Designing a High-Accuracy, Fast-Response Work Zone Alert System

Designing a High-accuracy, Fast-response Electrical Work Zone Alerting System

Morteza Nazari-Heris, CPWR Small Study, 2024.

Overview

Construction workers in road work zones are increasingly at risk of work-related injury, with the Bureau of Labor Statistics reporting that in 2022, more than 5% of the industry's nearly 1,100 fatal injuries occurred in these areas. Although automated systems already exist that alert road workers of vehicles intruding into construction zones, the research team in this study found many limitations in existing systems, such as high cost, delays in sending warnings, and too many false alarms. In response, they developed and tested a new, lower-cost system to detect errant vehicles and warn workers of potential danger. They evaluated a range of components and software, settling on ultrasonic sensors, Arduino microcontrollers, and Python programming. They then tested the system, including sensor placement, in various weather conditions.

Key Findings

- The system was found to enhance work zone safety by promptly sending out visual and audio alerts about errant vehicles.
- The system accurately and reliably identified oncoming cars in both cool and cloudy weather and in hot and sunny conditions; it also was accurate at different distances.
- Because the system has a low cost, it is more likely to be used by smaller contractors with limited resources.
- The system has a user-friendly interface that makes integrating hardware components simple for construction workers, allowing for easy set up and operation.
- The system is designed so its efficacy could be enhanced by integrating it with communication tools such as smart watches, which would alert the worker through vibrations when a vehicle is intruding the construction work zone.

For more information, contact:

Morteza Nazari-Heris: m.nazari@ieee.org

Read the report:

https://bit.ly/3DMfYuh

 Production of this document was supported by cooperative agreement OH 009762 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

CPWR
THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING
WWW.CPWR.COM