7146CEM: Automotive Software Engineering - Design and Development

Coursework

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# Introduction

This document contains information and details regarding the workflow used to create the PID controller, Tuning of PID and Generation of Code.

# Software Development Life Cycle

This section gives an over all view of the software development process used to develop the cruise control and motor speed model.

## Requirement Gathering

### PID controller

To design the PID controller using the following equations

Where,

### Cruise Control

To design the cruise control model with the give specifications

Table 1 Cruise Control Model Requirement

|  |  |
| --- | --- |
| S.No | Requirements |
| 1 | Rise time < 10s |
| 2 | Overshoot < 10% |
| 3 | Stead state error <1% |

### Motor Speed

To design the motor speed model with the give specifications

|  |  |
| --- | --- |
| S.No | Requirements |
| 1 | Rise time < 5s |
| 2 | Overshoot < 5% |
| 3 | Stead state error <1% |

### Code

To develop the code in accordance with ISO26262 and following Misra Guidelines

## Design

### PID Controller

-Mention the process used to design the PID controller like creating the transfer function, converting transfer function to Z Transform

### PID Tuning Algorithm

-mention the script which is used to Tune the PID for the models

### Cruise Control

-UML diagrams, block diagrams

### Motor Speed

-UML diagrams, Block diagrams

## Coding

-Autocode generation procedures, Documentation procedures used.

## Testing

-Unit testing results, Polyspace statics analysis result. Cpp Check result

## Validation

-Comparing requirements and output of Testing to validate.

Table 2 Cruise Control Model Validation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.No | Requirements | Input | Expected Output | Actual Output | Pass/Fail |
| 1 | Rise time < 10s |  |  |  |  |
| 2 | Overshoot < 10% |  |  |  |  |
| 3 | Stead state error <1% |  |  |  |  |

Table 3 Motor Speed Model Validation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.No | Requirements | Input | Expected Output | Actual Output | Pass/Fail |
| 1 | Rise time < 5s |  |  |  |  |
| 2 | Overshoot < 5% |  |  |  |  |
| 3 | Stead state error <1% |  |  |  |  |

# Advantages of the used SDLC model

* Mention the advantages of the SDLC model used with the development of the pid.

# GitHub Workflow

* Mention the github links.
* Paste the flow chart of comits and branches as a picture

GitHub is integrated with Matlab, and all the versioning process is done within matlab itself.

# References