

## **ABSTRACT**

*The sense of sight for humans is very important. Blind people have limited vision, which makes it difficult for them to walk in unfamiliar places or have many obstacles. Today, sticks and guide dogs are commonly used media, but their effectiveness is lacking. Therefore, this study designed and built helmets and belts as auxiliary devices equipped with ultrasonic and GPS sensors. This tool uses Arduino Mega 2560 and NodeMCU ESP8266 as a control center to read and process data from ultrasonic and GPS sensors, which are then sent to the user's device. With this tool, it is expected to provide solutions for blind people in carrying out daily activities more independently and safely, because they can avoid obstacles and know their position accurately. The results of testing IoT features on the Blynk application show that the latitude and longitude values, user speed, and user destination direction are consistent and in accordance with expectations. These IoT features show good and stable performance. Tests on the ultrasonic sensor and GPS module on the HY-SRF05 sensor also provide consistent and accurate results against the measured target, including precise distance measurement with 0% error rate and 100% accuracy average on all ultrasonic sensors. In addition, the GPS test results of the NEO-M8N show an average difference of 6 meters from the GPS on the smartphone. From the design and testing of helmet and obstacle detection belt systems for blind people with GPS, the system successfully functions well in detecting obstructions around the user.*

**Keywords:** *Visually Impaired, Helmets, Belts, Ultrasonic Sensors, GPS.*