

Opinion piece: Improving Mining's 'fitness' with connected devices, Artificial Intelligence and Edge Computing

Using the analogy of personal fitness tracking tools, we can better visualise the potential of Artificial Intelligence (AI), IoT and Edge Computing in the Mining sector

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A simple analogy in the everyday realm of consumer technology can be a powerful way of understanding how advanced technologies like AI, the Internet of Things (IoT), and Edge Computing can advance the mining industry.

Think of the wearable fitness tracker – which burst onto the scene a few years ago – now being used by sports and health enthusiasts across the world. We can draw some interesting parallels between these personal devices and advanced industrial mining technologies.

Real-time sensor data is continually captured

The beauty of your SmartWatch is that it stays connected to the rhythms of your body – capturing data relating to step count, sleep, heart rates, activity levels, energy burned and even body fat. When connected to the Internet, it pushes all this information into databases, to be analysed with sophisticated tools.

In just the same way, advanced number-crunching algorithms in mining technology ingest real-time data from a variety of equipment sensors – tracking vibration, temperature, wear and tear, running times, and more.

Data is converted into actionable insights – giving 'definition' to the data

As mentioned above, the raw data from personal health devices is shaped into forms and definitions that we can understand. With the smart use of Artificial Intelligence systems, the general concept of 'motion' becomes the tangible category of 'steps taken', 'activity' is converted into 'calories burned', and so on.

Artificial Intelligence enables us to analyse the information detected by accelerometers in a smart watch or fitness device – interpreting and calculating it into the stats that we can understand.

In just the same way that our fitness gadgets start to sort and classify data on the device, Edge Computing makes it possible for much of the data analysis and Artificial Intelligence services to happen on mining devices themselves – reducing the vast volumes of data that need to be sent back to central processing hubs. With Edge Computing, we can process and translate data into actionable insights, so that only relevant information is transmitted to central systems, on-board computers, etc.

Goals, rules and parameters are established

The whole purpose of fitness tracking devices is to stimulate a change in our behaviour – to exercise more, to eat healthier, or to get more sleep. We set ourselves goals such as completing a certain distance of walking and running, or perhaps reaching certain heart rate zones during interval training.

Similarly, in industrial technology, we may set certain goals regarding machine performance. We

might stipulate the number of running hours before maintenance is needed, or define parameters around tolerable levels of vibration or temperature ranges. Automation and Artificial Intelligence tools are able to track any maintenance issues that are likely to arise.

Reminders and alerts keep us on track – helping us take small, corrective action

Sometimes, however, we don't stay within our targets. If we fall behind on our exercise programme, our fitness devices send us alerts, suggesting we carve out more time for a visit to the gym. Alarms and haptic capabilities on the devices keep us continually aware of how we're tracking against our fitness goals.

With IoT-based mining technology, historical data can be fused with real-time sensor data, to warn us when machines are likely to overheat or require new parts. With this 'predictive maintenance' approach, mine operators can improve their ability to reach organisational targets around uptime, outputs, budgets and more.

Contextual logic and variables are taken into consideration

Fitness tracking devices have always dealt with the fact that healthcare must be personalised. Our bodies are all different, and respond differently to different environments. AI in devices create this ability to appreciate 'context' – knowing that the number of calories one burns can depend on factors such as height, weight, age, gender, and health-state.

In a similar way, algorithms in mines must consider a piece of equipment's age, service history, fault history, productivity records and so on. Added to this, it needs to factor in environmental factors such as shaft depth, humidity or temperature. By understanding all of these factors combined, we can individualise predictive maintenance recommendations for each piece of equipment.

Taking the information into a broader ecosystem

We've already seen the first inklings of fitness devices bleeding into broader business ecosystems, with medical insurers allowing people to integrate data from their devices into their insurance profiles. They can better tailor one's premiums, and use loyalty and rewards to encourage people to improve their health.

The analogy in the industrial sense is that we could start to integrate IoT data on mining machinery into the structure of commercial contracts, equipment warranties and insurance. In this way, real-time data incentivises all parties to increase the useful lifespan of equipment, getting the greatest possible efficiency and productivity from the mine.

In much the same way that we cannot predict the next wave of consumer fitness technology, we cannot predict the future of AI and robotics in industrial environments. By taking the principles of personal health devices, and applying them to a mine, we can improve the 'fitness' of our operations, and better position us for the next era of high-tech mining.