Haptic Touch Amplification in Virtual Reality Environments

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Haptic (def.): relating to the sense of touch

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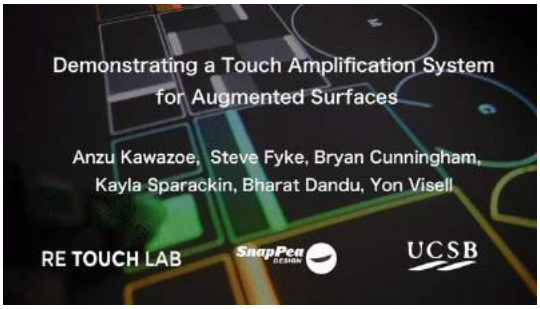
What are *Dynamic* Haptics?



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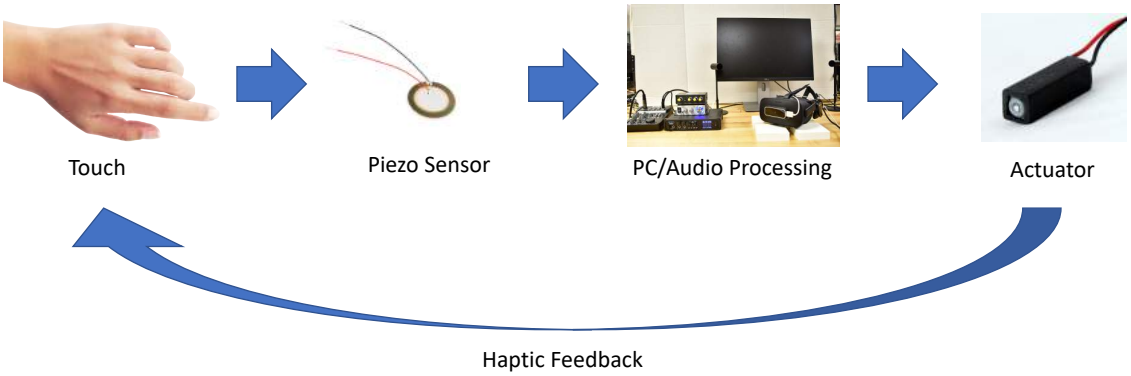
Touch Amplification Device Feedback Loop



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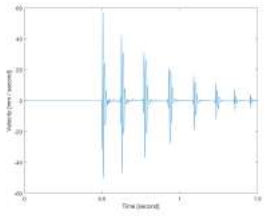
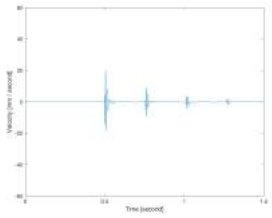
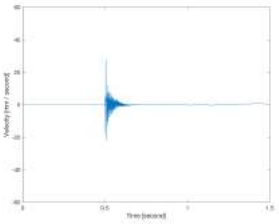
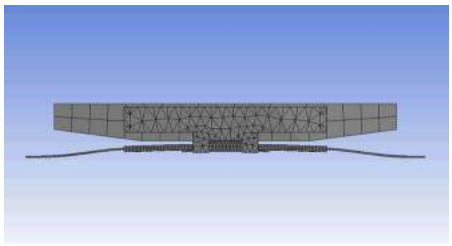
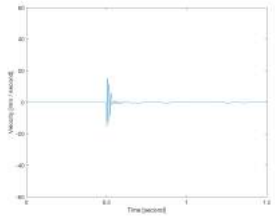
Examples of Touch Amplification Effects

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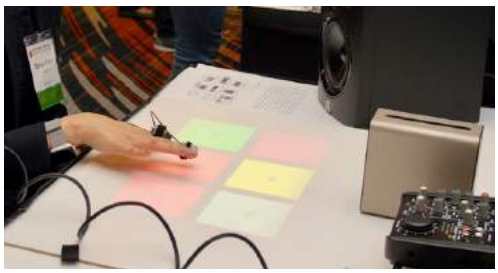
Touch Amplification in a Virtual Environment



Original 2D Projected Interface

Virtual Reality Prototype

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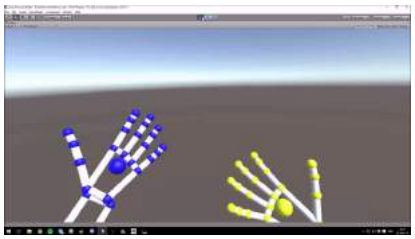
Implementing virtual reality components

Hardware:
- Oculus Rift VR Headset
- Leap Motion hand tracker
- Touch amplification system

Software:
- Development in **Unity - C#**
- Using Leap Motion **Core** + **Interaction Engine Assets**



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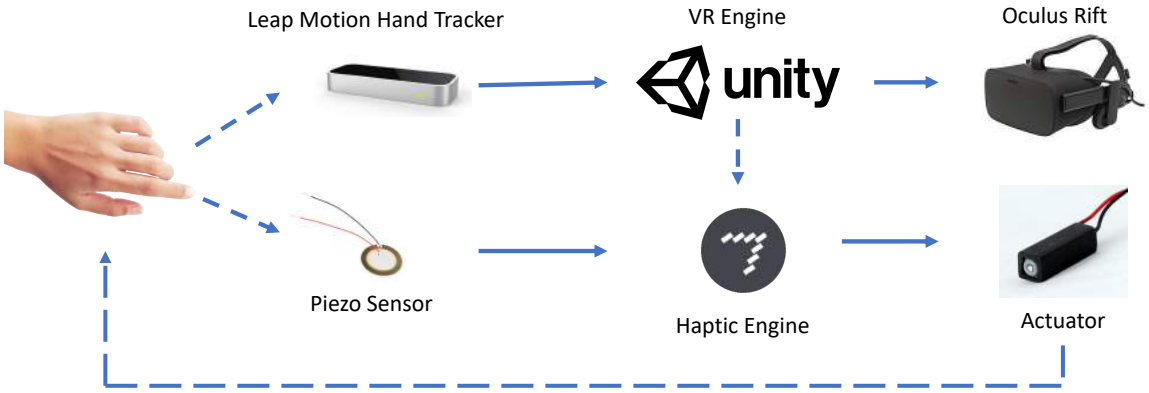
Haptics + VR System



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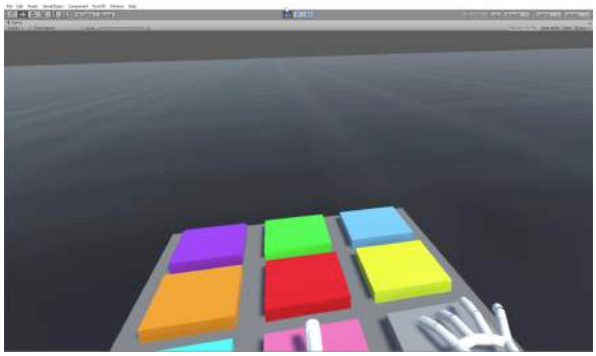
Prototype Demonstration



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Experimental Question: Does dynamic haptics in a 3D environment affect user preference? Is it empirically more "**immersive**"?

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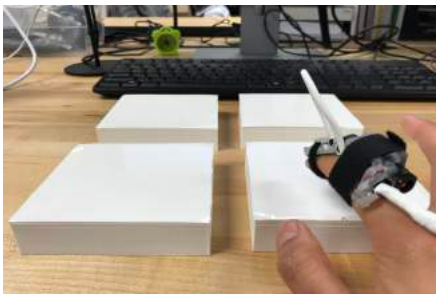
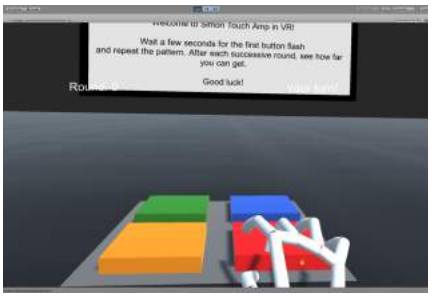
Simon VR Game Application

- Goals:
  - Using **proxy objects** to make static objects more interactive and lifelike.
  - Showing only one of the many possible applications for haptic touch amplification in VR.





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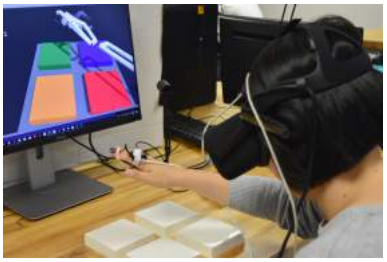

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Hypothesizing increased user interactivity with haptics in VR

- User pilot study:
  - Playing game in VR, **with** and **without** touch amplification.
  - Standard survey methods: 7 point Likert scale ”preference” and “presence” questions
    - Tangibility, naturalness, accuracy, responsiveness, and entertainment.

7 Point Likert Scale Survey: Presence Questionnaire

Sample Question:

Responsiveness:

1. How responsive was the environment to actions that you initiated (or performed)?

|_____|_____|_____|_____|_____|_____|_____|
NOT AT ALL SOMEWHAT COMPLETELY

Looking forward …

- Continue **working on paper** until September.
  - Submitting to *SIGCHI Conference: Human Factors in Computing Systems*
- Build more applications, focusing on the use of **proxy objects.**
  - Demonstrate the device's diverse capabilities.
- **Optimize** current applications.

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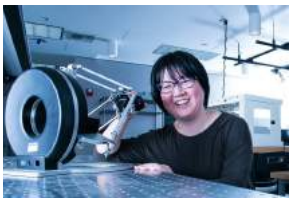
Special thanks to …



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