



# Ubiquitous Monitoring Environment for Wearable and Implantable Sensors (UbiMon)

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## Introduction

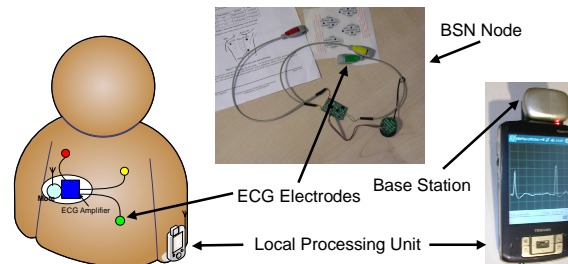
The last decade has witnessed a rapid surge of interest in new sensing and monitoring devices for healthcare. One key development in this area is implantable in vivo monitoring and intervention devices. While the problem of long-term stability and biocompatibility is being addressed, several promising clinical prototypes are starting to emerge. For example, in the case of managing patients with acute diabetes, the blood glucose level can be monitored continuously in vivo, which controls the insulin delivery from an implanted reservoir. For the treatment of epilepsy and other debilitating neurological disorders, there are already on the market implantable, multiprogrammable brain stimulators which save the patient from surgical operations of removing brain tissue. In cardiology, the value of implantable cardioverter-defibrillator (ICD) has increasingly been recognized for the effective prevention of sudden cardiac death (SCD). The technological advancement of these devices will inevitably reshape the general practice in clinical medicine.

The aim of having a ubiquitous monitoring environment for wearable and implantable sensors (UbiMon) is to provide continuous management of patients under their natural physiological states so that transient but life threatening abnormalities can be detected and predicted. In addition, we will also investigate in parallel the use of implantable sensors for post surgical care, especially in conjunction with minimal access surgery.

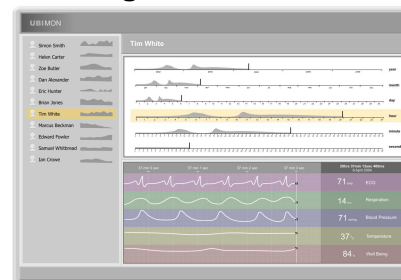
## Objectives

- Novel micro-power wearable/implantable sensors with context awareness capability for improved episode detection
- Portable wireless communicator performing multi-sensor interfacing
- Intelligent multi-sensory data fusion and mining leading to an intervention strategy or reliable prediction of critical events
- Preliminary clinical evaluation for management of patients with ischaemic and arrhythmic heart disease

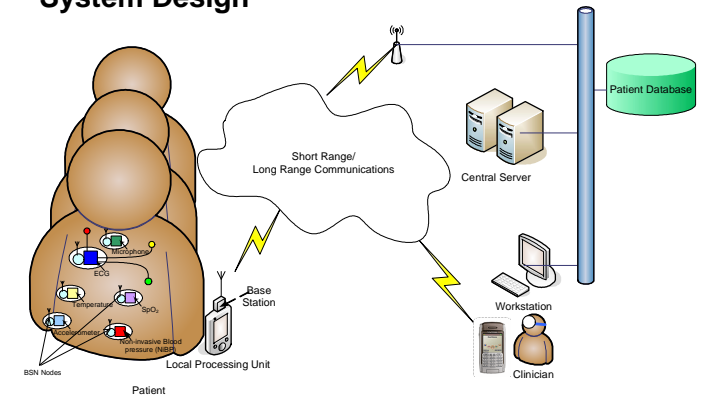
## Prototype System



## Sensor Readings



## System Design



- *BSN Nodes* - A miniaturized battery/batteryless wearable or implantable physiological sensors, such as ECG, SpO2, temperature sensors, etc
- *Base Station (BS)* - Wireless receiver for interfacing between the BSN Nodes and the LPU
- *Local Processing Unit (LPU)* - Portable handheld devices, such as PDA, sending the results to the central server via wireless communications
- *Central Server (CS)* - Collecting data from all LPUs to the database and perform trend analysis
- *Patient Database* - Central storage of patient data
- *Workstation* - Monitoring terminals, such as mobiles/personal computers, for clinicians to analyse patient data