EECE 5552-Assistive Robotics
Assignment 8-a

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***Due by 11:59 PM Eastern Time, Tuesday, Nov 24**

Group project 1

Task 1
Interface the analog temperature sensor module (KY-013) with the Galileo board. Each team can acquire a sensor and a Galileo board for this project. Please sample the sensor at: 1 Hz, 5 Hz, 10 Hz and 20 Hz for 30 seconds. Please plot the results.(**Warning: Connect the 5V power supply to the Galileo board first, then connect the board to the computer with the USB cable.**)

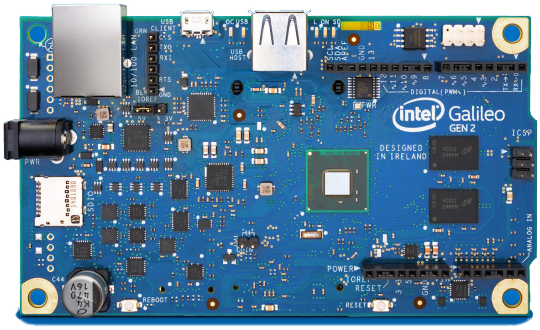

Figure 1: Intel Galileo Gen2.

Description
The analog temperature sensor module KY-013 for Arduino, measures ambient temperature based on the resistance of the the thermistor.

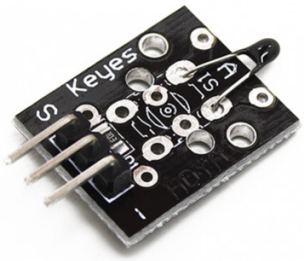

Figure 2: Analog Temperature Sensor.

Specifications
The KY-013 analog temperature sensor module consists of a NTC thermistor and a 10 k resistor. The resistance of the thermistor varies with surrounding temperature, you can use the Steinhart–Hart equa-

tion to derive precise temperature of the thermistor.

Operating Voltage	$5V$
Temperature measurement range	-55°C to 125°C [-67°F to 257°F]
Measurement Accuracy	$\pm 0.5 Deg.$

Connection Diagram
Connect the board's power line (middle) and the ground (-) line to 5V and GND respectively. Connect the signal(s) to the pin A0 on the Arduino.

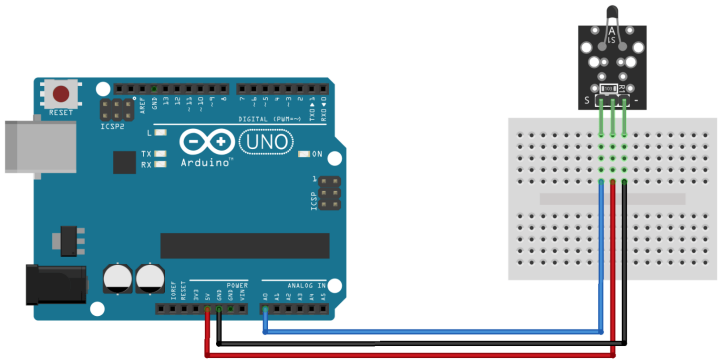

Figure 3: Connect sensor to the board.

KY-013	Arduino
S	A0
middle	5V
-	GND

Code

```
#include <math.h>

double Thermister(int RawADC) {
  double Temp;
  Temp = log(((10240000/RawADC) - 10000));
  Temp = 1 / (0.001129148 + (0.000234125 + (0.0000000876741 * Temp * Temp ))* Temp );
  Temp = Temp - 273.15; // Convert Kelvin to Celcius
  return Temp;
}

void setup() {
  Serial.begin(9600);
}

void loop() {
  Serial.print(Thermister(analogRead(0))); //read pin A0
  Serial.println("c");
  delay(1);
}
```

Group project 2

Interface the KY-003 Arduino Hall Magnetic Sensor Module with the Galileo board. Each team can acquire a sensor and a Galileo board for this project. Please sample the sensor at: 1 Hz, 5 Hz, 10 Hz and 20 Hz for 30 seconds. Please plot the results.(**Warning: Connect the 5V power supply to the Galileo board first, then connect the board to the computer with the USB cable.**)

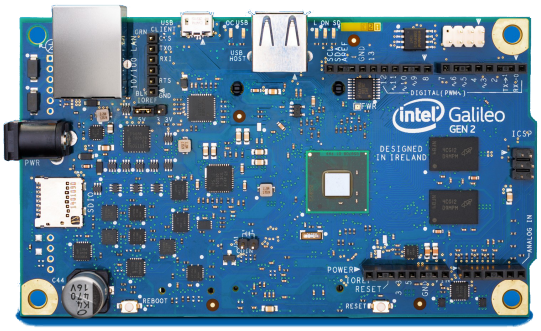

Figure 4: Intel Galileo Gen2.

Description
KY-003 Arduino Hall Magnetic Sensor Module is a switch that will turn on/off in the presence of a magnetic field.

Figure 5: KY-003 Arduino Hall Magnetic Sensor Module.

Specifications
KEYES KY-003 Arduino Hall Magnetic Sensor Module is a switch that will turn on/off in the presence of a magnetic field.

Operating Voltage	$4.5V$ to $24V$
Temperature measurement range	-40°C to 85° C
Dimensions	18.5 mm × 15 mm [0.728in × 0.591in]

Connection Diagram
Connect the Power line (middle) and ground (-) to +5 and GND respectively. Connect signal (s) to pin 3 on the Arduino.

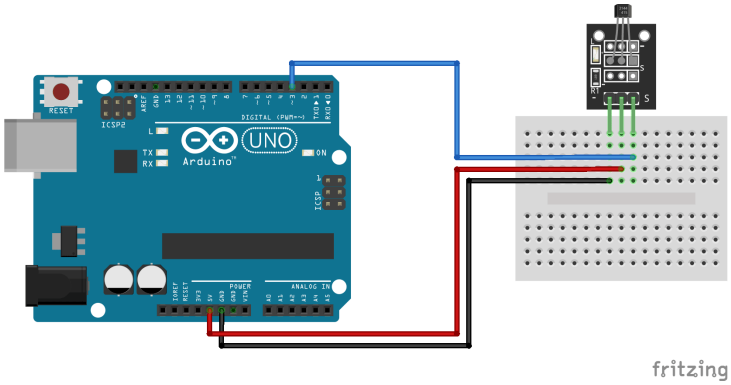

Figure 6: Connect sensor to the board.

KY-003	Arduino
S	Pin 3
middle	+5V
-	GND

Code
The KY-003 Arduino sketch will light up the LED on pin 13 when a magnetic field is detected.

```
int led = 13;//LED pin
int sensor = 3; //sensor pin
int val; //numeric variable

void setup()
{
        pinMode(led, OUTPUT); //set LED pin as output
        pinMode(sensor, INPUT); //set sensor pin as input
}

void loop()
{
        val = digitalRead(sensor); //Read the sensor
        if(val == LOW) //when magnetic field is detected, turn led on
        {
                digitalWrite(Led, HIGH);
        }
        else
        {
                digitalWrite(Led, LOW);
        }
}
```

Reference

Problem 1*https* : *//arduinomodules.info/ky* − 013 − *analog* − *temperature* − *sensor* − *module/*
Problem 2*https* : *//arduinomodules.info/ky* − 003 − *hall* − *magnetic* − *sensor* − *module/*