



The Canadian Satellite Design Challenge Management Society presents...

The CanSat Kit

for

Dummies

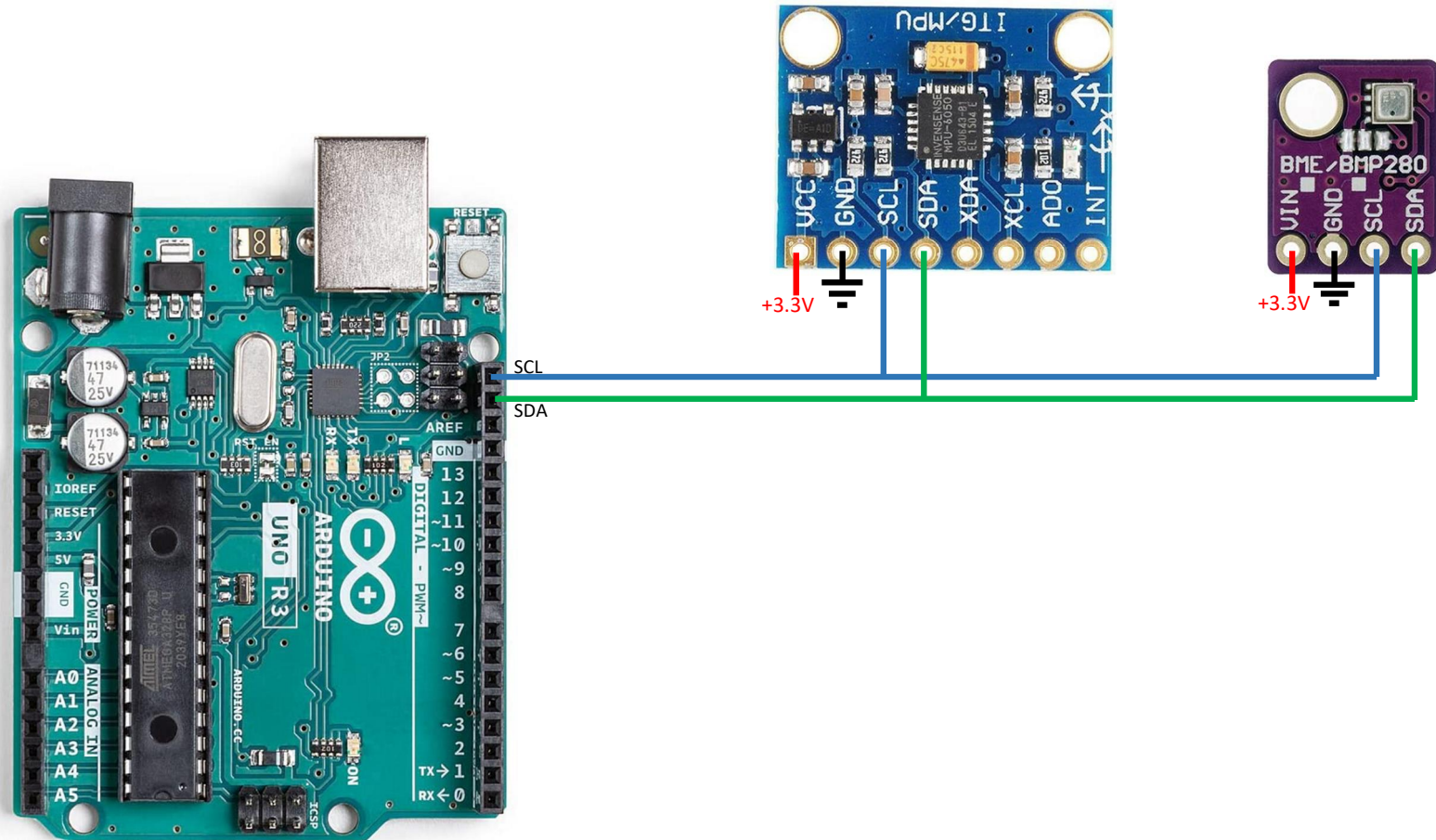
Future Space Scientists & Engineers!

Episode #7: Creating a "FlatSat"

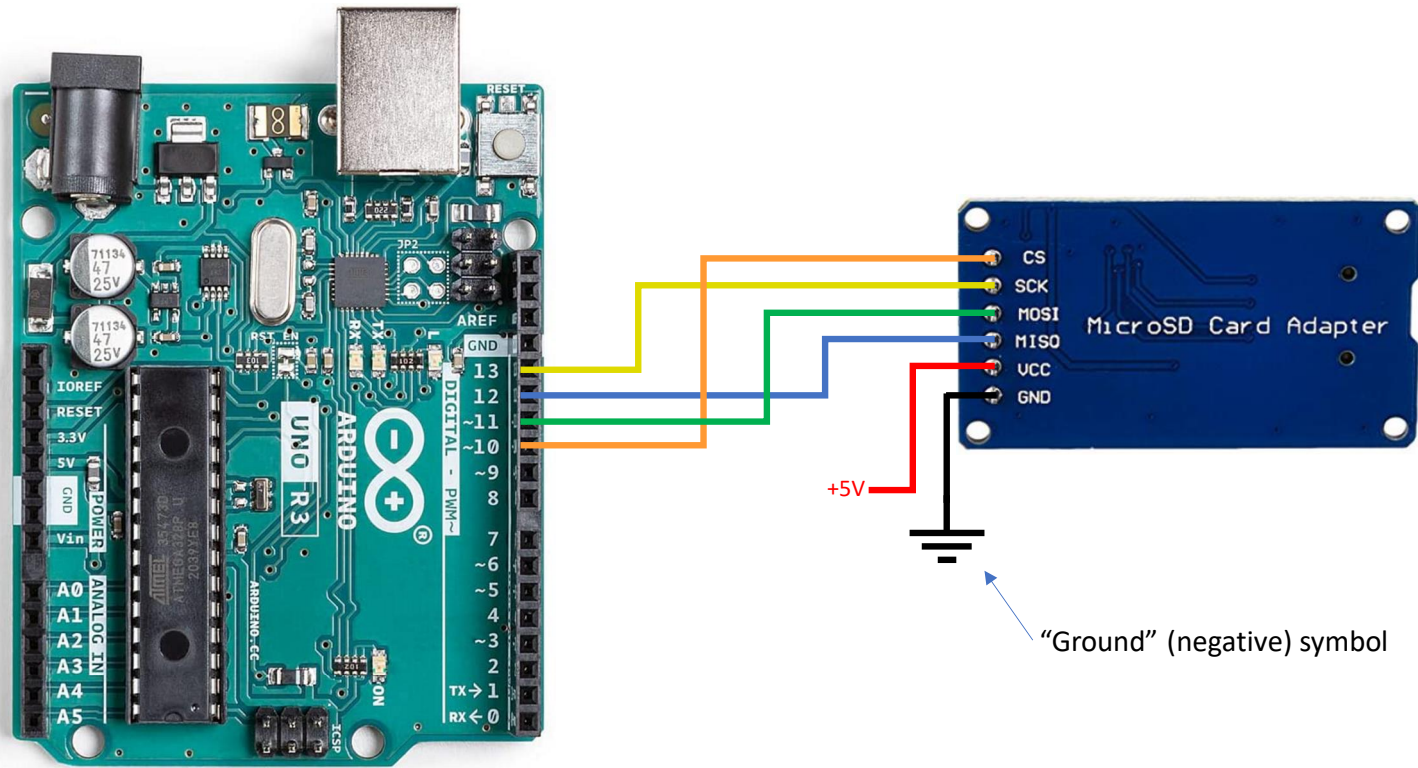
What we

- ” Connect the BMP-280, MPU-6050, and SD card together
- ” Modify the code to save the data to SD card (rather than just print it out to the Serial monitor)

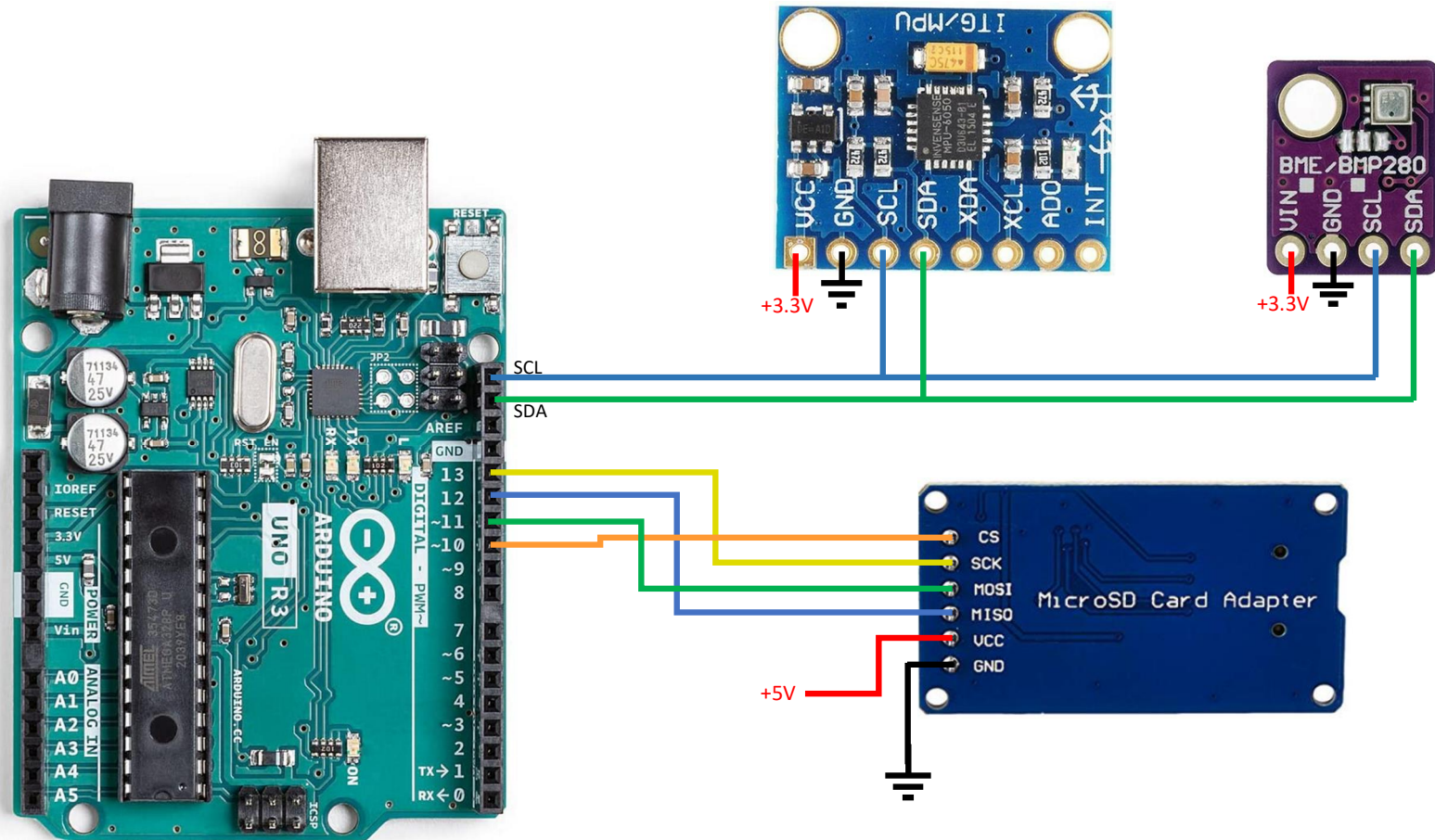
The Combined Circuit



The SD Card Circuit



The Combined Circuit



” We will save the data into a Comma-Separated Variable (csv) file, so that it can easily be opened in Microsoft Excel.

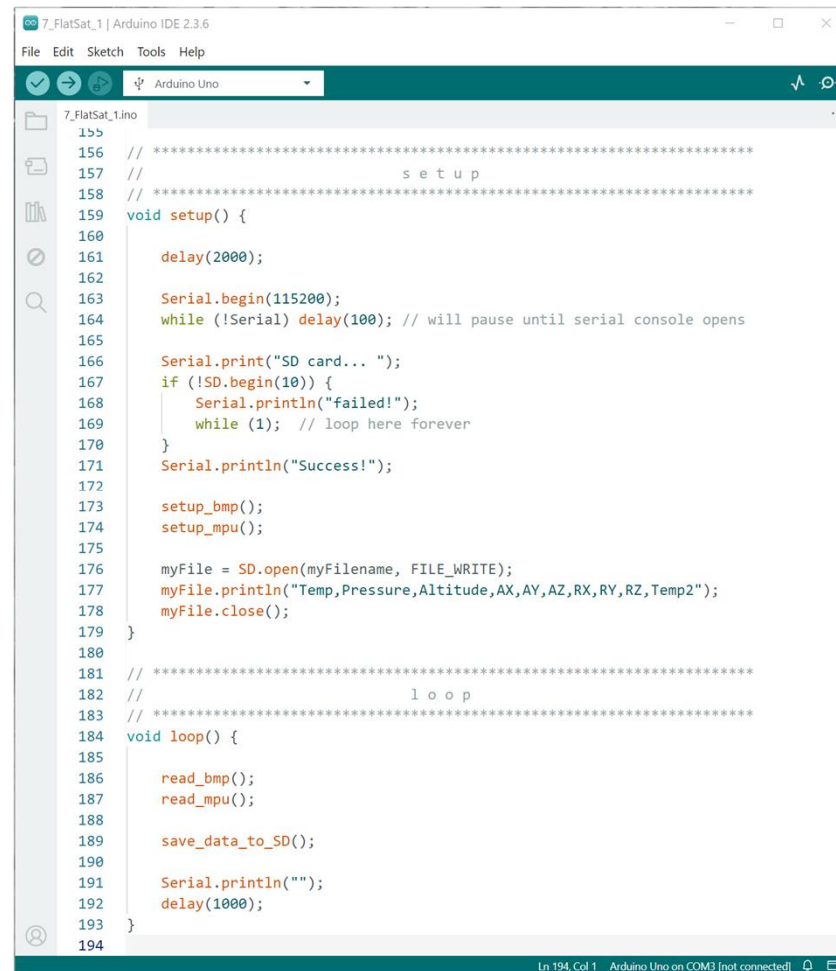
[illegible]

Program structure



```
1 // Basic demo for accelerometer readings from Adafruit MPU6050
2 #include <Wire.h>
3 #include <SPI.h>
4 #include <Adafruit_BMP280.h>
5 #include <Adafruit_MPU6050.h>
6 #include <Adafruit_Sensor.h>
7 #include <SD.h>
8
9 Adafruit_MPU6050 mpu;
10 Adafruit_BMP280 BMP280; // I2C
11
12 File myFile;
13 char* myFilename = "MYDATA.CSV";
14
15 // -----
16 //                               s e t u p _ b m p
17 // -----
18 > void setup_bmp() { ...
35 }
36
37 // -----
38 //                               r e a d _ b m p
39 // -----
40 > void read_bmp() { ...
53 }
54
55 // -----
56 //                               s e t u p _ m p u
57 // -----
58 > void setup_mpu() { ...
73 }
74
75 // -----
76 //                               r e a d _ m p u
77 // -----
78 > void read_mpu() { ...
109 }
110
111 // -----
112 //                               s a v e _ d a t a _ t o _ S D
113 // -----
114 > void save_data_to_SD() { ...
154 }
155
116 // -----
117 //                               s e t u p
118 // -----
119 > void setup() { ...
179 }
180
181 // -----
182 //                               l o o p
183 // -----
184 > void loop() { ...
193 }
```

Setup and Loop procedures



```
7_FlatSat_1.ino
155
156 // *****
157 //                               s e t u p
158 // *****
159 void setup() {
160
161     delay(2000);
162
163     Serial.begin(115200);
164     while (!Serial) delay(100); // will pause until serial console opens
165
166     Serial.print("SD card... ");
167     if (!SD.begin(10)) {
168         Serial.println("failed!");
169         while (1); // loop here forever
170     }
171     Serial.println("Success!");
172
173     setup_bmp();
174     setup_mpu();
175
176     myFile = SD.open(myFilename, FILE_WRITE);
177     myFile.println("Temp,Pressure,Altitude,AX,AY,AZ,RX,RV,RZ,Temp2");
178     myFile.close();
179 }
180
181 // *****
182 //                               l o o p
183 // *****
184 void loop() {
185
186     read_bmp();
187     read_mpu();
188
189     save_data_to_SD();
190
191     Serial.println("");
192     delay(1000);
193 }
194
```

Ln 194, Col 1 Arduino Uno on COM3 [not connected]

Save_data_to_SD procedure



```
7_FlatSat_1.ino | Arduino IDE 2.3.6
File Edit Sketch Tools Help
Arduino Uno
7_FlatSat_1.ino
111 // ----- save_data_to_SD -----
112 //
113 // -----
114 void save_data_to_SD() {
115   sensors_event_t a, g, temp;
116
117   myFile = SD.open(myFilename, FILE_WRITE);
118
119   // Read the values from the BMP
120   myFile.print(BMP_280.readTemperature());
121   myFile.print(",");
122
123   myFile.print(BMP_280.readPressure());
124   myFile.print(",");
125
126   myFile.print(BMP_280.readAltitude(1025.0)); /* Adjusted to local forecast! */
127   myFile.print(",");
128
129   // Read the values from the MPU
130   mpu.getEvent(&a, &g, &temp);
131
132   myFile.print(a.acceleration.x - 0.37);
133   myFile.print(",");
134
135   myFile.print(a.acceleration.y - 0.14);
136   myFile.print(",");
137
138   myFile.print(a.acceleration.z - 1.03);
139   myFile.print(",");
140
141   myFile.print(g.gyro.x * RAD_TO_DEG + 0.23);
142   myFile.print(",");
143
144   myFile.print(g.gyro.y * RAD_TO_DEG - 0.22);
145   myFile.print(",");
146
147   myFile.print(g.gyro.z * RAD_TO_DEG + 1.5);
148   myFile.print(",");
149
150   myFile.println(temp.temperature);
151
152   myFile.close();
153 }
154
155
```

Ln 154, Col 2 Arduino Uno on COM3 [not connected]