



Title: Collaborative Research: CPS: Medium: Closing the Teleoperation Gap: Integrating Scene and Network Understanding for Dexterous Control of Remote Robots

Indian PIs: Amit Bhardwaj (IIT Jodhpur), Suril Shah (IIT Jodhpur), Ankita Chugh (AIIMS Jodhpur) and Vineet Gokhale (TU Delft)

US PIs: Stefanie Tellex, James Tompkin, Srinath Sridhar, Brown University; Keith Winstein, Stanford University

Both the IHFC and NSF projects are related to teleoperating a robot. In the US project, the robot is controlled through virtual reality interfaces while integrating scene and networking understanding of the remote environment, and in the IHFC project, the robot is controlled by a haptic interface that commands position/velocity information to the end-effector of the robot and receives force/torque information from the robot once there is an interaction with objects in the remote environment. In the joint project, we integrate both the approaches of controlling the robot and propose two experimental scenarios:

1. Controlling a robot at Brown/Stanford with the operator at IIT Jodhpur using a VR interface and haptic controller.
2. Controlling a robot at IIT Jodhpur with the operator at Brown/Stanford using a haptic controller and a VR interface

The proposed setup will be used to build a tele-dentistry system for performing the following basic dental tasks: Early diagnosis of dental diseases by real time visual inspection of remote patients; assess the hardness of teeth severity of pain by tapping with the help of an attachment mounted on the robot; To assess the hardness and softness of tissues/gum by pressing them with the help of an attachment mounted on the robot.

