THE UNIVERSITY of ADELAIDE

Automated Cardiac Variability Monitoring

Benefits

- Fully automated ECG processing technology that also includes conventional fiducial wave delineation.
- Unprecedented accuracy in beat-to-beat measurement of the QT interval, significantly outperforming existing methods.
- It can be readily integrated into existing clinical ECG systems or integrate in current wearables measuring ECG.

Background

Globally, sudden cardiac death accounts for 10%–20% of deaths in industrialised countries. Almost half of all victims have no previously diagnosed heart disease.

Repolarisation of the heart's ventricles varies between cardiac cycles and can be observed as beat-to-beat QT interval variability (QTV) on the electrocardiogram. Elevated QTV has been reported in a range of cardiac conditions, including coronary artery disease, myocardial infarction and congestive heart failure. Because excessive QTV is a harbinger of lethal arrhythmia, QTV assessment aids the stratification of cardiac mortality risk. Clinical systems measure static ECG, not repolarisation dynamics. Smart watches use ECG to detect atrial fibrillation, but do not asses ventricular activity.

Technology overview

Accurate QTV measurement cannot be achieved by conventional ECG processing systems. It requires dedicated high- performance algorithms.Our novel system is fully automated, exploiting the dynamical, temporal information in ECG waveforms for quantifying QTV. The system uses a free-form deformation to extract crucial information in the temporal behaviour of the repolarisation wave. The system is equipped to deal with the noise and movement artifacts common in ambulatory recordings and uses state-of-the-art signal processing methods to separate measurement noise from genuine QTV.

Development status

Our systems offers high fidelity tracking of morphological changes in ECG and accurate beat-to-beat assessment of ventricular repolarisation changes (QT interval variability) to obtain risk markers of sudden cardiac death. The ECG processing algorithm has been implemented, tested and validated against state-of-the-art technology. We are looking for pilot trial opportunities as an integrated component of smart wearables and hospital equipment with potential commercial licensees.

IP Status

PCT/AU2021/051469

Publications

1. QT interval variability in body surface ECG: measurement, physiological basis, and clinical value
2. Template Adaptation of 2D Quasi-Periodic Data Using a Soft-Assign Localized Correspondence Matrix

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