IRB #: IRB2019-XXX

Title: Pilot Testing of Sedentary Behavior Detection Method in a Controlled Laboratory Setting

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Status: Applied

Principal Investigator: Jo Woon Chong

Review Board: Institutional Review Board

Sponsor:

Study History

Submission Type	Review Type	Decision
Initial		Applied
Submission Type	Review Type	Decision
Modification		Applied

Key Study Contacts

Member	Role	Contact
Jo Woon Chong	Principal Investigator	j.chong@ttu.edu
Member	Role	Contact
Md Kamrul Hasan Foysal	Investigator	kamrul.foysal@ttu.edu

<u>Recruiting Materials - Introduction to Survey</u>

We would like to find out more about detection of sedentary posture condition and developing an alarming system for promoting a healthy work environment. This experiment will take about 2 minutes of your time, and we will use the results for a research study. We will not be able to identify you individually – please do not put your name on this survey. If you would prefer not to answer a question, please leave it blank. Your participation is voluntary and you can stop at any time. If you have any questions about this study, please call at XXX-XXX-XXXX. Please keep the Information Sheet provided. Thank you for helping us with this research.

7.1

State the objective of the research study and summarize relevant background knowledge.

Prolonged sedentary behavior has been identified as a potential cause of adverse health outcome (i.e. obesity, back pain, diabetes) [1]. Specifically, office workers usually have sedentary posture for several hours when they work [2]. However, limited research has been performed on detecting their sedentary time and alarming them to stimulate them to exercise. To promote a healthy work environment, prolonged sedentary posture detection/alarm methods are highly demanded. Although the findings have generally supported the idea of adverse health effects on prolonged sedentary posture, a measure is yet to be found that can objectively and accurately measure excessive sedentary behavior.

As direct observation, a gold standard method, is not feasible in research practice, subjective measures such as self-reported questionnaires and time-diaries have been the primary measurement methods used in the literature. There have been several approach of detecting/alarming prolonged sedentary posture using wrist watch [3] or accelerometer [4]. However, the privacy-invasive nature and accuracy of those methods has significantly precluded their use in research applications.

Our research team has recently developed the conceptual model of the sensor-based monitoring device that can directly measure the time spent in a sedentary condition with an infra-red camera method in a non-intrusive manner. Our proposed method detects human sedentary posture time and alarms if sedentary time is longer than pre-determined threshold. The primary objective of this project is to conduct the proof-of-concept study testing accuracy of the device in a controlled laboratory setting.

7.2

What is the research question or questions to be addressed?

We will test accuracy of the device for detecting the sedentary behaviors in office work-space (i.e., working on a desk in front of a computer) mimicking an office environment in a laboratory setting.

7.3

Research design (i.e., quantitative/qualitative, mixed methods, multi-phase, etc.). This will be a single group, quasi-experimental study that compares the estimates of time spent in screen-time behaviors between a direct observation (i.e., gold standard) and the device.

The experimental observation of pre-designed sedentary behaviors will be administered in the Computer Vision and Image Analysis Laboratory (director: Dr. Jo Woon Chong) in the Electrical and Computer Engineering building. Recruited subjects will be asked to sit on a chair located in front of a desk where a computer screen is placed. In the laboratory, the thermal imaging device, IR camera is installed on a desk facing a subject is set up . The device view range covers standard sitting position of an individual in an office environment. The Infrared Camera is set to record a video with 8 frames per second (fps). A subject is asked to change their postures facing the camera as follows:

1) Upright Sitting - (30 seconds),

2) Lean Backward - (15 seconds),

3) Lean Forward -   (15 seconds),

4) Lean Left -   (15 seconds),

5) Lean Right -   (15 seconds),

 5) Stand Up -   (15 seconds),

6) Leave the Desk - (15 seconds).

7.4

Importance of the knowledge to be obtained as a result of this research.

This proof-concept study will provide us with the pilot data to apply for a publication to improve the measurement practice of sedentary behaviors in health-related areas.

7.5

Enter or attach the citation references from question 7.1.

[1]   "Physical activity and sedentary leisure time and their associations with BMI, waist circumference, and percentage body fat in 0.5 million adults: the China Kadoorie Biobank study," *The American journal of clinical nutrition,* vol. 97, no. 3, pp. 487-496, 2013.
[2]   E. Banks, L. Jorm, K. Rogers, M. Clements, and A. Bauman, "Screen-time, obesity, ageing and disability: findings from 91 266 participants in the 45 and Up Study," *Public health nutrition,* vol. 14, no. 1, pp. 34-43, 2011.
[3]   J. Staudenmayer, S. He, A. Hickey, J. Sasaki, and P. Freedson, "Methods to estimate aspects of physical activity and sedentary behavior from high-frequency wrist accelerometer measurements," *Journal of applied physiology,* vol. 119, no. 4, pp. 396-403, 2015.
[4]   G. Lyons, K. Culhane, D. Hilton, P. Grace, and D. Lyons, "A description of an accelerometer-based mobility monitoring technique," *Medical engineering & physics,* vol. 27, no. 6, pp. 497-504, 2005.

7.6

Does this study involve approval by the Food & Drug Administration (FDA)?

- Yes
- ✔ No

7.7

Is this research study a clinical trial?

- Yes
- ✔ No