Señor Robot

A Robotic Courier System

Progress Report Wk2

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3/27/12

Milestone chart

Task	Scheduled Completion	Team Member	Modified Completion Date	Comments
Chassis Prototype construction	1/1	Andrew	1/1	
USB motor control	3/3	Alex	3/17	Delayed
Teleoperation of Vehicle	3/10	Andrew, Alex	3/19	Delayed due to usb controller not working.
Auxiliary sensor installation and configuration	3/17	Alex		Delayed Until Sensors are Ordered
Power supply/charging system	3/17	Andrew	3/22	Completed, but will need to be rehashed when mechanical system is done.
Mapping Framework Completed	3/24	Andrew	3/22	Completed. Still needing calibration
Wireless Data Acquisition & Estimation	3/31	Russ		About to Enter Unit Testing
Mechanical and Electrical Completion	3/31	Alex		
Navigation Framework Completed	3/31	Andrew		Rough navigation works, but without calibration the robot doesn't realize it is at the destination
User Interface Design Completed	4/7	Ryan		
Wireless Data Acquisition on Vehicle	4/15	Russ		

Wireless Location Integration	4/22	Russ, Andrew		
User Interface Communicating With Vehicle	4/22	Ryan		
Completed Assembly & Integration Testing	4/29	All		
Completed Project & Testing	5/1	All		

Current Milestones:

Auxiliary sensor installation and configuration	3/17	Alex		Delayed until sensors are ordered.
Power supply/charging system	3/17	Andrew	3/22	Partially complete. Delayed until 3/22
Mapping Framework	3/24	Andrew	3/22	Completed. Still needs calibration

Next Milestones:

Wireless Trilateration Completion	3/31	Russ		About to Enter Unit Testing
Navigation subsystem	3/31	Andrew		Rough navigation works, but without calibration the robot doesn't realize it is at the destination

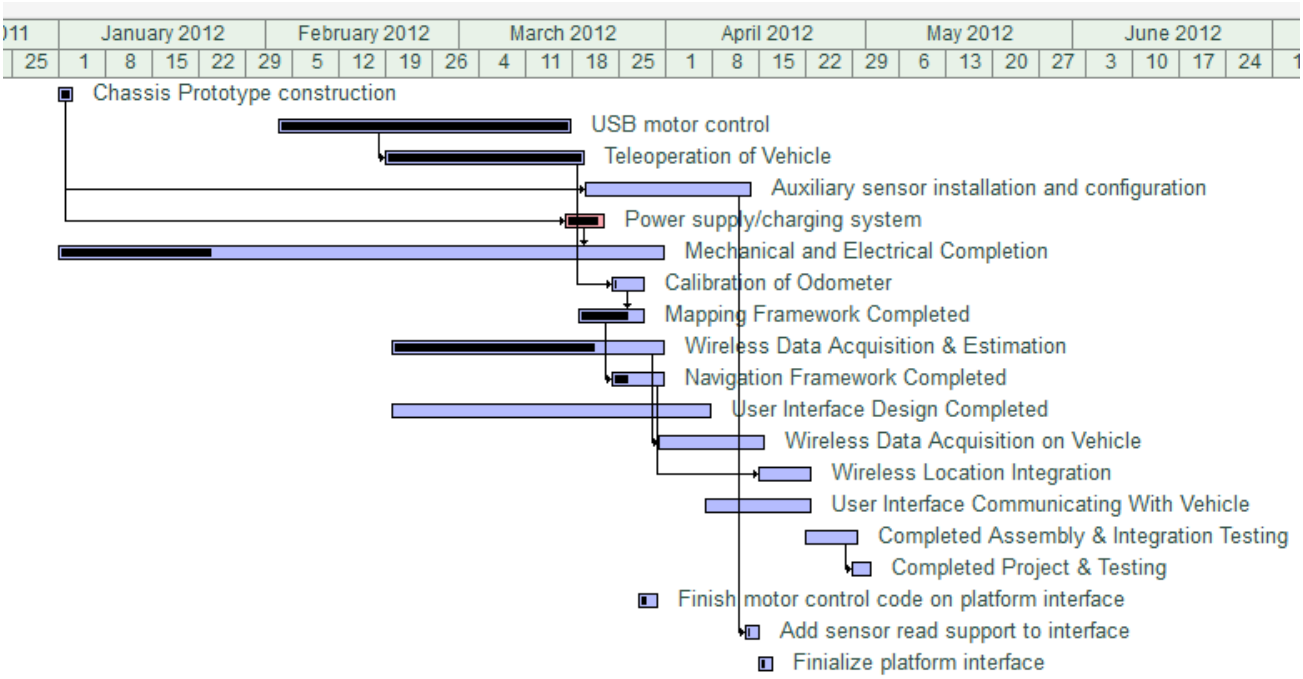
Status:

While we have previously questioned the need for the wireless access point estimation, we have decided to continue progress on it, due to the fact that it is far along, and there are no other higher priorities to work on as of now. This work will continue for the next several weeks, until the subsystem is completed and integrated, or other subsystems get closer to deadlines and need immediate work to be performed. Regardless, the current progress that was made on the wireless subsystem this week involved determining the exact framework and algorithms that would be used by the subsystem to calculate access point locations, as well as continuing work on the program.

The remaining work needed for this subsystem is to interface it with the SciPy library that allows least squares calculations, which will create the location of all access points given data. Following that, testing will need to be performed on the device, which is likely to take the most amount of time. The data is hard to generate, and must be calculated in a different manner in order to determine the accuracy of this subsystem. This will likely be the most time consuming part of this subsystem over the next week. Additional work with this subsystem involved attempting to determine accurate calibration of signal strength to distance, but attempts at mapping real data to the unpredictability on Russ's laptop came up highly inaccurate. In order to fix this, we are purchasing a wireless card with an external antenna, which will help alleviate some of the inaccuracies that have occurred.

The mapping subsystem is up and running. Automatic mapping and localization through the slam_gmapping libraries works fairly well with teleoperation, but we've run into some issues with odometric data inaccuracies. When rotating, the platform will translationally drift, and vice versa. This is almost certainly due to imperfect orthogonal mounting of the mouse, but can easily be corrected. If still insufficient we have a gyroscope with .003 degrees/second resolution available to augment the rotation information supplied by the mouse. Hopefully this will resolve some of our issues with loop closure.

The power supply has finally been hashed out, but because the mechanical system needs to be rebuilt, it hasn't been installed. We will need space for two 17AH lead acid batteries, which should provide us with approximately 3 hours of continuous runtime. We've settled on a 200W power inverter running on the main system batteries to power the kinect and the laptop. There will be a minimal efficiency hit, but the draw of the kinect and laptop is small compared to the motors. To recharge the batteries, we'll be breaking out two terminals to connect to a large UPS system to recharge the lead acid batteries.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January 2012
February 2012
March 2012
April 2012
May 2012
June 2012
25 1 8 15 22 29 5 12 19 26 4 11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24
Chassis Prototype construction
USB motor control
Teleoperation of Vehicle
Auxiliary sensor installation and configuration
Power supply/charging system
Mechanical and Electrical Completion
Calibration of Odometer
Mapping Framework Completed
Wireless Data Acquisition & Estimation
Navigation Framework Completed
User Interface Design Completed
Wireless Data Acquisition on Vehicle
Wireless Location Integration
User Interface Communicating With Vehicle
Completed Assembly & Integration Testing
Completed Project & Testing
Finish motor control code on platform interface
Add sensor read support to interface
Finialize platform interface