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Sampath Kumar Krishna Murthy

Anthropomorphic Robotic Hand for Different Grasp Types.

ABSTRACT - Masterthesis

There exist several anthropomorphic robotic hands. The dexterous nature of the robotic hand is an important concern for the researchers rather than developing the hand, that just mimic human hand. Human hand is highly dexterous in nature and it is difficult to understand the mechanism of the human hand. Human hands do perform so many grasps in daily life activities. It is important to understand the kinematics of human grasps before adopting to artificial hands. Therefore, the development of dexterous hands, is still an active area of research in the field of robotics. The robotic hands are integrated as end effectors in the industrial manipulators and in prosthetics to the arms of the amputees. So, analysing the performance of the hand is a main objective to the researchers. The dexterity nature of the hand is measured by performing the hands for different human grasp types.

There exist many evaluation procedures for robotic hands, but they vary in individual. Some are confined to their structured environment and some are universal in appeal. So, it is necessary to frame the evaluation procedure for any developed hand to analyse the performance. Brunel hand is such anthropomorphic hand developed by the Open Bionics team. This hand is an Open source and the design files are available to build the hand. These design files are taken to print the hand and the necessary electronics required to control the hand is investigated and interfaced with the hand. The hand is controlled for the required positions using Python API.

The position feedback is achieved to control the hand for the goal positions with respect to individual grasps performed. Then, the evaluation procedure is framed to evaluate the hand with the perspective that the protocol should be simple and general. This protocol is applied to evaluate the built hand for different grasp types and the contact force of the fingers with respect to individual grasp performed by the hand is measured. An object set is prepared from the objects that are common in our daily life. The hand is controlled to grasp the objects and the grasps are analysed and discussed with the results.