ISOMETRIC LOW FORCE EXPERIMENT FOR THE HAND HELD FORCE MAGNIFIER

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The lack of sense of touch presents a difficult challenge for surgeons performing microsurgery, as in ophthalmology. To augment the surgeons' perception of tissue properties, we have been developing a novel surgical device, the Hand Held Force Magnifier (HHFM). A sensor in the HHFM measures the interaction force between the tool tip and the target, while an actuator amplifies the measurement to produce a proportionally greater force sensed by the user's hand on the tool handle. We report here on initial psychophysical experiments that investigate whether the HHFM enables improved force control when users are asked to maintain a small target force. In this experiment, users are asked to contact a flat target with the HHFM, in either 'push' or 'pull' direction, to reach various target force levels, with magnification on or off. The magnitude and direction of the target forces, as well as the magnification state are presented in a random order. An integrated experimental platform was built for these psychophysical tests. Three LEDs initially provide the visual cue to guide the user to a particular target force. When the user reaches the target force, the user is instructed to hold that force steadily for a short period of time. The visual feedback is removed two seconds before the end of the trial. A high precision load cell continuously records the force applied by the user for further analysis. Preliminary results indicate that the HHFM may enable users to sustain small forces with less variability by augmenting the perception of tool-target interaction.