Transcutaneous Electrical Stimulation of the Wrist Evokes Sensations from the Fingers

THE UNIVERSITY OF UTAH
DEPARTMENT OF BIOMEDICAL ENGINEERING

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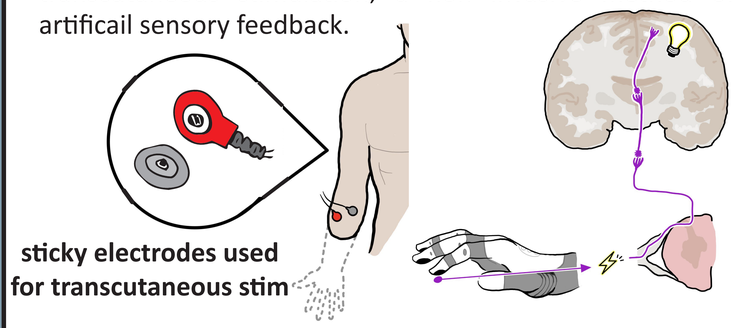
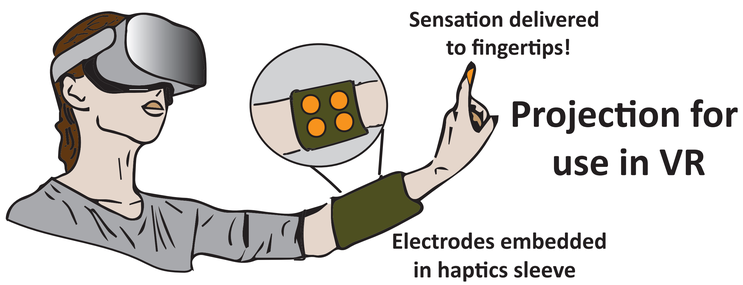
MOTIVATION

Approximately 50% of upper limb amputees abandon use of their prosthesis within the first year, often citing lack of sensory feedback as a primary reason. Currently, there exists no clinical solutions for direct sensory feedback in prostheses to combat this issue. Additionally, current haptic device technology is bulky and non - intuitive for VR applications. Both of these issues can be addressed with transcutaneous stimulation; a non invasive method of artificail sensory feedback.

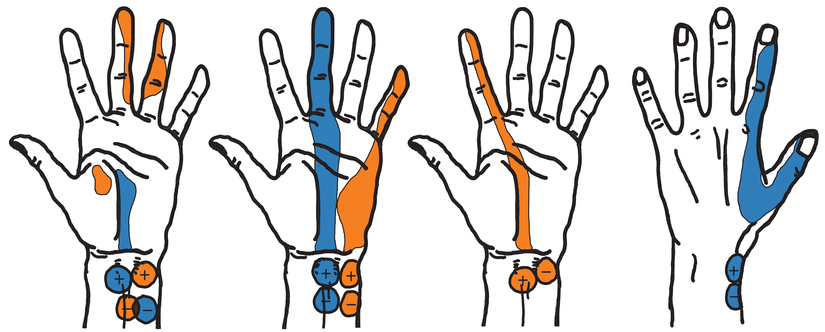




TEST DESIGN

Reference Stimuli		Test Stimuli	Probability Judged Stronger
	vs.		0
	vs.		0.5
	vs.		1

SENSATION EVOKED AT NUMEROUS LOCATIONS



-- sensation location based on +/− electrode placement

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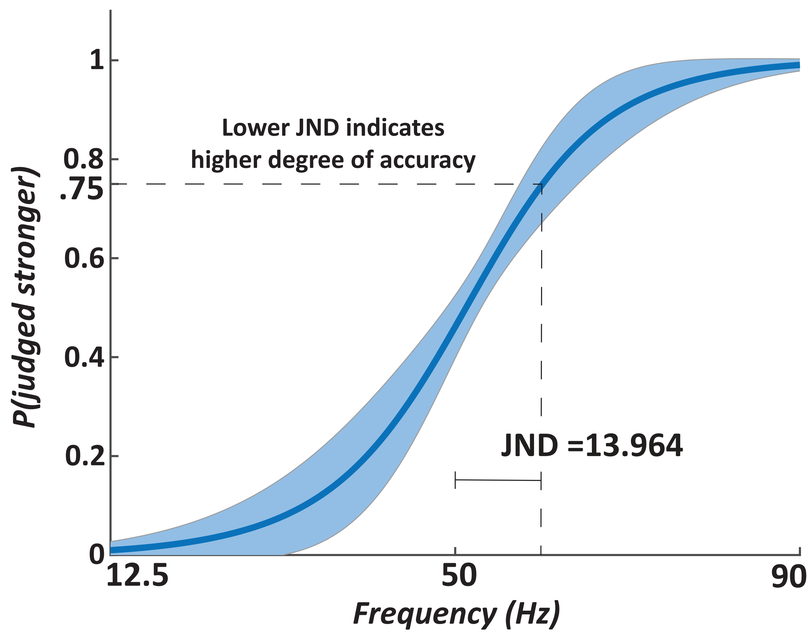
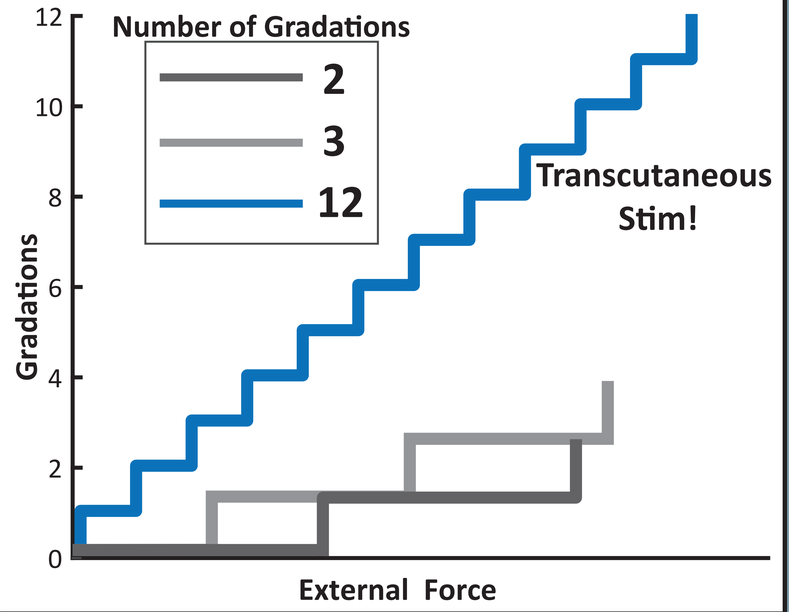
JND VALUE INDICATES A CHANGE IN 14 Hz REQUIRED TO FEEL A DIFFERENCE



GRADATIONS OF TRANSCUTANEOUS STIM IMPROVED FROM HAPTIC GLOVES



FUTURE WORK

Expand work to gather more information on transcutaneous stimultion and its uses across different fields with the following goals:

- **Exploring the upper limit of stimulation frequecy**
- **Further mapping sensation locations on the hand**
- **Improving sensory gradations**

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