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ME311 Assignment 1

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1. Based on these pin names, the communication protocol being used is I2C, or inter-integrate circuit. It has two communication lines, SDA and SCL, and occasionally a RESET pin.
2. For the OLED board provided in the link, I would use the maximum current draw value provided in the datasheet, in this case 20mA. This way the microcontroller/battery can be designed to deliver extra current when the display is running at its maximum.

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| --- | --- |
| **OLED Pin** | **Microcontroller Pin** |
| SDA | Digital pin 2, PD1, SDA |
| SCL | Digital Pin 3, PD0, SCL |
| RST | Reset for I2C is digitally controlled, so it can be connected to any digital pin |
| GND | GND |
| 3.3V | Not Connected |
| VIN | 5V OR 3.3V. The internal regulator can handle either voltage |

1. To estimate the current value for servo motors, you should look at the “Stall” current draw. This is the point where the servo is working the hardest and drawing the most current from its power supply. For this servo the stall current is 320 mA @ 6V. We want to choose this value, so the power supply is not overworked.

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| --- | --- |
| **Servo Pins** | **Microcontroller Pins** |
| Servo 1 GND | GND |
| Servo 1 Power | 5V Or External Power Supply |
| Servo 1 Control | Digital Pin 9, PB5 |
| Servo 2 GND | GND |
| Servo 2 Power | 5V Or External Power Supply |
| Servo 2 Control | Digital Pin 10, PB6 |

1. For these pins, the communication protocol being used is Serial. Based on the GPS datasheet, the baud rate is 9600.
2. For this GPS, the current draw would be approximately 20mA at full power. I chose this value based on the specifications of the module listed on the website.

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| --- | --- |
| **GPS Pins** | **Microcontroller Pins** |
| 3.3V | Not Connected |
| EN | Not Connected |
| VBAT | Not Connected |
| FIX | Any digital pin |
| TX | RXD1, PD2 |
| RX | TXD1, PD3 |
| GND | GND |
| VIN | +5V |

1. Yes, this battery is sufficient to power our robot. The 7.4V supply is more than adequate for the microcontroller (which can handle up to 16V) and the 2200 mAh capacity should give a long running time. See the current draw calculation below for the total current draw of the system. Based on the current draw calculated below, the battery can run for approximately 3 hours at full load before requiring a charge.

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| --- | --- | --- | --- |
| Component | Current Draw | Quantity | Total Current Draw |
| Microcontroller | 27mA (From Datasheet) | 1 | 27mA |
| Servo Motors | 320mA | 2 | 640mA |
| OLED Display | 20mA | 1 | 20mA |
| GPS | 20mA | 1 | 20mA |
|  |  | **Total Current Draw** | 707mA |

Part 2: Pseudocode

1. Include the GPS Library
2. Include the OLED Library
3. Include the Servo Library
4. Define pinouts for each component

Setup:

1. Attach the servo motors to the microcontroller pins
2. Attach the OLED display to the microcontroller pins
3. Initialize I2C
4. Initialize Serial

Loop:

1. Wait for GPS fix.
2. If no GPS fix, Display “wait” on OLED
3. If GPS fix is acquired, proceed to next section of code
4. Display GPS coordinates on OLED
5. Using Servos, move forward 4 inches.