

**NUS Graduate School for Integrative Sciences and Engineering
Research Project Write-up**

Title of Project : Intelligent Continuous Monitoring and Remote Diagnostic System for the Elderly at Risk of Falls

Name of Supervisor : Yu Haoyong

Contact Details: Department of Biomedical Engineering
Block EA-02-02, 9 Engineering Drive 1, Singapore 117575
Email: biehy@nus.edu.sg
Tel: + (65) 6601-1590
Fax: + (65) 6872-3069

Short Description

By 2030, there will only be 2.1 working-age citizens in Singapore for each citizen aged 65 and above. Increasing healthcare needs are faced with decreasing supply of healthcare personnel, leading to healthcare cost escalation. There is a great need for innovation in the healthcare to realize the target of aging in place and active aging. It is estimated that more than one third of the elderly over the age of 65 living in the community fall every year and half of them have recurrent falls, which result in serious injuries, such as hip fractures, subdural haematomas (head injuries), serious lacerations and even death. However anomalies in vital signs like heart rate, ECG, blood pressure along with day-to-day activity patterns can be monitored to reflect risks of falls and promote safer activity.

The aim of this project is to develop and clinically test a continuous health monitoring and diagnostic system for the elderly at risk of falls in the community in Singapore. The system employs smart data fusion and noise cancellation algorithms for multiple vital sign data to detect health parameters such as heart rate and blood pressure, body postures, and physical activity levels. These data is transmitted to computers of the eldercare facilities / hospitals. However, getting these data is only one small step, what is more important is how to make sense and effective clinical use of the data.

Therefore, this research will focus on the **signal processing, data fusion, machine learning algorithms** for patterns and abnormality detection of these parameters associated with certain specific activities and fall events, and intuitive methods for presenting them as useful analytics for doctors managing these elderly to determine circumstances of falls. This project will be conducted in close collaboration with Geriatric Medicine Clinicians.

This research will generate not only high impact publications, but also IPs with great commercialization value. Highly motivated students with ECE and Computer Science background who are interested in this exciting and promising new area of research are welcome to join this research.

Keywords:

Healthcare analytics, Signal Processing, Machine Learning, Fall Detection and Prevention, Wearable Sensors.