

Development of Haptic Loop for Telemanipulation Control.

Abstract

Haptic master arm is used for intuitive telemanipulation for remote handling applications in fusion research environments. While the existing system allows an operator to control the motion of a remote manipulator through natural hand movements, it currently provides limited or no force feedback from the slave manipulator to the operator. The absence of this bidirectional interaction reduces the operator's perception of contact with the remote environment, affecting precision and task execution.

This project aims to develop a haptic control loop for the telemanipulation system by establishing real-time bidirectional communication between the master haptic arm and the slave manipulator. The work will involve implementing position and force feedback control algorithms, integrating suitable sensors and actuators, and ensuring stable and responsive haptic interaction. The developed system will enable the operator to perceive contact forces encountered by the remote manipulator, thereby improving situational awareness, manipulation accuracy, and operational safety.

The project will provide students with hands-on experience in teleoperation, haptic feedback, real-time control, and system integration. The developed haptic loop will serve as an important step towards advanced telemanipulation systems for remote maintenance and inspection tasks in the challenging environments.

Academic Project Requirements:

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

2) Name of course with branch/discipline: M.E./M.Tech Electronics and Instrumentation Engineering

3) Academic Project duration:

(a) Total academic project duration: 38 Weeks

(b) Student's presence at IPR for academic project work: 4 Full working Days per week

Email to: naveen@ipr.res.in[Guide's e-mail address] and project_ece@ipr.res.in [Academic Project Coordinator's e-mail address]

Phone Number: 079 -4438 [Guide's phone number]