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LWT³

To reduce injury rates for workers, cut healthcare costs and boost industrial productivity, LWT³ is using OpenText™ Vertica to power an advanced biomechanical analytics solution.

Who is LWT³?

Founded by Human-Machine Interface specialists, LWT³ creates innovative solutions to enable biomechanical movement analysis, for almost any human activity from sports to music to manufacturing. The company combines its expertise in three key areas—data harvesting (IoT devices, bio-signals, prototyping), data processing (mining, machine learning, data fusion), and data visualization (dashboard, AR/VR, haptics)—to help organizations monitor and optimize biomechanics.

Understanding and Optimizing Human Movement

LWT³ designs, manufactures, and tests IoT devices and wearables, powered by physiological sensors that provide data to help discover the root causes of human biomechanical stresses. The company gathers the data in real-time, and completes its analysis using big data and machine learning platforms, all protected by blockchain-based data security engines.

In a specific project, the company is working with industry partners to address the challenges of Musculoskeletal Disorders (MSD). According to the European Agency for Safety and Health at Work, more than half of the 159 million workers in Europe suffer from MSD. And of the 61 million people working in manufacturing, construction, and logistics, as many as 46 million (70%) suffer from some form of MSD. The condition—typically caused and/or aggravated by physical work—represents a huge and increasing cost to society. In EU member states, the annual cost is estimated to be EUR 240 billion, which represents a cost of up to 2% of total GDP.

Paolo Belluco, Head of R&D, LWT³, comments, "Our objective is to understand work-related MSD injuries so that we can work with industry partners to decrease their occurrence and impact. In doing so, we can reduce the costs to society and increase productivity, while ensuring better health outcomes, improved quality of life, and a stronger economy for all."

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>
> **PAOLO BELLUCO**
> Head of the R&D Department
> LWT³

At a Glance

■ **Industry**
Technology

■ **Location**
Italy

■ **Challenge**
To help reduce occupational diseases, LWT³ wanted a flexible, high-performance platform for analyzing enormous biomechanical data sets.

■ **Products and Services**
Vertica Analytics Platform

■ **Success Highlights**
+ Handles large and growing data sets faultlessly
+ Enables sophisticated, high-performance analytics
+ Scales seamlessly to meet multi-petabyte requirements
+ Offers low initial pricing and clarity around likely future costs

Putting Predictive Analytics to Work

In the initial stages of the new project, LWT[3] set up a pilot scheme to gather and analyze data with industry partners. The goal was to measure and correlate physical movements and injuries, in order to build predictive models that could both inform best practices in industry and trigger warning signals about the risk of developing or aggravating MSD.

Paolo Belluco continues, "We designed and prototyped an advanced set of wearable sensors to monitor the position, movement, and strain on key muscles, and record how people execute their work in industrial settings. This generates huge data volumes."

LWT[3] wanted an analytics platform capable of anonymizing, aggregating, and correlating personal biomechanical and health data. As the company's sensors harvest more data from more people, the predictive accuracy will increase. With massive scale in mind, the company looked for an analytics engine that could scale easily, and handle both batch and stream analysis.

Managing Enormous Data Sets in a Flexible Way

LWT[3] selected the OpenText™ Vertica Analytics Platform as the ideal start-small, grow-without-limits solution for analyzing MSD-related data through its WINGS product. WINGS is an intelligent wearable system that uses custom electropads to measure biosignals and movement, working with sensors in machinery to reveal muscle stress, strength, and fatigue in real time.

"We will be capturing very large data flows from wearable devices within very short timescales—even at the pilot stage," remarks Paolo Belluco. "It was very important to us to build a scalable analytics solution right from the start, and Vertica offers the capacity for these very large data sets that will give LWT[3] predictive capabilities around MSD."

To run its Vertica solutions, LWT[3] relies on an in-house hyperconverged data center, with replication to a private cloud environment hosted by Gamma Studio, an Italian IT systems integrator and Vertica technology partner in Milan. The hybrid model delivers high performance combined with the option to scale rapidly.

Paolo Belluco comments, "The Vertica pricing model suits our business perfectly: The per-terabyte fee combines low initial costs with full clarity about our likely future spend as data volumes grow. In addition, the Anaconda stack in Vertica makes it easy to run our existing Python code and develop additional functionality, essential for our plans to expand WINGS into other sectors."

Reducing Injuries and Improving Quality of Life

WINGS is a first-of-its-kind solution, so the direction in which LWT[3] heads will be defined by initial results. The company therefore needs to be agnostic about the types of data it collects

during the project, and how it processes that data. Paolo Belluco reports, "Vertica gives us the ability to capture and work with any kind of data, so we are confident we have the right framework in place. It's simple to move our data into Vertica, and the platform offers exceptional performance for the analysis of our anticipated data sets."

Now that all the technical components are in place, LWT[3] is working with industry partners to roll out the pilot and gather biosignals from real-world workers. By analyzing billions upon billions of sensor data-points from 10,000 individuals, the company will be able to see in great detail how workers interact with the physical environment and machinery, and what impact this has on their bodies.

"Our goals are to reduce the incidence and severity of work-related MSD, and to enhance the way in which people work with machinery," says Belluco. "By building and analyzing huge biometric data sets with Vertica, we can create best-practice approaches—for example, telling people the best way to lift a product or interact with a piece of manufacturing equipment. We can alert workers when their physical movement is putting them at risk of an injury."

Using best practices derived from the analysis of real-world work, manufacturing businesses will be able to improve the efficiency and productivity of their processes, reduce injuries and related healthcare costs, cut the number of days lost to injury, and improve their reputation for safety. For employees, the benefits will be improved working conditions, reduced pain and discomfort, longer and healthier working lives, and improved quality of life during both employment and retirement. Moreover, reducing the incidence of MSD will result in significant reductions in healthcare costs and increases in GDP.

"Vertica gives LWT³ a flexible, high-capacity, high-performance analytics engine that can capture and process huge amounts of biomechanical data. We are confident that with Vertica we have chosen the right framework for scalability and growth, capable of offering benefits right across society."

PAOLO BELLUCO
Head of the R&D Department
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The WINGS wearable computer also has the potential to be used outside of industrial settings—for example, LWT³ plans to extend its use to wearable telemedicine. The system could be used by physiotherapists and occupational therapists to gather vital diagnostic information or to provide alerts on risky movements.

Paolo Belluco concludes, "Vertica gives LWT³ a flexible, high-capacity, high-performance analytics engine that can capture and process huge amounts of biomechanical data. We are confident that with Vertica we have chosen the right framework for scalability and growth, capable of offering benefits right across society."

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