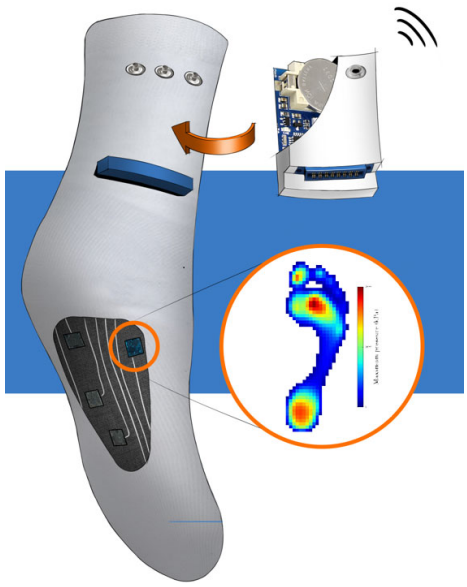
IoT data platform for a wearable sock system for the prevention of foot ulcers



Foot ulcers are one of the most important complications of diabetic patients. When talking about quality of life of the patients, the risk of diabetic foot-ulcers could be decreased, by an early indication of the risk, and the development of a customized orthopaedic shoes to minimize pressure on the foot. Foot ulcers are a huge problem for the healthcare system, healthcare-costs and mainly for the quality of people suffering such complications.

However, these shoes are developed based on expertise of the therapist and the traditional sole-pressure mapping. But one of the main problems is that foot ulcers do not only originate at the bottom of the foot, but also on the sides and top part of the foot. Currently there is no such system available for podiatrist that could measure and record the pressure on multiple points around the foot while walking using a conventional shoe during the therapy session.

The **ExPressure project** aims to develop such a state-of-the-art monitoring system, covering many research aspects such as wearable sensing technologies, 3D food modelling to asses important areas for ulcer formation, embedded sensors, wireless data transmission, data storage and visualization, among others. The project consortium is formed by universities, specialist and podiatrist and industrial partners in the area of Twente. The Ambient Intelligence research group is researching on state-of-the-art data infrastructure platforms: IoT, sensor systems, data storage, analysis and visualization, with a focus on user interface/experience design that could ease and help the podiatrist to assess the foot ulcer formation.

PROJECT DESCRIPTION

Within the ExPressure project, different system versions are being developed, following an incremental and iterative design approach. In 2020, a group of students during their SSS project developed an alpha system prototype consisting on: a sensorized sock, a portable embedded system with Wifi communications and a basic data platform to store the data. The aim of this project assignment is to develop the IoT data platform, covering some topics such as:

- Firmware development for the Arduino-based embedded platform (ESP32) to allow the transfer of data via Wifi/Bluetooth/BLE wireless communications to a data platform.
- Develop a data platform to store the recordings (back end)
- Basic UI application to display the different measurement sessions (front end).

PRACTICAL INFORMATION

- **Student profile:** HBO-ICT with passion about IoT, embedded systems and software engineering.
- **Client:** Ambient Intelligence research group, in collaboration with Voetencentrum Wender
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