NEMO

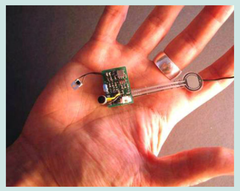
Network Embedded Models and Memories of Physical Work Activity

LANCASTER UNIVERSITY

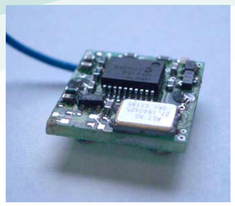
Aims

The project concentrates on three core aspects:

- The development of embedded ubiquitous computing technologies and embedded wireless sensor systems
- The investigation of peoples' understanding and use of ubiquitous computing technologies in industrial environments
- The investigation of how this technology will change the nature of organizations.

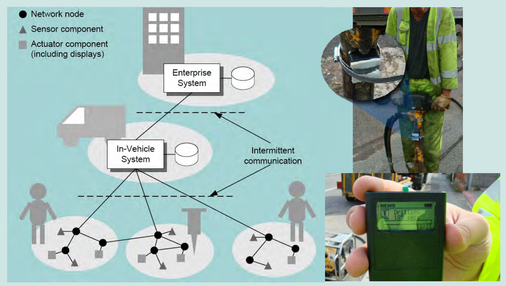


The focal point of the project is the development and use of smart artefacts, i.e. work-related objects such as tools and containers augmented with embedded computing, sensing and wireless communication capabilities.



Case study: Hand-Arm Vibration Monitoring

Long term exposure to hand arm vibration (HAV) can lead to serious health conditions such as "vibration white finger" (VWF) and existing health and safety regulations specify limits on workers' exposure to HAV when operating heavy vibrating machinery such as hydraulic drills and breakers. Within the context of the NEMO project we developed a HAV monitoring system. Our system comprises a collection of wireless sensor nodes, personal user devices and mobile computers that collaborate in an ad-hoc manner in order to collect HAV exposure information and propagate that information to a back-end database.



Tools and operators are augmented with NEMO devices that collect and process information in the field to allow the identification of work activities and rule compliance. The devices are then able to provide instant feedback and in situ assistance to the operators, empowering them create a safer working environment.

These devices create a disconnected sub-net of devices that can operate independently of any additional infrastructure. When they are reconnected with the in vehicle system any gathered information is uploaded and forwarded to the company network.

This information is tagged with meta-data to assist in searching and maintaining data provenance thus enabling managers to quickly access the required information is a key goal in increasing productivity.

A two week field trial of the technology has recently been completed during which the system successfully collected all required information. There will be follow-on field trials this summer.

Impact

The objective of the project is to turn businesses into real-time and connected organisations that enable management to access pertinent information to assist decision making about resources and work plans. By improving the accuracy and timeliness of the information the system will increase the productivity of works processes.

The project also aims to create an improved health and safety culture within businesses by studying the current attitudes and the impact new technology has on employees at all levels of the companies. Through these studies we aim to better inform workers of the dangers they face and assist management in the creation of better rules and guidelines.

The effects of the system are demonstrated by the HAV monitoring system that provides direct feedback to users about their vibration exposure. By highlighting a hidden risk the system raises worker awareness helping to create a more informed health and safety culture. The system also informs managers of workers who are approaching exposure limits, facilitating improved work scheduling that prevents operators being unable to work.

The NEMO Project

The NEMO project is an EPSRC-funded collaborative effort by the Departments of Computing, Management Science and Psychology at Lancaster University aimed at the inter-disciplinary investigation of ubiquitous computing technologies and embedded wireless systems for industrial workplaces. The project runs for four years, and involves close collaboration with companies such as Agilent, BP, Carillion and In Touch.

EPSRC
Engineering and Physical Sciences Research Council

In Touch

Agilent Technologies

bp

carillion

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