INERTIAL MOTION CAPTURE BASED TELEOPERATION OF A MOBILE ROBOT MANIPULATOR

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INTRODUCTION.

Autonomous mobile robots are still lacking the capability to provide a sufficient degree of reliability for complex tasks in dynamic environments. Human intelligence is frequently employed for high-level robot decision making and control. Nonetheless, human presence at the robot site is undesirable or impossible in many cases such as space or undersea exploration, hazardous material handling, disarmament of improvised explosive devices, etc.

RESULTS AND DISCUSSION.

In this work, a full-body inertial human motion capture system Xsens MVN was used to control the Kuka youBot mobile manipulator. Xsens MVN consists of 17 inertial motion trackers attached to the body using straps capable of providing real-time full body kinematic data. The KUKA youBot is an omnidirectional mobile platform with mecanum wheels, which accommodates a five degrees of freedom robot manipulator. In order to create an intuitive mapping between the body segments and mobile manipulator parts, we decided to use the right hand position and orientation to generate the robot end effector position and orientation references. Inverse kinematics for the mobile manipulator arm is computed at each sampling time to convert hand position and orientation to robot joint angles. The body center of mass (CoM) position and orientation is used to provide position and orientation references for the omnidirectional base. For providing high level user interface commands, a gesture recognition module was developed. Six distinct left arm gestures were selected for providing high level commands to the teleoperation system. These gestures are hand forward, hand on chest, hand on waist, hand up, hand sideways and neutral. Classification accuracy for the testing set is 95.6%.

Figure 1. *– Mobile manipulator teleoperation setup*