1. **Implementation of Arbitrary Path Constraints using**

Dissipative Passive Haptic Displays,

Human Subject Consent

2. The principle investigator (PI) for this research is the Georgia Institute of Technology, School of Mechanical Engineering. Davin Swanson, Ph.D candidate, and Dr. Wayne Book, faculty advisor, are responsible for administering the tests.

3. You are being asked to volunteer for a research project studying the control and performance of haptic interfaces. These are force-reflective devices which interact physically with a human operator. An example would be a computer joystick which has the capability of pushing back on the user's hand. This research will study the performance of different types of computer programs used to control a haptic interface, and will investigate methods of measuring both physical performance of the device and the user's opinion of the device.

In being chosen as a participant, you must be physically capable of interacting with a large-scale haptic interface which can provide forces of up to 20 pounds to your hand. You will be one of 10 or more subjects whose results will be combined and studied. You will be asked to manipulate a haptic interface in order to perform some simple tasks. The motion of the interface and the forces which you provide to it will be recorded, and you will be asked to complete a survey of questions dealing with how you perceive your own performance and the operation of the interface.

Please let the researcher know if you have had any type of repetitive strain injury, arm or back injury, muscle condition, or any other condition that could interfere with your performance.

Testing should take no longer than one hour, with breaks as necessary.

4. The following items explain the testing which will take place. If you have any questions or complaints about the process, please address them to the researcher, either now or during the actual tests.

   (a) You are asked to fully read this Human Subject Consent Form. It contains important information about the research in which you are participating and your rights and responsibilities as a subject.

   (b) The content of this form will be discussed with the researcher that will be carrying out these tests. If you have any questions at any time, please do not hesitate to ask the researcher. You will be asked to sign the form, which will be kept by the researcher, and a copy will be given to you.

   (c) The test will take place in Room 218 of the J.E. Love manufacturing building. This is a lab that is used by several different researchers, but a partitioned area will be provided for you during the testing for privacy, and to reduce outside distractions. You may be asked to wear headphones which play static in order to prevent outside noises from distracting you. The researcher will be present at all times.

   (d) The researcher will explain the operation of the haptic interface, called PTER. If you have any questions or concerns about its operation, please ask the researcher. During the tests if you become uncomfortable or tired, please inform the researcher. You will be allowed some time to practice using PTER before the actual tests begin.

   (e) During testing, you will be asked to perform simple tasks, such as trying to guide PTER along a line, or trying to move PTER from one point in its workspace to another. You may be asked to perform secondary tasks during the test, such as avoiding obstacles in the workspace. During some tests, PTER will attempt to help you complete the tasks, and in others, PTER will not be activated. The researcher will explain specifically what the goal of each task is before you start.

   (f) The computer that is attached to PTER will record your motion during the tests. This includes where you move PTER as well as the forces that you apply to its handle. In addition to this recorded data, after each test you will be asked several questions about how you rate your performance and the operation of PTER, as well as how difficult you think it is to operate PTER.

5. This testing poses minimal risks to you, the subject. The interface used for the testing is a passive device, which means that it is physically unable to move on its own. In order to move, you, the user, must push against it. This means that, even in the event of a system malfunction, the device cannot exert forces higher than would be seen in normal operation.
Physical fatigue may result from operation of the device. Fatigue is one of the performance measures that will be studied in the experiment, and upon completion of tasks you will be asked about how tired you are. However, if you become too tired and wish to rest, notify the researcher at once. You are allowed to cancel your participation in this research at any time.

If at any point you experience any undue physical discomfort (back pain, arm pain, cramps, etc.) at any time, notify the researcher at once.

6. This research will provide no direct benefits to you as a subject. You are participating in a research project which will lead to published results, which may benefit this field of research as a whole. This research may eventually be used to make safer and more reliable devices to be used in manufacturing, robotic surgery, and other fields.

7. You will not be financially compensated for your time donated to this research. Your participation is greatly appreciated.

8. Your individual data will be kept confidential. Other than on this consent form, your name will not be recorded. Code numbers will be used to identify datasets, and only physical data possibly relevant to data analysis (sex, height, etc.) will be recorded. Some of this data may be published with the results of the research, but no personally identifiable information will be released. All data, however, may be released upon a court order.

9. None of the researchers have a direct financial interest in this research.

10. Reports of injury or reaction as a result of this testing should be directed to:

Davin Swanson or: Dr. Wayne Book
School of Mechanical Engineering School of Mechanical Engineering
J. Erskine Love Building J. Erskine Love Building
771 Ferst Drive, Room 114 771 Ferst Drive, Room 202
Atlanta, GA 30332-0405 Atlanta, GA 30332-0405
(404) 385-1875 (404) 894-3247
gt6032c@mail.gatech.edu wayne.book@me.gatech.edu

Neither the Georgia Institute of Technology, the Woodruff School of Mechanical Engineering, nor the researchers has made provision for payment of costs associated with any injury resulting from participation in this study.

11. If you have any questions about this research, call or write

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J. Erskine Love Building J. Erskine Love Building
771 Ferst Drive, Room 114 771 Ferst Drive, Room 202
Atlanta, GA 30332-0405 Atlanta, GA 30332-0405
(404) 385-1875 (404) 894-3247
gt6032c@mail.gatech.edu wayne.book@me.gatech.edu

12. You have rights as a research volunteer. Taking part in this study is completely voluntary. If you do not take part, you will have no penalty. You may stop taking part in this study at any time with no penalty. If you have any questions about your rights as a research volunteer, call or write:

Office of Research Compliance
Georgia Institute of Technology
Atlanta, Georgia 30332-0420
Voice (404) 894-6944 Fax (404) 385-0864

13. A copy of this form will be given to you. Your signature below indicates that the researchers have answered all of your questions to your satisfaction and that you consent to volunteer for this study.

Signature:

Date:

14.