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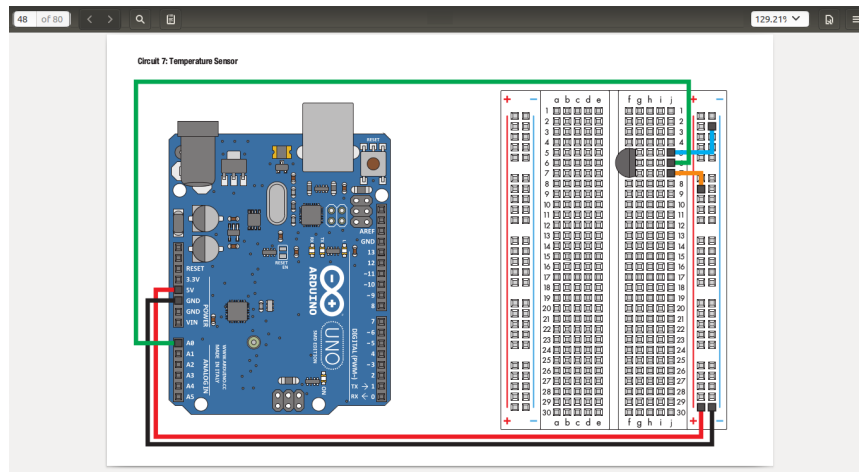
## 1 Arduino Intermediate Class

In this class each week will go over a specific circuit from the vilros book, going over some electronics and programming before building and testing the circuits. Students are welcome to try other circuits from the book if they have already completed this exercises, and we will try and provide tips as time allows. Handouts are posted at <https://github.com/mcshicks/exHub>. This class is in the tempsensor folder.

## 2 This weeks Circuit: Temp Sensor Circuit (Circuit 7)

This week we are going to build the temp sensor circuit. It's relatively straightforward, there is a component that puts out a voltage that is proportional to the temperature of the component. After we have the circuit running using the code provided with the kit we will modify it to behave like a thermostat. The temp sensor looks very similar to the transistor make sure you pick the part that is marked TMP.

## 3 Temp Sensor Schematic



## 4 Code modifications for Thermostat function

### 4.1 Before setup

we need to add variable for input string, temperature set point, and to mark if a string has been input

### 4.2 In Setup

A small addition to setup to allocate memory for string

### 4.3 In Loop

Two additional if statements in loop, one to check thermostat "set" point, the other to check for an input string

### 4.4 Additional routine

We add the routine serialEvent. This is an arduino reserved name that gets called in the same code as "loop" and is used for serial processing.

## 5 Before Setup, Declare additional variables

```
const int ledPin = 13;
float setTemp = 25.0; // degrees C, STP

String inputString = "";           // a string to hold incoming data
boolean stringComplete = false;    // whether the string is complete
```

## 6 Setup - Add additional initialization for input string

```
// reserve 200 bytes for the inputString:
inputString.reserve(200);
```

## 7 Loop - Check for change in temperature, check for input string

```
if (degreesC < setTemp) // could add hysteresis here
{
    Serial.println("turn heater on");
} else
{
    Serial.println("turn heater off");
}

if (stringComplete) {
    Serial.print("Setting Temperature to: ");
    setTemp = inputString.toFloat();
    Serial.println(setTemp);
}
```

```

    // clear the string:
    inputString = "";
    stringComplete = false;
}

```

## 8 Serial Event Code

```

/*
  SerialEvent occurs whenever a new data comes in the
  hardware serial RX.  This routine is run between each
  time loop() runs, so using delay inside loop can delay
  response.  Multiple bytes of data may be available.
  */
void serialEvent() {
  while (Serial.available()) {
    // get the new byte:
    char inChar = (char)Serial.read();
    // add it to the inputString:
    inputString += inChar;
    // if the incoming character is a newline, set a flag
    // so the main loop can do something about it:
    if (inChar == '\n') {
      stringComplete = true;
    }
  }
}

```

## 9 Other things to try with this code:

### 9.1 LED Indicator

Turn on an LED if the temperature is above or below a value.

### 9.2 Thermostat knob

Read that threshold value from a potentiometer - now you've created a thermostat