IEOR 140 Final Project Milestone 3 - 11/2/2012

Team 4: Nate Bailey and Raymond Ma

Responsibilities

In this project, Nate was in charge of program design and coding. Raymond was in charge of hardware design, experimental work, and project writing.

Hours Spent

Approximately 14 hours of work

Project Code

https://github.com/ieor140-team4/FinalProject

Performance Specifications

Our robot met all of the performance specifications (there were no bonus specifications to meet).

Experimental Work

(-30, 35)												
Heading 0			Heading 90			Heading 180			Heading -90		
X	Y	H	X	Y	H	X	Y	H	X	Y	H
-24.098	36.934	0.687	-24.188	36.5	89.931	-28.75	34.844	178.377	-28.138	35.5	-90.761
-28.186	36.662	3.526	-26.484	36.5	90.259	-28.748	34.94	179.377	-28.903	35.499	-90.974
-25.424	37.258	-2.691	-24.975	36.5	89.71	-28.748	34.94	179.377	-27.292	35.498	-91.551
-24.755	37.24	-2.501	-26.484	36.5	90.259	-29.656	34.916	179.127	-28.138	35.5	-90.761
-31.853	36.474	5.486	-27.302	36.5	90.029	-27.859	34.868	178.623	-28.138	35.5	-90.761
-26.795	37.007	-0.078	-25.772	36.5	89.485	-27.859	34.868	178.623	-27.292	35.498	-91.551
-31.853	36.474	5.486	-18.047	20.504	92.058	-28.748	34.94	179.377	-28.138	35.5	-90.761
-24.755	37.24	-2.501	-26.58	36.5	89.259	-28.748	34.94	179.377	-28.138	35.5	-90.761
Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg
-27.2149	36.91113	0.92675	-24.979	34.5005	90.12375	-28.6395	34.907	179.0323	-28.0221	35.49938	-90.9851
Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev
3.143426	0.336064	3.504766	2.971213	5.65544	0.857823	0.574572	0.04044	0.422359	0.522253	0.000916	0.356914
Overall:											
Average X:		-27.2139									
Average Y:		35.4545									
Std Dev X:		2.518496									
Std Dev Y:		2.847518									
(240, 185):											
Heading 0			Heading 90			Heading 180			Heading -90		
X	Y	H	X	Y	H	X	Y	H	X	Y	H
239.392	177.711	3.012	244.043	176.565	98.809	219.424	175.154	-167.892	236.271	174.483	-85.474
233.48	177.743	2.681	243.948	176.551	97.809	219.424	175.154	-167.892	212.222	217.341	-76.206
233.48	177.743	2.681	243.948	176.551	97.809	224.076	175.353	-176.319	236.271	174.483	-85.474
239.392	177.711	3.012	250.139	176.555	98.124	229.195	175.387	-175.965	235.903	175.481	-85.274
233.48	177.743	2.681	211.715	176.638	102.848	214.325	175.38	-176.038	236.271	174.483	-85.474
233.48	177.743	2.681	250.139	176.555	98.124	251.562	175.04	-179.579	236.271	174.483	-85.474
239.392	177.711	3.012	250.139	176.555	98.124	229.201	175.291	-176.965	236.271	174.483	-85.474
239.392	177.711	3.012	226.942	176.581	99.845	224.076	175.353	-176.319	236.271	174.483	-85.474
Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg	Avg
236.436	177.727	2.8465	240.1266	176.5689	98.9365	226.4104	175.264	-174.621	233.2189	179.965	-84.2905
Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev	Std Dev
3.160097	0.017105	0.176927	13.76508	0.029657	1.718157	11.35605	0.130675	4.31303	8.484996	15.10622	3.267381
Overall:											
Average X:		234.048									
Average Y:		177.3812									
Std Dev X:		10.80071									
Std Dev Y:		7.390092									

From our experimental work, we discovered that the values deviated more when we were farther away from the lights as opposed to when we were closer to the lights. We have some large standard deviations when we are further away from the lights, but this is most likely caused by one bad reading out of multiple good readings.

Task Analysis

- Collect data from Scanner
- Calculate Pose

Class Responsibilities

The Scanner had the added task of being able to detect the Ultrasonic distance. This milestone was performed pretty much entirely by the Locator class in NXT Files. The Locator was in charge of using the Scanner class to scan for the distance to the wall and the angles to the lights and then uses this information to calculate its Pose.

Interesting/Challenging/Difficult

The most interesting, challenging, and difficult part was all in the logic of figuring out the correct and most accurate way of calculating our Pose. One way we used to make our values more accurate was to take into account the distance of the head to the center of rotation of our robot.

Appendix
Source Code | Java Docs