Date: Thursday, June 8, 2017 11:17:29 AM

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1.1 Study Identification

*All questions marked by a red asterisk * are required fields. However, because the mandatory fields have been kept to a minimum, answering only the required fields may not be sufficient for the REB to review your application.*

Please answer all relevant questions that will reasonably help to describe your study or proposed research.

1.0 * **Short Study Title** *(restricted to 250 characters)*:
Recognition of Daily Activities Using Environment-Based Sensing

2.0 * **Complete Study Title** *(can be exactly the same as short title)*:

Recognition of Daily Activities Using Environment-based Sensing: Simulating and Recognizing Activities in the Smart Condo

3.0 * **Select the appropriate Research Ethics Board (***Detailed descriptions are available by clicking the HELP link in the upper right hand corner of your screen***):**
REB 2

4.01 * **Is the proposed research:**
Funded (Grant, subgrant, contract, internal funds, donation or some other source of funding)

5.0 * **Name of Local Principal Investigator:**
Eleni Stroulia

6.0 * **Type of research/study:**
Faculty/Academic Staff

7.0 **Investigator's Supervisor (required for applications from undergraduate students, graduate students, post-doctoral fellows and medical residents to REBs 1 & 2. HREB does not accept applications from student PIs):**

8.01 **Study Coordinators or Research Assistants:** People listed here can edit this application and will receive all email notifications for the study:

Name	Employer
Christine Daum	RM Occupational Therapy

9.0 **Co-Investigators:** People listed here can edit this application and will receive email notifications *(Co-investigators who do not wish to receive email, should be added to the study email list team below instead of here).*

Name	Employer	Employer.ID
Lili Liu	RM Occupational Therapy	3402001

10.01 **Study Team:** *(co-investigators, supervising team, and other study team members) - People listed here cannot view or edit this application and do not receive email notifications.*

Last Name	First Name	Organization	Role/Area of Responsibility	Phone	Email
Mohebbi	Parisa		Research Assistant		mohebbi@ualberta.ca
Elahi	Mashrur	University of Alberta	Research Assistant		eelahi@ualberta.ca
Nikolaidis	Ioanis	University of Alberta	Co-investigator		nikolaidis@ualberta.ca
Fernandez	Victor Cervates	University of Alberta	Postdoctoral Fellow		vf@ualberta.ca
Yang	Herb	University of Alberta	Co-investigator		herberty@ualberta.ca

1.3 Study Funding Information

1.0 * **Type of Funding:**

Grant (external)

If OTHER, provide details:

2.0 * **Indicate which office administers your award.** *(It is the PI's responsibility to provide ethics approval notification to any office other than the ones listed below)*
University of Alberta - Research Services Office (RSO)

If OTHER, provide details:

3.0 * **Funding Source**

3.1 Select all sources of funding from the list below:

There are no items to display

3.2 If your source of funding is not available in the list above, click "Add" below and write the Sponsor/Agency name(s) in the free text box that pops up. *(Nore: You may reflect multiple sources of funding by continuing to click "Add" to add each additional source of funding).*
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4.0 * **Indicate if this research sponsored or monitored by any of the following:**
Not applicable

The researcher is responsible for ensuring that the study complies with the applicable US regulations. The REB must also comply with US Regulations.

1.5 Conflict of Interest

1.0 * **Are any of the investigators or their immediate family receiving any personal remuneration (including investigator payments and recruitment incentives but excluding trainee remuneration or graduate student stipends) from the funding of this study that is not accounted for in the study budget?**

○ Yes ◉ **No**

2.0 * **Do any of investigators or their immediate family have any proprietary interests in the product under study or the outcome of the research including patents, trademarks, copyrights, and licensing agreements?**

○ Yes ◉ **No**

3.0 * **Is there any compensation for this study that is affected by the study outcome?**

○ Yes ◉ **No**

4.0 * **Do any of the investigators or their immediate family have equity interest in the sponsoring company? (This does not include Mutual Funds)**

○ Yes ◉ **No**

5.0 * **Do any of the investigators or their immediate family receive payments of other sorts, from this sponsor (i.e. grants, compensation in the form of equipment or supplies, retainers for ongoing consultation and honoraria)?**

○ Yes ◉ **No**

6.0 * **Are any of the investigators or their immediate family, members of the sponsor's Board of Directors, Scientific Advisory Panel or comparable body?**

○ Yes ◉ **No**

7.0 * **Do you have any other relationship, financial or non-financial, that, if not disclosed, could be construed as a conflict of interest?**

○ Yes ◉ **No**

Please explain if the answer to any of the above questions is Yes:

Important

If you answered YES to any of the questions above, you may be asked for more information.

1.6 Research Locations and Other Approvals

1.0 * **List the locations of the proposed research, including recruitment activities. Provide name of institution, facility or organization, town, or province as applicable**

The Smart Condo, located in ECHA room 2-350.

2.0 * **Indicate if the study will use or access facilities, programmes,**

resources, staff, students, specimens, patients or their records, at any of the sites affiliated with the following *(select all that apply):*
Not applicable

List all health care research sites/locations:

3.0 Multi-Institution Review

* **3.1 Has this study already received approval from another REB?**
○ **Yes** ◉ **No**

4.0 If this application is closely linked to research previously approved by one of the University of Alberta REBs or has already received ethics approval from an external ethics review board*(s)***, provide the study number, REB name or other identifying information. Attach any external REB application and approval letter in the Documentation Section – Other Documents.**
Although the purpose, type, and procedures are different in the present study, it draws upon some aspects of the protocol approved by HREB in March 2017 entitled "Bipolar Disorder in Later Life (BADAS) In-Home" (Pro0070608).

2.1 Study Objectives and Design

1.0

Provide planned start and end date of human participant research.

Start Date
6/19/2017

End Date:
9/30/2017

2.0 * **Provide a lay summary of your proposed research which would be understandable to general public**
Currently, 747,000 Canadians have some type of cognitive impairment, including dementia. This number is expected to double by 2031. People with dementia experience challenges with daily activities (e.g., cooking meals, ironing, taking medication, personal care) such as completing tasks in incorrect sequences and misplacing materials. Having accurate information about an older adult's daily activities and the patterns of these activities can provide rich information on his/her abilities and functions. Major deviations in daily patterns may indicate a person's decline. Having this information could alert caregivers of potentially risky events and the need for support.

This study builds on work that has been done in the Smart Condo™, a fully-equipped, technology-embedded "living lab" located at the University of Alberta. The purpose of the present study is to evaluate the accuracy of sensor and beacon data against video data while participants perform daily activities in the Smart

Condo™. This study is a precursor to future research that looks specifically at older adults' daily activities and their activity patterns.

Twenty students will be recruited from the Department of Computing Science and the Department of Occupational Therapy to spend one two-hour shift, either alone or in pairs, in the Smart Condo™. These participants will be asked to follow a structured activity schedule that specifies when and what activities should be completed. Activities include talking on the phone, preparing a simple meal, light housekeeping and laundry (e.g., sweeping floor, ironing), watching TV, playing a tablet-based game, and exercising. Some activities will be simulated (e.g., personal care, dressing) and others will be real (e.g., cooking, ironing, exercising). During their time in the condo, participants' movements and actions will be tracked using the sensors, beacons, and video cameras. Movements will be analyzed for location, time, and frequency and these will be compared to video data.

3.0 * **Provide a full description of your research proposal outlining the following:**

- **Purpose**
- **Hypothesis**
- **Justification**
- **Objectives**
- **Research Method/Procedures**
- **Plan for Data Analysis**

Background and justification: Currently, 747,000 Canadians have some type of cognitive impairment, including dementia, and this number is expected to double to 1.4 million by 2031. Clinical observations and research evidence suggest that people with dementia experience challenges with daily activities including preparing meals, ironing, taking medication, and personal care. It has been demonstrated that they make mistakes such as completing tasks in incorrect sequences and misplacing materials. Possessing accurate information about an older adult's daily activities and the patterns of these activities can provide rich evidence on his/her abilities and functions. Significant exceptions and changes in these activity patterns may indicate a decline in cognitive abilities. Having this information could alert caregivers of potentially risky events and the need for support.

The present study builds on work that has been done in the Smart Condo™ located at the University of Alberta. The Smart Condo™ contains a variety of very small, unobtrusive, and inexpensive ambient sensors (e.g., infrared motion, pressure, water flow, electricity). These sensors permit the observation and analysis of activities, collected on a server. The Smart Condo™ has recently been redesigned to include bluetooth low energy (BLE) beacons attached to different objects in the house and a service running in the background of the occupants' smartphones. The smartphone is used to collect and report signal strength measurements from

nearby BLE beacons. At the same time, non-BLE sensor data triggered as the inhabitants move around are also collected to a back-end server. These two types of data sources are used to infer each person's locations, which are provided to the smartphones of the users, as well as streamed to the cloud-based Smart Condo™ server. The server generates textual reports and spatial visualizations for the movements and inferred activities of every occupant in any time interval, and warnings for special incidents which can be accessible by the person's doctor or caregiver or anyone of his or her choice.

Purpose and objectives: The purpose of the present study is to collect a comprehensive data set to be used as the benchmark for activity-recognition research. To the best of our knowledge, there is no other data set that (a) is informed by occupational therapy research on ADLs (activities of daily living), (b) includes one and multiple participants, and (c) includes such a comprehensive set of sensor types (Infrared motion sensors, pressure, water flow, electricity, BLE stickers, video cameras, and Kinect cameras). In the immediate future, the data set will be used by several students in our team for the following evaluative studies:

a. analyzing the performance of activity-recognition methods relying on different sets of sensor types and different numbers of sensors;
b. evaluating our video-based action-recognition algorithms; and
c. evaluating our algorithm for analyzing a Kinect-captured video to recognize a scripted activity, such as cooking.

After validating the new Smart Condo™ system, the intent is to deploy a subset of these sensors and beacons as well as the Smart Condo™ platform into community settings (i.e., select assisted living facilities, an independent living suite) for further evaluation and research. Ultimately, we hope that our system can detect and alert older adults and their caregivers of potential safety risks and the need for support.

Procedures: Twenty students will be recruited from the Department of Computing Science and the Department of Occupational Therapy to spend one two-hour shift in the Smart Condo™. Fourteen participants will visit the Smart Condo™ on their own and six will visit the condo in pairs.

Participants will be asked to follow a structured activity schedule (see Appendix A) that specifies when and what activities should be completed. Activities include talking on the phone, preparing a simple meal, light housekeeping and laundry (e.g., sweeping floor, ironing), watching TV, playing a tablet-based game, and exercising. Most activities are drawn from three screening and assessment tools commonly administered by occupational therapists who work with older adults (the Assessment of Motor and Process Skills, the Kettle Test, and Executive Function Performance Test). Some activities will be simulated (e.g., personal care, dressing, doing

laundry) whereas others will be real (e.g., preparing a meal, exercising, playing a game).

During their time in the Smart Condo™, participants will also be asked to play two serious games (entitled Virtual Gym and Vibrant Minds) developed by Eleni Stroulia and colleagues. Virtual Gym is a Kinect-based game that guides participants through postures and movements, recognizes features of their movement, and provides different types of constructive feedback and motivating rewards when movements are performed well. Vibrant Minds is a suite of three tablet-based serious games (whack-a-mole, word search, bejeweled) that presents game-playing levels of systematically increasing difficulty, thereby challenging different aspects of the participants' cognition. Participants will be asked to play both of these games and to provide feedback on their usability by completing two six-item Survey Monkey surveys while in the Smart Condo™. Survey responses will be used to further improve these two games which will be deployed and evaluated in other studies.

Plan for Data Analysis: During each two hour activity recognition session in the Smart Condo™, participants' movements and actions will be tracked using the sensors, beacons, a Kinect camera, and video cameras embedded in it. The team will then analyze location, time, and frequency of participant movements and compare these to video data to determine the sensor and beacon accuracy.

1. We will code the video recorded for each session, with the types of activities mentioned in the script (walking, sitting down, standing up, opening/closing cabinets/drawers/doors, etc).
   The coded video segments, obtained from numerous cameras and perspectives, will be used to evaluate our video-based activity recognition algorithms (PhD student Elahi), as well as to understand the impact of camera quality and perspective on the algorithms' accuracy.
2. We will analyse the stream of sensor+BLE sticker data using our ambient activity-recognition algorithms (MSc student Mohebbi) to infer the participants locations and activities at each point in time.
   Correlating the time-stamped locations obtained from the application used by the participants to record their presence at a prescribed location for in each prescribed activity, we will obtain the accuracy of these algorithms.
3. We will code and cross-reference the coded segments of the recordings obtained by the Kinect camera and the video camera, observing the cooking activities.
   This data set will be used to evaluate the performance of our video-based activity recognition algorithms (PhD student Elahi and PDF Fernandez) on the two video formats.

4.0 Describe procedures, treatment, or activities that are above or in addition to standard practices in this study area *(eg. extra medical or health-related procedures, curriculum enhancements, extra follow-up,*

etc):
None.

5.0 **If the proposed research is above minimal risk and is not funded via a competitive peer review grant or industry-sponsored clinical trial, the REB will require evidence of scientific review. Provide information about the review process and its results if appropriate.**

6.0 **For clinical trials, describe any sub-studies associated with this Protocol.**

2.2 Research Methods and Procedures

Some research methods prompt specific ethical issues. The methods listed below have additional questions associated with them in this application. If your research does not involve any of the methods listed below, ensure that your proposed research is adequately described in Section 2.1: Study Objectives and Design or attach documents in the Documentation Section if necessary.

1.0

* **This study will involve the following** *(select all that apply)*

Participant Observation
Surveys and Questionnaires (including internet surveys)

NOTE 1: Select this ONLY if your application SOLELY involves a review of paper charts/electronic health records/administrative health data to answer the research question. If you are enrolling people into a study and need to collect data from their health records in addition to other interventions, then you SHOULD NOT select this box.

NOTE 2: Select this option if this research ONLY involves analysis of blood/tissue/specimens originally collected for another purpose but now being used to answer your research question. If you are enrolling people into the study to prospectively collect specimens to analyze you SHOULD NOT select this box.

2.7 Participant Observation

1.0 **Who will the observer be?**
Sensor and video data that will be collected while participants are completing the daily activities described in the research protocol will be viewed by the study team described in section 1.1 of the present application (i.e., Principal Investigator, Co-investigators, Postdoctoral Fellow, Research Assistants, Study Coordinator).

2.0 **Who is being observed?**
People who will be observed are limited to the study participants. These are 20 Computer Science or Occupational Therapy students at the University of Alberta who volunteered to participate in this study.

3.0 **Why are they being observed?**
Participants are being observed so that the study team can test the accuracy and usability of the sensors (e.g., Infrared motion sensors, BLE stickers, Kinect sensors) against video data, including the ability of these

sensors to detect "mistakes/errors" made while completing the activity protocol.

4.0 When and where will participants be observed (i.e. during class, during their workday)?
Participants will be asked to follow the activity schedule (see Appendix A) during the two hours that each participant will spend in the Smart Condo.

5.0 Will others be present who are not being observed (i.e. non-participants)?
○ Yes ◉ **No**

6.0 What data will be collected?
Video and/or audio recordings
Other

2.9 Surveys and Questionnaires (including Online)

1.0 How will the survey/questionnaire data be collected (i.e. collected in person, or if collected online, what survey program/software will be used etc.)?
After playing the two serious games (Virtual Gym and Vibrant Minds) in the Activity Schedule (Appendix A), we will ask participants to provide feedback about these games developed by the team. This feedback will be elicited via a 6-item questionnaire that each participant will respond to individually after playing each of the serious games (see Appendix D). Completing these questionnaires will give us information that will be used to continue to improve the serious games and it will simulate computer work, a common daily activity.

Questionnaires will be administered using Survey Monkey. Each participant will be asked to complete the questionnaire immediately after using each of the two serious games. Participants will be given a tablet to complete the questionnaires. Thus, data will consist of participants' typed responses.

2.0 Where will the data be stored once it's collected (i.e. will it be stored on the survey software provider servers, will it be downloaded to the PI's computer, other)?
Upon collecting participant responses to the questionnaires, data will be stored encrypted, in a University of Alberta file server. The encryption key will be known to the Study Coordinator.

Participant responses to the questionnaires will be collected by the Study Coordinator who will aggregate responses in a separate document prior to sending responses to investigators. No email addresses or IP addresses will be shared.

3.0 How will you ensure the data is kept secure, both during and after it is collected?
As described above, data will be stored encrypted, in a University of Alberta file server. The encryption key will be known to the Study Coordinator.

Participant responses to the questionnaires will be collected by the Study Coordinator who will aggregate de-identified responses in a separate document. No email addresses or IP addresses will be shared.

4.0 **Who will have access to the data?**
The Study Coordinator will have access to the raw data collected via Survey Monkey. Aggregated and deidentified data will be shared with the Principal Investigator and one research staff member assigned to each of the serious games (Virtual Gym and Vibrant Minds).

5.0 **How long will the data be kept? If it will be destroyed, when and how will destruction occur?**
The data will be retained for 5 years. The data will NOT become part of a data repository and will NOT involve the creation of a research database or registry for future research use.

Following 5 years or in the case of participant withdrawal, the data will be destroyed. This will be
done by shredding paper records and erasing electronically-stored information using commercial software applications designed to remove data from the storage device.

3.1 Risk Assessment

1.0 * **Provide your assessment of the risks that may be associated with this research:**
Minimal Risk - research in which the probability and magnitude of possible harms implied by participation is no greater than those encountered by participants in those aspects of their everyday life that relate to the research (TCPS2)

2.0 * **Select all that might apply:**

Description of Possible Physical Risks and Discomforts

No	Participants might feel physical fatigue, e.g. sleep deprivation
No	Participants might feel physical stress, e.g. cardiovascular stress tests
No	Participants might sustain injury, infection, and intervention side-effects or complications
No	The physical risks will be greater than those encountered by the participants in everyday life

Possible Psychological, Emotional, Social and Other Risks and Discomforts

Possibly	Participants might feel psychologically or emotionally stressed, demeaned, embarrassed, worried, anxious, scared or distressed, e.g. description of painful or traumatic events
No	Participants might feel psychological or mental fatigue, e.g intense concentration required
Possibly	Participants might experience cultural or social risk, e.g. loss of privacy or status or damage to reputation
No	Participants might be exposed to economic or legal risk, for instance non-anonymized workplace surveys
No	The risks will be greater than those encountered by the participants in everyday life

3.0 * **Provide details of all the risks and discomforts associated with the research for which you indicated YES or POSSIBLY above.**
Participants' movements and activities while performing the prescribed list of activities during their time in the Smart Condo will be monitored using video and sensors (ie., Infrared motion, Kinect, and BLE stickers that are attached to items in the Smart Condo). Some participants may feel self-conscious at having their movements tracked using video and sensors. However, the prescribed activities that they are being asked to complete (see Appendix A) are not sensitive in nature. With the exception of washing their hands, participants will not be asked to complete any personal hygiene tasks. They will be asked to step into the bathtub (to simulate bathing and showering), to sit on the toilet, and to don some clothing (shirt, pants, socks, shoes, jacket) but they will be fully clothed throughout these activities. In other words, bathing, toileting, and dressing tasks will be simulated only, for the purpose of testing sensor accuracy.

It is possible that some participants may experience social risk by participating in this study given that they may know members of the research team who are also located within the Department of Computer Science and the Department of Occupational Therapy. Participants may feel embarrassed or uncomfortable at the prospect of having their movements recorded and viewed by these people. However, participants are not required to take part in this study. Their participation entirely voluntary.

4.0 * **Describe how you will manage and minimize risks and discomforts, as well as mitigate harm:**
If participants feel that their participation will cause undue psychological stress and discomfort, they can withdraw from the study.

Further, as described above, sensitive activities (i.e., bathing, toileting, dressing) will be simulated only. At no time will participants be asked to disrobe.

5.0 **Is there a possibility that your research procedures will lead to unexpected findings, adverse reactions, or similar results that may require follow-up** *(i.e. individuals disclose that they are upset or distressed during an interview/questionnaire, unanticipated findings on MRI, etc.)***?**
○ Yes ◉ **No**

6.0 **If you are using any tests in this study diagnostically, indicate the member(s) of the study team who will administer the measures/instruments:**

Test Name	Test Administrator	Organization	Administrator's Qualification
There are no items to display			

7.0 **If any research related procedures/tests could be interpreted diagnostically, will these be reported back to the participants and if so, how and by whom?**
Not applicable.

3.2 Benefits Analysis

1.0 * **Describe any potential benefits of the proposed research to the participants. If there are no benefits, state this explicitly:**
Participants will not directly benefit from taking part in this study.

2.0 * **Describe the scientific and/or scholarly benefits of the proposed research:**
Indoor-localization of individuals and activity recognition is a thriving area of research. It is essential in supporting "smart buildings" that minimize their energy consumption while improving the comfort of their occupants and in enabling "ambient assisted living spaces" that support people with disabilities to live independently. A number of benchmark data sets have been collected by different research groups working in this area, however, to the best of our knowledge, there does not exist a data set that covers the types of sensors that the proposed data-collection will cover.

This data set will support evaluation of the research of at least three theses in our own group and will be an invaluable resource for the research community at large.

3.0 **If this research involves risk to participants explain how the benefits outweigh the risks.**
This research involves very little risk to participants. The benefits of the proposed research outweigh the risks.

4.1 Participant Information

1.0 * **Will you be recruiting human participants** *(i.e. enrolling people into the study, sending people online surveys to complete)***?**
(●) **Yes** ( ) No

1.1 Will participants be recruited or their data be collected from Alberta Health Services or Covenant Health or data custodian as defined in the Alberta Health Information Act?
( ) Yes (●) **No**

4.2 Additional Participant Information

1.0 **Describe the participants that will be included in this study. Outline ALL participants** *(i.e. if you are enrolling healthy controls as well):*

Participants in this study will be students in the Department of Computing Science and the Department of Occupational Therapy. These may include students at all levels of study (e.g., Bachelor, Master, Doctoral) as well as summer students and postdoctoral fellows.

2.0 * **Describe and justify the inclusion criteria for participants** *(e.g. age range, health status, gender, etc.):*

There are no specific inclusion criteria. We are including Computing Science and Occupational Therapy students for convenience purposes only.

3.0 **Describe and justify the exclusion criteria for participants:**

If students from other Departments were willing to participate, they would be included in this study. As described, we are recruiting Computing Science and Occupational Therapy students for convenience only.

Other than their willingness to contribute two hours toward this study by spending two hours in the Smart Condo completing the prescribed activities, there are no exclusion criteria.

4.0 Participants

4.1 How many participants do you hope to recruit *(including controls, if applicable?)*
20
4.2 Of these, how many are controls, if applicable?
0
4.3 If this is a multi-site study, how many participants do you anticipate will be enrolled in the entire study?
0

5.0 Justification for sample size:
A described in the research summary, this study will precede deployment of sensors in community settings such as assisted and independent living settings. As such, to ensure that sufficient variation in data (including potential errors) is observed, a sample size of 20 was selected.

A sample size of 20 will allow us to obtain data for 14 single occupants (i.e., participants who will visit the Smart Condo on their own) and 6 double occupants (i.e., participants who will visit the Smart Condo in pairs). Having data on both single and double occupants will help us understand improvements that need to be done to the system in order to reflect the scenarios faced by older adults with cognitive decline may live alone or who may reside with someone else.

4.4 Recruitment of Participants (non-Health)

1.0 Recruitment

1.1 How will you identify potential participants? Outline all of the means you will use to identify who may be eligible to be in the study *(i.e. response to advertising such as flyers, posters, ads in newspapers, websites, email, list serves, community organization referrals, etc.)*
The Principal Investigator (Stroulia) and Co-Investigator (Liu) will recruit participants by sending an email to Department of Computing Science students and Department of Occupational Therapy students via department listservs (Undergraduate and Graduate listservs in the Department of Computing Science, Graduate listserv in the Department of Occupational Therapy). Please see Appendix B for the Study Invitation email. This email will also be sent to Stroulia and Liu's colleagues in their Departments. These students and colleagues will be asked to circulate the notice among their networks.

1.2 Once you have identified a list of potentially eligible participants, indicate how the potential participants' names will be passed on to the researchers AND how will the potential participants be approached about the research.
Potential participants will be asked to contact the Study Coordinator who will explain the study and schedule participants for a visit to the Smart Condo.

2.0 Pre-Existing Relationships

2.1 Will potential participants be recruited through pre-existing relationships with researchers *(e.g. Will an instructor recruit students from his classes, or a physician recruit patients from her practice? Other examples may be employees, acquaintances, own children or family members, etc.)*?

(●) **Yes** ( ) No

2.2 If YES, identify the relationship between the researchers and participants that could compromise the freedom to decline *(e.g. clinician/patient, professor/student)*
The Principal Investigator (Stroulia) and Co-Investigator (Liu) may or may not be have existing relationships with potential participants. However, neither the Principal Investigator nor the Co-Investigator are teaching courses during the Spring and Summer terms (hence the timing of the proposed study) and thus, they will not recruit from their classes.

2.3 How will you ensure that there is no undue pressure on the potential participants to agree to the study?
To ensure that potential participants do not feel pressured to participate, they will be asked to contact the Study Coordinator (not the Principal Investigator or Co-Investigators) to express their interest in the study.

3.0 Will your study involve any of the following? *(select all that apply)*
Payment or incentives, e.g. honorarium or gifts for participating in this study

4.5 Informed Consent Determination

1.0 Describe who will provide informed consent for this study *(i.e. the participant, parent of child participant, substitute decision maker, no one will give consent – requesting a waiver)*
Each participant will provide his/her own written consent to participate in the study. Participants will be at least 18 years of age. Because of the nature of the sample, all participants will have capacity to provide informed consent.

1.1 Waiver of Consent Requested
If you are asking for a waiver of participant consent, please justify the waiver or alteration and explain how the study meets all of the criteria for the waiver. Refer to Article 3.7 of TCPS2 and provide justification for requesting a Waiver of Consent for ALL criteria (a-e)

1.2 Waiver of Consent in Individual Medical Emergency
If you are asking for a waiver or alteration of participant consent in individual medical emergencies, please justify the waiver or alteration and explain how the study meets ALL of the criteria outlined in Article 3.8 of TCPS2 (a-f).

2.0 How will consent be obtained/documented? Select all that apply
Signed consent form

If you are not using a signed consent form, explain how the study information will be provided to the participant and how consent will be obtained/documented. Provide details for EACH of the options selected above:

3.0 Will every participant have the capacity to give fully informed consent on his/her own behalf?

◉ **Yes** ○ No

3.1 Explain why participants lack capacity to give informed consent *(e.g. age, mental or physical condition, etc.).*
Not applicable

3.2 Will participants who lack capacity to give full informed consent be asked to give assent?

○ Yes ○ No

Provide details. IF applicable, attach a copy of assent form(s) in the Documentation section.
Not applicable

3.3 In cases where participants (re)gain capacity to give informed consent during the study, how will they be asked to provide consent on their own behalf?
Not applicable

4.0 What assistance will be provided to participants or those consenting on their behalf, who may require additional assistance? *(e.g. non-English speakers, visually impaired, etc.)*
Participants will be adults who are university students who can communicate in English, therefore, they will understand the study information letter and consent form.

Should potential participants have hearing or visual challenges that may affect their ability to provide informed consent, research team members will provide large text documents
(i.e., information letter, consent form) and provide clear verbal instructions to enable those participants with hearing challenges to participate.

5.0 * If at any time a PARTICIPANT wishes to withdraw from the study or from certain parts of the study, describe when and how this can be done.
Participants can request to withdraw from the study at any time orally or in writing. If this occurs, they will be free to leave the Smart Condo during the data collection session.

6.0 Describe the circumstances and limitations of DATA withdrawal from the study, including the last point at which participant DATA can be withdrawn *(i.e. 2 weeks after transcription of interview notes)*
Participants will be able to withdraw their data until seven days AFTER their data collection session (i.e., the date that they visited the Smart Condo) to withdraw their data from the study. In the event that a participant requests to have his/her data destroyed, the research team will honour this request by erasing their electronic data and shredding paper-based records.

7.0 Will this study involve any group(s) where non-participants are present? For example, classroom research might involve groups which include participants and non-participants.

○ Yes ◉ **No**

4.6 Expense Reimbursements and Incentives

1.0 Expense Reimbursements:

1.1 Describe in detail the expenses for which participants will be reimbursed, the value of the reimbursements per item as well as the total maximum reimbursement and the reimbursement process *(e.g. participants will receive a cash reimbursement for parking at the rate of $12.00 per visit for up to three visits for a total value of $36.00)*
Not applicable. Participants will not be reimbursed for their expenses. We assume that most participants will be summer students who will already be on campus. As such, they will not incur additional parking or transit expenses.

1.2 IF you will be collecting personal information to reimburse or pay participants, describe the information to be collected and how privacy will be maintained.
Not applicable.

2.0 Incentives:

2.1 Will participants receive any incentives for participating in this research *(i.e. gift card, cash payment, prize draw)***? If yes, provide details of the value, including the likelihood (odds) of winning for prize draws and lotteries.**
http://www.reo.ualberta.ca/en/Human-Research-Ethics/Incentives.aspx
Each participant will receive a $20 gift card to a coffee shop (e.g., Starbucks, Tim Hortons) at completion of their two hour data collection session in the Smart Condo.

2.2 What is the maximum value of the incentives offered to an individual throughout the research?
The maximum value of incentives per participant is $20.

2.3 IF incentives are offered to participants, they should not be so large or attractive as to constitute coercion. Justify the value of the incentives you are offering relative to your study population.
Participants will be given an honorarium in the form of a $20 gift card to thank them for their time (2 hours). Current minimum wage in Alberta is $12.20/hour. As such, the value of the incentive is close to minimum wage (it does not exceed minimum wage).

5.1 Data Collection

1.0 * **Will the researcher or study team be able to identify any of the participants at any stage of the study?**
(●) **Yes** ( ) No

2.0 Primary/raw data collected will be *(check all that apply)***:**
Directly identifying information - the information identifies a specific individual through direct identifiers (e.g. name, social insurance number, personal health number, etc.)

3.0 If this study involves secondary use of data, list all original sources:
Not applicable.

4.0 In research where total anonymity and confidentiality is sought but cannot be guaranteed *(eg. where participants talk in a group)* **how will confidentiality be achieved?**
Not applicable.

5.2 Data Identifiers

1.0 * **Personal Identifiers:** will you be collecting - at any time during the study, including recruitment - any of the following *(check all that apply)*:
Initials
Full Face Photograph or Other Recording

If OTHER, please describe:

2.0 **Will you be collecting - at any time of the study, including recruitment of participants - any of the following** *(check all that apply)*:
There are no items to display

If OTHER, please describe:
No, we will not collect any of the above.

3.0 * **If you are collecting any of the above, provide a comprehensive rationale to explain why it is necessary to collect this information:**
Given the nature of video data, participants' faces will be identifiable.

To associate participants with their sensor and video data, we will create a participant number (an alphanumeric code) which will be tied to this data. A master list will link participants to these participant numbers. To do this, we will collect participant first and last initials rather than their full names. This master list will be retained until the data collection phase of the study has been completed.

4.0 **If identifying information will be removed at some point, when and how will this be done?**
Unfortunately, participants' faces cannot be obscured.

Participant names will be replaced by an alphanumeric code at the beginning of the study. This alphanumeric code will be retained throughout data collection and analysis. A master list that links participants with the alphanumeric code will be kept in a password protected file which will be stored on the Principal Investigator's computer.

5.0 * **Specify what identifiable information will be RETAINED once data collection is complete, and explain why retention is necessary. Include the retention of master lists that link participant identifiers with de-identified data:**
The only identifiable information that will be retained is the video data.

6.0 **If applicable, describe your plans to link the data in this study with data associated with other studies (e.g within a data repository) or with data belonging to another organization:**
Not applicable.

5.3 Data Confidentiality and Privacy

1.0 * **How will confidentiality of the data be maintained? Describe how the identity of participants will be protected both during and after research.**
We will assign participant numbers (numeric codes) to participants in place of their initials or names. Only one research team member will have

access to the master list that in which these codes are linked with participant first and last initial. With the exception of conversations directly with each participant, their names will not be used, only their numbers.

2.0 **How will the principal investigator ensure that all study personnel are aware of their responsibilities concerning participants' privacy and the confidentiality of their information?**
All study personnel (ie research assistants, study coordinator, postdoctoral fellow) must have taken the TCPS 2 Tutorial to ensure they are aware of their responsibilities concerning participants' privacy and the confidentiality of their information.

3.0

External Data Access

* **3.1 Will identifiable data be transferred or made available to persons or agencies outside the research team?**
○ Yes ◉ **No**

3.2 If YES, describe in detail what identifiable information will be released, to whom, why they need access, and under what conditions? What safeguards will be used to protect the identity of subjects and the privacy of their data.
Not applicable.

3.3 Provide details if identifiable data will be leaving the institution, province, or country *(eg. member of research team is located in another institution or country, etc.)*
Not applicable.

5.4 Data Storage, Retention, and Disposal

1.0 * **Describe how research data will be stored, e.g. digital files, hard copies, audio recordings, other. Specify the physical location and how it will be secured to protect confidentiality and privacy.** *(For example, study documents must be kept in a locked filing cabinet and computer files are encrypted, etc. Write N/A if not applicable to your research)*
Hard copies of consent forms and activity logs will be kept in a locked filing cabinet in the Principal Investigator's office. All de-identified electronic study documents will be stored encrypted and stored on a password protected computer located in the PI's office. The encryption key will be known to the Study Coordinator.

2.0 * **University policy requires that you keep your data for a minimum of 5 years following completion of the study but there is no limit on data retention. Specify any plans for future use of the data. If the data will become part of a data repository or if this study involves the creation of a research database or registry for future research use, please provide details.** *(Write N/A if not applicable to your research)*
The data will be retained for 5 years. There are no plans for future use of the data other than publishing the data in peer reviewed journals and conferences. The data will NOT become part of a data repository and will NOT involve the creation of a research database or registry for future research use.

3.0

If you plan to destroy your data, describe when and how this will be done? Indicate your plans for the destruction of the identifiers at the

earliest opportunity consistent with the conduct of the research and/or clinical needs:
After 5 years, the data will be destroyed. This will be done by shredding paper record. Records stored on a computer hard drive will be erased using commercial software applications designed to remove all data from the storage device.

Documentation

Add documents in this section according to the headers. Use Item 11.0 "Other Documents" for any material not specifically mentioned below.

Sample templates are available in the REMO Home Page in the **Forms and Templates**, or by clicking HERE.

1.0 Recruitment Materials:

Document Name	Version	Date	Description
Appendix B - Study invitation email | History	0.01	5/30/2017 11:06 AM	

2.0 Letter of Initial Contact:

Document Name	Version	Date	Description
There are no items to display			

3.0 Informed Consent / Information Document(s):

3.1 What is the reading level of the Informed Consent Form(s):
9

3.2 Informed Consent Form(s)/Information Document(s):

Document Name	Version	Date	Description
Appendix C - Information letter and consent form | History	0.03	6/6/2017 7:53 PM	

4.0 Assent Forms:

Document Name	Version	Date	Description
There are no items to display			

5.0 Questionnaires, Cover Letters, Surveys, Tests, Interview Scripts, etc.:

Document Name	Version	Date	Description
Appendix D - Interview questions | History	0.01	5/30/2017 11:57 AM	

6.0 Protocol/Research Proposal:

Document Name	Version	Date	Description
There are no items to display			

7.0 Investigator Brochures/Product Monographs:

Document Name	Version	Date	Description
There are no items to display			

8.0 Health Canada No Objection Letter *(NOL)*:

Document Name	Version	Date	Description
There are no items to display			

9.0 Confidentiality Agreement:

Document Name	Version	Date	Description
There are no items to display			

10.0 Conflict of Interest:

Document Name	Version	Date	Description
There are no items to display			

11.0 Other Documents:

For example, Study Budget, Course Outline, or other documents not mentioned above

Document Name	Version	Date	Description
Appendix A - Activity schedule | History	0.01	5/30/2017 12:11 PM	

Final Page

You have completed your ethics application! Click "Continue" to go to your study workspace.

This action will NOT SUBMIT the application for review.

Only the Study Investigator can submit an application to the REB by selecting the "SUBMIT STUDY" button in My Activities for this Study ID: Pro00073382 .