East Midlands designed health sensor could be a lifesaver for miners

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A chance discussion between a Professor at The University of Nottingham and the managing director of a Derby company has resulted in the development of a revolutionary new technology which could help save lives in the mining industry.

Tioga, which employs 90 people at its headquarters in Derby, is a contract electronics manufacturer producing products in sectors as diverse as telecommunications, medical devices, security, mining, gaming and transport.

The University of Nottingham has, since 2008, been researching into a technology called 'Heart Light' which provides a way of continuously monitoring the heartbeat of new-born babies by attaching a small sensor to their head. This also means that doctors and midwives can perform resuscitation if needed, without having to stop to check the heartbeat with a stethoscope.

During a chance conversation between Professor Barrie Hayes-Gill of the University and Warwick Adams, the Managing Director of Tioga, the Professor mentioned the patented Heart Light work that he and his team had been involved in. As Tioga undertakes work in the mining industry, Mr Adams was curious as to whether the technology could potentially be developed to monitor the wellbeing of miners while working underground. Interestingly, the predecessor to the Heart Light was initially designed for the monitoring of workers in Rio Tinto aluminium smelting plants in 2004, so its migration to mining was a

natural progression of the original purpose of the technology.

Recent mining accidents have all too clearly demonstrated the need to be able to assess the health and location of miners trapped underground. Although some mines now use RFID systems (Radio Frequency Identification Systems), many still employ the tally system, using tokens to check whether miners have returned from their shift. In addition, there are no reliable monitoring systems in place to indicate whether or not the miner is suffering from any health problems while working underground.

As Tioga were keen to explore the idea further, they signed a licence agreement with the University for the development of an optical head mounted heart rate sensor to monitor workers in high risk industrial environments, which was designed and patented by the Applied Optics Research Group at The University of Nottingham.

To undertake the research work required to design a product suitable for the mining industry, the University set up a Knowledge Transfer Partnership (KTP) with Tioga. A Knowledge Transfer Partnership is a relationship between a company and an academic institution which enables the transfer of knowledge, technology and skills.

The University obtained funding from the Engineering and Physical Sciences Research Council (EPSRC) and the Technology Strategy Board (TSB), to appoint a dedicated researcher, Steve Jackson, to work with Tioga to develop the technology. Steve's work with Tioga is being managed by Professor Barrie Hayes-Gill and supported by other specialists at the University.

Steve's work will involve the evolution of the initial 'Heart Light' concept into a penny-sized sensor which can reside within a miner's helmet. The solution, which is known as the Mining Industry Mobile

Sensor (MiMoS), is able to detect a range of essential features for miners, including details about their heart rate, temperature, activity and respiration. The system will also reduce the risk of injury to individual miners by checking for dangerous gases, which are currently monitored on an ad hoc basis.

Speaking about the new MiMoS system, Professor Barrie Hayes-Gill said: "From the work that we have done, with Tioga, it is clear that there is tremendous potential for this Mining Industry Mobile Sensor (MiMoS), in the mining industry. Not only will it be able to instantly detect serious issues with the wellbeing of miners, but it will also enable long term and detailed occupational health monitoring of each miner to take place.

"In addition, it will also offer continuous gas detection technology, which will enable managers to quickly recognise potentially dangerous changes in gas levels, so that the necessary action can be taken as required."

The University of Nottingham's Knowledge Transfer Partnerships (KTP) have proven to be very successful for businesses involved, resulting in an average increase in turnover of more than £200,000 for firms that have participated.

Commenting on the KTP scheme, Warwick Adams from Tioga added: "I am very excited about the development of the Mining Industry Mobile Sensor, as it will also help us to establish our own unique product range for the mining industry and other industries that require similar solutions."

"The relationship with The University of Nottingham has been extremely beneficial for us. The Knowledge Transfer Partnership is enabling us to cost-effectively access the skills of a top quality researcher and many

leading experts at the University, who have helped us to develop a unique product which aims to improve the wellbeing of miners and potentially save lives."

Tioga has already undertaken successful initial trials of MiMoS in mining conditions and following final development work on the product, they are aiming to launch the product in 2014.

Tioga also marks The University of Nottingham's 60th Knowledge Transfer Partnership project. The majority of businesses that the University has worked with on KTP projects are small and medium sized East Midlands companies. Speaking about the KTP scheme, Dan King, Head of Knowledge Transfer at the University, added: "Through the Knowledge Transfer Partnership (KTP) scheme, the University has worked with 60 businesses, using our knowledge and technologies to help give each a competitive advantage by developing new products and business improvements.

"Tioga is an excellent example of how research undertaken here at The University of Nottingham has real commercial potential and could lead to a new product which will save lives. The KTP scheme is a great way for companies to work with Universities in a way that delivers bottom line benefits. We are always keen to hear from any businesses that want to work together with us to exploit and market innovative new ideas."

Provided by University of Nottingham