IEOR 140: Project 2 Milestone 1

Team 6: MoonSoo Choi & Sherman Siu

**Sherman**: experiment runner, coder (both LineTracker and extra credit), report reviser

**MoonSoo**: experiment runner, coder (mainly for extra credit problem), report writer

**Time spent:** Approximately 8 hours each person (a bit *too* much for this milestone in our opinion)

**Project Description:**

We programmed our robot to follow the line (marked by blue tape) on the track. The robot would complete four complete circuits, turn 180 degrees, and then complete four additional circuits in the opposite direction. We also programmed our robot to make 4 figure-8 shapes.

**Experimental work:**

We ran an experiment for this milestone to determine how far above the ground the robot sensors should be.

We ran three trials with three different heights (0, 2, and 4 Lego units) for where the sensors should be located. Experiment results show that as the sensors are located closer to the track, the higher light sensor value.

**Most interesting/challenging/difficult part of the project:**

In order to program the robot to track the line successfully, we had to determine *appropriate amount* of each individual variables. Such variables included speed, acceleration, gain, error, and control. Since there were so many variables to take care of, we had to learn how each variable would influence the smoothness of robot tracking the line. While all of the variables are significant, we eventually learned that acceleration is quite a critical variable, and realized that we needed to lower the acceleration.

**Experimental data to improve the smoothness of tracking**

The experiment displays several significant results.

One, as the color of the track gets darker, the light sensor value will become lower.

Two, as the sensors are higher above from the track, the light sensor value will be lower.

Three, left and right light sensor may differ in their values.

Four, lowering the gain and accelerations value will cause the robot to move smoother.

But if the values are too low, the robot cannot adjust quickly enough and will go off track. **(continued on next page)**

However, there is one more significant result observation that helped us to improve the smoothness of tracking. We observed that as the sensors are higher above from the track, the differences between light sensor value above ***white*** track and one above ***blue*** track will be larger. In other words, locating the sensors high above the track will help the robot to distinguish different colors a lot easier, so it is probably not a good idea to attach light sensors really close to the ground.

**Programs:**

Tracker.java

Milestone1.java