

Weekly Report - Tuesday, February 12, 2019

Auburn University IEEE SoutheastCon 2019 Hardware Competition Team

Current Development Tasks

Task Name	Category	% Compl.	Progress Updates
LIDAR Localization Algorithm Development	Software	30%	ROS and the YDLIDAR are now set up and communicating.
Electrical Hardware Selection	Electrical	99%	Parts for the first prototype have been ordered. No more major orders are planned. Minor orders in the future may occur.
Electrical Hardware Placement	Electrical-Mechanical Integration	50%	Temporary electronics base has been mounted with all electronics wired except for the stepper motors and camera
Motor Controller Integration	Electrical-Software Integration	75%	Main motors can be driven by the main program, stepper motor control will be integrated this upcoming week
Open MV Cam Visual Processing Real-Time Analysis	Electrical/Software	90%	The algorithm to detect objects has been implemented. Need to add the ability to filter out unwanted objects like tape on the floor and corner posts.
Follow Debris Algorithm	Software	50%	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	3
Matthew Castleberry	Follow Debris Algorithm	2
Matthew Castleberry	Motor Controller Integration	5

Nia Perkins	LIDAR Localization Algorithm Development	6
Joe Hinely	Electrical Hardware Selection	
Joe Hinely	Electrical Hardware Placement	0.5
Josh Jablonowski	Electrical Hardware Selection	0
Josh Jablonowski	Electrical Hardware Placement	5
Josh Jablonowski	Motor Controller Integration	1

Achievements, Obstacles, and Risks

Most of the electrical hardware has been mounted on a temporary piece of plexiglass to allow for other teams to begin testing on the main platform. CAD design is still being improved upon to ensure accuracy for 3D printing. Wiring for the main DC motors is complete, and control via the Raspberry Pi has been established. To help clean up the wiring, USB cables with high flexibility will need to be ordered, and the CAD will reflect space for wires to be run around the robot. Stepper motor control is being worked on, along with improvements to the mechanical design of the gantry.

With the electronics now placed on the new robot platform, we were able to establish communication from the Pi to the Arduino to the motor controller. It seemed to work well but will need some improvement when we want to control the stepper motors alongside the drive motors. We plan to develop a generalized function that can control all 5 motors and the servo. It will take a parameter for motor selection (1-6) and speed (-100 to 100). The Arduino will process this data and map it to the corresponding motor.

Further development has occurred on the follow debris algorithm test for the visual processing. A function has been developed for determining the distance to the objects. The code changes will need to be tested and tuned to work properly.

We have committed to the decision to use ROS as the means for localization. This decision was made after a visit to the RFID Lab. We determined it was fully worth the time to get ROS operational. ROS is now integrated with our Pi and LIDAR. We will dive into ROS and explore how helpful this tool can be. The first step is to generate a static map of the field.