APPENDIX B. Experimental Protocol

EXPERIMENTAL PREPARATION:

1. PRIOR TO TESTING
   a) Obtain volunteer's research folder
   b) Review screening questions
   c) Review testing procedure as explained in consent form.
   d) Familiarize subject with all the apparatus for the study and answer any additional questions
   e) Allow the subject to perform movement pattern with touchscreen and metronome
      i. Auditory pacing will be governed using a metronome software application and will be correlated using direct movement measurements from the OEMC. After which, the beats will increase in speed (slow, medium, fast, faster and fastest). The beats after the baseline will be randomized for each participant in an effort to avoid learning. Additionally, the subject will perform a movement at their own pace without a beat stimulus.
      ii. The subject will perform movements in five quadrants of a touchscreen in a standing posture. The quadrants will have concentric circles of varying size and color (analogous to a bullseye target), where the center represents an optimal touch.

2. SUBJECT PREPARATION
   a) Subject should remove jewelry or clothes with long sleeves and the subject should stand in a neutral position on the force plate which will be in-front of the touchscreen. The OEMC cameras will be placed at the right side of the subject to capture their right hand movement with the touchscreen
   b) For this experiment, the home position will be the subject’s side in the standing neutral posture
   c) Utility belts, beepers, cell-phones and communications devices should be removed
d) The touchscreen will be adjusted so that the subject’s interaction with the screen forms a perpendicular angle with their right arm and their body - subjects comfort is important
   
a. (Please note: If the subject didn’t want the screen adjusted, the screen was set to the fixed height of 50.25.)

e) After palpating for bony landmarks, place retro-reflective markers on the subject’s manubrium sterni, left and right sternoclavicular joint, the parietal (in-line with the right ear), frontal (between the eyebrows) and temporal (in-line with frontal marker and the right ear) sections of the skull, right greater tubercle, right lateral epicondyle, right radial and ulna styloid, right metacarpophalangeal joints 2 and 5, right head of proximal phalange 2 and right tuberosity distal phalange 2 with double sided tape and velcro as needed

f) Prepare the skin with an alcohol wipe and place 4 sEMG sensors (see sensor in Figure 8) on the subject’s right upper extremity using double-sided tape. Sensor placements are made on the bellies of the following muscles: 1) trapezius, 2) pectoralis major, 3) lateral head of the tricep brachii, and 4) bicep brachii. Next, prepare the skin on the volar aspect of the subject’s right forearm just proximal to the wrist crease with an alcohol wipe or any location that doesn’t interfere with the task (i.e., the lumbar area of the back…etc.) and place the reference sensor (i.e., grounding electrode) with double-sided tape. For each placement, add water-soluble contact gel (SignaGel, Parker Laboratories Inc., Fairfield, NJ) between the skin and sensor to eliminate air pockets and provide better signal conductivity.

g) As an additional experimental condition to the adjusted touchscreen height (see 2.d), the touchscreen height is fixed to 50.25 inches from the ground to the bottom of the screen for each subject. The screen during the enclosed test is fixed at the same value as the open fixed test of 50.25 inches.
EXPERIMENTAL TASK:

1. TEST ADMINISTRATION FOR OPEN SCREEN FIXED/ADJUSTED SPACE TESTING

a. Instruct to start in the home position
b. Turn on the device
c. Select a randomize speed from metronome
d. Perform motion for trial 1
e. Perform motion for trial 2
f. Perform motion for trial 3
g. Perform motion for trial 4
h. Perform motion for trial 5
i. Subject returns to home position
j. Turn off the device
k. Ask if the subject is OK and willing to continue
l. Rest period
m. Repeat step ‘c’ for next randomized speed from the metronome
n. Once all 5 beat patterns have been captured continue to step ‘o’
o. Turn on the device
p. Perform motion for no beat trial
q. Subject returns to home position
r. Turn off the device
s. Interview subject on the experiment
t. Remove measurement tools from the subject
2. TEST ADMINISTRATION FOR ENCLOSED SPACE TESTING

(This additional experimental condition presented in the Figure above consists of black curtains made of soft fabric (e.g., felt) supported by a simple and lightweight framing system (e.g., PVC tubing) that encloses the experimental testing space. As in the original protocol, the subject stands in the center on a force plate and interfaces with the touchscreen.)

a. Instruct to start in the home position.
b. Turn on the device.
c. Select a randomized speed from metronome or 0Hz for ‘no beat’.
d. Perform motion for trial 1.
e. Perform motion for trial 2.
f. Perform motion for trial 3.
g. Perform motion for trial 4.
h. Perform motion for trial 5.
i. Subject returns to home position.
j. Turn off the device.
k. Ask if the subject is OK and willing to continue.
l. Provide a rest period.
m. Repeat step ‘c’ for next randomized speed from the metronome.
n. Once all 5 beat patterns have been captured continue to step ‘o’.
o. Turn on the device.
p. Perform motion for 1Hz or 60 beat trial.
q. Subject returns to home position.
r. Turn off the device.
s. Remove measurement tools from the subject.
t. Interview subject on test administration and allow subject to provide feedback on the experiment.