Software Design Document

Project: DPM Final Project

Document Version Number: 1.0

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EDIT HISTORY:

[29/10/2018] Zakaria: Created the document + added flow chart

[30/10/2018] Zakaria: Added UMLs and class hierarchy+ comments

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1. Overview:

Our software design will be mainly constructed from the subparts that were developed during the research phase of the project in the labs. We will be using all those pieces (with minor changes) in addition to new classes to perform the tasks required. Since the final project doesn't require searching, we will not be using that part from Lab5, we will only be using the color detection feature from this lab. We will also need the following parts: Odometer, Localization and Navigation.

2. Navigation:

This subsystem is used to go to a desired point in the map. It always interacts with odometer class to get its position on the grid to know by how much it should move. In our final project, this system will be used in a similar fashion in order to navigate to the tree and back to our starting corner.

In order to visualise this system, we included the UML diagram that we had from the Navigation Lab:

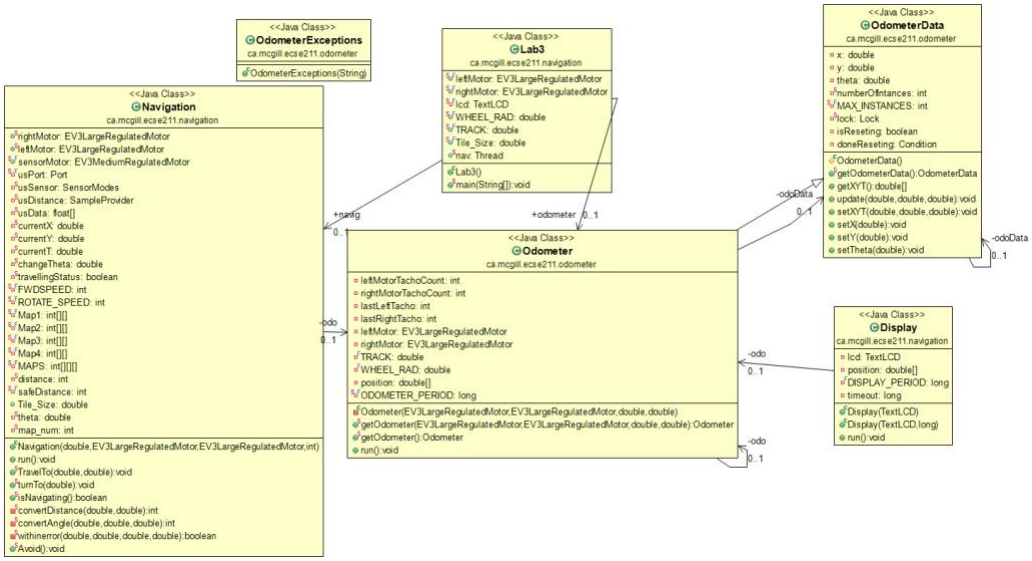

Figure 1: UML diagram from the Navigation Lab

3. Localization:

This system is used to perform the ultrasonic and light localization. In this lab, we had two ways of performing the ultrasonic localization (falling edge and rising edge). Since we don't use both ways and falling edge works better in our design, we decided to delete the rising edge part. For the light localization, we decided to change the design to a use two light sensor instead of one, we noticed that this gave us more precision. We also decided to add poller classes to have

cleaner code structure. By doing so, we would have three pollers for these tasks, “LeftLightPoller”, “RightLightPoller”, “UltrasonicPoller”.

We included the UML diagram from this lab in the following figure:

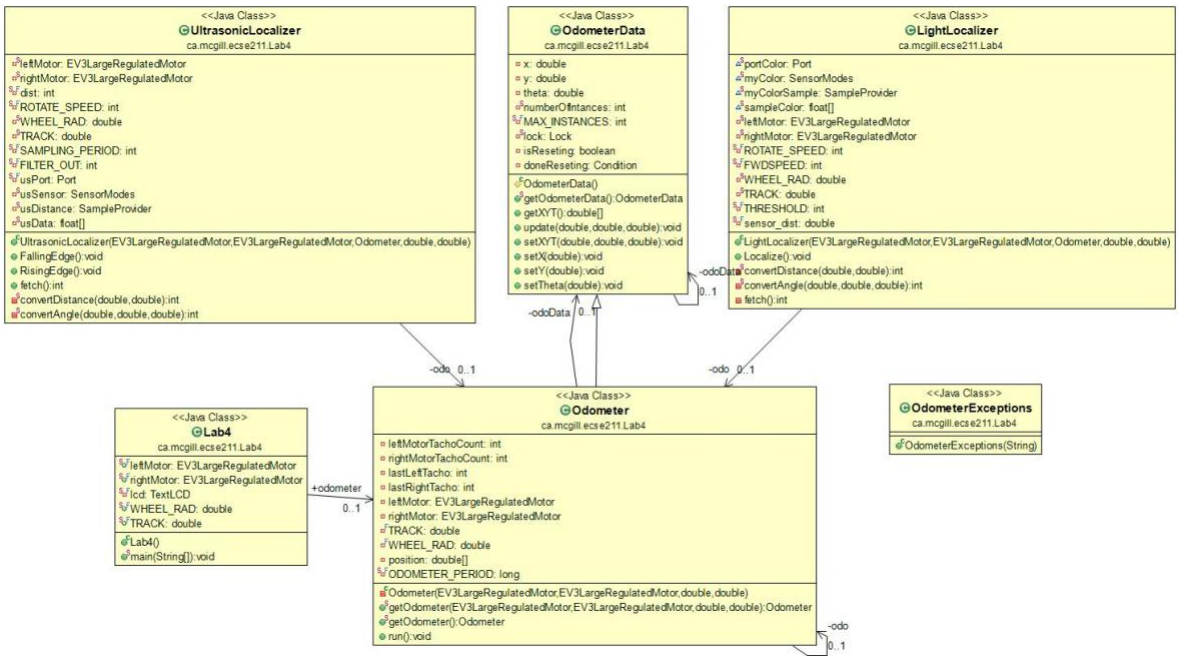

Figure 2: UML diagram from the localization lab

4. Search and Localize:

The main part that will be used from Lab 5 isthe color detection. Basically, we will create an instance of this class and call the detect method to get the ring color. We can see all the fields and classes from this class in the following figure:

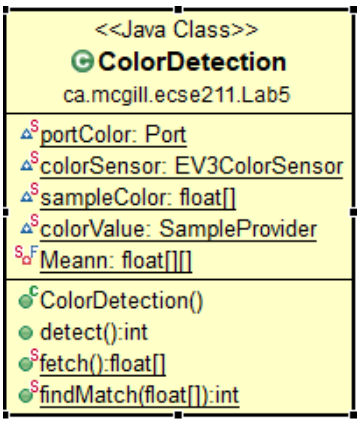

Figure 3: Summary of the Color Detection class

5. Project design:

For now, our software is still simple since we are still writing the initial code and building an effective prototype and thus we don't know what kind of issues we would have to fix with software.

The following flowchart explains the biggest steps of the

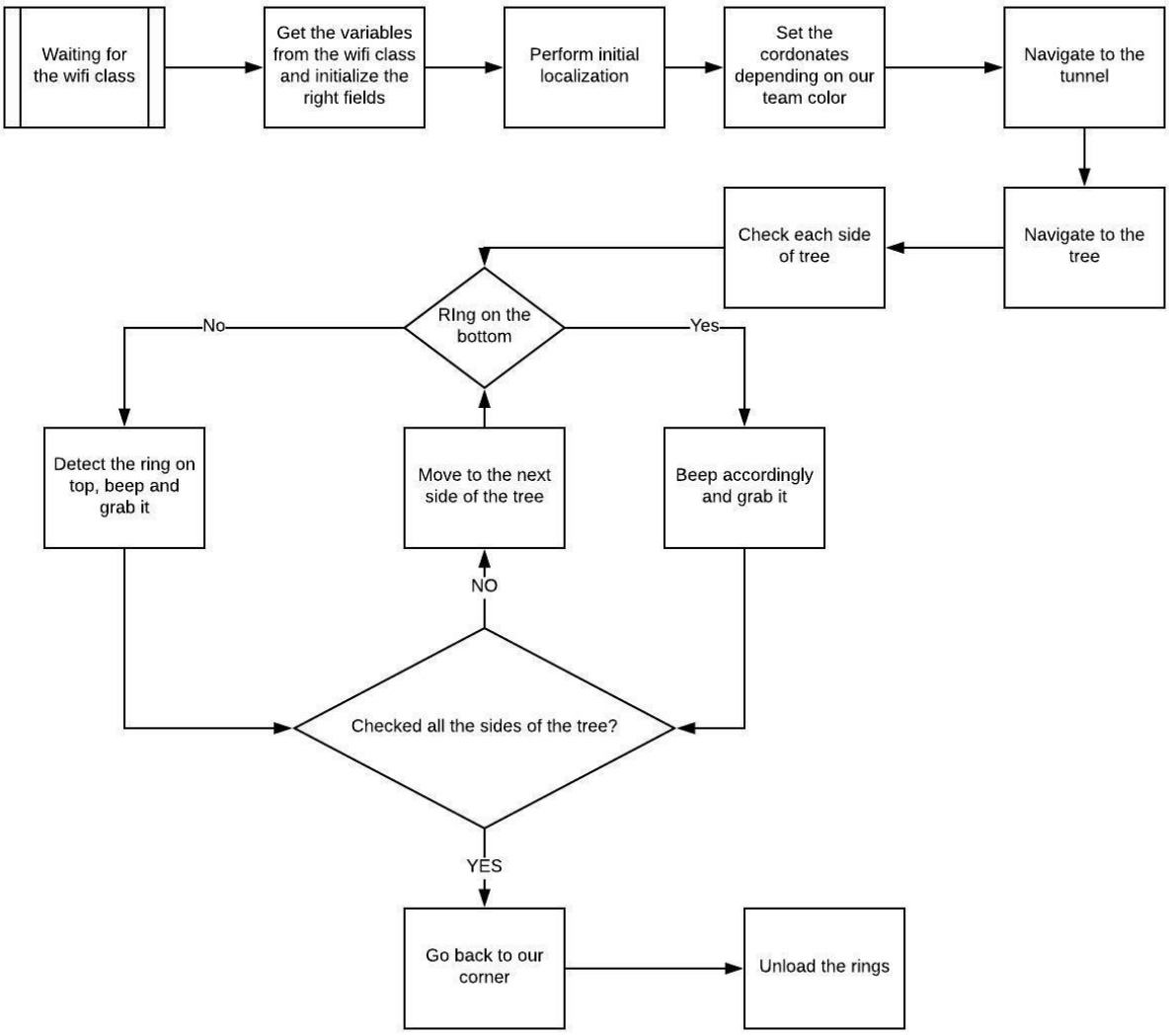

Figure 4: Preliminary flowchart for the project

We also included a preliminary class hierarchy that shows the basic interactions between the class. There are a few changes to note compared to the other labs:

- We are now using poller classes for the sensors instead of implementing them directly in the classes.
- We will be using two light pollers for light localization.
- The navigation class will call the light localization class from time to time

Preliminary class hierarchy:

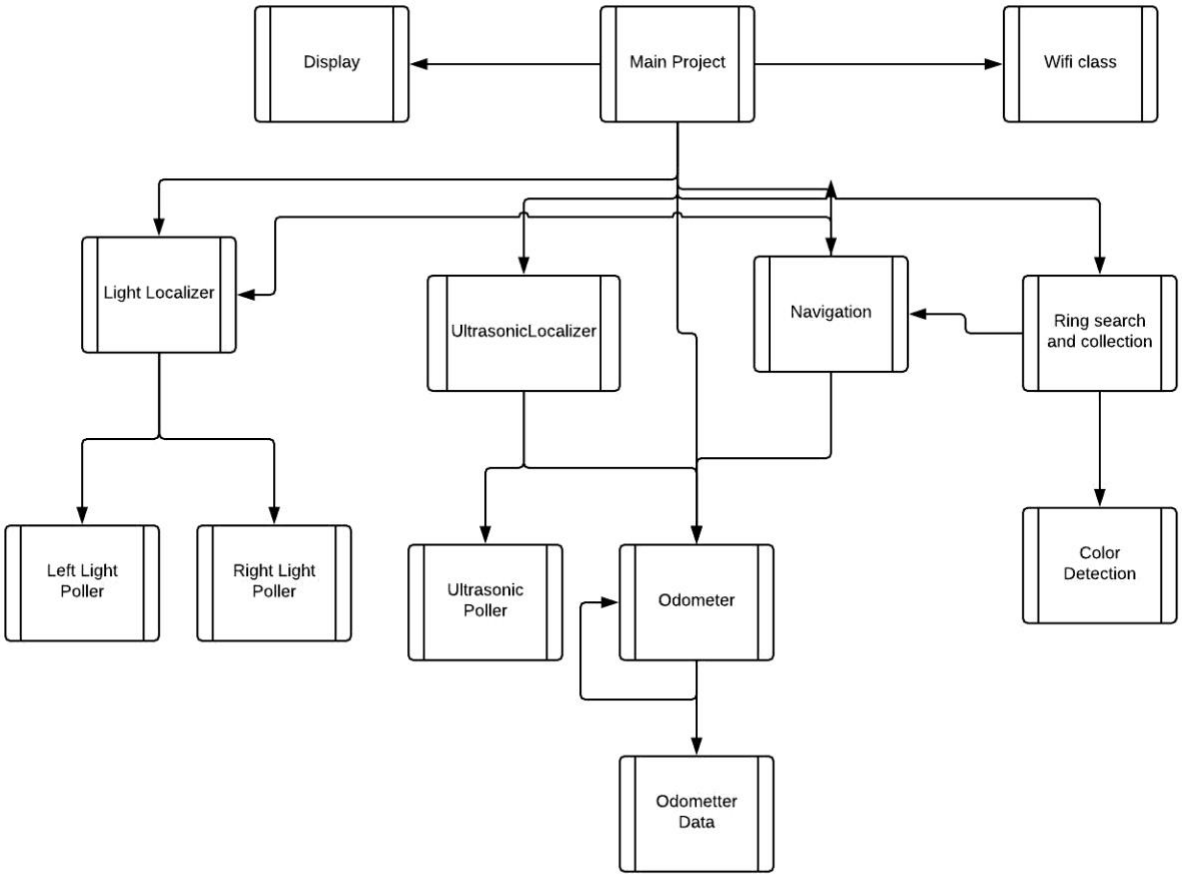

Figure 5: Preliminary class hierarchy for the project

6. Objectives for this week:

- Developing an accurate light localization routine that accounts for all the particular cases where the sensors a since we will be using it while travelling.
- Developing the first prototype of the ring search and collection class when the hardware will be available.

- Dealing with false positives from the color detection class coming from seeing the tree stand as being a yellow ring.