

## **ABSTRACT**

The ability of computer vision to determine the accuracy of objects, makes the use of computer vision, especially in object tracking, as a specific object identifier. This test is carried out to obtain the characteristics of the Light Emitting Diode (LED) which is analyzed from the Pulse Width Modulation (PWM) signal on the LED, which will be applied to the smart weapon.

In this experiment, various stages of experiments were carried out to obtain the appropriate quality and characterization of LEDs. Where the test starts from distance testing with different lighting variations, which aims to test the extent to which the system can detect objects in different lighting situations. Subsequent testing obtains the duty cycle value to determine the duration of the LED turning on and off, obtaining the delay time value and obtaining accuracy which aims to determine the quality of a good LED.

From this testing process, obtained the farthest distance of the detected object, the value of the duty cycle, the value of the delay, and the accuracy of each color experiment on the LED. Then determine the LED with good quality as an active marker that will be installed on the smart weapon. The best LED quality is seen from the accuracy obtained in the accuracy calculation process. In the distance test with 0 Lux light (no light), the system can recognize objects up to a distance of 20 meters on each object color. The results of the active marker test, in each test of the duty cycle value variation the best accuracy is obtained red color reaching 98.6% at 50% duty cycle, from this test focused on 50% duty cycle testing with different time variations. The test results show that at a 50% duty cycle, the best accuracy is obtained on the red LED which is visible with an accuracy value that reaches 96%. In the LED test that the effect of light affects the results of color detection on the LED.

**Keywords:** *Computer Vision, Object Tracking, LED, PWM signal*