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## **EXPERIMENT-2**

**AIM:-** Read data from a sensor. Experiment with both analog and digital sensors.

**OBJECTIVE:-** Student should get the knowledge of Temperature Sensor and IR sensor

**OUTCOMES:-** Student will be developed programs using Arduino IDE and Arduino Board for Temperature Sensor and IR sensor

### **CONNECTING TO A TEMPERATURE SENSOR**

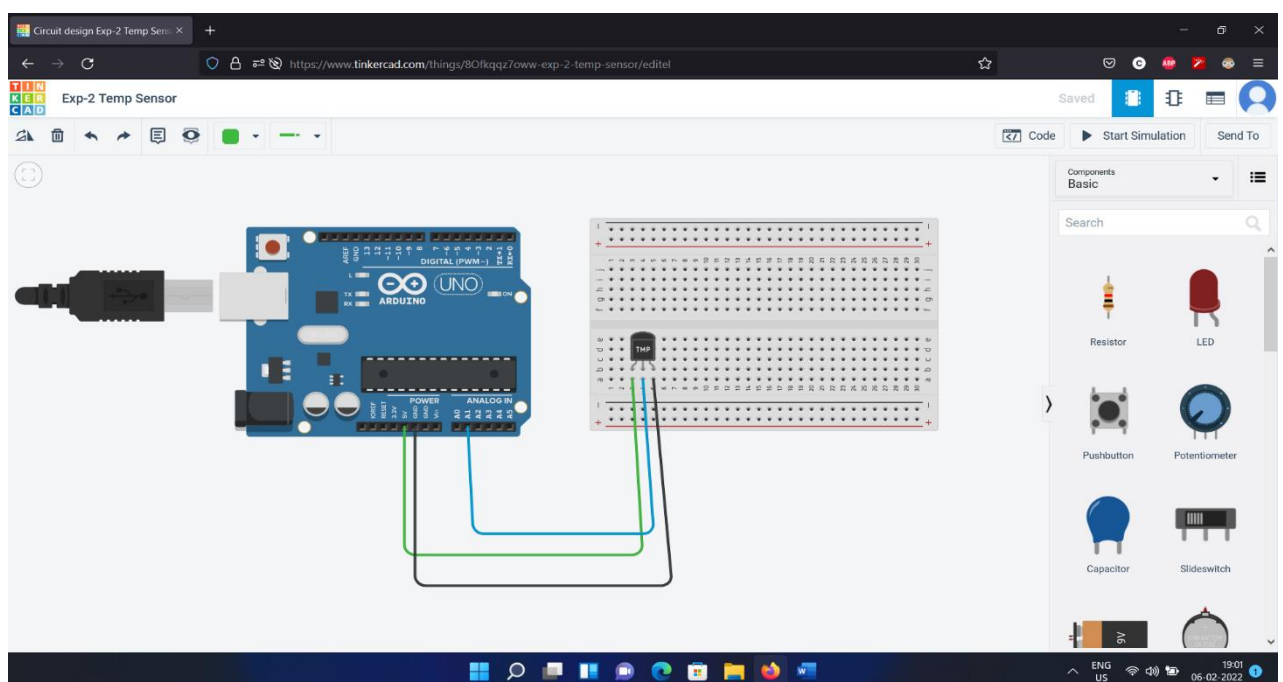
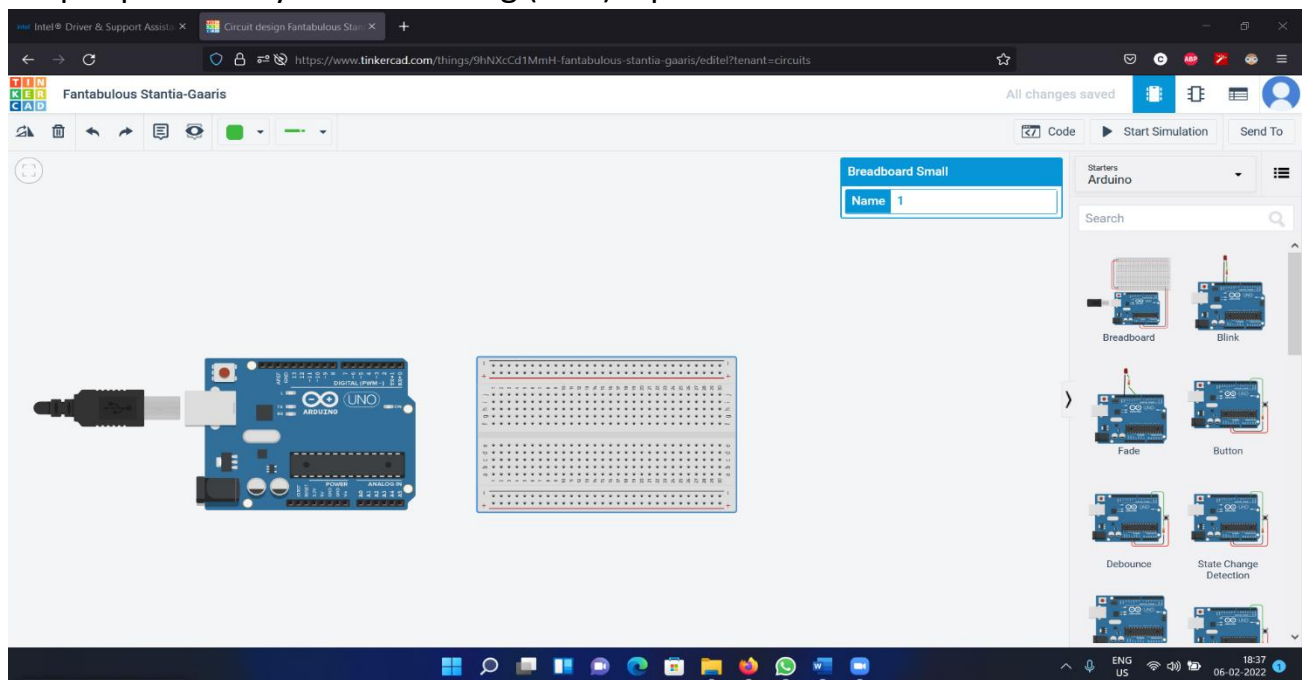
These sensors have little chips in them and while they're not that delicate, they do need to be handled properly. Be careful of static electricity when handling them and make sure the power supply is connected up correctly and is between 2.7 and 5.5V DC - so don't try to use a 9V battery.

They come in a "TO-92" package which means the chip is housed in a plastic hemi-cylinder with three legs. The legs can be bent easily to allow the sensor plugged into a breadboard. You can also solder to the pins to connect long wires

### **READING THE ANALOG TEMPERATURE DATA**

The sensor has 3 pins 2 pins are used to power the sensor and third one is the analog output. To read the temperature value from the sensor, connect the

output pin directly into an Analog (ADC) input of Arduino board.



**Voltage at pin in milliVolts = (reading from ADC) \* (5000/1024)**

This formula converts the number 0-1023 from the ADC into 0-5000mV (= 5V)

If you're using a 3.3V Arduino, you'll want to use this:

**Voltage at pin in milliVolts = (reading from ADC) \* (3300/1024)**

This formula converts the number 0-1023 from the ADC into 0-3300mV (= 3.3V) Then, to convert millivolts into temperature, use this formula:

$$\text{Centigrade temperature} = [(\text{analog voltage in mV}) - 500] / 10$$

### Simple Thermometer

This example code for Arduino shows a quick way to create a temperature sensor, it simply prints to the serial port what the current temperature is in both Celsius and Fahrenheit.

The screenshot shows the Tinkercad web interface for a project named "Exp-2 Temp Sensor". An Arduino Uno is connected to a breadboard. A temperature sensor (TMP) is connected to the breadboard. The code on the right is as follows:

```
1 int sensorPin = 0;
2
3 void setup()
4 {
5   Serial.begin(9600);
6 }
7 void loop()
8 {
9   int reading = analogRead(sensorPin);
10  float voltage = reading * 5.0;
11  voltage /= 1024.0;
12  Serial.print(voltage); Serial.println(" volts");
13  float temperatureC = (voltage - 0.5) * 100 ;
14  Serial.print(temperatureC); Serial.println(" degrees C");
15  float temperatureF = (temperatureC * 9.0 / 5.0) + 32.0;
16  Serial.print(temperatureF); Serial.println(" degrees F");
17  delay(1000);
18 }
```

The Serial Monitor shows the following output:

```
187.30 degrees C
369.15 degrees F
4.00 volts
349.90 degrees C
661.82 degrees F
1.82 volts
131.64 degrees C
268.95 degrees F
```

Circuit design Dazzling Juttuli | x

https://www.tinkercad.com/things/80fkqz7oww-dazzling-juttuli/editel?tenant=circuits

### Exp-2 Temp Sensor

All changes saved

Simulator time: 00:00:08.439

Code Stop Simulation Send To

1 (Arduino Uno R3)

Output Control  
Input Math  
Notation Variables

set built-in LED to HIGH  
set pin 0 to HIGH  
set pin 3 to 0  
rotate servo on pin 0 to 0 degrees

set reading to read temperature sensor on pin A0  
print to serial monitor reading with newline

Serial Monitor

188  
331  
145  
421  
271  
430  
118  
247  
154  
401  
59  
145  
112  
270

600  
150  
-300

Send Clear

The screenshot shows the Tinkercad web interface for a project titled "Exp-2 Temp Sensor". The main workspace displays an Arduino Uno R3 board connected to a breadboard. A temperature sensor is placed on the breadboard, with its pins connected to the Arduino's power and ground pins. The code editor on the right contains the following blocks: "set built-in LED to HIGH", "set pin 0 to HIGH", "set pin 3 to 0", "rotate servo on pin 0 to 0 degrees", "set reading to read temperature sensor on pin A0", and "print to serial monitor reading with newline". The serial monitor on the bottom right shows a list of numbers: 188, 331, 145, 421, 271, 430, 118, 247, 154, 401, 59, 145, 112, and 270. A graph on the right side of the serial monitor displays a fluctuating signal, with the y-axis ranging from -300 to 600. The bottom status bar shows the time as 14:35 on 04-02-2022.