ENGDUINO LIBRARIES: THE THERMISTOR

The thermistor is a very simple device that changes its resistance (think Physics lessons and Ohms law) depending on how warm it is. This means we can use it to measure temperature.

HEADER

At the top of your program you must have the following line – often in addition to the one for LEDs and other bits of the Engduino.

```
#include <EngduinoThermistor.h>
```

SETUP()

At the top of your program you must have the following line – often in addition to the one for LEDs and other bits of the Engduino.

```
EngduinoThermistor.begin();
```

BASIC FUNCTIONS

There is only one function for the thermistor – to get the temperature, which comes back in degrees Celsius by default. But let's introduce another idea too – serial output, so you can read a numerical the value on the screen.

```
void loop() {

    float f;

    f = EngduinoThermistor.temperature();
    Serial.println(f);
    delay(1000);

}
```

This program reads the temperature and then prints a value out that you can read on the screen. It does this over the USB cable, so it isn't going to do anything if that isn't connected. Upload the program and then click on the button in the top right hand corner of the screen that looks like:

It should say 'Serial Monitor' next to it when you move the mouse pointer over it.

This will bring up another window and you will see that a temperature value appears every second. The thermistor is a tiny component at the top of the E with NTC written next to it in white (look on

the Engduino diagram if you're still unsure). Put your finger on it and, unless you're programming this on a beach in Hawaii, you should see the temperature go up.

MORE ADVANCED FUNCTIONS

It is possible to specify the temperature scale you wish to use:

```
float fc = EngduinoThermistor.temperature(CELSIUS);
float fk = EngduinoThermistor.temperature(KELVIN);
float ff = EngduinoThermistor.temperature(FAHRENHEIT);
```

It is also worth saying a bit more about the printing to the screen.

```
void loop() {

    Serial.println("Hello World");
    delay(1000);

}
```

Will print "Hello World" all on one line, delay a second and print it again on a new line. But what if we want to print several things on the same line? Try the following:

```
void loop() {

    float f;

    f = EngduinoThermistor.temperature();
    Serial.print("Temperature is: ");
    Serial.print(f);
    Serial.println(" Celsius");
    delay(1000);

}
```

This should print "Temperature is 25.71 Celsius" (or whatever your temperature is). Using `Serial.print` doesn't move the output on to the next line – so we've used this for the first two parts of the line, and then we used `Serial.println` finally to end the line.

Note that you can only start the Serial Monitor after you have uploaded your program. So you might miss some of what it prints.

IDEAS FOR PROJECTS WITH THE THERMISTOR

- Make the LEDs change colour as temperature changes
- Find out how much the temperature changes in a room when you open a window – what do you think that tells you about heating energy wasted?