

## ABSTRACT

Positioning is very important using Global Positioning System (GPS) technology. However, these technologies are limited for use in indoor positions. Low performance on GPS due to signal obstructed by buildings causing error detection. Given these limitations, a technology that can be used in indoor environments can be used.

In this final project, an application of technology in the environment using a mobile robot is designed by utilizing digital images. The system designed on a mobile robot uses a camera as an image acquisition system in real-time. The image that has been acquired by the camera is then processed with HSV filters and frame differences to monitor and monitor the movement of the object acquired by the camera.

The test results found that the image processing system is capable of NIR flare objects using an HSV filter as far as 160 cm and can measure the object distance between 15 cm to 115 cm with a precision level of  $\pm 0.17$  cm to  $\pm 2.26$  cm. Whereas for a distance of 120 cm to 160 cm, the level of precision is  $\pm 2.66$  cm to  $\pm 11.82$  cm. In the movable robot motion tester, it is placed in a room with dimensions of 3.2 m x 2.5 m. The test uses 4 scenarios for mobile robot scenarios with an initial distance of 15 cm for each object. From this tester, a mobile robot can monitor and track NIR beacon objects with an average framerate of 12.85 FPS from a maximum framerate of 60 FPS and can maintain a distance from objects between 9 cm to 60 cm.

**Keywords:** *mobile robot, HSV filter, frame difference, global positioning system.*