Notice of the Final Oral Examination
for the Degree of Master of Science

of

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“Activities of Daily Living as a Functional Assessment Predictor in Older Adults: A focus on Architecture in Connected Health”

Department of Computer Science

Monday September 30, 2019
1:00 P.M
Engineering Computer Science Building
Room 467

Supervisory Committee:
Dr. Jens Weber, Department of Compute Science, University of Victoria (Co-Supervisor)
Dr. Morgan Price, Department of Computer Science, UVic (Member)

External Examiner:
Dr. Alex Kuo, Department of Health Information Science, UVic

Chair of Oral Examination:
Dr. Doug Magnuson, School of Child and Youth Care, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies
Abstract

Background: Functional Assessment (FA) in older adults is an important measure of their health status. FA using Activities of Daily Living (ADL) is a strong predictor of health outcomes, especially as we age. With the development of increasingly-connected health, we have a new opportunity for more robust and improved FA.

Objective: The objective of this thesis is to collate and discussed published evidence on FA predictors and how the FA predictors can be collected using the paradigm of Connected Health (CH) architectures through an industrial case study°.

Methods: The method is to do two Systematic Literature Reviews (SLRs). The two SLRs was undertaken with Preferred Reporting Items for Systematic Reviews and Meta Analyses statement (PRISMA) and Parsifal, an online tool for SLR. This thesis catalogs various FA and state-of-the-art Software Engineering Architectural Tactics and Styles (SEATS) used within Connected Health (CH) that focuses on ADL. The results of the cataloged information were used in the industrial case study° where some of the FA predictors were automated. Articles obtained from the data source during the SLRs were filtered based on the titles, abstracts, full-text provision, English language literature, including age, which must be sixty-five years and above. Another reviewer was also included in this study, while all the defined inclusion and exclusion criteria detailed in this thesis were applied. Information about FA via ADL were extracted from the articles with further extraction on the SEATS used for computer-supported FA during the industrial case study°.

Data Source: During the SLRs processes, database searched included PubMed, EBSCOhost, Engineering Village, IEEE Xplore Digital Library, and ScienceDirect. The conducted search contains both controlled terms called Medical Subject Headings (MeSH) such as activities of daily living and search strings such as functional assessment, older adults, geriatrics, seniors, elderly care, and aging.

Results: From Four hundred and ninety-five initial abstracts and titles, nineteen full text journal articles were included in the final review for the SLR on FA predictors. Six full-text journal articles were obtained from the SLR on CH architectures after reading
its 449 titles and abstracts. In the SLR on FA predictors, predictor metrics for FA via ADL were extracted from each of the articles. Gait speed, sleep quality, and movement activities were assessed as ADL predictor metrics for FA in older adults. Other FA predictors reported involved self-reported metric scale measurement using Barthel-20 scale and performance-based scale through Timed-UP and Go test. This thesis reviewed each metric for sleep quality and movement activities. In the SLR on CH architectures, quick response of ADL and resource efficiency such as sensors were some of the major tactics related to performance in Software Engineering (SE) quality in CH, while confidentiality and integrity of FA measures related to security in SE quality in CH was another major concern.

Conclusion: Having conducted the two SLRs, a wide range of measures were used for FA in older adults, including consideration on the SEATS used for computer-supported FA. Overall, these FA measures and SEATS provide inexpensive and easy-to-implement FA. The diversity of the FA measures and SEATS contributes towards the development of computer-supported FA. However, future work is needed to consider the result of this study as an open-source computer-supported FA tool, and such tool should also be evaluated and verified through direct examination with older adults.

Keywords: Functional Assessment, Activities of Daily Living, Geriatric, Older Adults, Aging, Connected Health, Architectural Style, Architectural Tactics, computer-supported FA.