

ABSTRACT

Conventional assistive tools such as canes still have limitations in detecting obstacles that are further away or beyond the reach of the cane tip. Therefore, various technologies are now being developed to provide better solutions for individuals with visual impairments, one of which is the use of smart canes equipped with more advanced technology.

In this study, a smart cane system was developed for visually impaired individuals, combining obstacle detection using a camera with the YOLOv11-nano algorithm and position detection using the Neo-6M GPS module integrated with the SIM800L for location transmission via SMS. This system is designed to assist visually impaired users in outdoor mobility by providing physical alerts through a vibration motor whenever an obstacle is detected in front of the cane.

The results of this study show that the smart cane system successfully detects outdoor obstacles such as humans, trees, and hazardous roads, with the highest detection accuracy of 80% achieved at a distance of 2 meters. The system also provides real-time vibration feedback through the cane handle as a warning signal and is capable of sending the user's location to an emergency contact when the panic button is pressed.

Keywords: *smart cane, YOLOv11-nano, object detection, GPS, visually impaired, obstacle detection.*