REC for Cortex

6.1 Project: Mailbot Challenge - Advanced

Name: _____ **Class/Period:** _____ **Date:** _____

Overview:

The knowledge and techniques you acquired throughout this program will be tested by the Mailbot Challenge.

Duration:

2 weeks

Materials:

Qty	Description
1	BaseBot
	easyC
	Additional parts from your REC 1 Bundle
1	Ultrasonic Sensor
1	Line-Follower Kit
1	3 Ring Binder
1	All Purpose Tire
1	Playing field with course outline

Procedures:

6.1.1A: Introduction

Your project was inspired by real life mail trains of the late 19th and early 20th centuries. At that time nearly all mail was moved by rail at least once during its journey, and many rural areas of the country relied heavily on passing trains. Amazingly most trains serviced small towns along their route without ever slowing down!

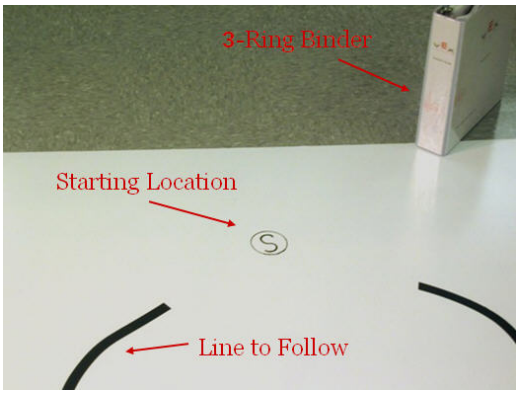
A mail crane was used to suspend the mail bag beside the path of the oncoming train. Double exchanges, in which the train also suspended a mail bag that was caught by a net on the ground, were also common.

In this project, your robot will be mimicking the journey of a fictional mail train by collecting and delivering a mail bag.

6.1.2A: Ultrasonic Train Yard

Your robot must begin by finding its way out of the starting position.

This challenge is simulated using the ultrasonic sensor. On the day of the competition, your teacher will stand a 3-ring binder on end opposite from the line your robot will need to follow in the next challenge. Your robot will need to utilize the ultrasonic sensor and the positioning of the 3-ring binder to determine the location of the line (tracks).



6.1.3A: Track Following

The train tracks will be simulated using a line of black electrical tape.

Your robot will have to follow the line all the way back to the start, stopping only to load and unload mail.

As you think more about this project, you will discover how each aspect of it differs slightly from what you have already learned. Line following is no different, and you will need to modify your old code, or write a new program to complete this challenge.

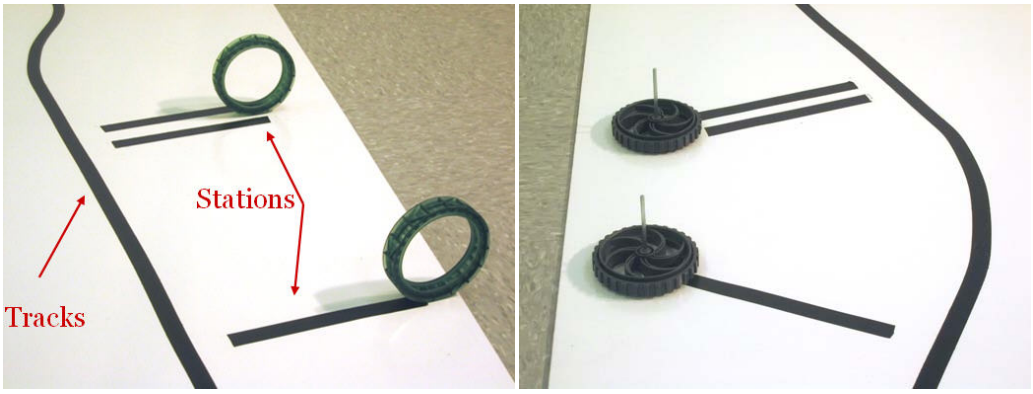
6.1.4A: Recognizing the Mail Station

The first two stations along the journey are the pickup locations. Your robot should take possession of the object representing the mailbag there.

Your robot will need to know when it has reached a station. Each station is uniquely identified by either a single or double stripe of black tape oriented perpendicularly to the track. The mailbag from the single stripe pickup station will need to be delivered to the single stripe delivery station. The stations marked with double stripes are similarly associated.

The second pair of stations are the delivery locations. The robot will need a way of releasing the mailbag, and possibly even playing it on the field in a certain way. Your teacher will explain how the object will need to be deposited.

Your robot will need to deliver the correct mail bag to each station. This may involve making more than one journey around the course, which is perfectly acceptable. One of your tasks is in finding the most efficient way to complete the challenge.



6.1.5A: Manipulating the Mail

Possibly your most challenging task will be to design an end effector capable of picking up and delivering the mailbag. The mailbag will most likely be round and hollow like a rubber tire.

You will be constrained by the building materials available to you. Don't waste time designing a system that you can't build.

Also remember that your end effector should be flexible enough to pick up and deliver the mailbag in a specific manner.

6.1.6A: Challenges

The project can be summarized by 5 key tasks:

- Your robot must make its way out of the starting ultrasonic area, and onto the correct black line (the line leading to the pickup station).
- Your robot must line follow until the pickup station is reached.
- Your robot must grasp and take the mail bag into its possession.
- Your robot must continue along the line until the delivery station is reached.
- The end effector must appropriately deliver the mailbag.

There are two separate grading rubrics for this project, one for

Week 1, and another for Week 2.

- Week 1 focuses on brainstorming, building your robot, and completing the Challenge under Operator Control.
- Week 2 focuses on programming your robot to complete the course autonomously.
- Each week of the project will conclude with an in class competition. Each group will have an opportunity to publicly showcase their robot design, RC and autonomous programs.

Congratulations!

You now have all the information you need to begin this challenge.