

## **Ambient Sensing of Vital Signs and Wellbeing through Sensors and Signal Processing**

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Ambient assessment of wellbeing is absolutely critical to support the independence of the aging population as enabling them to be active leads to their best quality of life and the activity itself provides physical and cognitive stimulation that actually slows decline and assists their continued independence. By extending independence, aging adults can avoid or delay entry into assisted living or long-term care, reducing the demand on the health systems for these services that are normally over-stretched to meet the demand.

The ongoing assessment of aging adults can provide the needed information to care partners, family and supporting health professionals to ensure that the person is living well, providing the aging adult with automated support such as applied smart home systems and allowing intervention when required, hopefully before a significant issue or event.

This ongoing assessment must not intrude into the lives of the aging adult and require them to do new or different behaviours as this is intrusive and will lead to non use and hence ambient assessment through sensors placed in the home (or vehicle) provides an alternative.

This tutorial will present current and emerging methods for the ambient assessment of vital signs and health indicators:

- 1) Heart rate and many heart rate related measures such as heart rate variability
- 2) Respiration rate and respiration related conditions such as apnea
- 3) Blood pressure and specifically changes in relative blood pressure
- 4) Temperature
- 5) Coughs
- 6) Mobility and physical health
- 7) Activities of Daily Living (ADL)

Methods are emerging for the assessment of these through many different types of sensors deployed in the residence that include pressure, motion, sound and temperature sensors that are now being augmented with emerging techniques based on video magnification of visible light and thermal video, applications of RADAR and UWB sensors for motion tracking and recently the addition of WiFi through analysis of the changes in the WiFi signal caused by activity.

The tutorial will explore recent progress and applications along with identification of future research directions for applications and technology.