

Major advances in sensor technologies

Sensor technologies developed at LJMU have proven application across a wide range of industrial sectors generating significant cost savings.

Sensors are used in everyday objects and applications to detect and monitor change. Researchers from LJMU's Built Environment and Sustainable Technologies (BEST) Research Institute have developed unique sensor technology with the help of electromagnetic waves.

Prior to the use of electromagnetic wave technology, types of sensors included optical, acoustic, mechanical, electrical or biological, all of which have limitations in terms low reliability, sensitivity, accuracy combined with high cost and infrequent measurements. Although a niche area of research, it has a broad application across a wide range of everyday applications, such as in improving water and food quality, and for testing the effectiveness of equipment in the defence sector.

The design and development of a non-invasive hybrid sensor for monitoring water quality has helped to reliably and efficiently assess the physical and chemical properties of water and is now being used by Balfour Beatty as a means of internal leak detection system for the water network. The BEST research and development in this area also led to collaboration with the Anglo-Japanese organisation, Daiwa, to develop a sensor to detect for nuclear contamination in water systems.

In the food industry, the design of a non-invasive sensor by BEST researchers has been used to reliably test the quality of meat by accurately measuring water content, meat tenderness and detect bacteria. This research was funded by the Norwegian research Council and resulted in a low cost and accurate innovation which has improved the quality of meat entering the food chain and reduced production costs by up to 100,000 per day.

In the defence industry, non-invasive sensors have been used to develop a unique system for determining residual life in gas masks, which are issued to many active members of the military across the UK. Prior to the development of this new system, gas masks were replaced after a fixed amount of time, rather than when required. This new sensor technology, designed and developed by BEST in collaboration with UK Defence Science & Technology Laboratory (DSTL) indicates when an ineffective

mask needs to be replaced and reduces waste for masks which do not need to be replaced, resulting in significant cost savings.

“The sensor system developed at LJMU has proven to be ideal for the meat industry and looks set to become the new gold standard for meat quality indication which will help inform meat processing improvements and ensure a high standard of meat being delivered to consumers.”

Senior Research Scientist

“The developed real time non-invasive electromagnetic wave sensors by LJMU have certainly helped us in determining the quality of water with consistency and high repeatability in real time without the need for the biological and chemical laboratory testing.”

Technology Development Manager