

Robotic Arm Assisted with Image Processing and Pick and Place Along with Universal Gripping

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This research project introduced an innovative application of a three Degrees of Freedom robotic arm integrated with advanced image processing techniques for precise object identification and automated handling and manipulation of a diverse range of objects with varying shapes and colours such as blue, yellow and red, enhancing the adaptability and efficiency of industrial automation processes. The system incorporates a camera module to capture real-time images of the environment, leveraging computer vision algorithms to discern objects based on colour and shape. The robotic arm, equipped with a versatile gripper, adeptly executes pick and place maneuvers, ensuring the accurate relocation of objects to predefined positions. Stepper motors and Raspberry Pi 3 Model B ensure accurate control of the arm's movements. The desktop application, programmed by Python Language, facilitates seamless interaction between the robotic arm and the object. The robotic arm, designed using SolidWorks and fabricated through 3D printing using PLA (*Polylactic Acid*), enables the efficient handling of cubical, spherical, and pyramidal shape objects with 4.5 cm width and a weight range from 0 g to 60 g within a 15 cm range. The robot also successfully identifies blue colour objects. This research emphasizes not only present manufacturing needs but also future adaptability.

Keywords: *Three degrees of freedom; Varying shapes; Blue color; Pick and place; Predefined; Stepper motors*