

## **Design and Development of Multi-Functional Intelligent Robot Arm Gripper**

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**Abstract :** An intelligent robot arm is expected to recognize the desired object, grasp it with appropriate force without dropping or damaging it, and also manipulate and deliver the object to the desired destination safely. This paper presents an intelligent multi-finger robot arm gripper design along with vision, proximity, and tactile sensor for efficient grasping and manipulation tasks. The generic design of the gripper makes it convenient for improved parts manipulation, multi-tasking and ease for components assembly. The proposed design emulates the human's hand fingers structure using linkages and direct drive through power screw like transmission. The actuation and transmission mechanism is designed in such a way that it has non-back-drivable capability, which makes the fingers hold their position when even unpowered. The structural elements are optimized for a finest performance in motion and force transmissivity of the gripper fingers. The actuation mechanisms is designed specially to drive each finger and also rotate two of the fingers about the palm to form appropriate configuration to grasp various size and shape objects. The gripper has an automatic tool set fixture incorporated into its palm, which will reduce time wastage and do assembling in one go. It is equipped with camera-in-hand integrated into its palm; subsequently an image based visual-servoing control scheme is employed.

**Keywords :** gripper, intelligent gripper, transmissivity, vision sensor

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