Weekly Report - Tuesday, February 19, 2019

Auburn University IEEE SoutheastCon 2019 Hardware Competition Team

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Current Development Tasks

Task Name	Category	% Compl.	Progress Updates
LIDAR Localization and ROS	Software	40%	ROS operational on Ubuntu, working on Rasbian.
Electrical Hardware Placement	Electrical-Mechanical Integration	70%	Electronics plate has been mounted as well as all control electronics. Stepper motors still haven't been connected due to mechanical challenges
Motor Controller Integration	Electrical-Software Integration	85%	The Pi has been programmed to communicate with the stepper motors using serial control. The Arduino needs to communicate directly with the stepper motors and the stepper motors need to be wired to the motor controllers.
Follow Debris Algorithm	Software	70%	Distance detection has been added but needs to be tested.

Senior Design Team Members Time Management

Member Name	Task Name	~ Hours Spent
All Members	Team Meetings	1
Matthew Castleberry	Follow Debris Algorithm	4
Matthew Castleberry	Motor Controller Integration	4
Nia Perkins	LIDAR Localization and ROS	4
Joe Hinely	Motor Controller Integration	3

Achievements, Obstacles, and Risks

On the visual processing aspect, we have decided to go with the Pi camera instead of the Open MV camera as it is giving us a decent frame rate to 10 frames per second. We have tested it in a program that attempts to keep the cube in the center of the frame. It seems to be fairly responsive but the limited frame rate has to be accounted for. If you never stop the motors until the cube is within the threshold, the robot tends to overshoot the cube. We created a modified version where the robot turned for 30ms until a new picture came in. This worked much more responsively but was quite jittery. We developed a threaded version to allow the image processing to be done in the background and account for the inertia of the robot. There was still some large overshooting characteristics as this method needs better tuning.

The plate for mounting electronics was successfully designed, printed, and fit to the robot- this includes any brackets needed for the plate. 90% of the necessary electronics have been properly mounted to the plate, except for the standoffs to carry the Raspberry Pi, which is currently being ordered. Going forward, the next steps will include developing the battery mounts in time for E-Day, and coming up with a prototype circuit board- not on a breadboard- that will mount to the top of the Raspberry Pi. The idea of this board will be to save space on the back of the mounting plate and allow the board to act as a sort of shield with the Arduino and stepper motor controllers.

The plan for this week as for as localization is to hopefully get a static map generated in ROS. The difficulty arises as there is a strong learning curve with ROS. The means for mapping will be executed with a process called gmapping which is provided with ROS. Also, our initial testing was done with Ubuntu and the OS we will use is raspbian, steps were made to get ROS operational in raspbian.