

SYNOPSIS

Mini-project Group No:95

Register No:

123012046

Name:

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Project Title: Mobility aid device for Wheelchair users to be used in a Railway system.

Name of the Guide: Dr. R. Hari krishnan, Assistant Professor, SOME

Abstract

People with physical disabilities and elders generally find it difficult to board the vehicles, especially when it comes to entraining, detraining and traversing within the train compartments and railway stations. Several mobility assistive devices like manual and powered wheelchairs, modified electric scooters etc. are available for Persons with Disabled (PWD) to locomote in public places. But, there are no devices that enable them to board a train and traverse to their seat and also aid them in transferring from one surface to another at least not without a Succour.

The objective of this work is to develop a simulation model of a complete locomotion system specifically designed to enable locomotion on the railway platform, entrain, detrain and self-transfer whenever necessary. The control system of the proposed device will be developed using MATLAB software and will be integrated with the developed model using the simulation framework CoppeliaSim

Specific Contribution

- Designed the Open loop and Closed Loop Speed control system of the PMDC Motor used for Locomotion in MATLAB.
- Designed the Closed Loop Speed control system of Linear Actuator in MATLAB.
- Designed a Wheelchair with Step climbing ability in SOLIDWORKS software.
- Designed a Simple DYOR Vehicle using pure objects in CoppeliaSim software.
- Designed the 2 stage Telescopic mechanism in SOLIDWORKS software.

Specific Learning

- Learnt to work with Simulink and Simscape.
- Learnt to Design a Linear Control System using Control System Designer App and auto-tune the designed controller using the internal app of MATLAB software.
- Learnt to Import SOLIDWORKS files to CoppeliaSim software using mesh files. (without the use of URDF Convertor)
- Learnt about the importance of Joint-Link Hierarchy in CoppeliaSim software.
- Learnt to work with SOLIDWORKS (2021) software.
- Familiarized and Understood the Working environment of CoppeliaSim software and Lua Programming.

Technical Limitations & Ethical Challenges faced

- Initially, we faced lack of knowledge on Linearization of a plant in MATLAB and on tuning the designed controller to the requirements.
- Unable to identify the cause of misbehaviour of the imported 3D model although the Joints have been configured with properly devised Joint-Link Hierarchy.
- Unstability in the imported URDF model.

keywords: Linear Control System, Step Climbing Wheel chair, Joint-Link Hierarchy, Telescopic mechanism

Signature of the Student

Signature of Guide

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