

## **Automated Anonymous Customer Information Systems**

**Department:** Communication Systems

**Academics:** Dr. Reuben Edwards

**Seeking:** License / Funding / Sale of Patent / etc

Customer information is vital to any organisation and we have been developing systems that provide novel ways of gathering anonymous information about customers that can provide meaningful insight about customer behaviour and patterns. We have developed an automated anonymised footfall system that can build up a rich picture about customer footfall and behaviour in a variety of organisations. This technology is ideally suited to retail companies that do not currently have mechanisms for measuring customer footfall and/or loyalty. Related applications relate presence information about customers and their behaviour and loyalty to provide richer marketing information and targeted visual advertising systems.

## **Delivering Broadband to Rural Communities via Wireless Mesh**

**Department:** Department of Computing

**Academics:** Johnathan Ishmael/Nick Race

**Seeking:** License / Funding / Sale of Patent / etc

This presentation describes our wireless mesh network solution designed to provide broadband Internet connectivity to communities or sites with little existing infrastructure. It is based on over five years of research into wireless mesh networks, which has included installations into the local villages of Wray and Wennington. This deployment experience, alongside our own research has culminated in the development of a new Wireless Mesh platform, designed to meet the needs of communities by reducing many of the operational issues and complexity traditionally associated with network deployments. The solution provides all the key features of traditional mesh networking (including route optimisation, self-healing for network outages and resiliency), but includes back-office user-management and tools for the network operator all designed to provide a lower total cost of ownership – reducing the deployment time of networks, providing self-healing mechanisms in the case of network failure and reducing an engineer's time in the field.

## **Wire integrity Testing Using Intermodulation Products Processing**

**Department:** Communication Systems

**Academics:** Bamidele Adebisi, Bahram Honary

**Seeking:** License / Funding / Sale of Patent / etc

Wires and cables, necessarily, have lifetime limitations due to material degradation and the operating conditions to which they are exposed (e.g. vibrations in many cases as well as chemical, thermal, electrical, and mechanical stresses). Aging wiring can result in degraded system performance and it is therefore desirable to identify faults in wiring systems, preferably before such faults reach a stage at which system performance is unacceptably degraded.

This invention provides a method of fault detection in which signals are applied to a signal carrying component (e.g. a substantially linear structure such as a cable or wire) and a resultant signal is analysed to determine whether a fault exists. The analysis is based upon the presence of intermodulation products in the resultant signal. The developed measurement system is capable of not just locating, but also characterising such sources of intermodulation products. Faults characterisation makes it possible to determine whether they are progressively getting worse. This makes the system a feasible diagnostic tool, in which case, ageing wiring is detected and replaced before it becomes a safety hazard. This method can be used for fault detection on overland electrical transmission lines, ships, in-house wiring, Digital Subscriber Line (DSL), and onboard aircraft.

## **Touch-Display Keyboards**

**Department:** Computing

**Academics:** Hans Gellersen

In spite of many advances in GUI workstations, the keyboard has remained limited to text entry and basic command invocation. In this presentation, we introduce the Touch-Display Keyboard (TDK), a novel keyboard that combines the physical-ergonomic qualities of the conventional keyboard with dynamic display and touch-sensing embedded in each key. The TDK effectively transforms the keyboard into an interactive surface that is seamlessly integrated with the interaction space of GUIs, extending graphical output, mouse interaction and three-state input from the screen to the keyboard.

## **A position and orientation sensitive marker system'**

**Department:** Engineering

**Academics :**Malcolm Joyce

Radiotherapy is a very successful modality for the curative and palliative treatment of cancer that is used throughout the world. The ultimate requirement is to deliver a prescribed dose to the area defined for treatment, whilst the healthy tissue surrounding this zone is protected from exposure. Significant engineering advances have been made to protect healthy tissue from the effects of prescribed radiotherapy but these rarely accommodate the inevitable movement of such tissue during and between treatments. Tumours and the tissue surrounding them move on the order of short timescales as a result of digestive processes and respiration, and this movement can result in healthy tissue straying into the line of treatment. This reduces the dose that can be imparted to the tumour and thus limits the potential efficacy of the treatment; a variety of mechanisms have been explored to indicate tumour motion during treatment, but many of these require further imaging or X-ray treatment which introduce further dose and are often very expensive.

In this presentation a novel proof of principle to monitoring the location of tumours during medical radiotherapy treatments will be described which dispenses with the requirement for additional imaging or X-ray, based on research carried out at Lancaster on this problem, but which requires important miniaturization and device integration to achieve commercial viability.

**Department:** Communication Systems

**Academics:** Garik Markarian

**Seeking:** License / Funding / Patent Filing and Sale of Patent / etc

This presentation describes our latest work on wireless and sensory networks for aviation security and safety. The work was instrumental in establishing new industry standards EUROCAE WG-72 and EUROCAE WG-82, where we have strong presence. Our demonstration will illustrate joint work of on-board smart sensory networks and wireless mesh networks, both adapted for increasing aviation security and safety. The solution has a few novel elements, which can be patented and commercially exploited. Market potential is huge and some preliminary interest from the leading players has been expressed. This resulted in collaboration in international standards and in invitation to present our work to the USA standardisation body RTCA.

### **Endotheliometer**

**Department:** Physics

**Academics:** Dr Aneta Stefanovska, Dr Alan Bernjack

**Seeking:** License / Funding / Sale of Patent / etc

Endotheliometer is a proposed medical device for assessing the general health of the human cardiovascular system by evaluating the functioning of the endothelium. Endothelium is a single layer of cells lining the inner surface of the entire cardiovascular system and plays a crucial role in the cytotoxic and immune reaction of the organism. Recent studies have recognised endothelial dysfunction as a significant factor in predicting various cardiovascular diseases. Therefore, evaluation of the endothelial function has an important prognostic value and the endotheliometer can be envisaged as a routine clinical device.

A device for direct, selective and non-invasive assessment of endothelial function is currently not available. Our invention is based on several elements: (i) the fact that capillaries predominantly consist of endothelium, (ii) non-invasive measurements of blood flow in the capillary bed using laser-Doppler flowmetry, (iii) an original assessment of the blood flow signal and features of the pulse propagated to the capillary bed, and (iv) the fact that the endothelial elastic properties change with temperature. Impairment of the endothelial function can thus be easily assessed as changed pulse propagation time versus temperature relationship. The endotheliometer provides a simple and robust index of the endothelial function after just a few minutes of assessment.

### **Magnetic nanoparticles**

**Department:** Lancaster Environment Centre (LEC)

**Academics :** Barbara Maher

Removal of contaminants (eg salt, organic carbon, radionuclides, arsenic) from water supplies? Or concentration and collection of precious metals from mine tailings? Or synthesis of magnetic fillers? This presentation describes novel synthetic materials, which are not only ultrafine-grained (i.e. nanoscale), thus providing extremely high surface areas,

but also very strongly magnetic. These nanoscale magnets can be used to adsorb charged species (cations or anions) on their surface, and then be magnetically collected in order to remove those ions from solution. Because the surface charge on the magnetic material is pH-dependent, negatively charged species (eg dissolved organic carbon) can be adsorbed at low pH; positively charged ions (eg sodium chloride) at high pH. By altering the pH, the magnetic material can subsequently desorb its surface ions, and be re-used over and over again. Their fine grain size, coupled with strong magnetic properties, also makes them ideal as potential magnetic filler materials.

## **Delivering High Quality Personalised Television Content to the Web Browser**

**Department:** Computing

**Academics:** Keith Mitchell/Nick Race

The way people create, consume, exchange and interact with digital media is changing. TV particularly is rapidly moving from linear broadcast to a multi-platform, multi-device and more social experience. In this presentation we present a system which provides high quality TV content to a web browser which is relevant to each user's social and personal interests. The core platform has been built from the ground up to exploit social and content metadata to reduce the burden of finding something to watch. Our aggregation technology allows viewers to discover programmes from multiple sources easily and recommends appropriate content according to usage and individual preferences. The solution is modular and can easily be tailored to operate with any content ingest platform. Our rich user interface provides access to Live TV/Radio, Video on demand and catch-up services in both Standard Definition (SD) and High Definition (HD) directly to any web browser on any platform.

## **GAIA – an improved Wave Energy Converter**

**Department:** Engineering

**Academics:** Dr George Aggidis

**Seeking:** License / Funding / Sale of Patent / etc

As the demand for sources of renewable energy increases, there is increasing interest in the Wave Energy Converter ("WEC") of which there are many different types. The present invention is a novel design of WEC. There exist many WECs of various designs, some suited for near-shore installation and some for deeper water. Power extraction depends on the geometry of each device, and the engineering for long-term survival at sea remains an issue. Researchers continue to explore designs in the search for a successful combination of efficient power output, durability, and low cost of construction, installation and maintenance. Of the many types of WEC that have been proposed previous to the present invention, few if any have proved commercially viable. The present invention comprises an improved WEC. The improvement consists of allowing the conversion of energy from motion in all directions. This is achieved by allowing a buoyant body to move in multiple directions relative to a frame to which it is coupled. The buoyant body and the frame are coupled by rigid members with flexible joints, and one or more hydraulic rams are fixed to the members across each joints so that wave motion generates hydraulic pressure which is used to drive an electrical generator.