An Intelligent, Bimanual Mobile Manipulator for Assisted Living Applications

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The ongoing shortage of caregivers has made it increasingly difficult to meet growing healthcare demands, leaving many individuals without the necessary assistance for daily tasks. The use of robots in the home has shown promising potential in alleviating this issue, offering increased autonomy to individuals who may not have access to consistent human care. While existing solutions are suitable for research environments, there has yet to be a mobile manipulator design that not only possesses the dexterity and mobility for useful tasks, but is also realistic for in-home use in terms of intuitive usability. In this work, we present a low-cost bimanual manipulator designed to perform a wide range of useful tasks in real-world home applications, integrating artificial intelligence to enhance both teleoperation and autonomous functionality. The mechanical design of the robot consists a two-wheeled differential drive base for stability and mobility, as well as two telescoping arms, each mounted on a revolving base joint to allow for a wide range of motion. The vertical motion of each arm is controlled independently through a belt driven elevator system, enabling manipulation of objects at various heights. The end effectors consist of a mechanical gripper mounted on a 2 degree-of-freedom (DOF) differential wrist. Initial testing demonstrates that the system reliably executes core manipulation and mobility tasks, validating its real-world potential.

Awards Won: