Senior Design Progress Report

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| **Student**: | Brian Dye | **Team**: | 20 ENIGMA |
| **Semester**: | Spring 2022 | **Position**: | Team Leader |
| **Week**: | **10 and 11** | **Hours**: | 40 |

# Progress Description

Over Spring Break, I successfully interfaced the SparkFun Battery Baby Sitter and the Ublox SAM-M8Q GPS module. Both share the same I2C bus. Now we can accurately demonstrate the battery level remaining and show the GPS coordinates of our location:

A picture containing diagram

Description automatically generatedAn issue that I ran into was that I did not have the correct understanding of the frequency that the I2C clock operated at. My initial understanding was that it was operating at 48 MHz which is the same frequency that the STM32F091 clock is operating. The GPS did not “fuss” about the Data Setup Time or Data Hold Time in the I2C communication. However, the Battery Babysitter did. All my calculations for the timing register were incorrect due to my assumption that the I2C clock was operating at 48 MHz. I came to realize the clock is actually operating at 8 MHz from reading the old lecture notes from ECE-362. Once I made the correct changes to the timing register of the I2C, it works flawlessly. Now, the Battery Babysitter and GPS module can share an I2C bus to communicate seamlessly. This accomplishment concludes the serial communication interfacing required to implement the functionality that we desire from each node in our project. Now, I plan to start working on the routing algorithms required to create a self-forming, self-organizing, distributed mobile ad-hoc network.

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| **Module** | **Function** | **Serial Protocol** |
| RFM69HCW | Send & Receive Data for mobile network | Serial Peripheral Interface (SPI) |
| MP2022 TFT LCD Screen | Demonstrate Coordinates, Network Status and Battery Level to User | Serial Peripheral Interface (SPI) |
| HM-19 | Interface each node with Bluetooth Device | Universal Asynchronous Receiver Transmitter (UART) |
| Battery Babysitter | Charge and monitor LiPo battery | Inter-Integrated Circuit (I2C) |
| SAM-M8Q | Provide GPS coordinates | Inter-Integrated Circuit (I2C) |

# Printed Circuit Board (PCB)

PCB is done and ordered. We ran into the issue that the edge cut was not properly in the Gerber and Drill files. So, we had to fix the issue and resubmit the files to JCLPCB and it is currently on it’s way. I ordered 10 boards. We have enough modules to make 5 nodes. Extras are for mistakes that potentially occur while soldering components to boards.