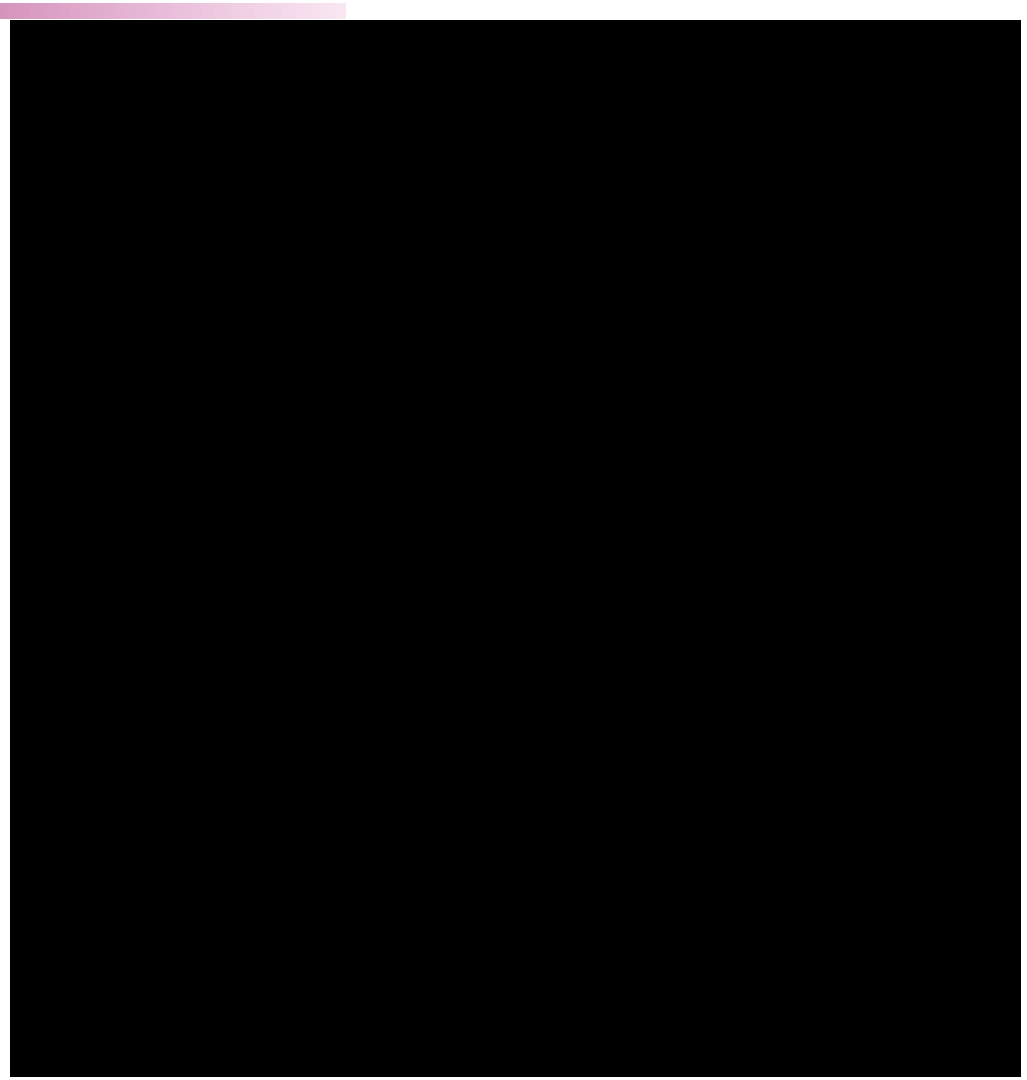
Automatic Authoring of Haptic Content

Seungmoon Choi, PhD
POSTECH

Motivating Example – Mobile Haptic Interface



I. Lee, 2009

Content Authoring Technologies

Recording → Authoring → Content → Display

In about 2009...

???

???

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Haptic Content

Haptic content creates value for end users.

Technology and Tools for Content Authoring

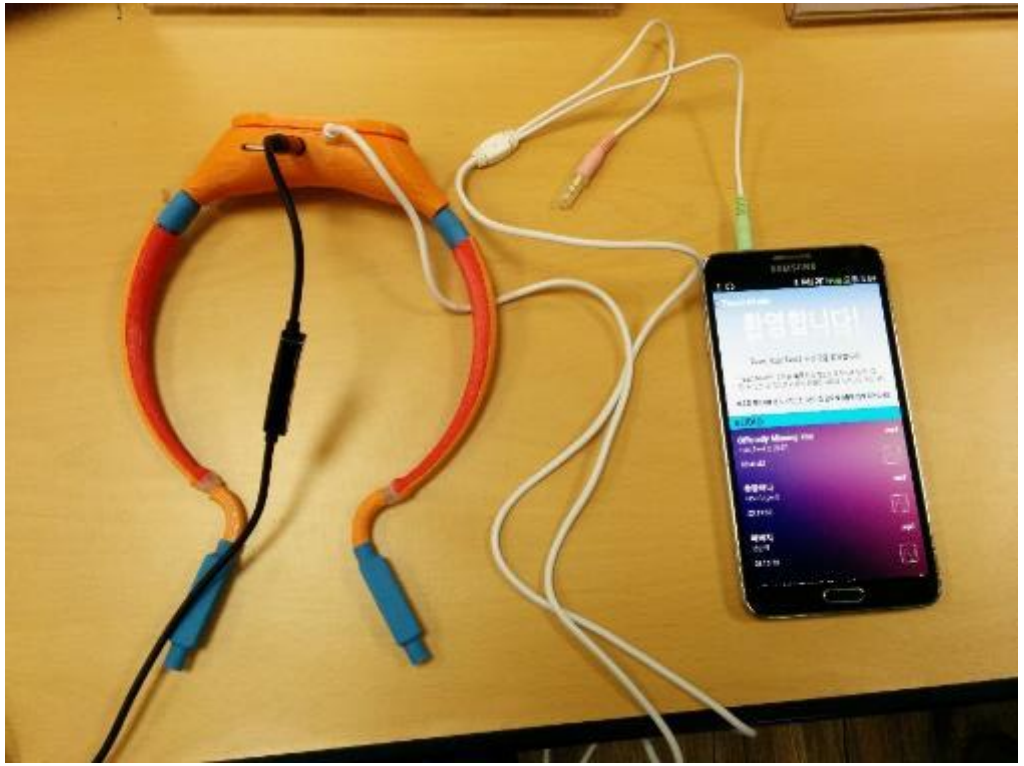
Automatic Synthesis of Haptic Content

- Sources of Information
  - Sound
  - Visual
  - Others?
- Types of Haptic Effects
  - Tactile
  - Force
  - Motion (Vestibular)
  - Others?

Automatic Synthesis of Vibrotactile Effects

Touch Music

- Music by Vision + Touch for the hearing impaired
- Vibration modes: beat emphasis and singer emphasis
- With Samsung C-Lab and Seoul National University



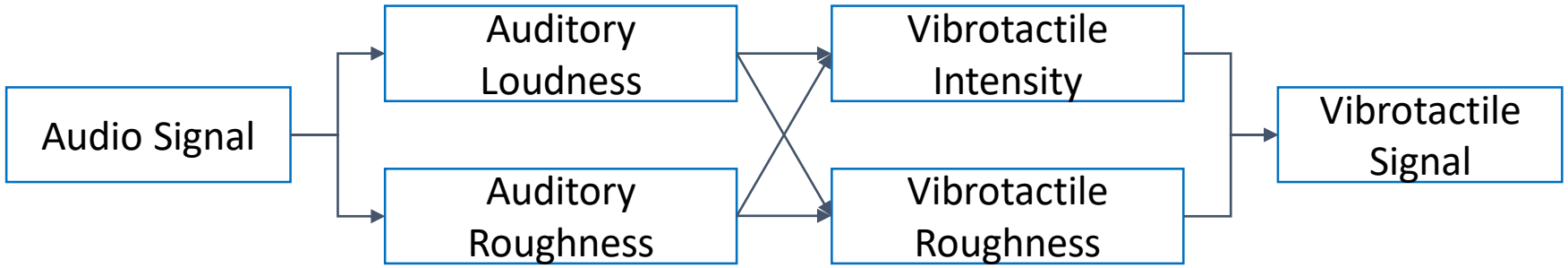
G. Park, 2015

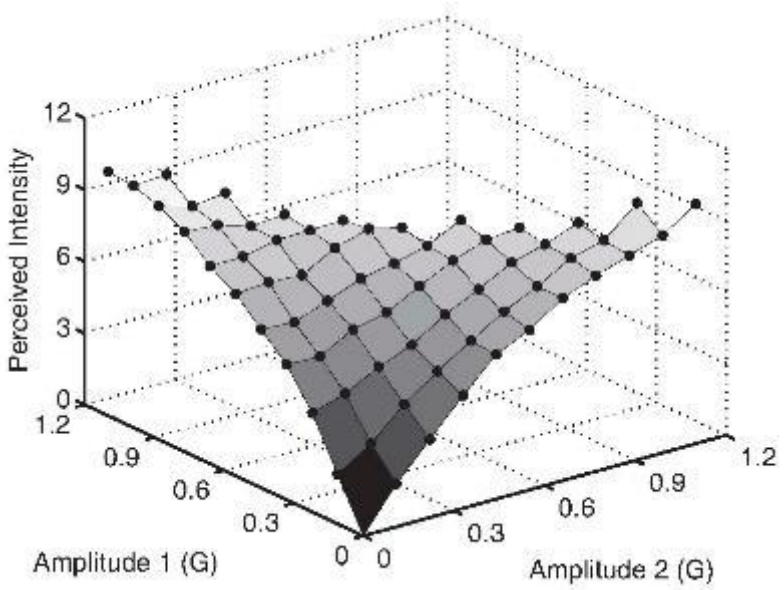
Touch Music - Demonstration

Real-Time Perception-Level Translation from Audio to Tactile Signals – Demo

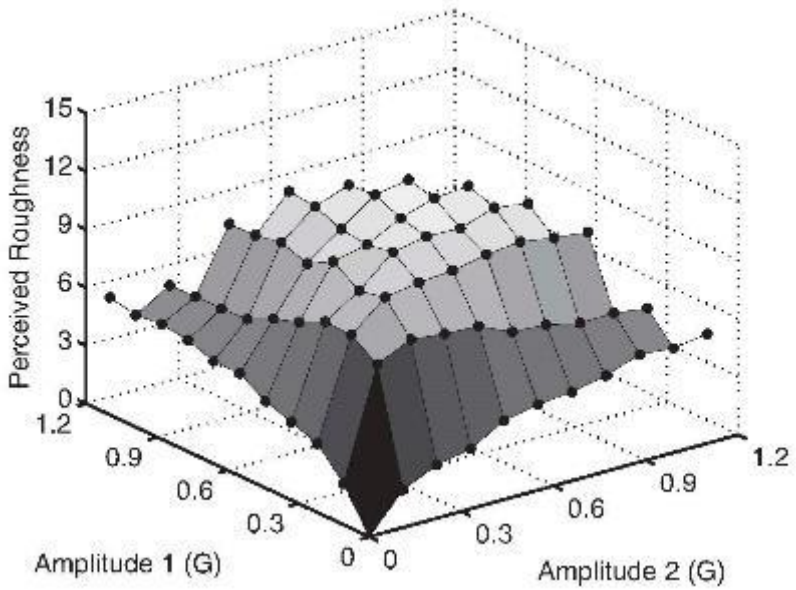
J. Lee, 2013

Real-Time Perception-Level Translation from Audio to Tactile Signals – Algorithm





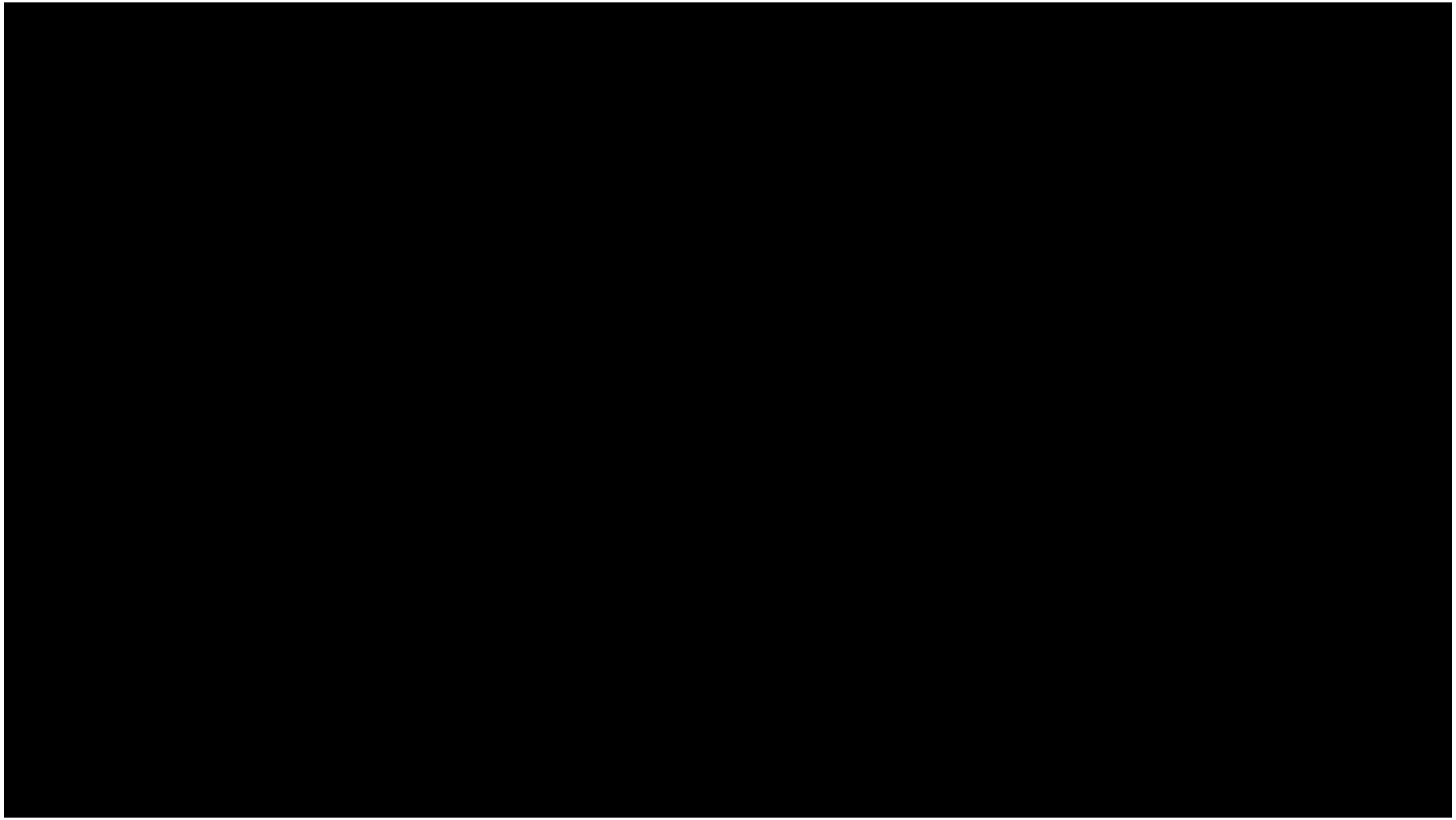
Vibrotactile Intensity



Vibrotactile Roughness

J. Lee, 2013

Physics Engine + Vibrotactile Feedback



G. Park, 2017

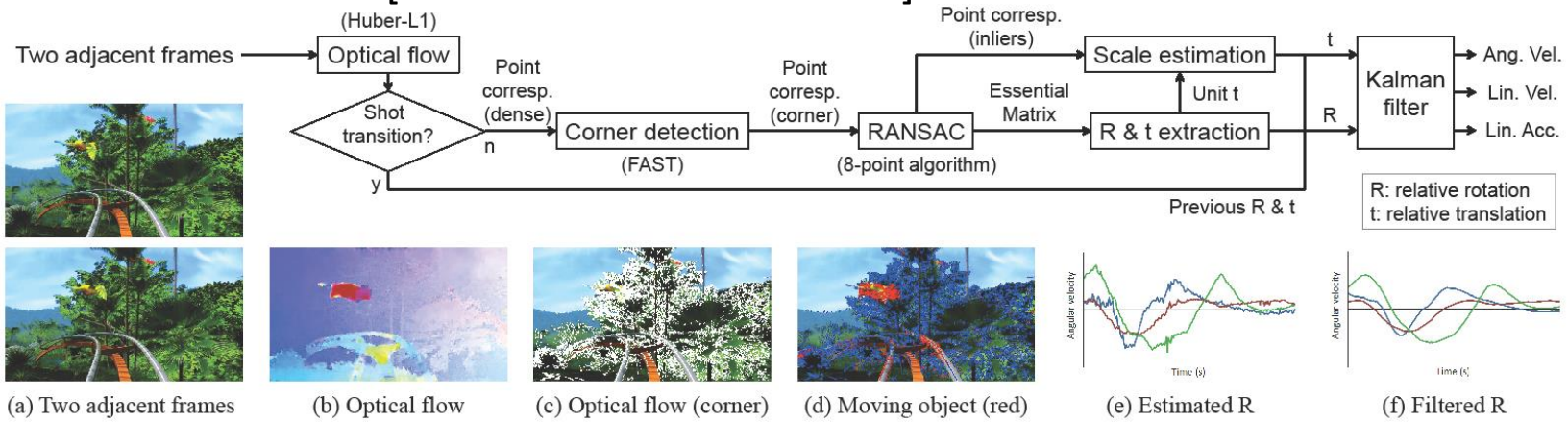
Automatic Synthesis of 4D Effects

Demonstration: Fast Camera + Impulse and Vibration Algorithm

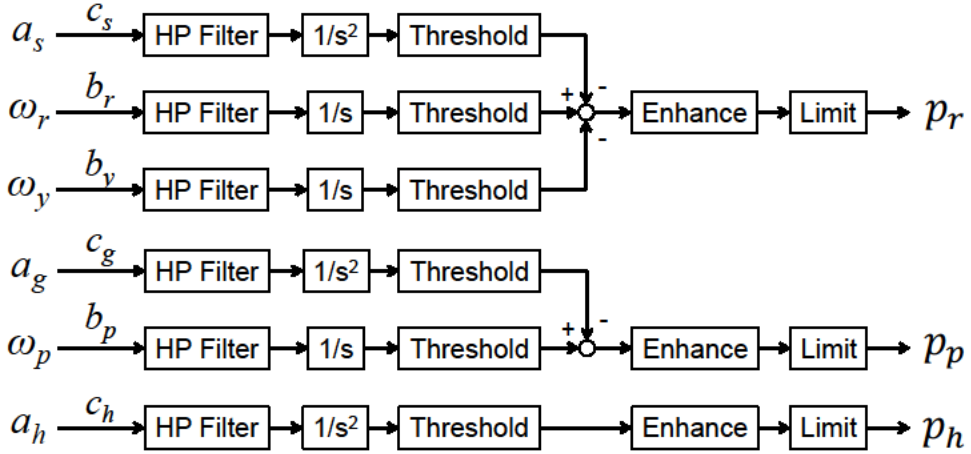
J. Lee, 2016

Motion Effects Synthesis for 4D Films – Fast Camera Effects

[Camera Motion Estimation]



[Motion Synthesis: Fast Camera Motion]



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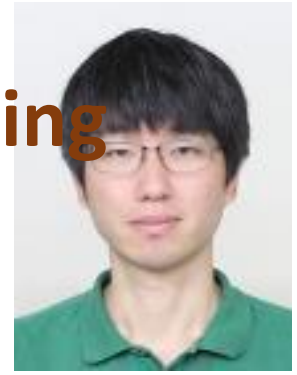
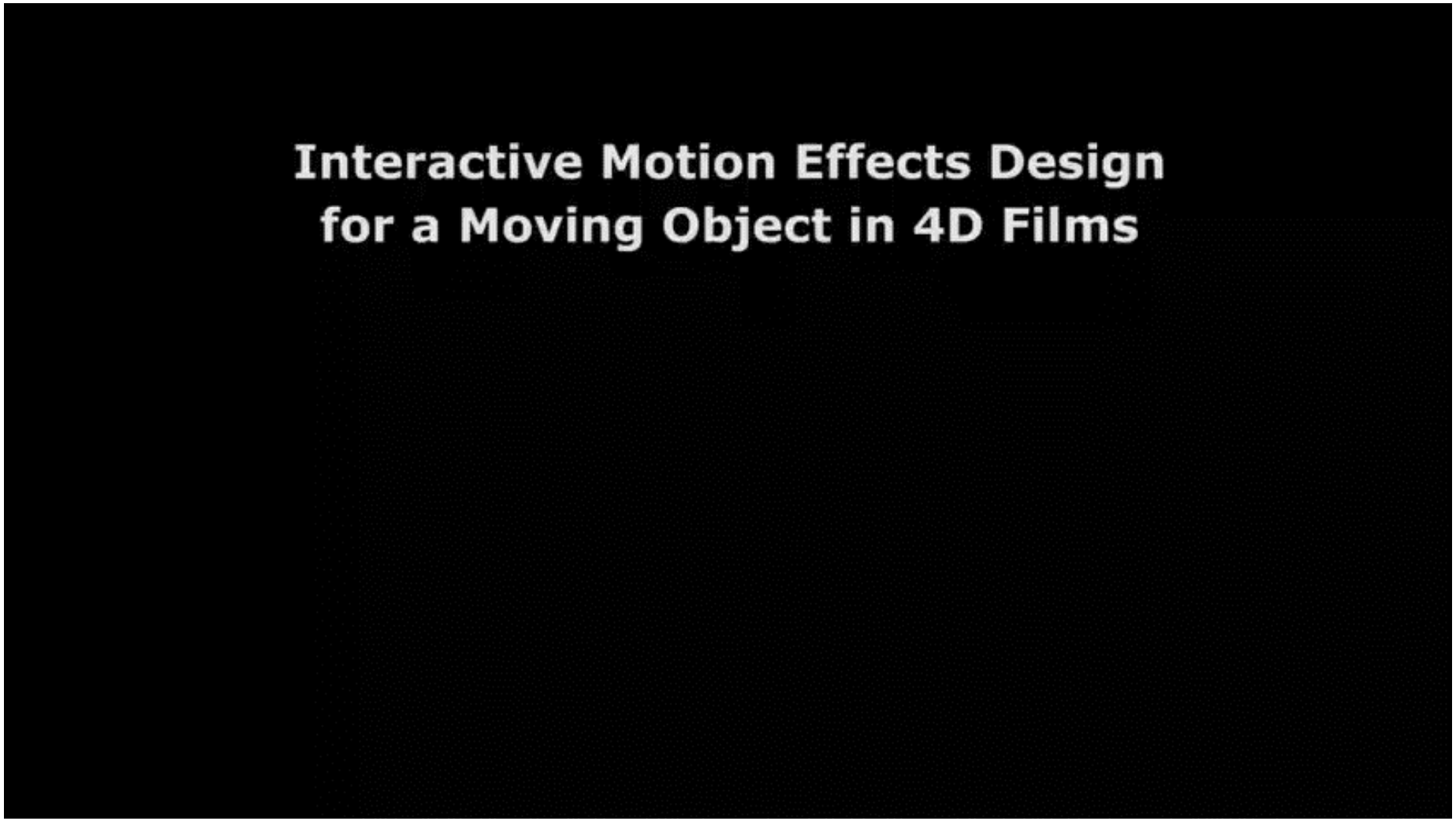
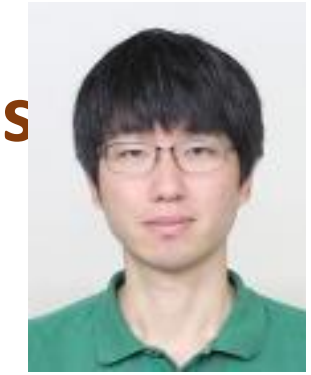
Motion Effects Synthesis for 4D Films – Interactive Authoring

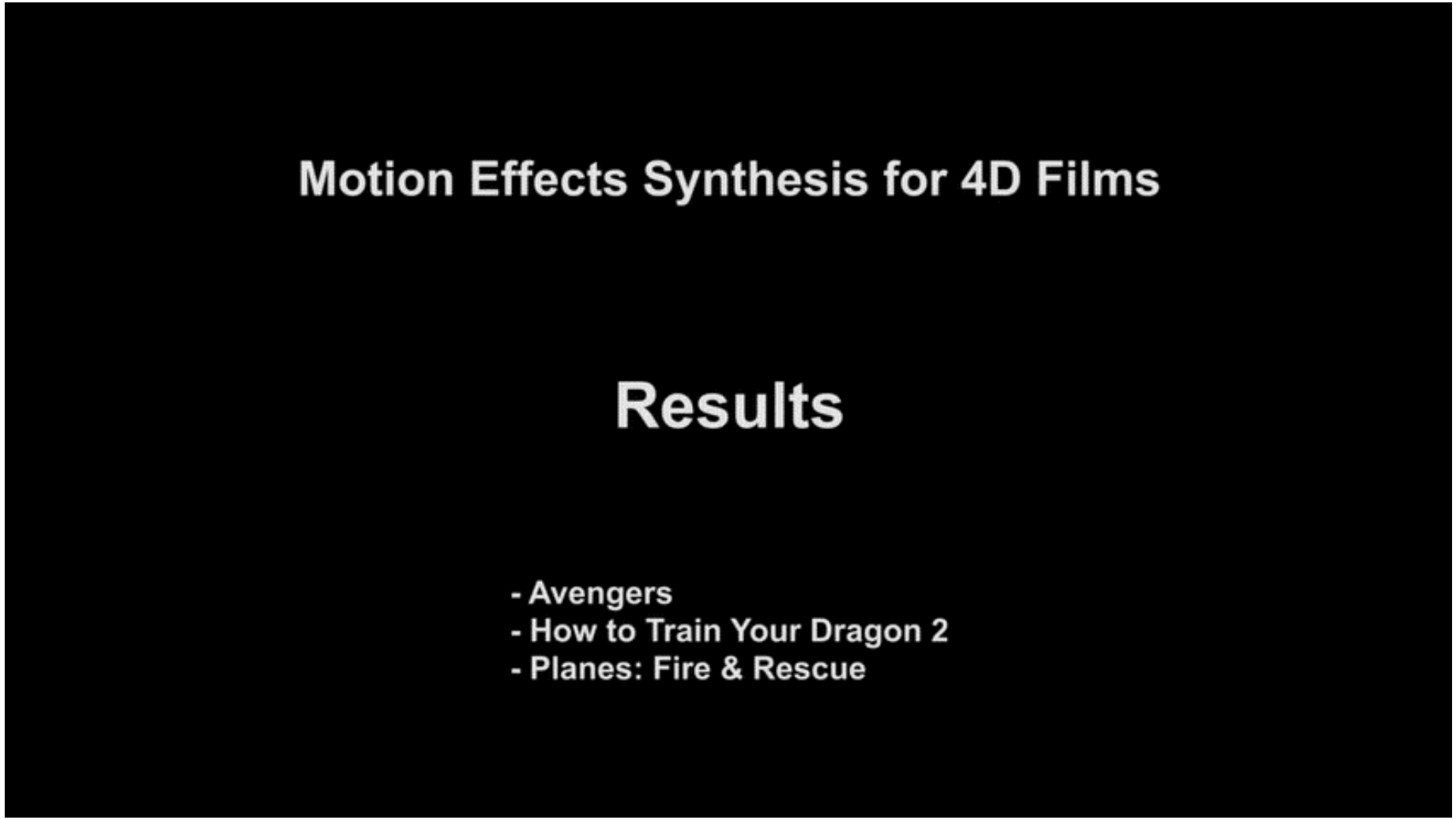




J. Lee, 2016 (2)

Motion Effects Synthesis for 4D Films – Object-Based Effects





J. Lee, 2016 (2)

Vibration Effects for Camera Motion

J. Seo, 2018

So What to Do More?

Information in Sound Useful for Haptic Effects

Type of Sound	Useful Information	Haptic Effects
Ambient	Events (Car approaching, dog barking, baby crying …)	Any, but typically vibrotactile, for situation awareness
Speech	A great amount of information for communication	Old tactile vocoders
Music	Mood	Vibrotactile effects for mood emphasis
Game	Special game sounds for event emphasis	Vibrotactile effects
Movie	Include speech, music, special sounds, etc	Vibrotactile and motion effects

Information in Vision Useful for Haptic Effects

Type of Sound	Useful Information	Haptic Effects
Movie	Motion, events, context	Vibrotactile and motion effects
Game	Motion, events, …	Vibrotactile and motion effects
Sports	Motion, events, …	Vibrotactile effects for mood emphasis
And more?		

Very open area, especially with the advent of deep learning

Takeaways

- Importance of haptic content is increasing.
- Technology for supporting the production of haptic content is essential for the further growth of haptics.

“Haptic” Photoshop?

References

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Some Other Details

- Thank you for your attention!

- Further inquiries to
  - Seungmoon Choi, Ph.D
  - Professor, Computer Science and Engineering
  - choism@postech.ac.kr, www.postech.ac.kr/~choism, 054-279-2384
  - http://hvr.postech.ac.kr.