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High tech hard hats put on another safety hat

DURHAM Hard hats have long protected workers' heads in calamities, and now engineers at Duke University are aiming to turn the hats into alarms when danger is present.

According to the Occupational Safety & Health Administration (OSHA), more than 1,100 workers die and thousands more are injured on construction sites annually. A modified hard hat, dubbed the SmartHat, could reduce these numbers by sounding a warning when workers venture too close to large equipment.



"Safety concerns are high when people and heavy equipment share the same space," said Matt Reynolds, a Duke electrical and computer engineering researcher and SmartHat's designer. "Most accidents and injuries occur because machine operators either don't see workers or workers are faced away from the equipment."

The SmartHat technology piggybacks on existing wireless networks at construction sites that monitor vehicle locations. Each piece of heavy machinery carries a wireless transmitter that broadcasts its location.

A silicon microprocessor, attached with Velcro to the crown of the SmartHat prototype, captures these free-floating radio-frequency waves with antennas. If the microprocessor determines the wearer is too close to equipment, it emits a high-pitched alarm that speeds up as man and machine move closer together.

"The beeping is an annoying sound that workers can hear through the noise of the work site," Reynolds said. "If we mount the microprocessor in the hard hat, we create an echo chamber to amplify the warnings."

However, the microprocessor's ultimate location must be chosen carefully, said Jochen Teizer, a civil and environmental engineer at the Georgia Institute of Technology. OSHA requires that nothing compromise a hard hat's ability to protect the wearer's head during an accident.

"Including the SmartHat technology can't create any danger to the wearer, such as creating a pinch point that could cause injury," Teizer said. "For the technology to be feasible, you need to integrate it inside the hard hat. Integrating it into the plastic would be the final solution."

Microprocessors should also have an extensive range, he said, to alert workers to fast-moving machinery.