

**Dead Reckoning Group
Bi-weekly Report 3**

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Accomplishments

- Assembled Chassis
 - Attached PCB
 - Used existing holes as mounts
 - Drilled holes in PCB
 - Cut threaded rod for posts
 - Secured using nuts
 - Attached scoop
 - Attached batteries
- Assembled PCB
 - Attached gyroscope
 - Attached compass
 - Attached accelerometer socket
 - Cut holes in board for pins
 - Soldered remaining pins for stability
 - Attached encoder wire headers
 - Attached 40pin header
 - Wired sensors to OOPic I/O bank through 40 pin header
- Wires
 - Constructed wiring
 - Five wire connectors for encoders
 - 40pin ribbon cable for PCB to OOPic interface
- Servos
 - Calibrated with software
 - Used OOPic object for continuous rotation servos (allows for speed control)
- Encoders
 - Designed and built U-shaped frames
 - Drilled holes for chassis, encoder attachment, and shaft
 - Attached and centered on chassis
 - Used OOPic object that counts pulses automatically
- Parts Ordered/Purchased
 - Ordered 40pin header with wire wrap from DigiKey
 - Purchased screws, nuts, sheet metal from Lowe's
 - Purchased nuts, threaded rod, and sleeves from Ace Nuts&Bolts
 - Purchased Velcro from Hobby Town USA
 - Purchased wiring, 6 pin headers, and ribbon cable from Mid State Electronics
- Software
 - Coded a North-bound compass based movement algorithm
 - Coded an encoder based destination algorithm
 - Interfaced with gyroscope

Problems / Solutions

- North-bound algorithm
 - We realized that the floor of the lab produces a magnetic field. We found areas of floor that provide a stable North reading.
 - We wrote a non-stable program. We fixed this per the advisors advice to use a PI controller.
- Encoder wheel rubbing
 - The encoder wheel was rubbing against the casing of the encoder. We fixed this by changing the angle that the frame was attached to the chassis.
- Servos needed to be recalibrated
 - Disassembled encoders and calibrated servos.
- Attachment of accelerometer socket
 - The footprint of the socket is non-standard. This posed a problem because we wanted to mount it on a standard PCB. A solution was proposed by our advisors based on the mixing of standard dimensions on the footprint. We were able align four pins with holes on the PCB. The other four pins were given space by cutting a portion of the PCB out. We then wire wrapped the four pins with extra space and slid them through the holes. Then we soldered the remaining pins to wrapping wire and the PCB. We then wired each of the pins to a socket bank so that we could create the filter/de-coupling circuit the accelerometer requires.

Goals

- Integrate accelerometer
- Develop accelerometer based navigation algorithm
- Develop tests for odometry and inertial navigation algorithms
- Develop weight values for data fusion algorithm