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| --- | --- |
| *Title:* | **Motor Control for Formula Student Electric Vehicle** |
| *Description:* | **Draft Report** |
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| *Date Submitted:* | **2018-2019 Semester 1 & 2** |
| *Submitted for* |  |
| *Module:* | **Project** |
| *Programme :* | **DT023-4, Design & Manufacturing Engineering** |
| *Lecturers:* | **TBA** |

# Executive Summary

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# Introduction

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# Problem Specification

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# Aims and Deliverables

## Principle Aim

xxxx

## Aims

xxxx

## Deliverables

xxxx

# Critical Path Analysis

## Project Plan

xxxx

## Project Logbook

xxxx

1. **Literature Survey**
   1. **xxxx**

xxxx

* + 1. **xxxx**

xxxx

1. **Feasibility Study**

xxxx

# Project Design

## Design 1

xxx

## Design 2

xxx

## Design 3

xxx

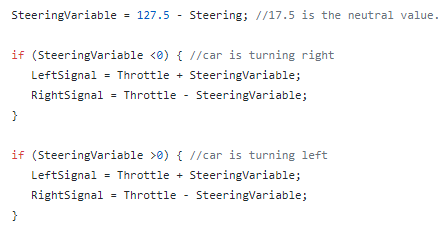
## Final Design

1. **Programming** 
   1. **Early Research**

As part of the early research, the first pieces of coding were simplistic and crude. The initial setup consisted of two potentiometers to represent the steering and throttle and two 3V DC motors to represent the two hub motors. The basic idea was to write a program that would increase the speed of both motors when the throttle (potentiometer 1) is increased and to increase the speed of one motor and decrease the speed of the other when the steering (potentiometer 2) was adjusted.

The basic functioning of the code and circuit was that as the potentiometer is adjusted, the electrical signal will vary from 0 to 5V. This is represented in the Arduino as a value from 0 to 1023. The signal that the Arduino can output from a PWM pin ranges from 0 to 255. Fundamentally, this 0-1023 range is converted to 0-255 ( by multiplying by the conversion factor 255/1023) and sent to the motors. That is the operation of the throttle. The steering is the first source of complication.

The first program considering the steering can be found below:



In this rudimentary block of code, the steering wheel value is subtracted from the neutral position. The neutral position is when the car is not being steered in either direction. This approach gives a proportional response, the further the wheel is turned, the larger the SteeringVariable will be. This value is then added or subtracted from the two wheels, depending on the direction of rotation.

This code has many faults. There is nothing stopping the values going out of the range of 0-255. The program will be almost ineffective as the car approaches minimum and maximum velocity.

The 127.5 value introduces the use of floating point data types. These are complex data types and there is no need in this instance.

Another source of inefficiency in this program is the unnecessary introduction of negative values. The next development in this code was to alter the range of the signal being put into the calculations which are ultimately sent to the motors.

(show x-y axis explanation)

# Bill of Materials

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