Automatic Robot Arm for Manufacturing Industry

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Abstract

In response to the escalating demand in the transportation and manufacturing sectors, this thesis investigates the issues associated with reliance on human labor for production processes. These challenges range from human error and worker welfare neglect to potential damage during sorting and transportation, and limited production volumes. To confront these issues, this thesis proposes a compact, prototype automated robotic arm system, measuring 40cm in length, 30cm in width, and 32.5cm in height. The system comprises robotic arms, object-detecting camera sensors, and conveyor belts. Utilizing a Raspberry Pi board as a microcontroller, the system manages the OpenCV capabilities of the camera system, filtering data using the Python programming language. The robotic arm's movements are controlled via servo motor control, enabling rotation towards the detected object for precise manipulation. The system also includes a Vue.js developed web application, facilitating real-time monitoring through a local database. Upon evaluation, using three distinct object shapes - circle, rectangle, and triangle, the prototype demonstrated a promising average accuracy of 67% in object handling. While the current dimensions and design of the prototype are not yet geared towards integration in large-scale manufacturing environments, these encouraging results highlight the potential for future development and implementation in the manufacturing sector to improve efficiency and productivity while reducing human labor dependencies.