# Elec 1100 Report

## SUMMER 2018

*We are team 122 and we were comprised of Zixiao Zhu and Olusola Babatunde. Though out our labs to construct our rover, balancing our workload seemed very delicate due to the nature of the tasks. So When it came to the process of current testing and debugging analysis Zixiao tended to take the lead and when it came down to circuit connecting and programming logic Olusola developed the main logical themes. But when it came to the Robot construction itself, both of us had taken apart and rebuilt the robot car enough times to say that our work load was a 50-50 split for both team members considering how we both had to make adjustments to each others assignments in order to make the car run smoothly and undertime.*

# Contents

*Pictures go here*

# Introduction

## What is the Pluto Rover?

The Pluto Rover(or just Pluto) is an electric car that was developed from scratch in order to complete a series of tasks on a maze board.

Our task was to develop a Robotic car, from scratch, that would be capable of tracking a line, making pre-determined turns, and start or stop its behavior by using nothing more then breadboard components, wires, a pair of wheels, and, at most, four sensors. The goal was to make the robot complete the maze in under 30 seconds and start and stop when a white piece of paper was place in front of its.

# Design - Body

Before we talk about what is happening inside of the car, lets start with the surface. Before we began construction, we knew we had to build our car in a way that would promote speed . Since our shell exterior was predesigned for us, we decided to make some placement changes

## Initial Design

For example, the way the Navidriod Plastic blue pieces we received were cut made it seem like our robot was designed to be slowed down by excessive drag force. Initially, we desired to 3D print or laser cut our own components for the car, but, due to this project occurring over the summer, their wasn't enough time to do it and get the car assembled. So instead we chose to speed the car up using basic principles of physics first.

For instance, we placed the bread board battery closer to the Wheels so that the total center of mass of the car would be place in roughly the same place. The change of placement helped improve the overall speed of the car because the force vector going down directly on the wheels eliminated some of the friction caused by the white rolling ball as it withstood the weight of the battery.

## Debugging

We placed the sensors closer to the wheels so that the car would be capable of making its turn judgements more accurately then if the wheels were placed on the opposite end of the robot. We also noticed after several runs that one of our car's motors is a bit faster then the other one and it caused our car to turn prematurely. Since our code was written with the assumption that both wheels would move in a straight line for the maze's perpendicular split sections, we decided to make the right sensor closer to the middle sensor on robot; that way, even if one wheel was moving faster, our second sensor would would help "correct" our robot to put it on a straight path more frequently then when they were both equivalent distance form the origin.

But not all of our adjustments were beneficial. For instance, but putting all the main components like the battery, motor, and sensors all on the same side of the car, that side got tangled with an array of wires. Initially this was problematic because the wires would occasionally drop down to the wheels and cause enough friction that the car make begin making a premature turn. Fortunately, we decided to use one of our wires to tie them all together and keep them above the wheels.

# Design – Circuits

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## Circuit Components used (if you want)

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## Debugging Report (Required)

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# Design – Code

## Initial Design

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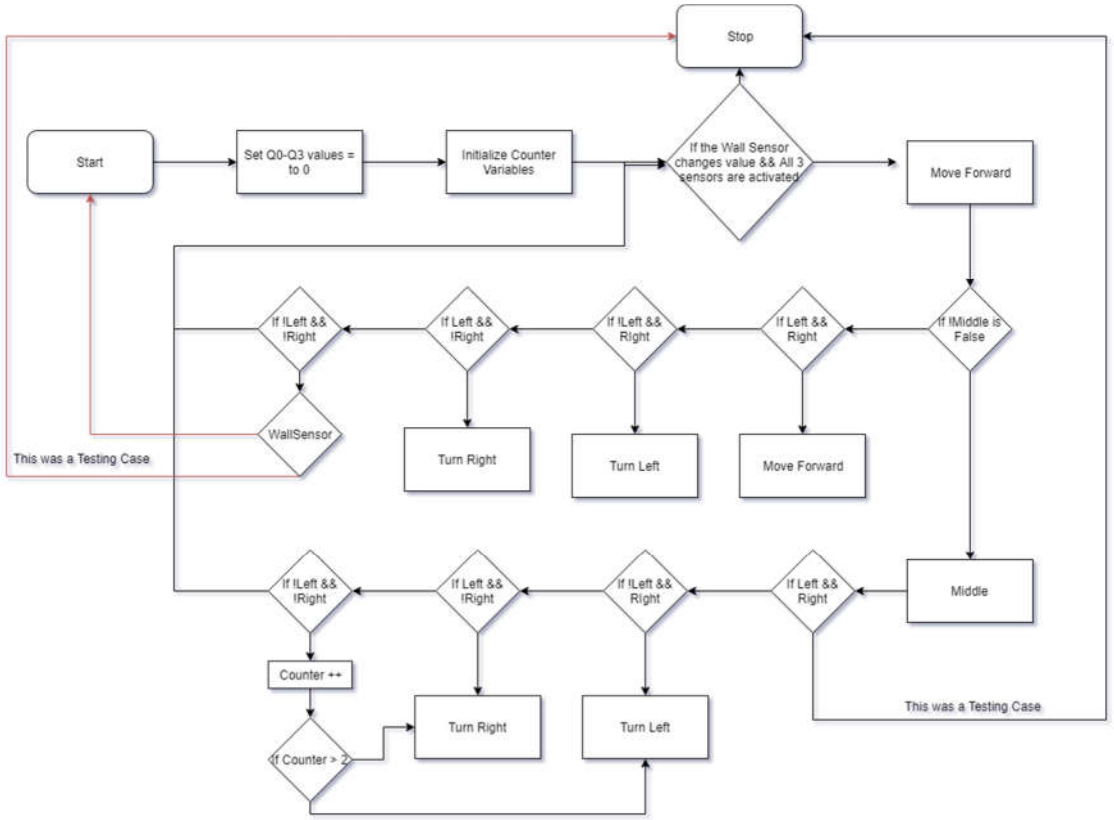
## Logic Flow chart




## Debugging Report (Required)

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# Results and Evaluation

## What do you think worked well in your design ?

## What worked poorly?

## How did you fix any unexpected incidents ?

- Curcit board exploding
-

## What would you do different if you had to start over ?

Make an appointment with our TO whenever we ran into a sever issue. Sometimes we spent hours just staring, testing, and rebuilding our car because we couldn't discover what issues were preventing it from functioning properly.

## How could you improve your design if you had more time?

We would use the Engineering Design center to laser cut our own parts for the robot. However, over summer laser cutting required us to take safety tests and learn a new software then what we were used to using. Due to our limited time, it was best for us to not do it this time, but, with 2 more weeks, we would do it!

## Are their any bad decisions you have made during the project period?

Yes! Of course! For instance, Olusola chose to attend a 2-day hackathon and Zixaio visited China over the weekend. If we had discussed this earlier, we could have taken our absence of leave at the same time, so we could work on the robot at the same time. Another incident that occurred was sometimes one of us would try to work on the robot without the other and it normally lead to a new component breaking and us needing to start all over.

## Conclusion

Ultimately, Pluto was a successful car because it not only met all of its required objectives, but because it required us to understand electronic development on the most fundamental level in order to succeed. This robotics course has truly been a unique experience for us international exchange students. This project gave us hands on applications to learning that aren't normally present in either of our home universities.