

Design of an Active Gravity Compensation Prototype for a 1-DoF Robotic Arm

Abstract

Background:

Remote Handling and Robotics Technology Development Division (RHRTD), IPR has working of design and development of remote handling system's prototype for the fusion machine.

Abstract of Project:

This project focuses on the prototype design of active gravity compensation system for a single Degree of Freedom (1-DoF) robotic arm. The project will involve the mechanical design of a reduced scale prototype arm along with CAD modelling and centre of gravity (CG) estimation of the mechanical structure. Analytical calculations will be carried out to determine the gravitational torque acting on the arm as a function of joint angle. A control system will be used to measure the arm position, and an appropriate counter torque will be generated by the motor to compensate the gravity effect throughout the motion range.

The primary objectives of the project are:

- To carry out a literature survey on active gravity compensation techniques.
- Development of CAD of a 1-DoF robotic arm and analytical calculation of gravitational torque variation with arm angle.
- Propose effective control algorithm for active gravity compensation using motor feedback.

Note: If time and resources permit, a physical prototype and experimental validation using the organization's workshop facilities will be carried out. All kind of control systems related support will be provided by IPR.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 1

2) Name of course with branch/discipline: B.E./B.Tech. Mechanical Engineering

3) Academic Project duration:

(a) Total academic project duration: 6 Weeks

(b) Student's presence at IPR for academic project work: 5 Full working Days per week

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