 nm.



The sensors in the flame detector will detect the radiation that is sent by the flame.

The photoelectric converts the radiant intensity signal of the flame to a relevant voltage signal.



This signal would be processed in a single chip microcomputer and converted into a desired output.

Flame-sensors are classified into four types:

- IR single frequency
- IR multi-spectrum
- UV flame detectors
- UV/ IR flame detectors

## **Project with Flame Sensor**

We will be using Cyber Pi for this project.

The advantage of Cyber Pi is its integral display unit.

## Fire Losses

During the (2015 – 20) five-**year** period, US fire departments responded to:

- An estimated average of 353,100 home structure fires **per year**.
- These fires caused an annual average of 2,620 deaths & 11,030 fire injuries.
- \$7.2 billion in direct property damage.

**Your simple gadget can help make the difference.**

The story is:

Under normal condition Cyber Pi displays 'Fire Alarm' on its screen.



Screen 1

If the attached sensor detects flame or flammable gas then a warning will be given in the form of alarm.



Screen 2

Also it displays a message telling you 'Fire Inside' & and telling you where is the Fire exit.



Screen 3

The messaging could be done as required.

## Final Code Flame Sensor

```
when CyberPi starts up
  forever
    if flame sensor 1 detected flame? then
      show Fire Inside at center of screen by (24) large pixel
      play buzzer at 600 Hz
      wait 0.2 seconds
      display [red][red][red][red][red]
      clear screen
      show Fire Exit is in right side at center of screen by (16) medium pixel
      play buzzer at 350 Hz
      wait 0.1 seconds
```

Continued

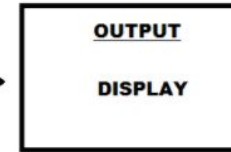
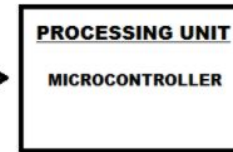
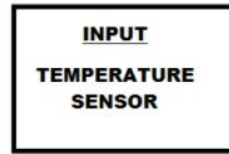
```
    turn off LED all
    wait 0.5 seconds
  else
    stop all sounds
    turn off LED all
    show Fire Alarm at center of screen by (16) medium pixel
    wait 1 seconds
    clear screen
    wait 0 repeat 10
    [ ]
```

**Output Devices.** No sensor can be complete without an accompanying output device.

A sensor based project could require more than one output device.

Some of the common output devices we are using include:

- RGB LED's.
- LED Matrix.
- Seven segment display.
- Buzzer.
- Speaker.
- DC Motor.
- Servo Motor.





Code Karega India Badhega