

Biweekly Report 1

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Dead Reckoning Robot Team
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Accomplishments

- Researched Components
 - Lee researched odometry and shaft encoders.
 - Ajay researched Prefab Robots / Kit Robots.
 - Steve researched custom robot solutions.
 - Saba researched accelerometers and gyroscopes.
 - Ajay researched compasses
- Selected Components
 - Accelerometers
 - MEMS was specified by problem definition.
 - Choose part made by Analog Devices.
 - Gyroscope
 - MEMS evaluation board from Analog Devices
 - Robot
 - Mark III kit robot selected. Comes with a OOPic microcontroller and modified servos for movement. OOPic microcontroller desired because of ease of programming and good I/O features.
 - Compass
 - Choose a compass that met our needs which was also available from Junun
 - Encoders
 - US Digital model E3 encoders selected.
 - Memory Expansion for OOPic board
 - Prototyping expansion board for OOPic microcontroller.
 - Processor upgrade for OOPic.
- Researched Interfacing Components to Microcontroller
 - OOPic has 31 Digital I/O Lines
 - 4 can be used for Analog input, OOPic has a A/D onboard
 - OOPic has built in power regulator onboard which can supply all components except for servos
 - Accelerometer
 - Digital Output
 - Needs 3 digital I/O ports (3 is for both axis)
 - Needs 1 5V
 - Needs 1 Common
 - 1.0 mA Max
 - 3.0 – 5.25 V
 - Gyroscope
 - 5.25 V max
 - 8 mA max
 - 1 analog input for angular velocity
 - 1 analog input for temperature reading
 - Servo Motors
 - One digital I/O line per motor
 - Power supplied by separate power supply (4 x AA)
 - Encoder Counters

- 5 digital inputs per counter (8 total)
- Compass
 - 2 digital I/O pins
 - 5 V
 - common
- Ordered Components

Problems / Solutions

- Problem definition was expanded after weekly meeting. We had not researched adding a gyroscope and compass to the robot. We were not sure if we had the I/O available on the chosen microcontroller to support these additional devices. After researching the microcontroller further and looking at available compasses and gyroscopes we determined we had plenty of I/O ports available.
- The first encoders had a minimum 300 RPM operating speed. We had to select a different encoder.
- The kit is going to have to be modified to include all of our sensors. We have some ideas for how we are going to do this.
- We did not know which type of gyroscope to use (Ball Grid Array or Evaluation Board). We looked into what each type was and decided on the evaluation board because it is easier to connect to our microcontroller.

Goals

- Algorithms for sensor interface.
- Algorithms for navigation using sensor input.
- Assembly of the robot.
- Complete Critical Design Review!