ipal
Image & Pervasive Access Lab

Masters Internship 2015

Signal Processing for Vital Signs Monitoring

Supervisor
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Presentation of the Internship topic

Unobtrusive monitoring of vital signs is an increasing requirement from the medical community. Such sensors must be versatile and in operation 24/7 in Institutions of Long Term Care - ILTC (eg. nursing homes) and in elderly peoples' homes.

In this research we are designing and developing sensors and software algorithms for remotely collecting vital signs unobtrusively from subjects in their beds. The topic of the research focuses on the analysis and validation of signals arising from the Piezo-Capacitive Sensor for sensing of continuous heart rate and breathing rate through the ballistocardiographic (BCG) signal. It will involve biomedical signal processing of the BCG signal – first to remove noise and then to extract the characteristic points for determining the heart rate and breathing rate, and if possible other hemodynamic parameters. The system will be tested in the laboratory in Singapore using clinical level validation tools, and subsequently deployed in nursing homes in France for the purpose of studying nocturnal sleep, awakening patterns and sleep apnea.

Expected deliverables

BCG signal processing algorithms to filter signals and remove noise arising from drift, movement and other sources. The signal processing algorithms will be fine tuned to obtain clean BCG waveforms and their characteristic points such as foot, slope and peak and other statistical features that are needed for extracting heart rates and breathing rates. Other sensors such as accelerometer and ECG / PPG sensors will be used to calibrate and validate the BCG sensor data. Lab testing and field testing will be done before data collection to study targeted clinical issues.

Keywords

Vital signs BCG, ECG and PPG, Biomedical Signal Processing, MATLAB, Field deployment and data collection

Applicant profile

- Master Degree or Engineer Student (last year of studies).
- Skills in programming, C++, MATLAB.
- Familiarity with digital signal processing and analog signal data acquisition are appreciated

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- Strong motivation towards this challenging project.
- Availability for 5 to 6 consecutive months

Gratification: About 800€ net per month (approx. 1,300 Singapore dollars)

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