

The code from pages 46-47 can easily be modified to allow for logging of GPS data.

Declare a global file and include the <SD.h> library

```
1 #include <Wire.h>
2 #include <SPI.h> }
3 #include <SD.h> }
4 unsigned long startTime;
5 File outputFile; |
6
```

Inside the Set up:

```
125 if(!SD.begin(10)) // 10 is our Chip Select.
126 {
127     Serial.println("Failed!");
128     pinMode(LED_BUILTIN, OUTPUT);
129     digitalWrite(LED_BUILTIN, LOW); // Common Anode LED
130 }
131
132 startTime = millis();
133 outputFile = SD.open("data.txt", FILE_WRITE);
134 outputFile.print("Lat, Lon, SIV, groundSpeed, Heading");
135 outputFile.close();
136 }
```

Inside the loop:

```
138 void loop()
139 {
140     if ((millis() - startTime) > 500)
141     {
142         NavData data = readNavPVT();
143         outputFile = SD.open("data.txt", FILE_WRITE);
144         outputFile.print(data.lat);           outputFile.print(", ");
145         outputFile.print(data.lon);           outputFile.print(", ");
146         outputFile.print(data.SIV);          outputFile.print(", ");
147         outputFile.print(data.groundSpeed); outputFile.print(", ");
148         outputFile.println(data.heading);
149         outputFile.close();
150         startTime = millis();
151     }
152 }
```

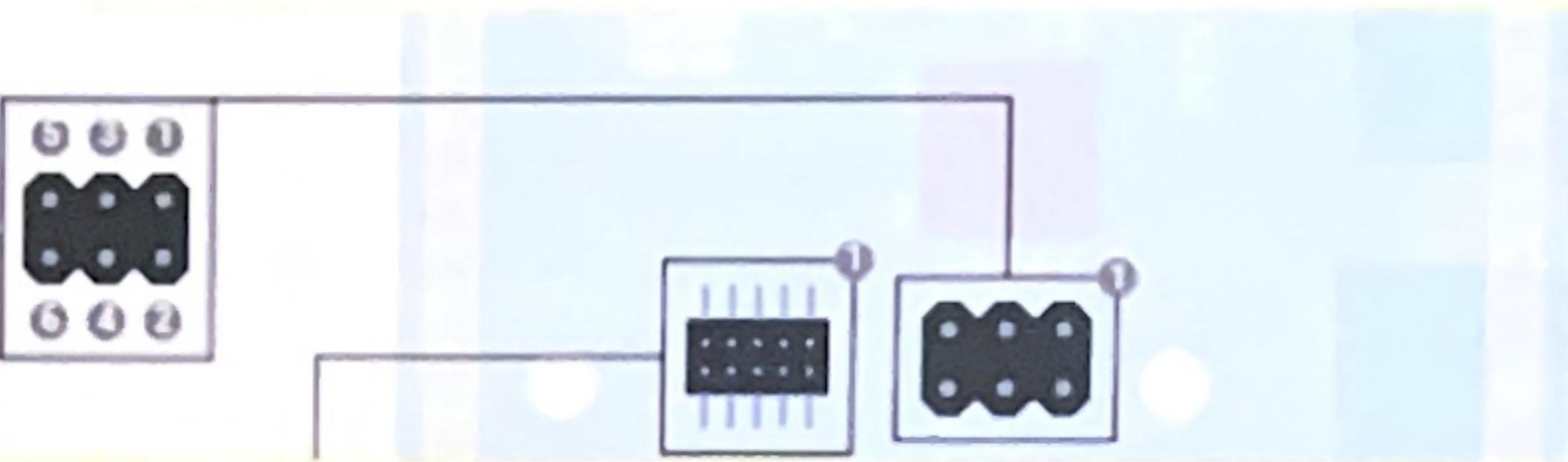
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The default SPI pins for the ~~prox~~ giga are on the SPI header, not the 11-13 pins.

Since the SPI header doesn't have a Chip Select, I have chosen pin 10.

SPI	Micro	SPI	
SPI1_CPO	PC9	D89	1
		5V OUT	2
SPI1_SCK	PB3	D91	3
SPI1_CPOI	P07	D98	4
RST	RESET		5
CMD			6



The I2C pins are the normal SDA and SCL (20 + 21)

Plotting on My Maps;

```
334683153, -819912078, 5, 1162, 34177162
334683153, -819912078, 5, 1162, 34177162
334683175, -819912091, 5, 1201, 32297905
334683389, -819912094, 5, 848, 34314576
334683389, -819912094, 5, 848, 34314576
334683558, -819912120, 5, 823, 33268791
334683558, -819912120, 5, 823, 33268791
```

This is what the data looks like in a .txt file.

Lets copy and paste into excel.

Lat, Lon, S	Speed, Heading	603984476, 134483527, 0, 134481429, 134489125
603984476, 134483527, 0, 134481429, 134489125	0, 0, 0, 0, 0	
Lat, Lon, SIV, groundSpeed, Heading	603984476, 134483527, 0, 134481429, 134489125	
0, 0, 0, 0, 0	0, 0, 0, 0, 0	
0, 0, 0, 0, 0	0, 0, 0, 0, 0	
0, 0, 0, 0, 0	0, 0, 0, 0, 0	

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Cook

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Oh, looks like we need to format it...

Text to columns → Delimited → comma → finish

The screenshot shows the Microsoft Excel ribbon at the top with various tabs like File, Home, Insert, Page Layout, Formulas, Data, Review, View, Automate, Help, and Acrobat. Below the ribbon, there's a toolbar with icons for Get & Transform Data, Queries & Connections, Data Types, Sort & Filter, Advanced, Text to Columns, Data Tools, What-If Analysis, Forecast Sheet, and Outline.

Two windows are open side-by-side:

- Convert Text to Columns Wizard - Step 1 of 3:** This window shows a preview of selected data with several rows of text. It asks if the data is Fixed Width or Delimited. The "Delimited" option is selected, and the "Comma" delimiter is chosen. A "Text qualifier" dropdown is set to double quotes ("").
- Convert Text to Columns Wizard - Step 2 of 3:** This window shows the data preview again, but now with columns separated by commas. It includes options for handling consecutive delimiters and a "Text qualifier" dropdown.

Below these windows, a data table is displayed in the Excel spreadsheet:

	A	B	C	D	E
1	Lat	Lon	SIV	groundSpeed	Heading
2	334683153	-819912078	5	1162	34177162
3	334683153	-819912078	5	1162	34177162
4	334683175	-819912091	5	1201	32297905
5	334683389	-819912094	5	848	34314576
6	334683389	-819912094	5	848	34314576
7	334683558	-819912120	5	823	33268791
8	334683558	-819912120	5	823	33268791
9	334683484	-819912174	5	1034	34323722
10	334683484	-819912174	5	1034	34323722

After removing data where the GPS didn't have a good signal, we are left with nice and neat data.

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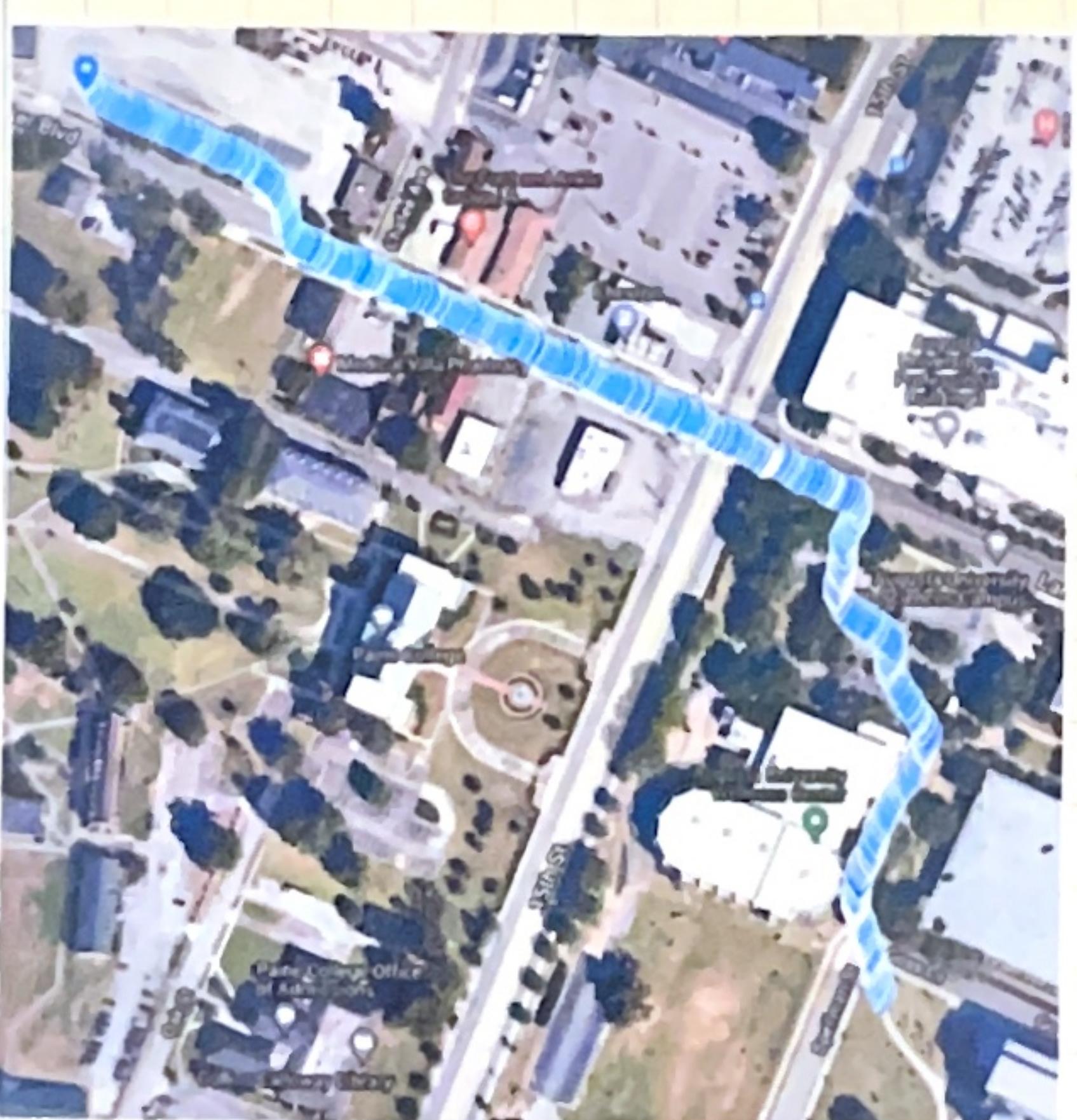
My Maps expects an unscaled latitude and longitude. See page 45 for the data sheet of the GPS. We need to divide by 10^7 .

	B	C	D	E	F	G	H	I
	Lon	SIV	groundSpeed	Heading		Head	Latitude	Longitude
34683153	-819912078	5	1162	34177162	341.7716	=A2	A877/10000000	
34683153	-819912078	5	1162	34177162	341.7716	33.46832	-81.9912	
34683175	-819912091	5	1201	32297905	322.9791	33.46832	-81.9912	
34683389	-819912094	5	848	34314576	343.1458	33.46834	-81.9912	
34683389	-819912094	5	848	34314576	343.1458	33.46834	-81.9912	
34683389	-819912094	5	848	34314576	343.1458	33.46834	-81.9912	
34683389	-819912094	5	848	34314576	343.1458	33.46834	-81.9912	

	B	C	D	E	F	G	H	I	J
	Lon	SIV	groundSpeed	Heading		Head	Latitude	Longitude	
34683153	-819912078	5	1162	34177162	341.7716	33.46832	=B2	B877/10000000	
34683153	-819912078	5	1162	34177162	341.7716	33.46832	-81.9912		
34683175	-819912091	5	1201	32297905	322.9791	33.46832	-81.9912		
34683389	-819912094	5	848	34314576	343.1458	33.46834	-81.9912		
34683389	-819912094	5	848	34314576	343.1458	33.46834	-81.9912		

We can also fix the scaling on the heading:

	B	C	D	E	F	G	H	I
	Lon	SIV	groundSpeed	Heading		Head	Latitude	Longitude
134683153	-819912078	5	1162	34177162	=E2	E877/100000	-81.9912	
134683153	-819912078	5	1162	34177162	341.7716	33.46832	-81.9912	
134683175	-819912091	5	1201	32297905	322.9791	33.46832	-81.9912	
134683389	-819912094	5	848	34314576	343.1458	33.46834	-81.9912	
134683389	-819912094	5	848	34314576	343.1458	33.46834	-81.9912	



Results

The excel file can be uploaded directly to my maps.

This path represents walking from CSM to lot 69.