To: Professor Merz
From: Benjamin Nitkin
Subject: IGVC Progress Report
Date: October 2, 2013

This week, the electrical & software team made substantial progress on sensors. In the past week, we finalized our sensor requirements, decided on placement within the robot, and began to shop for actual hardware. Our computers, loaned from Professor Rossman, are in our design room, set up and running.

In previous weeks, the programming team decided on a sensor package, including two cameras, a GPS, rangefinder, and a few other sensors. This week, we started to decide on real hardware. The PlayStation Eye was selected for our camera, as it's relatively inexpensive ($40/unit), offers a high framerate and resolution, and multiple units can be synchronized. We're planning to purchase them through Amazon.

To avoid racking up shipping costs, all other sensors were sourced through the same distributor: Sparkfun, a hobby electronics supplier. I assembled a preliminary list of sensors and electronics for the robot (see below), but still need to review datasheets for each. Most of the sensors communicate over either serial or I2C; both protocols are supported by the Arduino. After looking into compatibility and capabilities more, the team will decide exactly which sensors to order.

The software team also spoke with the drive team about sensor placement. As high-power AC electricity (such as the waveform feeding the motors) creates interference, radio and magnetic sensors should be far from the high-power components. The camera mast provides plenty of isolation from motor noise and a clear view of the sky, so the compass and GPS will be placed between the cameras. To prevent confusion between robot movement and mast sway, the accelerometer will be within the chassis. Finally, the SONAR range sensors need a clear line-of-sight off of the front of the robot. SONAR sensors watch for nearby obstacles and provide a failsafe to back up the stereo camera depthmap.

Two computers, on loan from Professor Rossman, are in the design room. Although they won't go on the robot, they'll be used for testing. (Otherwise, we'd have to wait for a laptop to come in before starting any code.) One machine is running Windows with RoboRealm; the other was reloaded with Ubuntu Linux and has ROS installed. Once the Playstation Eyes come in, we'll create a stereo test rig and try to generate a depthmap of the local environment using each software. The team set up a series of tests to determine which package is better suited to the competition.

Preliminary Parts list, electronics only.

Part no.	Catalog Name	Role	Cost/unit	Quantity	Total
DEV-11021	Arduino Uno - R3	Microcontroller	$29.95	1	$29.95
PRT-00116	Break Away Headers - Straight	Jacks	$1.50	1	$1.50
PRT-00115	Female Headers	Jacks	$1.50	1	$1.50
GPS-00465	20 Channel EM-406A SiRF III Receiver with Antenna	GPS	$59.95	1	$59.95
SEN-08502	Ultrasonic Range Finder - Maxbotix LV-EZ0	Rangefinder	$27.95	3	$83.85
SEN-10530	Triple Axis Magnetometer Breakout - HMC5883L	Compass	$14.95	1	$14.95
SEN-11486	9 Degrees of Freedom - MPU-9150 Breakout	Accelerometer	$49.95	1	$49.95
WRL-09819	XBee Explorer Dongle	Radio-USB	$24.95	1	$24.95
WRL-11216	XBee Pro 60mW PCB Antenna - Series 1 (802.15.4)	Radio	$37.95	2	$75.90
Total					$342.50

high-power components excluded (batteries, speed controls, wiring, power supplies, and motors)