

ABSTRACT

The use of depth cameras has penetrated various aspects of modern life, seen from their integration in mobile phones, 3D mapping for autonomous driving, and facial recognition. The depth camera, as the main component in object measurement and detection, ensures accurate and precise results. The main focus of using depth cameras is on autonomous driving, which includes obstacle recognition, road perception, navigation, perception of other vehicles, and security systems. A previous project, "Electro-Mechanical Brakes on Three-Wheeled Autonomous Vehicles," had applied depth cameras to detect objects and prevent accidents through an automatic braking system that still had its shortcomings. The author highlights three main problematic aspects of this project: determining the area where braking occurs, processing each frame which causes instability, and inaccurate distance assumptions.

Based on these three main aspects of the problem, the author offers solutions to overcome these problems. For the first solution, braking by utilizing distance information detected within a 8 meter radius. The next solution is to provide an edge as an object detection area that is 1,1 meters wide with a forward reach of 8 meters. In addition, the author carries out image processing by changing pixels into actual distances. With this solution, the author aims to be able to develop previous projects by providing maximum performance.

Based on testing data from the RealSense depth camera that has been taken in the object detection section shows a good level of accuracy in various light conditions, with an average confidence value of 0.85 with bright conditions and 0.85 with dim conditions. The distance information system obtained also shows a good level of accuracy with the lowest percentage error worth 1.13% and the highest worth 4.09%. And in the last test, the use of high pwm values on the actuator has a significant impact because it can produce a fairly low delay, in order to support the performance of actuators that require fast response and high precision. This development has also increased the accuracy of object detection and improved the stability of the actuator movement according to the distance information received.

Keywords: Depth camera, Measurement, Distance, Image Processing