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IMPLEMENTATION OF A SIMPLE PICK-AND-PLACE ROBOT WITH SINGLE OBJECT DETECTION

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The developed system integrates a four-wheel differential drive mobile platform with a six-degree-of-freedom robotic arm to perform object pick-and-place operations. The robot moves along a predefined path using infrared sensors for line-following navigation. For object detection, a USB camera is used, and the image processing tasks are carried out on a Raspberry Pi 5. An ESP-32 microcontroller is responsible for handling real-time motor control and coordinating the movements of motors and actuators. The system was tested in a controlled indoor environment, where it showed stable path tracking, accurate object detection, and reliable handling of lightweight objects. Overall, the proposed design offers a modular and low-cost approach that combines mobility, perception, and manipulation, making it useful for robotics learning and small-scale automation applications.