Development of a 4D of Robotic Manipulator Controller using Microsoft Kinect and Haptic Feedback Glove

Status: Filled

Group Members: Peter Johnston, Schiel Harman, Sage Devaz

Sponsor(s):

Supervisor(s): Amr Marzouk, Limited Term Lecturer/Postdoctoral Candidate, Mechatronics Systems Engineering

Complex robotic manipulators have been gaining tremendous popularity for the past several decades in fields ranging from manufacturing to practical medicine. However, in spite of their versatility, a great deal of knowledge and training is required to properly control these devices, be it in real time using a joystick or remote control, or by means of positional programming. Our project aims to make robotic manipulators more accessible and intuitive to individuals who find merit in their capabilities by softening the learning curve associated with implementing these devices.

We plan to use the revolutionary Microsoft Xbox Kinect 3D Vision system to serve as the platform for our controller. By moving their arm, the user will be able to control a 4DOF Lynxmotion robotic manipulator within a fairly wide range of motion. This controller will allow the user to either control the manipulator in real time, or program a path for the end effector to follow.

To supplement the user's experience, a glove will be developed for the users working hand which will respond to collisions between the end effector and objects in the environment. The glove will use a number of small vibration motors which will provide haptic feedback to the user whenever touch/pressure sensors are activated on the armature. To make for the best possible user experience, the glove will be designed for completely wireless data transmission.

January - Signal processing using Kinect complete, forward/inverse kinematics of arm characterized

June – Feedback to haptic circuit from sensors on Lynxmotion arm

July and August – Integration and final design considerations