

# A smartphone-based system for early recognition and management of frailty risk in community dwelling adults.

**Project Title:** Recognition and management of pre-frailty and frailty using smartphone technology, personalised models and in-time interventions

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**As the proportion of elderly people increases worldwide, so does the presentation of age-related health conditions.** In particular, a clinical condition known as frailty. Frailty develops as a consequence of age-related decline across many physiological systems, and is a leading cause of death in the elderly. Clinical presentations of frailty with rapid progressions and decline are more prevalent in the older population, especially those with co-morbidities. However, early detection of sub-clinical changes in middle-aged people (pre-frail) and suitable interventions drastically lowers the risk of functional and cognitive decline leading to clinical frailty syndrome.



This hub project aims to redesign an existing smartphone app and web dashboard system towards early recognition and management of functional decline which contributes to pre-frailty and frailty in community dwelling adults who may or may not be receiving aged care services. This system will:

1. collect continuous data using smartphone and wearable sensors and self-reports;
2. derive measures of functional decline, pre-frailty and frailty using machine learning models to construct real-time indicators of frailty risk in users;
3. offer personalised in-time self-help interventions through the smartphone app, and
4. create visual tools to prompt behaviour change in users,
5. design a web-based dashboard interface for carers - where care in the home is being provided.

The interventions in the app, aimed to maintain functionality and prevent further decline, will be optimised to maximise user engagement, adherence and behavioural changes.

The proposed system is a personalised frailty-risk monitor that integrates various data sources captured from a community-dwelling population. The smartphone-based system detects in real time when an individual may be beginning to decline and provides feedback and delivers interventions in the moment. Such an approach will promote self-awareness of functionality, and the maintenance of independence in a middle-aged and older adult population, and act in-time to prevent the progression of frailty symptoms. In addition, simple data visualisation tools on the dashboard interface will be designed to display participant's risk-metric summaries, and engagement with interventions over time. This will empower care providers to monitor, intervene and manage risk at an early stage and at a personalised level.

**Funding:** \$714,000 ARC Industry Transformation Research Hub (ITRH) for Digital Enhanced Living

**Project timeline:** 2017-2022

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\*The Flinders Digital Health Research Centre is supported by the Premier's Research and Industry Fund provided by the South Australian Government, and Cisco Systems Australia Pty Ltd under the Cisco Digital Health Initiative.

CRICOS No. 00114A | ABN 65 542 596 200