

Multi-Tooled Robotic Hand for Tele-Operation of Explosive Devices

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Abstract : Explosive attacks are arguably the most lethal threat that may occur in terrorist attacks. In order to counteract this issue, explosive ordnance disposal operators put their lives on the line to dispose of a possible improvised explosive device. Robots can make the disposal process more accurately and saving human lives. For this purpose, there is a demand for more accurate and dexterous manipulating robotic hands that can be teleoperated from a distance. The aim of this project is to design a robotic hand that contains two active and two passive DOF for each finger, as well as a minimum set of tools for mechanical cutting and screw driving within the same robotic hand. Both hand and toolset, are teleoperated from a distance from a haptic robotic glove in order to manipulate dangerous objects such as improvised explosive devices. SolidWorks® Computer-Aided Design, computerized dynamic simulation, and MATLAB® kinematic and static analysis were used for the robotic hand and toolset design. Novel, dexterous and robust solutions for the fingers were obtained, and six servo motors are used in total to remotely control the multi-tooled robotic hand. This project is still undergoing and presents current results. Future research steps are also presented.

Keywords : Explosive Manipulation, Robotic Hand, Tele-Operation, Tool Integration

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