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CLOVER'S MULTI-STATION HYDROSTATIC TESTING CONTROL SYSTEM



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A new eyewear technology can allow companies to monitor drowsiness in their workers.

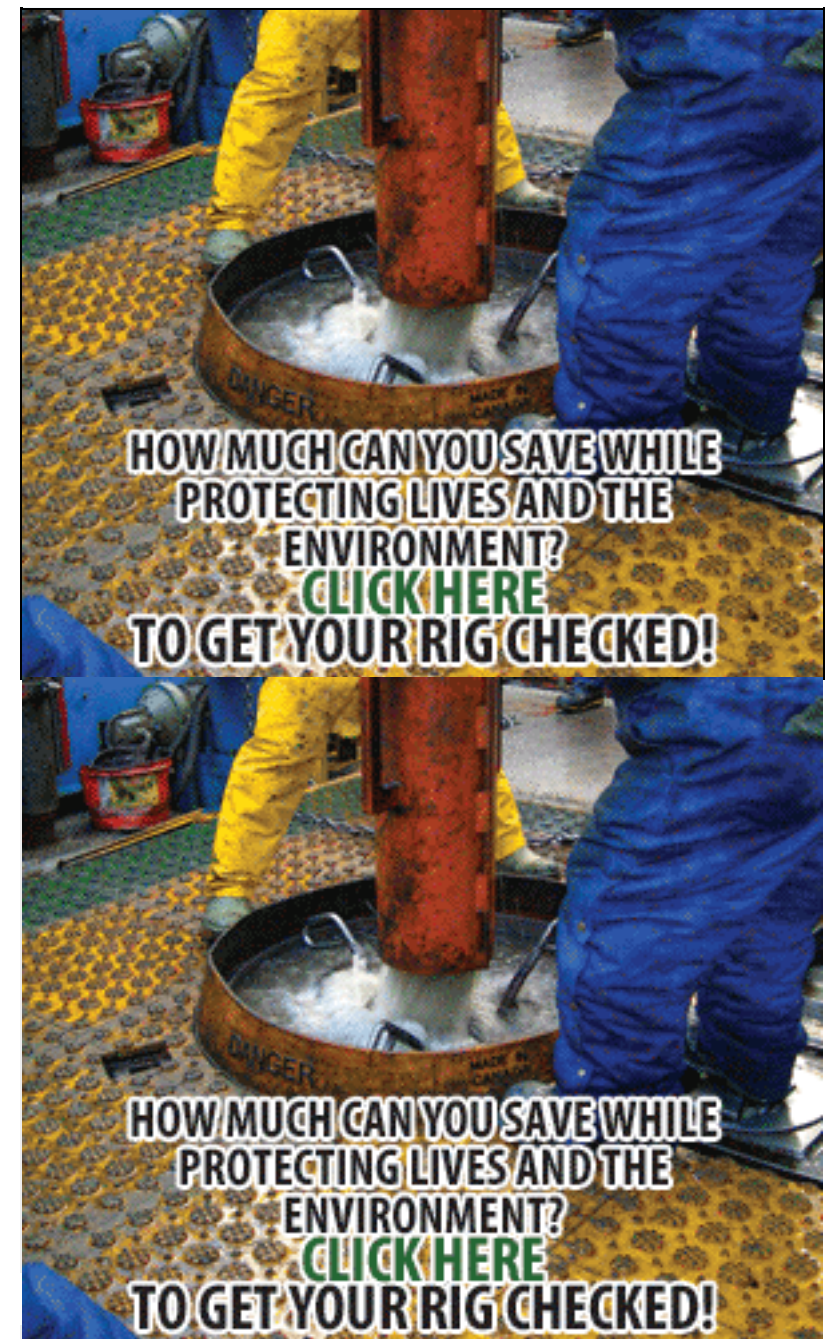
Eyewear can now not only provide sharper vision, but a clearer picture of worker fatigue levels.

Officials with Australia-based Optalert Limited say their drowsiness detection glasses – which measure a worker's eyelid blinks 500 times a second using a tiny LED built into the eyewear frame – is

the only safety system worldwide that continuously provides objective, scientifically-validated alertness information to drivers and supervisors in real-time.

The technology is the result of research into the physiology of drowsiness, with a combination of sleep medicine, psychophysiology, biophysics, human factors, psychology and engineering contributing to the technology, said James Gorry, vice president of global sales for Optalert, who spoke about the company's technology at the 2014 Oil and Gas Innovation Showcase in late April near Houston.

The event was sponsored by the Palo Alto-Calif.-based Oil and Gas Innovation Center, which addresses the oil and gas industry's technology needs by showcasing technologies that are either



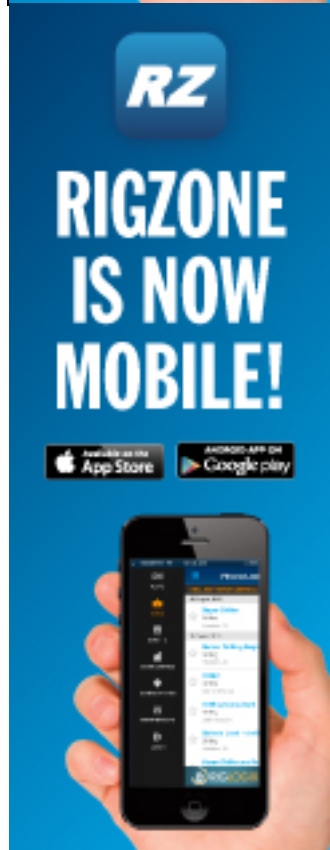
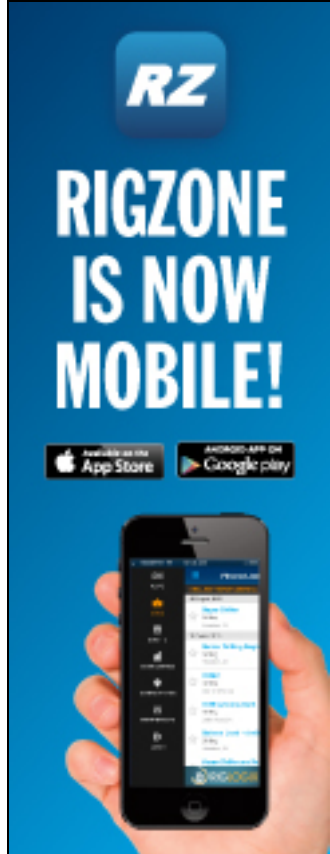
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According to a U.S. Bureau of Labor Statistics August 2013 report, fatal work injuries in the private mining sector increased in 2012, led by a rise in fatal worker injuries in oil and gas extraction industries. Worker fatalities in these industries grew by 23 percent to 138 in 2012 from 112 in 2011, a new high for the series.

Worker safety has become a focus of industry, particularly driver safety in the oil and gas industry due to U.S. shale activity as workers spend long hours on the road. Last year, the American Petroleum institute, the American Trucking Associations and the National Tank Truck Carriers unveiled recommendations to improve road safety and traffic management in oil and gas operations.

“Optalert’s technology is assisting organizations in their quest for removing fatigue-related incidents by providing important data to understand how fatigue may be affecting the safety of their employees,” Gorry said. “This information allows organizations to identify areas of risk and make safety decisions based on objective data.”

Two key measurements track the amplitude velocity ratio, essentially measuring how fast and how far a person opens their eyelid after they close it. These measurements are then translated into a score measured on the Johns Drowsiness Scale (JDS), said Gorry.

The system displays real-time information about driver alertness levels and the associated risk of a fatigue-related incident. The system displays a score of 0 to 10 each minute using the validated JDS, where 0 equals “very alert” and 10 equals “very drowsy”. JDS scores between 0 to 4.4 are considered low risk. Once scores exceed 4.5, auditory warnings are given to drivers, first at a medium level of risk, with JDS scores between 4.5 and 4.9, and again at high risk levels, with scores of five and greater, said Gorry.

Workers are warned with auditory and visual alerts if they move into either a medium or high risk state, said Gorry.

Independent research has shown that JDS scores at medium risk levels indicate performance impairment corresponding to a blood alcohol level (BAC) of .05. High risk JDS scores above 5.0 indicate performance impairment comparable to a BAC of .08.

The scale has been proven to show decreases in alertness associated with sleep deprivation and, when tested, on drivers it correlates significantly with reaction times, lapses in performance and lane departures. When used in conjunction with the Optalert early-warning drowsiness detection glasses, the user can see their score displayed on a monitor.

The continuous flow of information offers two layers of protection against the dangers of fatigue and allows all parties to monitor the associated risk and initiate proactive measures before it reaches dangerous levels, said Gorry.

The scale is named for Dr. Murray Johns, founder and chief scientist of Optalert. Johns in 1994 began developing a new technology for monitoring the drowsiness of drivers continuously. Over the past 20 years, that research has evolved into the products collectively known as Optalert’s early-warning drowsiness detection

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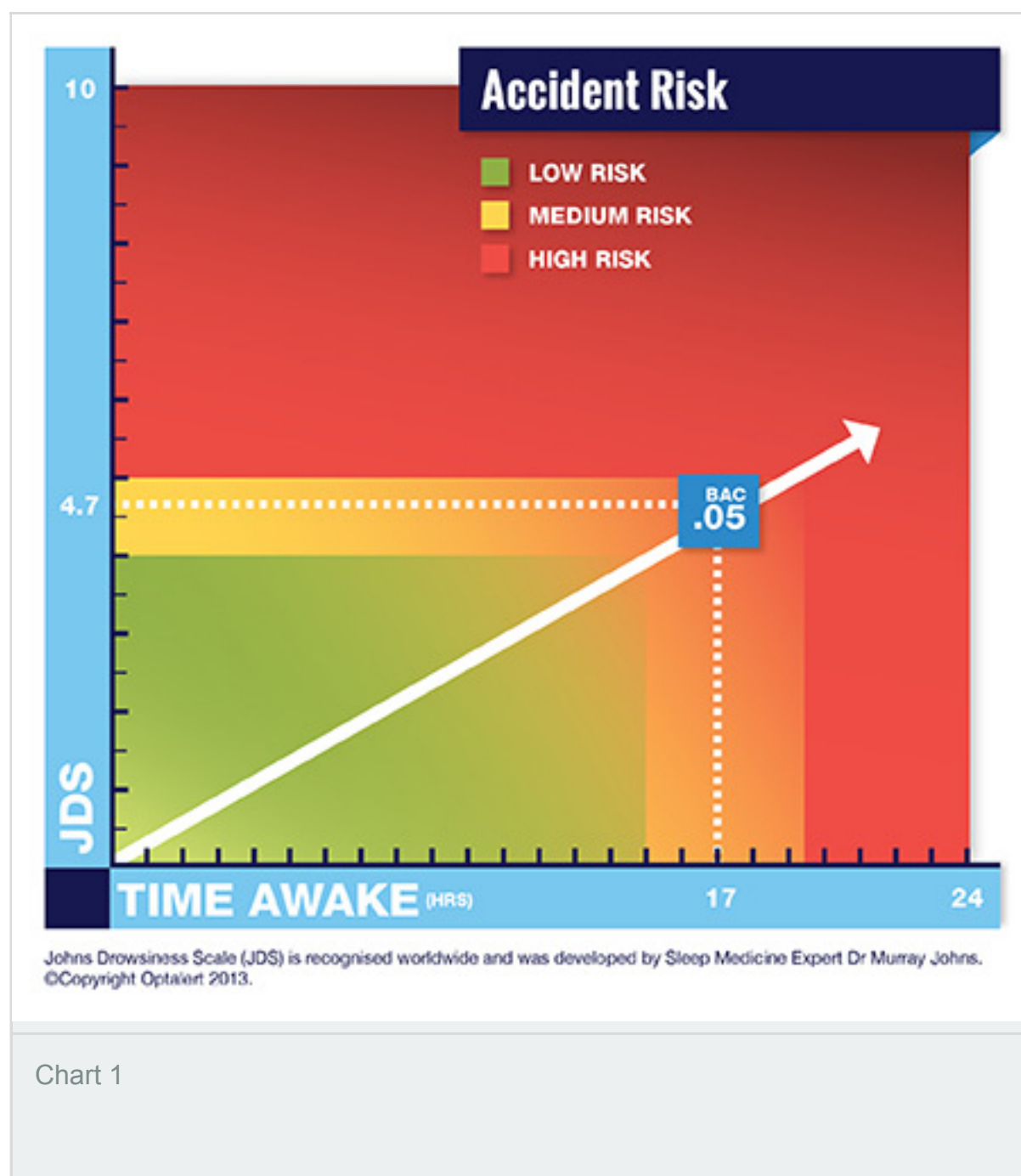
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system.

Throughout his career in clinical practice, Johns, a world-renowned sleep expert, had become acutely aware of the dangers associated with the state of drowsiness in people who required an alert state to safely complete their jobs, said OptaAlert CEO Scott Coles in a statement to Rigzone.

The technology has been made possible by the number of company shareholders who believe in OptaAlert's technology and see the importance of getting its products to market.

"Their investment and the vision of removing all fatigue-related incidents has helped see the company drive itself into markets with a high risk and great need for OptaAlert's early-warning drowsiness detection technology," Coles commented.



What Causes Fatigue?

The most common determinants of fatigue include night work and shift work, jet lag, sleeping disorders that include sleep apnea and insomnia, poor eating habits, stress and a lack of sleep. Companies often schedule work hours with a mandatory non-work time in between shifts, ranging from eight to 12 hours, but it is difficult to measure what is happening when they aren't at work. Therefore, it is difficult to measure what is happening when they aren't at work and whether they are fit and ready to work when they start.

"Often the time taken to commute to and from work is also not taken into account, and we believe the commute is often undertaken when workers are at risk of moving into the risky state of drowsiness," Gorry commented.

Work schedules involving long and irregular hours, night work or

rotating shifts, significantly affect the time available and opportunity for sleep. Around the clock operational demands in these industries challenge the body's natural cycle of waking and sleep.

The most common health problem reported by an estimated 75 percent of shift workers is disturbed sleep. It only takes one week of poor quality or restricted sleep to induce performance impairment equivalent to having a BAC of .1, significantly raising the risk of an accident. It is not surprising then that up to 30 percent of serious accidents are directly related to fatigue, Coles noted.

The performance impairments attributable to fatigue not only make people less effective, but also very unsafe. Numerous studies have found a relationship between fatigue and work-related injuries. Excessively sleepy or fatigued workers are 70 percent more likely to be involved in industrial accidents than alert, well-rested individuals.

"Most shift working industries are required to identify, assess and control fatigue as part of their health and safety management system," Gorry commented. "However, the management of fatigue-related risk in 24-hour operations is a complex and challenging issue. This particularly applies to personnel working in hazardous environments or performing safety critical tasks, such as commercial truck drivers or heavy vehicle operators in the road transport and mining industries."

It is drowsiness, not fatigue, which causes the issue. People can operate without risk if they are fatigued, such as if they did a hard workout in the morning before work. Drowsiness is a dangerous state where reaction times, decision-making and difficult activities can put a worker or company at risk.

Sleep loss not only creates a safety risk for workers on the job, but health issues. According to a study published earlier this year, sleep deprivation could be behind changes in human genes, the Huffington Post reported. The role of these genes and what the changes may mean are not entirely understood by researchers, but at least some affect inflammatory, immune and stress responses in people, and could help explain the link between short sleep and heart disease, obesity and diabetes.

Approaches to reduce fatigue-related accidents include hours-of-driving regulations, which limit consecutive and cumulative work hours. However, the effectiveness of such approaches has been

significantly compromised by their lack of incorporation of scientific sleep-wake principles such as circadian rhythmicity.

"Little guidance has been given to companies and drivers on how to best use these principles to adapt a 'one size fits all' regulation approach for their specific operational conditions," Gorry commented. "A more effective approach would involve the capability of continuously assess driver fatigue regardless of factors such as time of day, previous amount and quality of sleep, body position and the presence of drugs and alcohol."



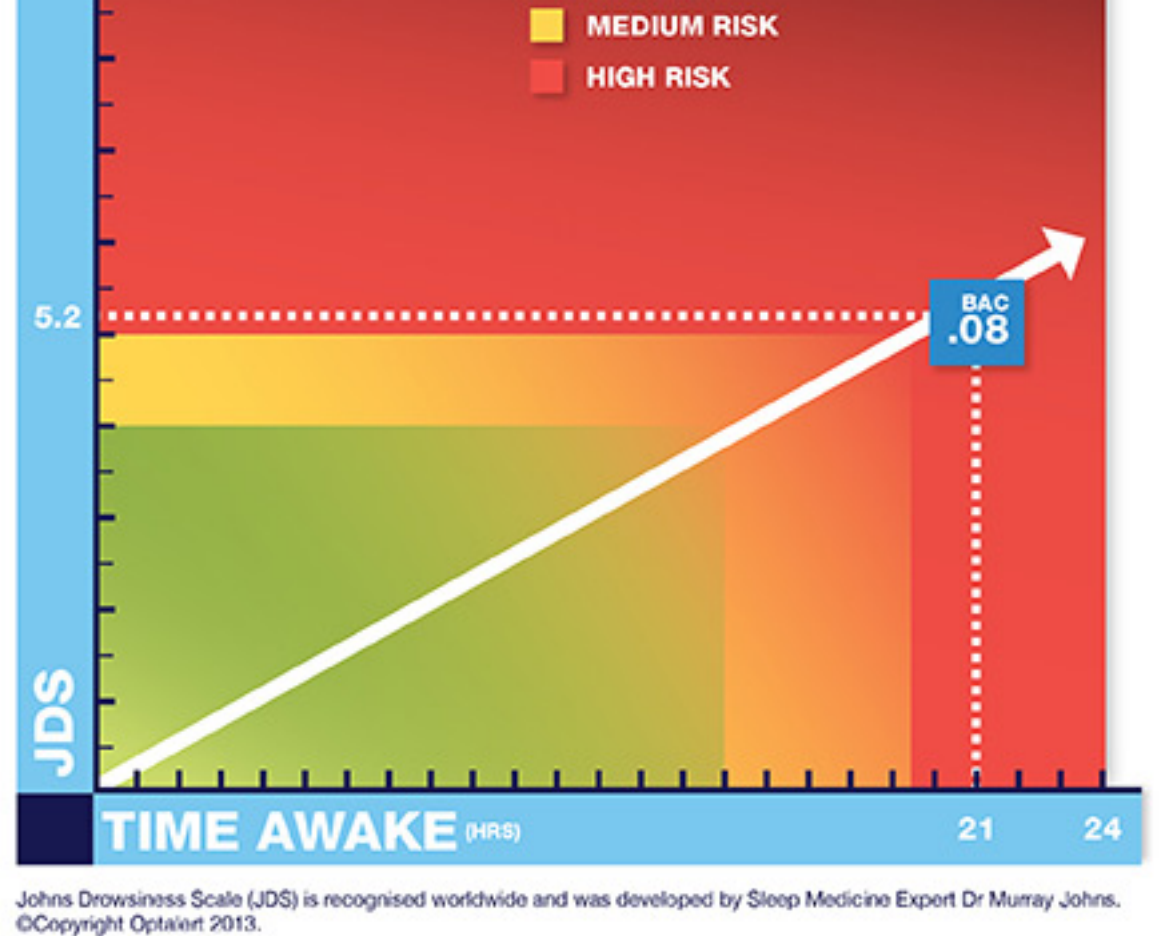


Chart 2

Detecting First Signs of Fatigue ‘Critical’ to Management Strategy

Detecting the first signs of fatigue is critical for any fatigue management strategy, Coles said.

“There are a few important things to remember when developing a fatigue management plan,” said Coles. “People aren’t designed for 24/7 operations; people don’t fully adapt to shift work; and technology can help.”

The ability to continuously assess operator fatigue, regardless of factors such as time of day (sleep-wake cycle), previous amount and quality of sleep, effect of drugs and alcohol, or undiagnosed sleep disorders, would be beneficial to any fatigue management plan. Optalert’s early-warning drowsiness detection system comes into play here.

Any fatigue risk management plan must take into account working time arrangements. These typically include:

- Scheduling of rosters
- Number of consecutive shifts
- Types of shift
- Maximum hours per shift and per roster cycle
- Break patterns within and between shifts
- Allowances for overtime scheduling
- Commuting time to and from work

Shift pattern variations can include eight and 12-hour shifts, day, evening and night shifts, and roster cycles.

“Often countermeasures are introduced to either minimize or counteract the effects of fatigue when driving,” said Coles. “While countermeasures can reduce the risk of a fatigue-related incident, they cannot eliminate the risk. The only cure for fatigue is sleep.”

In designing a plan, a company commonly looks at the hours of work for staff members and ensures they have enough time to

sleep between finishing a shift and starting the next shift; however, this doesn't often address their quality of sleep the night before or during the weeks leading up to the work, Gorry said.

"Add to this jet lag, sleep disorders, poor eating habits and stress and the situation can become serious."

"Unfortunately, a company usually doesn't have information on the quality and quantity of sleep of their employees while they aren't working, but all these factors impact a person's performance," Coles commented. "That is why we recommend real-time drowsiness detection with alerts prior to the employee reaching the dangerous state of drowsiness."

It is often difficult for drivers to accurately assess their own level of drowsiness and the associated risks at any particular time, Gorry commented.

"Because drowsiness impairs mental processing and decision-making abilities, drivers will not be aware that they are dozing at the wheel until after the event, when they rouse again and suddenly realize what has been happening. Having dozed behind the wheel once like that, it is very likely that they will do so again unless remedial action is taken."

These accidents typically involve a single vehicle that departs the driving lane and collides with another object, such as a tree beside the road or another vehicle. The driver is often alone, having been driving for some hours, often between midnight and 6 a.m. The consequences of drowsy crashes are often the most serious in terms of death, injuries and property damage because the drowsy driver makes no attempt to avoid the impending crash, or no brakes are applied and impact occurs at full-speed, Coles commented.

"That is why drowsy driving is so dangerous, more so than the state of fatigue which is often confused with drowsiness," Gorry commented. "Many people use the term 'fatigue' to mean what we are calling drowsiness. Fatigue is a subjective state that includes feelings of weariness, muscle aches or discomfort, irritability, and a disinclination to continue performing the task at hand. Most of us will be fatigued after many hours of work without a break, and the more fatigued we are, the more we are aware of it."

Fatigue gets progressively worse the longer you have been doing something and the more the effort, both physical and mental, required to do it.

"If you have been driving for many hours without a rest stop, you will likely feel fatigued, but you will not necessarily be drowsy," Coles commented. "The intermittent lack of awareness that characterizes drowsiness is not caused by fatigue. Consequently, drowsiness is much more dangerous than fatigue from a driver safety perspective."


"Your level of fatigue does not fluctuate very quickly, over periods of seconds, in the way that your drowsiness can," Gorry continued. "Fatigue can be relieved by rest and inactivity, but this will make drowsiness worse. On the other hand, increasing your physical and mental activity will temporarily reduce the effects of drowsiness, but not fatigue. The only way to overcome drowsiness is to sleep."

The Optalert glasses feature lenses that come in clear, yellow and dark for sun protection. People who wear prescription lenses can have inserts made or can choose digital form lenses.

Could drowsiness detection technology be incorporated into contact lenses? Optalert believes that anything is possible.

“Whether people would be more inclined to wear contacts rather than glasses remains to be seen,” Coles commented, noting that the company’s JDS and algorithm has applications for technologies such as gaming, augmented reality, anticipatory computing.

“We are constantly striving to improve and refine our product and we are open to creating partnerships to open up new opportunities for our intellectual property,” Coles said. “We are excited to see what the future holds.”

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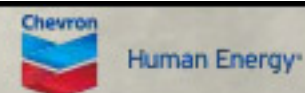


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