

## **ABSTRACT**

The development of technology in today's era is very fast, especially in the world of robotics. Therefore, many industrial companies make robots in order to help ease the human burden, where robots are a mechanical tool that can perform the task of replacing humans, both using human supervision and control. As for industrial robots that can be used to assist humans in moving an object without having to lift an object called a robotic arm, in previous research in utilizing robotic arm using tcs 3200 color sensor and Arduino Uno control system there are still shortcomings in the sensing conducted by robots that only detect the state of color.

In this final task research designed a robotic arm sensing tool that can detect objects based on color and shape using the RaspberryPi control system, as well as images from the camera will be processed by image processing. First of all the program is inserted into RaspberryPi which has been connected with the robotic arm using a communication device. After that automatically the robot can read the color and shape of the object according to the input data from the image processing.

The output obtained from this study is that it can detect shapes and colors on objects in real-time, and can connect the real-time data to the robotic arm in order to detect the object. By using this image processing system is expected to improve the quality of sensing of robotic arm. In this study a system was created to detect objects of shape and color assuming the conveyor belt goes to the left. Implement a shape and color object detection system based on image processing using the shape detection method. Then display the detection results on the image frame and track the object in the form of motion to the left. The test was conducted by first testing the accuracy of the distance between the camera and the detected object with 3 different circumstances as much as 9 times the test, at a distance of 9 cm accuracy obtained by 100%, a distance of 5 cm accuracy obtained by 96.29% failure rate of 3.71%, a distance of 13 cm accuracy obtained by 100%. Both testing colors and objects with 2 circumstances, namely 3 objects based on the same shape and color as many as

27 times the test obtained an average success of 96.29% failure rate of 3.71%, 3 objects based on different shapes and colors as much as 18 times the test with an average success of 94.44% failure rate of 5.56%. The third test data transfer from RaspberryPi to arduinouno microcontroller as a robotic arm drive there were 30 tests with a success accuracy of 96.6% failure rate of 3.4% with an average delivery time of 2.76 seconds per data.

**Keywords:** *robotic arm, detect shapes and colors on objects, image processing, real-time*