Embedded Safety Communication System Can Improve Workers' Hazard Awareness

Embedded Safety Communication System for Robust Hazard Perception of Individuals in Work Zones

Jee Park and Sayan Sakhakarmi. CPWR Small Study, 2019.

Overview

There is a need to find effective ways to communicate imminent hazards to workers, who often fail to perceive warnings generated by hazard detection systems because of external factors. This project developed and tested a prototype Embedded Safety Communication System (ESCS) to respond to this need. Vibrating motors and sense of touch form the heart of this tactile-based, wearable communication system, as direct vibrations are a more robust way to convey hazards in harsh construction environments than innate sensing, such as vision and hearing. After system development, the study conducted a series of tests to identify optimal spacing and configuration of motors embedded in the back of a waist belt worn by a worker. Additional field trials were designed to simulate scenarios representing situations where workers would be at high risk of being stuck by vehicles or caught between vehicles and equipment. The results of these trials were used to evaluate the ability of ESCS to improve worker hazard perception without relying on their innate sensing.

Key Findings

- The results of the study indicate tactile signals transmitted with the Embedded Safety Communication System (ESCS) prototype are capable of communicating potential hazards to workers, especially in harsh environments where workers' innate sensing is limited.
- Participants found it more difficult to identify signals from motors on a waist belt if they were arranged vertically than if they were arranged horizontally.
- When the spacing between adjacent motors was 2.5 inches, participants had approximately 95% accuracy in identifying signals from individual motors.
- Three signal parameters could be used to communicate information: signal intensity, signal duration, and signal delay.
- Participants showed clear improvement on vibration signal perception with continuous training.

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http://bit.ly/2ow5iJw

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