

Weekly Report - Tuesday, February 26, 2019

Auburn University IEEE SoutheastCon 2019 Hardware Competition Team

Current Development Tasks

Task Name	Category	% Compl.	Progress Updates
ROS Localization	Software	45%	PiCam module works on Ubuntu thus the precompiled ROS image should work as a replacement for Raspbian.
Electrical Hardware Placement	Electrical-Mechanical Integration	90%	Battery brackets have been printed and are in the process of being mounted. Progress has been made on CAD of the control panel. PCB Design will begin this week to account for lead time
Motor Controller Integration	Electrical-Software Integration	85%	The Pi has been programmed to communicate with the stepper motors using serial control. The Steppers need to be wired to the Arduino, tested, and given limit switches.
Follow Debris Algorithm	Software	100%	The program was successfully demonstrated at E-Day.

Senior Design Team Members Time Management

Member Name	Task Name	~ Hours Spent
All Members	Team Meetings	1
Matthew	Follow Debris Algorithm	4
Matthew	Motor Controller Integration	4
Nia	LIDAR Localization and ROS	1
Joe	Motor Controller Integration	5

Josh	Electrical Hardware Placement	4
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Tasks to be Accomplished Before Competition

Task Name	Version*	Category	Priority	Assignee
Construct 9"x9"x11" interior sizing box	2	Mechanical	Medium	Alex
Modify wheel design to accommodate rubber tread	2	Mechanical	Medium	Alex
Incorporate encoders	1	Mechanical	Immediate	Alex
Modify frame and bumper to have > 1cm radius per rules	2	Mechanical	High	Alex
Add an interior lip to close the gap in bumper	2	Mechanical	High	Alex
Reduce the center of gravity	1	Mechanical	Medium	Alex
Design flag raising mechanism	2	Mechanical	Medium	Josh
Install new main battery bracket	1	Mechanical	Immediate	Josh
Mounting hole improvements on Electronics plate	2	Mechanical	Medium	Josh
Inventory and Order Parts for new Robot	2	Mechanical/ Electrical	High	Alex/ Josh
Fabricate, 3D Print, Assemble, and Wire New Robot	2	Mechanical/ Electrical	Medium	Full Team
Aesthetical Improvements and Enclosing Electronics	2	Mechanical	Low	Matthew
Main and Auxilary Battery Voltage Detection	1	Electrical/ Software	Medium	Josh
Wire Encoders	1	Electrical	Medium	Joe
Wire and test stepper motors	1	Electrical/ Software	Immediate	Joe
Design Control Panel	1 or 2	Electrical	Medium	Josh

Design PCB	2	Electrical	High	Josh
Integrate Serial Control in ROS	1	Software	High	Nia/Noah/ Matthew
ROS Localization	1	Software	High	Nia/Noah
ROS Navigation/Pathfinding	1	Software	Medium	Nia/Noah
Capture ROS bag	1	Software	Medium	Nia/Noah
Add Limit Switches	1	Electrical	Immediate	Joe
Program Limit Switches	1	Software	Immediate	Joe
Integrate Visual Detection in ROS	1	Software	High	Matthew/ William
Integrate Encoders in ROS	1	Software	High	Nia/Noah
Test and Tune Full Competiton Algorithm (With 1 robot)	1	Software	Medium	Full Team
Test and Tune Full Competiton Algorithm (With 2 robots on the field)	1 and 2	Software	Low	Full Team

* The currently built robot is version 1. The new/competition robot will be version 2. Tasks implemented in version 1 will be propagated to version 2.

Achievements, Obstacles, and Risks

This past week the team presented at Auburn's E-Day with the first version of our robot that can detect a block and drive towards it. This week we will start working on fully completing the first version of the robot and moving towards putting together the second robot to prepare for algorithm development. Based on what we learned by preparing for the demonstration, we were able to come up with a list of what needed to be accomplished as well as outline our current plan for the electrical hardware and software organization.

The battery mounts were printed before last Friday, but will not be mounted until Tuesday. Hardware obstacles for the upcoming week include putting together the stepper motor control, designing, printing, and wiring a control panel, and beginning design of a PCB for our final design. The risk with developing a PCB is the lead time, so we plan to have it ordered by the end of next week. Figure 1 displays a block diagram of the proposed electrical hardware diagram. The new components to be added are the encoders, flag motor, and IMU. The encoders will either be connected to the Raspberry Pi or the Arduino. We will also begin taking inventory and moving towards constructing the second version of our robot.

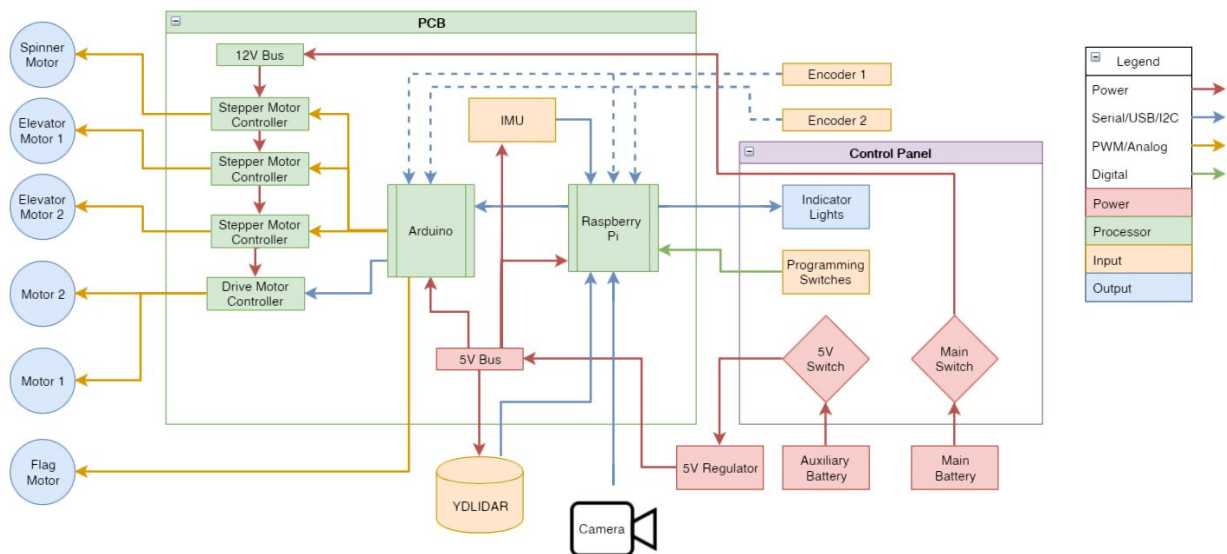


Figure 1: Block Diagram of Electrical Hardware

Some of the biggest remaining items are related to incorporating ROS with the code already developed. ROS is typically used with multiple specialized nodes that send messages to each other to accomplish the desired behavior. Figure 2 display a diagram of how we are planning on incorporating the four sensors, processing the data, and eventually outputting the control data to the Arduino.

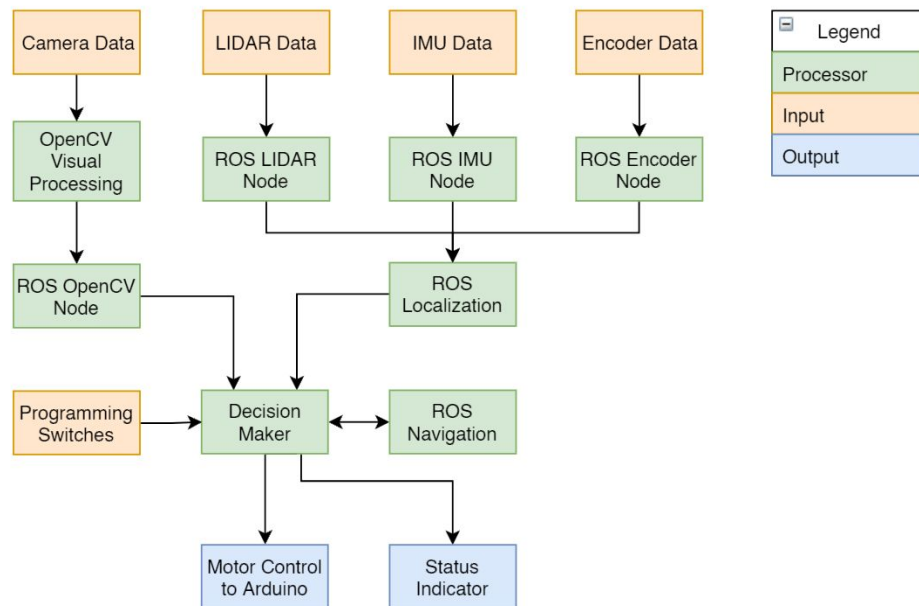


Figure 2: Software Architecture Block Diagram