VICTORIA UNIVERSITY, ENGR101

AVC Progress Report

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1 Abstract

The Following Lab Report details how the application of fundamental engineering concepts could be used in such a way to construct and operate an Autonomous Vehicle. This report will detail the design, construction, and programming decision that we made, the final outcome of the project and the end results, and in particular issues that arose, and how this was resolved.

Insert Results blurb here:

$$y = \frac{1}{\sqrt{2\pi}} e^{\frac{x^2}{2}}$$

2 Introduction

2.1 Purpose

The purpose of the AVC is to demonstrate engineering skills taught in the ENGR101 Labs; and to work as a team to create an autonomous vehicle.

2.2 Problem

The challenge of a self-driving car is not immediately intuitive; the act of simply “following a line“

2.3 Scope

The scope of this project was using C/C++, the ENGR101 C Library and skills we have learned in the Labs for the project. This includes *PID* Error Correction (Proportional, Integral and Derivative Responses) to follow the white line and other techniques taught in lectures.

3 Background

3.1 Theory

3.1.1 Closed Loops

A closed loop system is a system which constantly loops, checking a physical variable. This variable is then computed in such a fashion as to deliver an output which is used in such a method to influence the physical variable the next time the loop is checked.
A closed loop system is useful in the “follow the line“ section of the AVC where a difference in position of the line and the centre of the camera, which can be used to generate a difference in wheel speed. This difference in wheel speed can cause a turn in the vehicle

3.1.2 PID

PID stands for *Proportional, Integral and Derivative* response to a change in the conditions in a closed loop.
A proportional response is the current conditions and how it responds to them immediately. i.e. the further the object is from the line, the stronger corrective response is.
A integral response checks over time to see whether the car is on one side too often, and compensates accordingly.
A derivative response is related to how quickly the proportional response changes, and therefore turns the car the other way when it approaches the line.

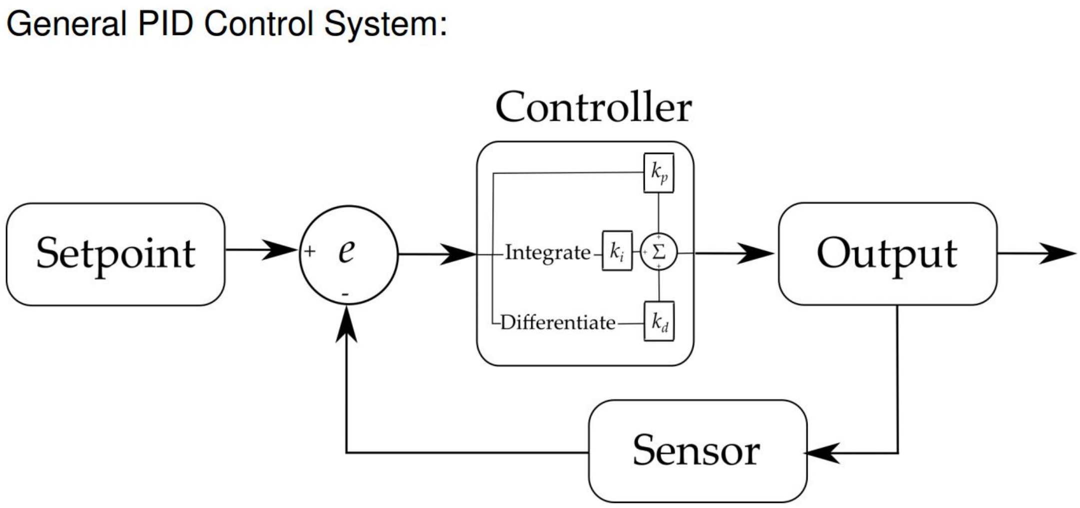

Figure 3.1: A
PID system diagram(Eldridge, 2016)

3.2 Research

Douglas, 2012

4 Test and Evaluation

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4.2 Procedure

5 Findings

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References

Douglas, B. (yearmonthday). Pid control - a brief introduction. **retrieved from** https://www.youtube.com/watch?v=UR0hOmjaHp0

Eldridge, J. (yearmonthday). Control systems and image processing for avc. **retrieved from** http://ecs.victoria.ac.nz/foswiki/pub/Courses/ENGR101_2016T1/LectureSchedule/ENGR101_Lecture20.pdf