

Are You Missing Dangers Right Before Your Eyes?

One split second is all it takes for a life to be changed forever or taken away by a workplace accident. Each year, close to 9,000 people are killed on the job across the U.S. and Europe; no doubt all these workplaces had safety protocols in place, but clearly more could have been done to prevent this loss.

The first step in preventing an accident is identifying its potential to occur—and this is easier said than done. Sadly, it's often only once an incident has happened that we realize something needs fixing. But what if you could see the potential for risk in a new way, or find answers to a problem for which a cause has been hard to pinpoint?

Eye tracking has an established track record as a reliable and objective method of measuring human attention, as a means of understanding the precursors of action, and as a method to see if a task creates too much cognitive load on a person. This information is now being increasingly utilized across multiple industries as a tool to increase productivity and improve safety. Balancing these two performance indicators has long been a catch-22, with increased productivity often associated with more risky operations, but technology has come to the rescue.

Eye Tracking: The Basics

The concept of eye tracking is quite simple: It reveals exactly where someone is focusing their attention while completing their daily activities. A pair of comfortable, discreet, worksite-ready eye tracking glasses are worn by the worker, and the system tracks every movement and fixation of the eye during this period of time. The worker's visual

behavior can be viewed live in real-time by supervisors and recorded for subsequent analysis and training.

To put it simply, this technology allows management to observe performance through the eyes of the employee without disrupting the work or creating an additional safety concern. The information collected reveals valuable insights on situational awareness, cognitive load, subconscious actions, risky behaviors and mental processing. The kinds of learnings that are available through eye tracking are nearly impossible to identify through traditional methods such as employee interviews, surveys, or walk-throughs.

But it isn't only management that can benefit from the implementation of eye tracking in the workplace. This technology is capable of highlighting on-the-job obstacles and informing new processes that remove distractions, stress and hazards for the worker. Additionally, the video outputs from eye tracking have been shown to ease and shorten the training experience for new employees, who are able to watch the task that they will be performing through the eyes of seasoned veterans instead of reading instruction manuals.

In essence, eye tracking research highlights:

- Elements of a process which cause distraction;
- Instructions or manuals which cause confusion and delay operations;
- Things which obstruct sight or movement or precede an error;
- Visual patterns associated with mistakes;
- The level of someone's situational awareness and cognitive workload.

How to Put It into Practice

The way this technology and method is applied will be unique to every business, but the following examples illustrate how it's been implemented and what results can be achieved. H&H Castings, a metal casting foundry in Pennsylvania, had a

research consultancy conduct an eye tracking study on workers in its melt. The procedure of pouring molten metal into a mold is dangerous, time-sensitive and a task which can't be interrupted for observation. A select number of staff were picked for the study and asked to wear eye tracking glasses while undertaking their everyday work routine.

The data collected revealed to management the visual patterns of experienced workers who were more proficient at carrying out the tasks, but importantly it also uncovered a visual pattern which occurs prior to a spill. The first piece of information helped the company develop material to illustrate best practices for new staff, but the latter was instrumental in helping it improve training to prevent future accidents. The head of human resources said that watching the eye tracking data was the first time during her 31 years with the company that she was able to see the degree of complexity linked to her staff's work.

Researchers at the University of Nebraska-Lincoln also used eye tracking to study situational awareness on a construction site. Participants wore eye tracking glasses and were asked to complete set tasks. The data showed that those with a high situational awareness observed more of the surrounding environment and directed their attention in a distributed way, while those with a low situational awareness remained predominantly absorbed in the task at hand without much consideration or awareness for their surroundings. This information can be used to identify which workers may be more prone to accidents and to illustrate best practice methods.

Similarly, this information can reveal hidden dangers, such as blind spots or elements of the physical environment which cause distraction or impede safe movement. For example, does the crane operator see his or her surroundings, is their attention diverted from the task at hand for any reason, do certain operators have a different gaze pattern when maneuvering the machinery, and if so, is one correlated with

an increased risk of error or accident? Eye tracking can also highlight if workers struggle to interpret instructions or written operational procedures.

With close to one-fifth of all workplace deaths in the U.S. occurring within the construction sector, the potential this technology has to help make changes that can save lives is huge. An eye tracking study is currently underway in Sweden for a collection of steel manufacturing companies, associations and government which aims to identify best practices across a range of roles. The purpose of this project is to enable more clear and efficient training materials through the enhanced illustration provided by the eye tracking recordings. It's also hoped this method will remove many of the language barriers that often exist within this group of workers, to not only expedite training but also reduce the scope for the miscommunication or misinterpretation of instructions.

When You Want to Hit Rewind, Virtual Reality is the Key

It would be nice if life afforded us a reset function, but sadly that's not the case. However, with training in virtual reality (VR), even the most disastrous of training mistakes can be undone at the click of a button.

This technology is especially useful in very high-risk fields such as mining, construction, aviation and medicine. With VR you can create life-like, immersive and interactive replicas of environments which are dangerous or simply hard to access. With integrated eye tracking you're able to get all the information relating to visual attention, which allows you to better train and assess worker ability.

The beauty of VR is that it's fully interactive and allows you to dictate the complexity of the environment and conduct training and assessments in a fully controlled setting. This removes the need for the physical environment to be present,

potentially saving time and money from lost productivity. It also allows standardized training and assessment to be carried out with workers anywhere in the world. Dutch airline KLM is using VR to train its engineers in safety procedures, while auto manufacturer Volkswagen has set its sights on training 10,000 staff in production and logistics within VR during 2018.

There's no doubt this technology is just at the beginning of its evolution and already the benefits are immense. Its ability to afford virtually guaranteed safety, combined with the insights you can obtain on human interaction through VR headsets with integrated eye tracking, offers great potential to businesses who take the step and invest in its implementation.

Knowing Where to Begin

With any research, the key is knowing and defining your objective. For businesses looking to implement eye tracking to improve safety it's important to identify what issues you wish to mitigate or which processes you want to understand more about. This often leads to subsequent investigation, but pinpointing your objective will make the design of the experiment and the interpretation of results much easier.

Familiarize yourself with how the process works and what type of results you can expect. Your end goal will help determine what type of wearable eye tracker will best help you answer your questions.

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