

For Academic, Applied and Clinical Researchers integrating wearable sensing technologies in to a wide range of application areas, Shimmer Research offers a flexible, wireless hardware platform, low power firmware and host side software to analyse the data.

Research Objective

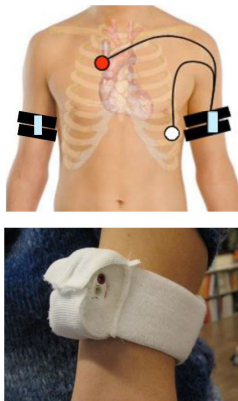
According to the World Health Organisation, epilepsy is a chronic noncommunicable disorder of the brain that affects over 50 million people worldwide.

The Shimmer platform is currently being utilised by researchers in the Netherlands studying Tele-Epilepsy and Remote Seizure Monitoring. The research is being conducted collaboratively amongst UMC Utrecht, Kempenhaeghe-Heeze and SEIN- Zwolle. Their research objective is presented as follows:

To detect and alarm for major nocturnal epileptic seizures using an integrated Multi Sensor Detection Instrument (MSDI) combining ECG and 3D-accelerometry data from Shimmer sensors paired with audio and automated video frame analysis.



Research Method



The project aims to develop a new multimodal device to detect nocturnal seizures and notify caregivers when a seizure takes place. The multimodal system uses an integrated **Multi Sensor Detection Instrument (MSDI)** combining Shimmer sensors with audio and video streams to provide ECG and Accelerometer data.

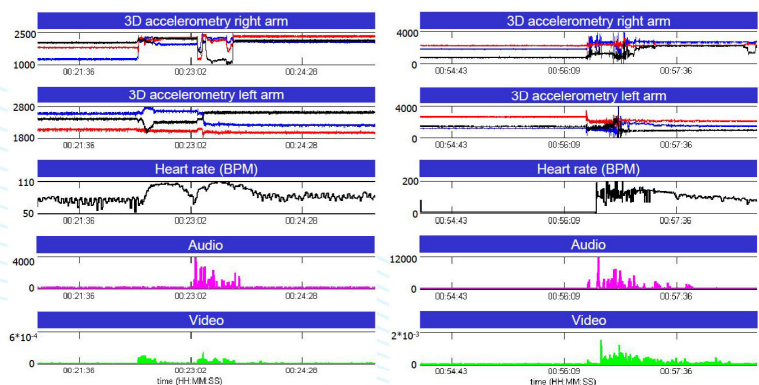
A diagnostic study was designed to define optimal combinations of patient factors and outcomes of the 4 modalities to detect seizures. The study was targeted at three main demographics; children under 16 years old living at home, mentally impaired adolescents , and adult patients who live either at home or in a sheltered home environment.

Research was conducted with **2 Shimmer sensors on each patient** – accelerometer on right upper arm and accelerometer and ECG on left upper arm. A PC then integrates data from the sensors and an alarm is sent once a threshold is surpassed. A real-time video and audio connection is established between the PC and a smart device used for monitoring.

Data-driven Results

The Shimmer sensors were employed for this study due to their flexible and configurable nature. At the time the research was initiated, the openness associated with the platform and its ability to interface with development tools like MATLAB was not available from other providers at a comparable price point.

The MSDI and algorithms were developed to analyze the four separate signals and examples of this data can be seen on the right. The data was acquired from two patients showing a tonic (left) and a tonic-clonic (right) seizure.



From Concept to Delivery - Achieving 90% Efficacy

One of the main reasons the Shimmer platform was chosen by the lead project investigator was the device's **CE certification**. Although a device for research purposes can be integrated without medical device classification, a certified electronic device must be used for research with human patients.

The multimodal solution incorporating the Shimmer platform has been **tested with over 50 patients** in an 'in-hospital' setting in four centres against the **gold standard for EEG-video monitoring**. Until now, this form of EEG-monitoring has been the traditional monitoring method of potential seizures due to the nature of the neurofeedback being a reliable indicator of an event.

With the research being at a crucial point before moving out of the hospital and into a home setting, the system has performed positively alongside the EEG gold standard with **90% efficacy**. Future plans for the researchers in this study include the refinement of the real-time software analysis system, the integration of sensor data, and validation in the home setting.



Shimmer Research - Sensing Solved.



Unlike many competing proprietary solutions, Shimmer Research's technology, supporting tools and applications provide you with complete control, and allows you to focus on the higher value add work of interpreting raw data that the platform generates, and to develop algorithms that enables a clinical understanding of the real-time kinematics and physiological data presented.

- Shimmer platform is **the tool to realise your research application** – derive new meaning, insight, societal benefit
- **Reduce** application development **time and cost** by 80%
- **High quality, robust**, scientifically reliable data
- Configurable and flexible – **tailor** to your specific application requirements
- **Complete control** over data capture, interpretation, analysis
- **Key support tools** readily available
- **Large research community** including some of the world's leading universities and research institutes

Contact Us

Shimmer is based in Dublin, Ireland, at our worldwide manufacturing and sales headquarters. The company continues to pioneer wearable wireless sensing development at our Boston R&D office, with our world class team of hardware and software engineers. If you're interested in working with us or wish to further discuss your research idea please get in touch at any of the below channels.

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