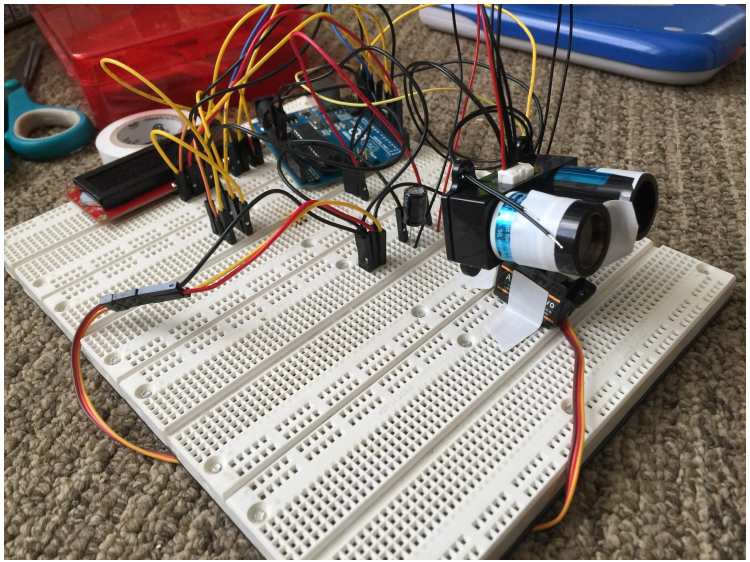
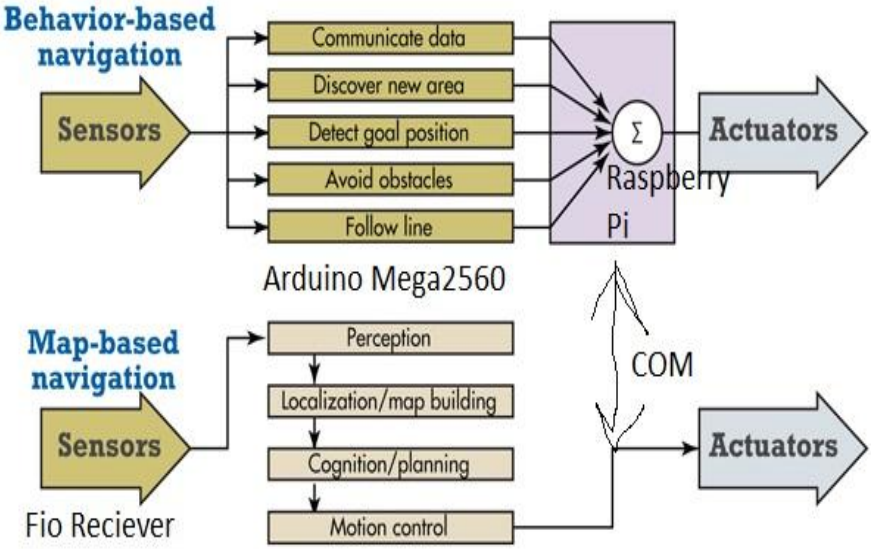
Western State Colorado University

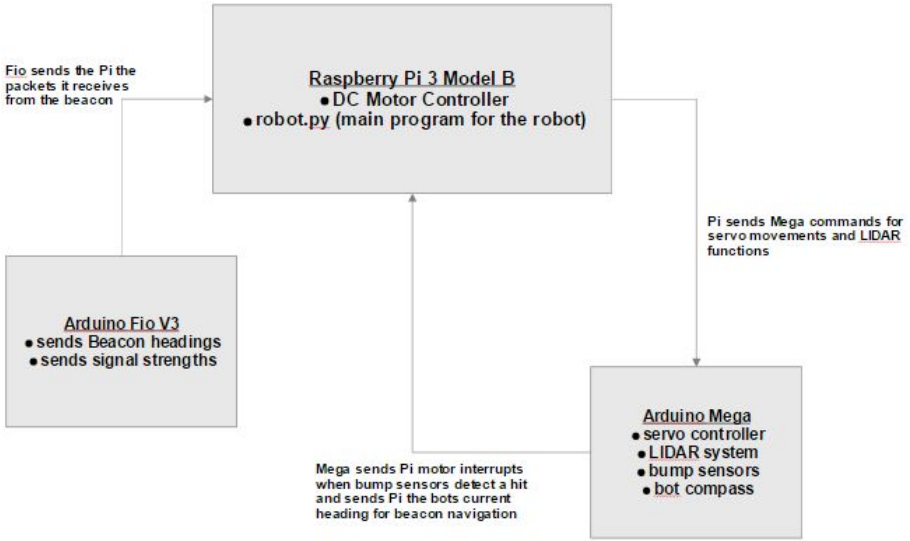
Design & Prototype Check-In

Team Overview

This year, we are improving on the design of last year’s robot by simplifying the embedded system, using Drunkard’s Walk algorithm as simple a simple movement seed. This behavior is augmented by using LiDAR SLAM and bump sensors to avoid terrain obsticles.







Materials List:

Arduino Fio v3, Mega2560, Raspberry Pi 3, Adafruit MotorHat for Pi, Adafruit Servo Shield, LiDAR Lite v2, DC Motors(4), HMC6352 compass, Bump Sensor(2), xBee RF Receiver, Battery Pack.

Total Build Cost: $480.65

Diagrams of Functionality

Estimates & Worries

Estimated Hours for:

Hardware - 15 hours (exclude 3D print time)

Software - 12 hours

Testing - 25 hours, includes mods to systems.

Our top three worries are that 1. 3D printing of new skeleton has proved difficult, 2. Migrating functions of 2 Uno’s to new Mega board 3. Determining the best way to interface with the robot in the field.

Beacon Code

We are using the older compass board. Both simulator and receiver Beacons has been tested successfully.

```
  File "/usr/lib/python2.7/dist-packages/serial/serialposix.py", line 446, in read
    ready,_,_ = select.select([self.fd],[],[], self._timeout)
KeyboardInterrupt
pi@raspberrypi:~/Robot2016/Robot2016 $ sudo nano xBeeTest.py
pi@raspberrypi:~/Robot2016/Robot2016 $ sudo python xBeeTest.py
['-58']
['195']
['-58', '-58']
['195', '195']
['-58', '-58', '-58']
['195', '195', '195']
['-58', '-58', '-58']
['195', '195', '195', '196']
['-58', '-58', '-58', '-58']
['195', '195', '195', '196', '196']
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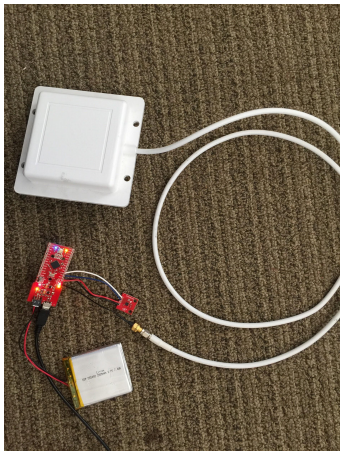

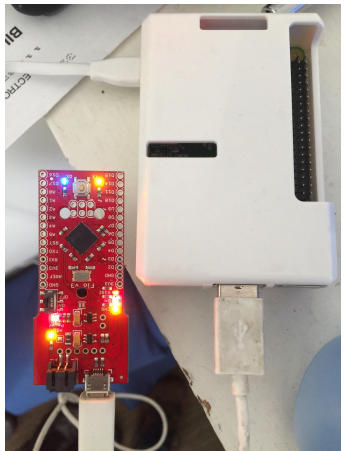

We are sending our beacon headings and signal strengths over serial to the Pi. Using python we remove the whitespace and EOL characters and split the data into two lists, Heading list and Signal List. We find the index for the strongest signal and use that index to get the corresponding heading. Then we orient our bot on the opposite of that heading.

Testing Plan

Once new body is printed, testing can begin on our revised boy once the body finishes printing this weekend; Our old version remains intact in order to provide rapid prototyping, and will be harvested for parts.

Tests using the Raspberry Pi (logic controller and motor signaling) are continuing on LiDAR sensor. We are developing method to push points from Arduino to Pi which will compile the point cloud for SLAM functionality.