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Project Initial Abstract

Behaviors

In the frenzy of technological advancements, there has been a strong movement towards automation of tasks with the main goal of improving our conditions of living. With this in mind, the goal of our autonomous towing machine, is to be able to detect and actuate when an automotive has fail and needs a towing service; this task is to be perform autonomously. The application of this idea is to be extended to full-scale automotive and, to accomplish the vision in mind, we begin advancing this idea on small scale robots.

At this point, the project consists of having two autonomous robots. Robot A will mimic a daily automotive that would drive around until it 'breaks down.' Once it breaks down, Robot A would send a signal to Robot B signaling its need of towing service. When Robot B receives such signal, he would then proceed to Robot's A location for assistance. Upon arrival, Robot B would tow Robot A to a specified destination. In recognizing the location of Robot A, there are various ways to accomplish it. There are two alternatives that will be researched before selecting the best choice: 1) a god-camera that would recognize the environment and communicate with Robot B Robot's A location so that Robot B could then travel to the specified location for towing, and 2) a camera onboard Robot B that would scan the environment looking for Robot A and towing it once located. Above we have discussed the possible solutions for visual recognition. Another function, and point of discussion, of the towing machine would be the mechanism for hooking or grabbing the broken-down robot. This could be accomplish using a claw of some sort, a magnetic attraction, Velcro, or some other possible solutions. Also, thought must be given to the communication between robots. Solutions include Wi-Fi, Bluetooth, or radio frequencies.

Depending on the development of the project as the semester progress, there are also some future advancements that would enhance the robots' list of features. Some of those future features includes obstacle avoidance based on information from the god-camera, best possible path recognition given a terrain, and a possible mobile application that could give a user-robot experience.

I have ordered a Teensy 3.2, Raspberry Pi 2, F5529 LP TI Launchpad, and a 3-pack USB 2.0 Type A to Micro-B cable. These is the tentative hardware that has been selected for the project.

Sensors

- Camera
- Xbee module
- Collision Sensors
- Motors
- Special Sensors-magnets
- Raspberry Pi 2
- Teensy 3.2
- Possible ABS 3-D Printing

Timeline

The timeline is divided into two phases: phase I deals mainly with obstacle avoidance, motor actuation, and initial software, whereas phase II deals with visual recognition and final project features.

Projects	**Comments**	**January**	**February**	**March**	**April**
IMDL Robot					
Hardware Research Phase I	Sensors: Visual, Tactile, Movement,	11th -25th			
Budget Analysis	Estimate Cost of Final Robots	22th			
Buy Equipment Phase I	Equipment for Phase I	22th			
Software Implementation Phase I	Obstacle Avoidance, Motor Actuation	25th -	8th		
Hardware Research Phase II	Sensors: Special Sensor, Visual, Networking		1st-8th		
Buy Equipment Phase II	Final Purchase		8th		
Hardware Implementation Phase I	Obstacle Avoidance, Motor Actuation, Body		1st -15th		
Testing I	Obstacle, Motors' Performance		15th-22nd		
Software Implementation Phase II	Visual Recognition, Communication, Path		29th-	14th	
Hardware Implementation Phase I	Effective Components Location			14th -21st	
Testing II	Location of Object, Possible Path Recognition			21st-	11th
Re-assess the course of the project.	Assessment, Objective Met				11th -25th