What is Haptics?

Haptics technology
Force and tactile (touch) sensation system to provide feedback

- Computer
- Haptic Device
- Users receive virtual tactile feedback
- Rehabilitation, VR, Education...

Motivation

The Haptic Rocker is a kind of haptic device [1,2]. Tactile feedback is more improved with the torsional type of rocker [2] than the lateral stretch of rocker [1]. This study was presented to understand how the distance between effectors of a torsional haptic rocker affects the transmission of tactile sense.

Design of Haptic Rockers

The platform of the device and 3 different torsional types of rockers were designed using Solidworks, and printed with 3D printer.

- Rocker A, B: Two touch points
- Rocker C: One touch point
- Variable: The distance between effectors on the skin (A:24mm, B:12mm, C:0cm)

Experimental Setup

**Arduino Uno**
- Hardware: Circuit Base with Microcontroller
- Software: Arduino IDE
  - Program to control the motor rotation (angle)
  - Define variables and the initial value (90 degrees)
  - Set up for the pin mode and the serial communication
  - Loop
    - [Command an angle to the motor → Rotate the motor, Record the angle→Restore the motor to the initial point]

- One Board Micro Controller
- Breadboard + Power Supply
- Servomotor

- The motor rotated to 3 positions (20: Small, 40: Medium, 60: Large [degrees])
- Subjects were instructed to focus on the skin sense, removing other environmental elements

- The motor was set to 3 points (20: Small, 40: Medium, 60: Large [degrees])
- Subjects were told which angle was S, M, L to standardize the sensation

Experiment

**Trial Part**
- A cycle of 3 motor positions (S, M, L) were demonstrated two times
- Subjects were told which angle was S, M, L to standardize the sensation

**Experimental Part**
- Subjects were presented with a position, and judged it to be S, M, or L.
- Each position was displayed 10 times (30 total rotations) in a random order

Results

THE ACCURACY OF ROTATION TRANSMISSION

- In the Small position, the sensation was identified accurately over 90% of the time for all rockers.
- In general, the rockers with two touch points (A,B) performed better, especially longer distance one (A).

Discussion

- Rockers with longer distance between effectors perform better.
- Performance differences between the transmissions increase with the amount of stretch.

Further Research

- Consideration about the effects of the order of displayed positions and rocker designs
- The comparison with the previous lateral stretch of rocker [1] and torsional type of rocker [2]

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References