McGill

Applicable Research Ethics Board
___REB-I ___REB-II ___REB-III

Application for Ethics Approval for Research Involving Human Participants

(please refer to the Application Guidelines [www.mcgill.ca/research/researchers/compliance/human/] **before** completing this form)

Project Title: Center of Mass Awareness for Virtual Character Balance Control

Principal Investigator: Monty Thibault **Dept:** Computer Science

Phone #: 306 852 8232 **Email:** monty.thibault@mail.mcgill.ca
(a McGill email MUST be provided)

Status: Faculty ___ Postdoctoral Fellow ___ Other (specify) _____
Ph.D. Student ___ Master's Student ___ Undergraduate _X__

Type of Research: Faculty Research ___ Thesis ___
Honours Thesis ___ Independent Study Project ___
Course Assignment (specify course name and #)_____
Other (specify) _____Summer Internship_____

Faculty Supervisor (if PI is a student): Prof. Paul Kry **Email:** kry@cs.mcgill.ca

Co- Investigators/Other Researchers (list name/status/affiliation):

List all funding sources for this project and project titles (if different from the above). Indicate the Principal Investigator of the award if not yourself.

Awarded: Paul Kry - NSERC 214978 Physically Based Character Animation, Editing, Control, Deformation, and Contact

Monty Thibault - NSERC USRA – "Center of Mass Awareness for Virtual Character Balance Control"

Pending:

Principal Investigator Statement: I will ensure that this project is conducted in accordance with the policies and procedures governing the ethical conduct of research involving human participants at McGill University. I allow release of my nominative information as required by these policies and procedures.

Principal Investigator Signature: _____  **_____ Date: _____5/5/2016_____**

Faculty Supervisor Statement**:** I have read and approved this project and affirm that it has received the appropriate academic approval. I will ensure that the student investigator is aware of the applicable policies and procedures governing the ethical conduct of human subject research at McGill University and I agree to provide all necessary supervision to the student. I allow release of my nominative information as required by these policies and procedures.

5/4/2016

Faculty Supervisor Signature: _____ **Date**: _____

Respond directly on this form to each section (1-8). Do not re-order or omit any section or any of the questions under each section heading. **Answer every part of each section. Forms with incomplete sections will be returned.**

1. Purpose of the Research

a) *Describe the proposed project and its objectives, including the research questions to be investigated (one-two page maximum).*

Over the past two decades, research on controlling balance in virtual characters has largely focused on the problems of achieving robust standing balance and that of robust locomotion. Balance controllers have been developed around a variety of principles, including linear momentum control, angular momentum control, model-predictive control, and virtual model control. They vary greatly in the assumptions about the nature of the balance or movement tasks, the abstractions used, and their reactive or anticipative nature. However, almost all balance algorithms presume that the center of mass and its velocity are known quantities that can be used within the control equations. This unfortunately allows virtual characters to potentially have super human balancing abilities. While the limitations of a given balance controller may limit unnatural balance in a virtual human, previous work has demonstrated that natural and interesting degradation of a balance controller can be produced by injecting noise into the balance controller's gravity direction, or likewise by directly perturbing the control torques. In this project, we will instead design and perform experiments with the goal of building a model for the error that humans make in controlling their center of mass.

b) What is the expected value or benefits of the research?

The research has application to the control systems used in games and film.

c) How do you anticipate disseminating the results (e.g. thesis, presentations, internet, film, publications)?

The results will be released in a publication and submitted to a conferences/journals concerned with computer graphics.

2. Recruitment of Participants/Location of Research

a) *Describe the participant population and the approximate number of participants needed.*

Participants include anybody 18 years of age or older in suitable physical health. The number of participants will be 10 or fewer.

b) *Describe how and from where they will be recruited. Attach a copy of any advertisement, letter, flier, brochure or oral script to be used to solicit potential participants (including information to be sent to third parties).*

Subjects will be recruited by sending an email on the grads.cs.mcgill.ca and cim-all@cim.mcgill.ca mailing lists.

The email to be used follows:

Hello, we are doing a study on human sensory awareness in the McGill School of Computer Science, and we are looking for athletic participants to volunteer in a session to assess your body's ability to balance.

Your movements will by captured by a system of force plates and motion capture sensors inside the McConnell Engineering Building. These will measure the forces your body exerts on the environment, and the relative position of your limbs. You will then be asked to perform a series of static positions in which you attempt to estimate the position of your body's centre of mass.

The hope is to apply the captured data to physically-based character animation systems in order to simulate realistic human locomotion.

Participation will be voluntary and informal, and times can be arranged to fit your schedule. For more information, please respond to this email. Thank you!

Researcher:
Monty Thibault – monty.thibault@mail.mcgill.ca

Supervisor:
Paul Kry – kry@cs.mcgill.ca

c) *Describe the setting in which the research will take place.*

The research will be conducted either in the lab itself (110A, McConnell), or alternatively in a suitably large room within the McConnell building where the apparatus can be set used.

d) *Describe any compensation subjects may receive for participating.*

Compensation will not be offered.

3. Other Approvals

When doing research with various distinct groups of participants (e.g. school children, cultural groups, institutionalized people, other countries), organizational/community/governmental permission is sometimes needed. If applicable, how will this be obtained? Include copies of any documentation to be sent.

No other approvals are required.

4. Methodology/Procedures

Provide a sequential description of the methods and procedures to be followed to obtain data. Describe all methods that will be used (e.g. fieldwork, surveys, interviews, focus groups, standardized testing, video/audio taping). Attach copies of questionnaires or draft interview guides, as appropriate.

Subjects will be asked to perform a variety of tasks while a series of wall-mounted/floor-mounted sensors measure the forces their body exerts on the environment. Such tasks may include standing, kneeling, balancing, leaning, and other such poses. Participants will also be assessed on their level of self-awareness with respect to their centre of mass through tasks that involve shifting their bodyweight to a given location on the ground or to a given height off of the floor. Subsequent experiments will involve motion capture and approximate mass distribution models to evaluate the

errors that humans make in estimating their center of mass position. Additional experiments and optimization will aim to more accurately locate the true centre of mass for a given posture.

5. Potential Harms and Risk

a) *Describe any known or foreseeable harms, if any, that the participants or others might be subject to during or as a result of the research. Harms may be psychological, physical, emotional, social, legal, economic, or political.*

There are no risks involved in the experiments. While there are no foreseeable harms, participation will likewise be completely voluntary to all individuals.

b) *In light of the above assessment of potential harms, indicate whether you view the risks as acceptable given the value or benefits of the research.*

The risks are non-existent.

c) *Outline the steps that may be taken to reduce or eliminate these risks.*

No steps will be taken to reduce risk.

d) *If deception is used, justify the use of the deception and indicate how participants will be debriefed or justify why they will not be debriefed.*

There will be no deception in the experiment.

6. Privacy and Confidentiality

a) *Describe the degree to which the anonymity of participants and the confidentiality of data will be assured and the specific methods to be used for this, both during the research and in the release of findings.*

The privacy of all data collected from the experiments is not expected to be problematic; nonetheless, the names of participants will be withheld from any data which is released. The name of the participant will not be stored or linked with the data in any way. The only data to be collected is through the force plate and motion-capture sensors.

b) *Describe the use of data coding systems and how and where data will be stored. Describe any potential use of the data by others.*

The raw sensory data will be stored inside of a software system in the School of Computer Science.

c) *Who will have access to identifiable data?*

The data will be stored inside of a software system in the graphics research lab. The data will be accessible by anyone in the repository and will be kept after the study for further inquiry. This includes any current or future researchers. The data will be analyzed and visualized with a variety of software tools. This is not expected to be problematic since none of the data is associated with the names of the participants.

d) *What will happen to the identifiable data after the study is finished?*

Characteristic data may be released alongside the publication to show evidence of the errors in human locomotion as a basis for the research topic. The data will be stored indefinitely both for archival purposes and for secondary use as outlined above.

e) *Indicate if there are any conditions under which privacy or confidentiality cannot be guaranteed (e.g. focus groups), or, if confidentiality is not an issue in this research, explain why.*

The data is not identifiable to any individual and thus not expected to have any privacy concerns associated with it.

7. Informed Consent Process

a) Describe the oral and/or written procedures that will be followed to obtain informed consent from the participants. Attach all consent documents, including information sheets and scripts for oral consents.

Participants will be made aware of the underlying purpose of the research prior to the experiment. The form has been attached to the end of the end of this document.

b) If written consent will not be obtained, justification must be provided.

Written consent will be obtained.

8. Other Concerns

a) *Indicate if participants are a captive population (e.g. prisoners, residents in a center) or are in any kind of conflict of interest relationship with the researcher such as being students, clients, patients or family members. If so, explain how you will ensure that participants do not feel pressure to participate or perceive that they may be penalized for choosing not to participate.*

All participation will be entirely voluntary, and seeing as no risks are present, the only commitment is time. Potential subjects will be offered the possibility of participating in a research study and those who show a lack of interest will not be pursued for participation. Seeing as all people are eligible to participate, lack of subjects is not an expected problem.

b) *Comment on any other potential ethical concerns that may arise during the course of the research*.

There are no ethical concerns expected to arise during the course of the research.

McGill
School of Computer Science

Participant Consent Form

Researchers: Monty Thibault – Undergraduate Student Project

Supervisor: Paul Kry

Title of Project: Center of Mass Awareness for Virtual Character Balance Control

Sponsor(s):

NSERC 214978 - Physically Based Character Animation, Editing, Control, Deformation, and Contact

NSERC USRA – "Center of Mass Awareness for Virtual Character Balance Control"

Purpose of the Study:

We are studying the human ability to estimate the position of center of mass and how it relates to character animation systems used in film and games. Current systems assume that the center of mass is known at all times, however more realistic results can be obtained by giving the character a degree of artificial error. Our study is an attempt to better quantify and implement the exact degree to which this error is found in real humans.

Study Procedures*:*

We have set up a system of sensors that include ground/wall-mounted force sensors and optionally a motion capture mass-density estimation system. These will be used to measure your true center of mass through the forces exerted by, and position of, your body to the surrounding environment.

You will be asked to perform a variety of tasks that involve shifting your centre of mass to a given position, or doing so in conjunction with actions such as kneeling, leaning, or balancing. The testing session will last no more than an hour.

Voluntary Participation*:*

Participation in this study is completely voluntary. No compensation or incentive will be given. You have the right to refuse participation in any activity, and may withdraw from the study at any time during the experiment, for any reason. In the event of withdrawal, your data will be withdrawn by default, although you may request that the data be kept for analysis.

you also have the right to withdraw the collected data at request to the researchers.

Your personal identity will not be associated with the data captured by the motion systems. By participating in the study, you are giving the researchers permission to use and release the data with any publications or software systems released in the course of the study.

As the study is anonymous, withdrawal is not possible after the session has concluded.

Questions*:*

Further questions regarding the research project can be directed towards the researches in person or at the following email addresses:

Mr. Monty Thibault (Principal Investigator, Undergraduate Student) – monty.thibault@mail.mcgill.ca
Prof. Paul Kry (Supervisor, Professor) – kry@cs.mcgill.ca

If you have any ethical concerns or complaints about your participation in this study, and want to speak with someone not on the research team, please contact the McGill Ethics Manager at 514-398-6831 or lynda.mcneil@mcgill.ca

Agreement*:*

Yes:__No:____You consent to physically participating in the experiment outlined above.

Please sign below if you have read the above information and consent to participate in this study. Agreeing to participate in this study does not waive any of your rights or release the researchers from their responsibilities. A copy of this consent form will be given to you and the researcher will keep a copy.

Participant's Name: (please print) _____

Participant's Signature: _____ Date: _____
