IEEE Haptics Symposium 2012
Workshop: Haptic Interaction Design

Authoring Tools of Haptic Content

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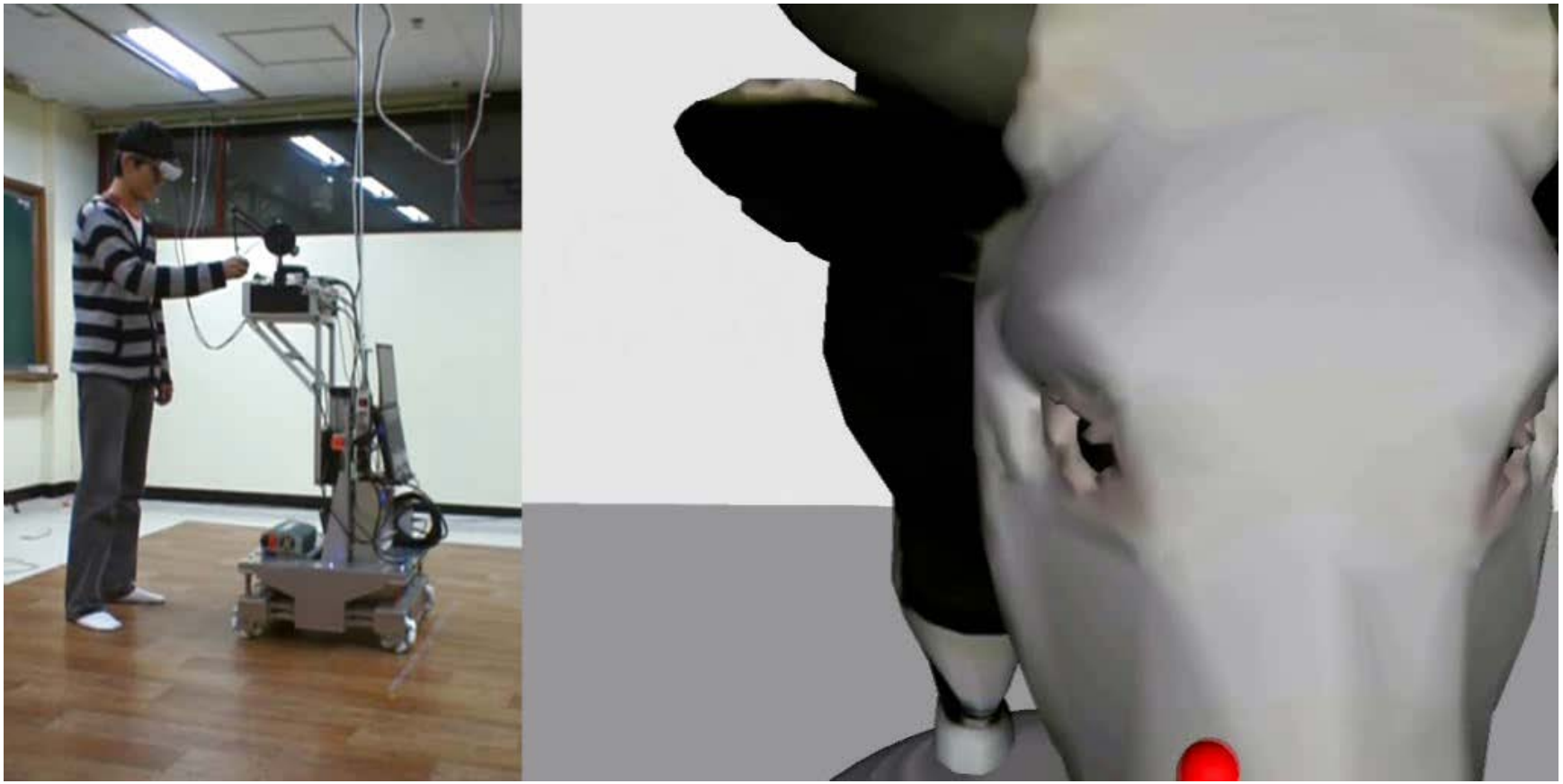
Motivating Example – Mobile Haptic Interface



Afterthoughts

- Resources invested to the mobile haptic interface
  - 0.3 M USD grant
  - 3 years
  - 2 professors and 5 graduate RAs
  - Additional hardware: Intersense tracker (35K USD)
- What can we do with the cool haptic technology?
- Haptic contents?

Haptic Technology vs. Haptic Content

- Chicken and egg problem?

- We have focused on haptic technology, but what about haptic content?

Technology for Content Authoring

Authoring Tools for Haptic Content

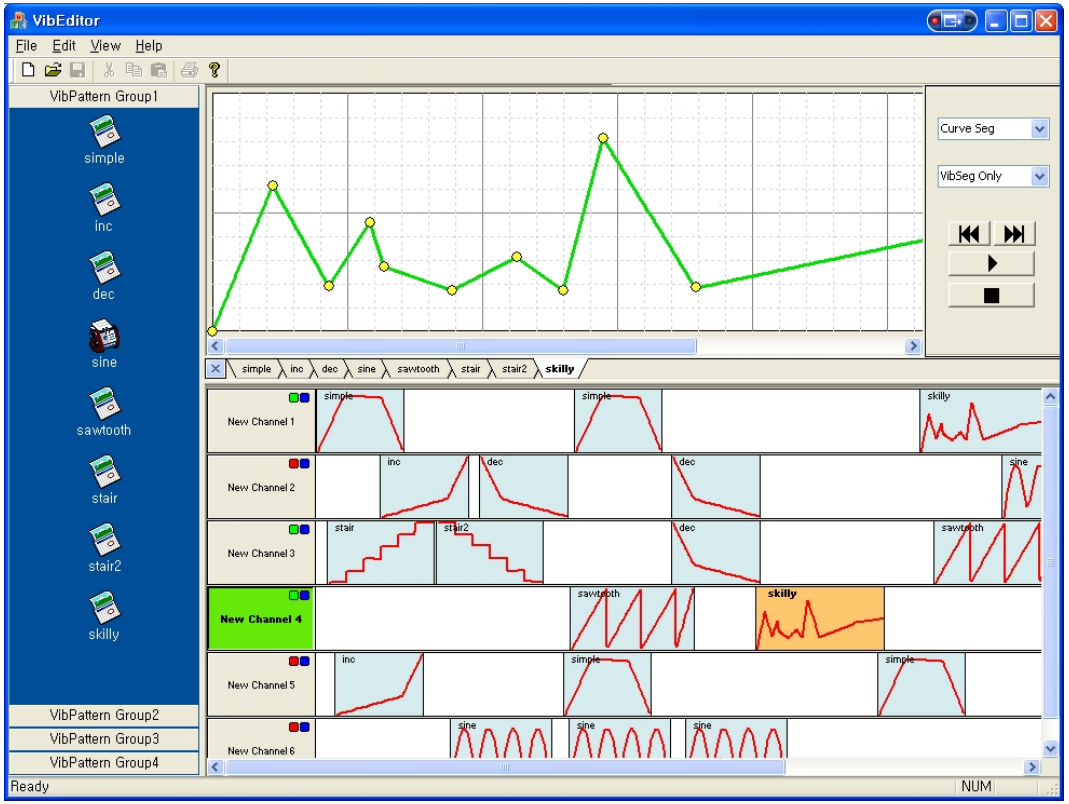
- Systems to help develop the contents that users can experience and enjoy using haptics technology
- Manual authoring vs. Fully automated
- The key component of the technology for haptic content creation
- We focus on those for vibrotactile rendering in this talk.

Customizing Vibrotactile Patterns in a Mobile Phone

- Samsung Electronics, 2009. “My Haptic” in Haptic Phone 2.

posVibEditor – Waveform Editing

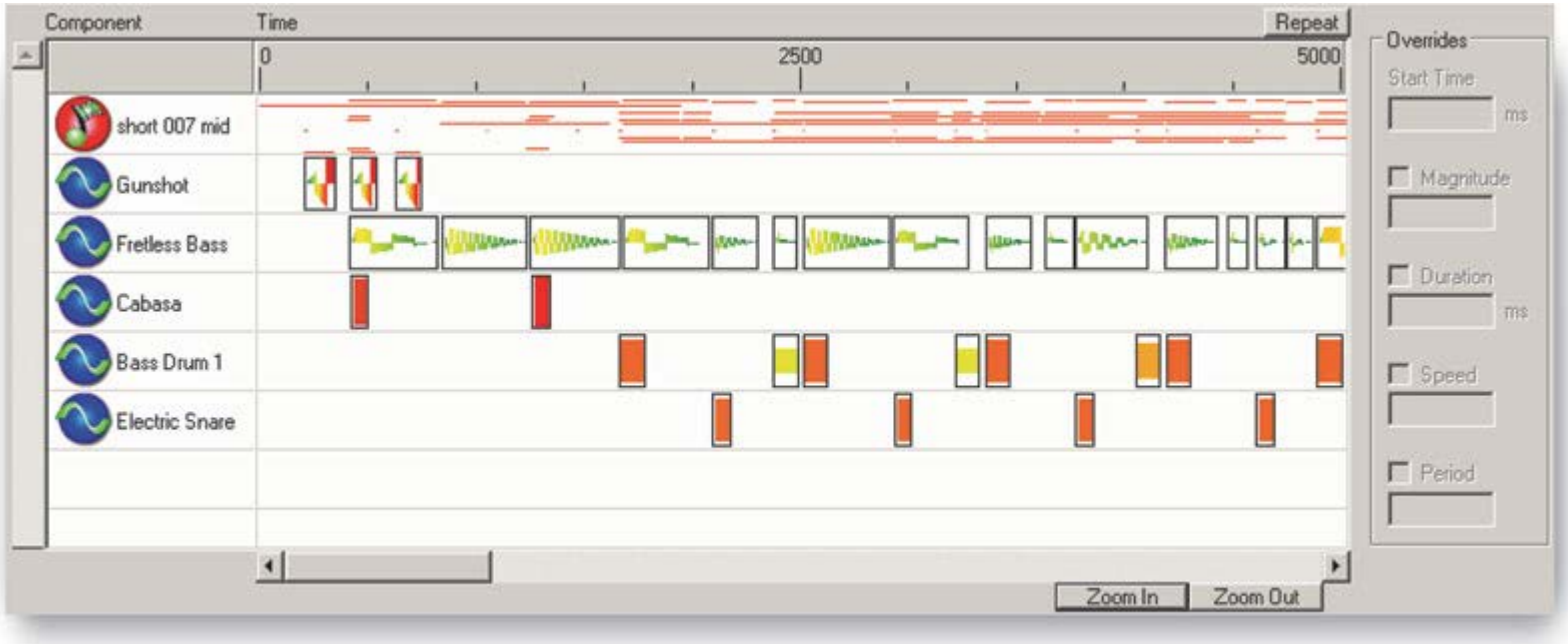
- Multi-channel support for multiple actuators
- Automatic compensation for vibration output of linear perceptual strength



J. Ryu and S. Choi, "posVibEditor: Graphical Authoring Tool of Vibrotactile Patterns", IEEE HAVE, pp. 120-125, 2008

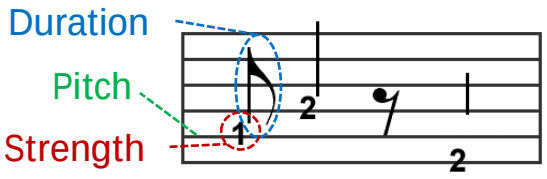
Touchsense Studio

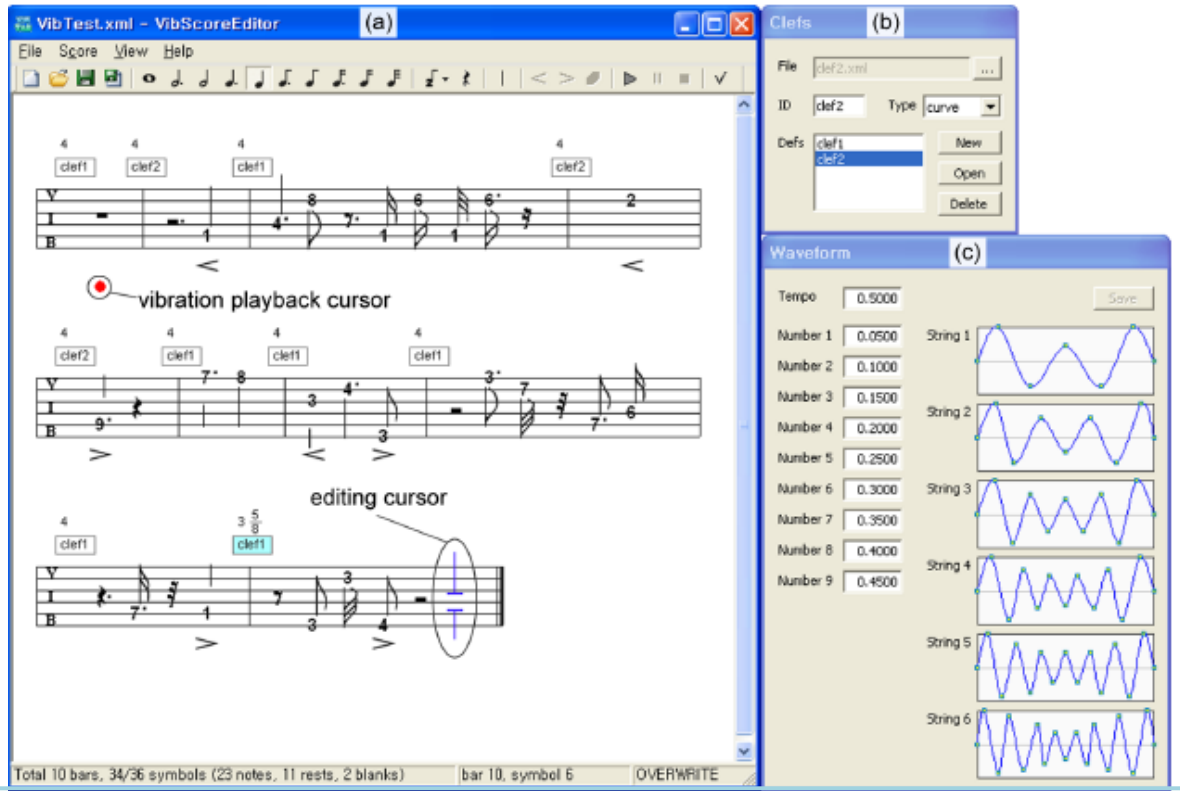
- Immersion
- Vibrotactile effect authoring



Vibrotactile Score – Symbolic Design

- Graphical editor for complex vibrotactile pattern design
- Allows high-level composition with decoupled signal-level details





Jaebong Lee, Jonghyun Ryu, and Seungmoon Choi, "Vibrotactile Score: A Score Metaphor for Designing Vibrotactile Patterns," In Proceedings of World Haptics Conference, pp. 302-307, 2009.

Jaebong Lee and Seungmoon Choi, "Evaluation of Vibrotactile Pattern Design Using Vibrotactile Score," To be presented in IEEE Haptics Symposium, 2012.

Touch-based Authoring in iOS5

- By tapping on the screen, you can decide the rhythm of a vibration signal.
- See video at http://www.youtube.com/watch?feature=player_embedded&v=rK4Cjq2mR3Q

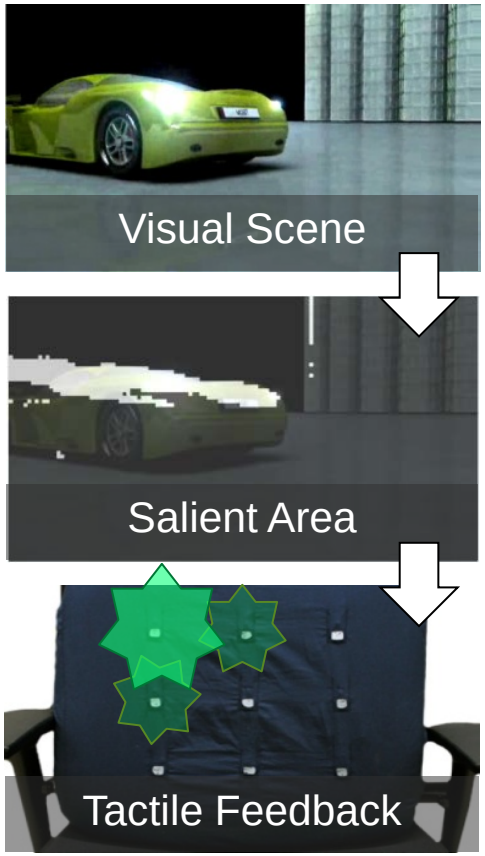
Tactile Effect Authoring from Video

- Manual authoring of tactile effects for video viewing

Y. Ki, J. Cha, I. Oakley, and J. Ryu, J, “Exploring Tactile Movies: An Initial Tactile Glove Design and Concept Evaluation,” IEEE Multimedia, vol. 16, no. 3, pp. 34-44, 2009.

Saliency-Driven Tactile Effect Authoring (1)

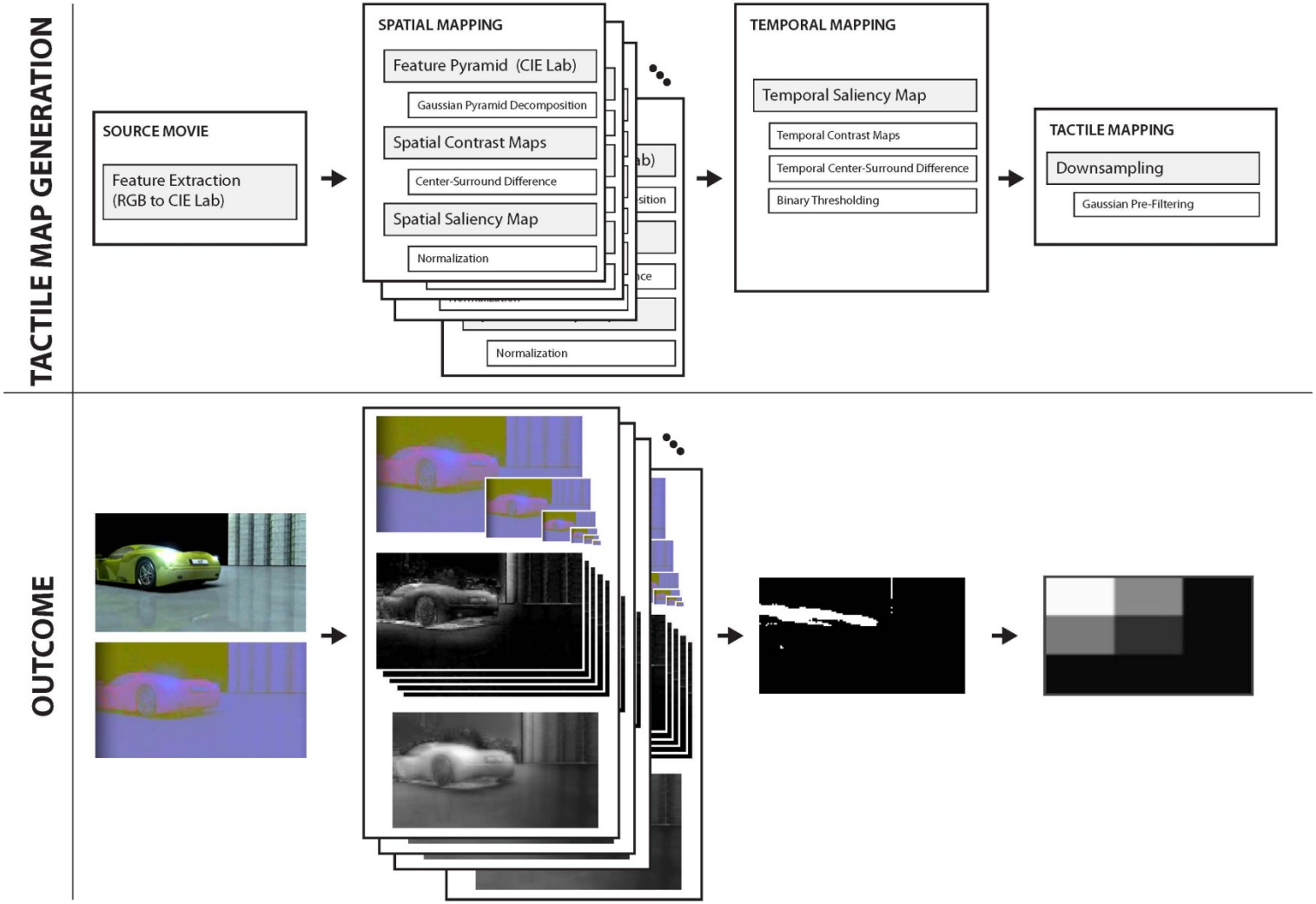
Haptic feedback in harmony with the visual saliency of a scene



DEMO Teaser

Myongchan Kim, Sungkil Lee, and Seungmoon Choi, “Smart Chair: Automatic Haptic Feedback Authoring System Based on Visual Saliency,” Demo in IEEE Haptics Symposium 2012.

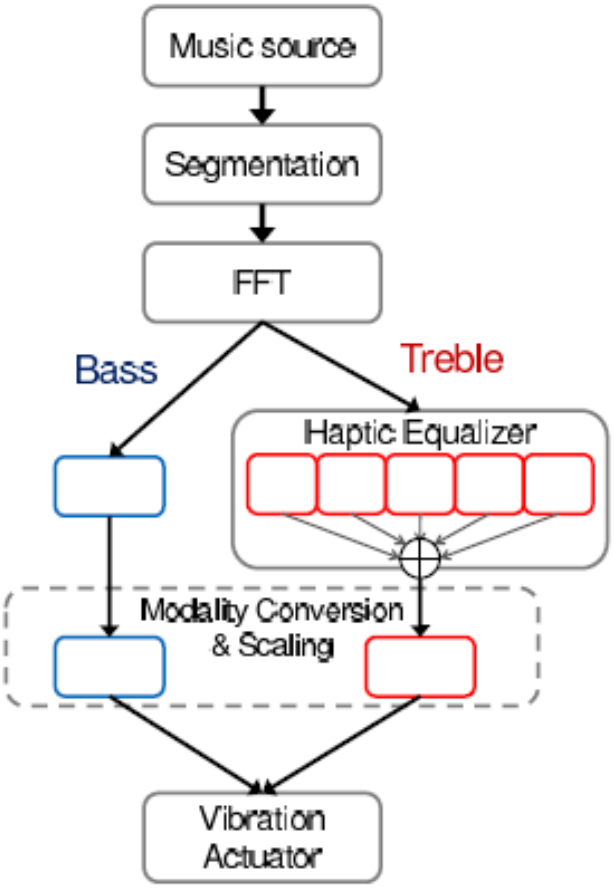
Saliency-Driven Tactile Effect Authoring (2)



Myongchan Kim, Sungkil Lee, and Seungmoon Choi, “Saliency-Driven Tactile Effect Authoring for Real-Time Visuotactile Feedback,” Submitted, 2012.

Real-time Dual-band Haptic Music Player

- DMA
- Real-time, automatic vibration generation algorithm from music sources
- Superposed vibration – Beat
- High frequency vibration – Music Feature
- Haptic equalizer
  - Frequency-dependent weighting
  - Weights depend on the music genre
- Perception-based modality conversion

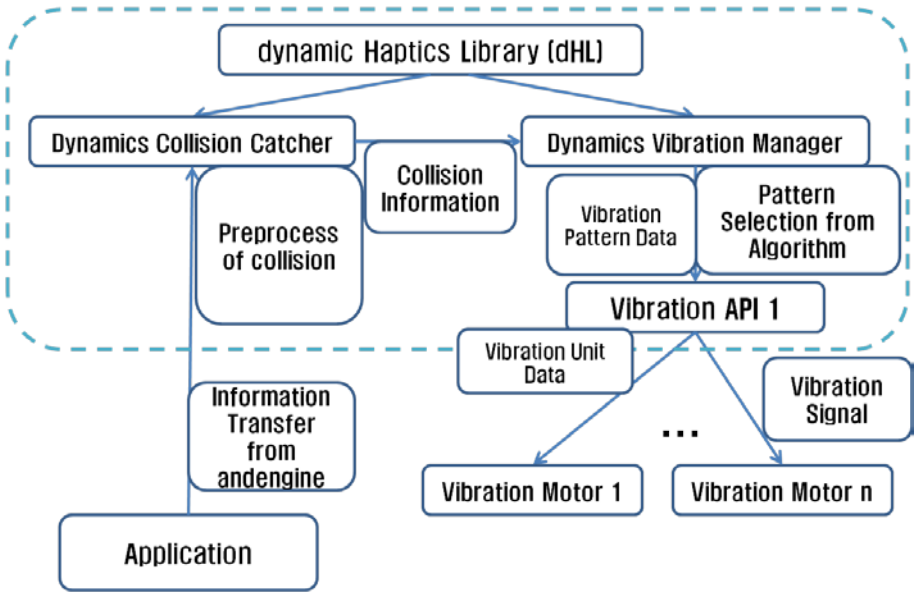


Structure

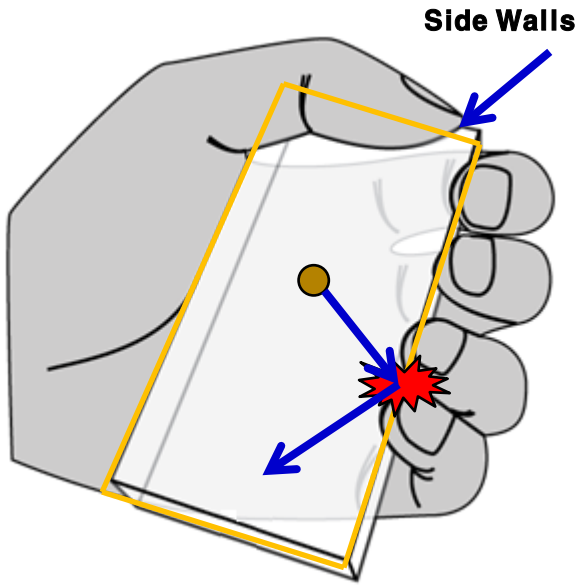
Inwook Hwang, Seungmoon Choi, Kyunghun Hwang, Sunwook Kim, Jaecheon Sa, and Moonchae Joung, "Real-time Dual-band Haptic Music Player for Mobile Devices," Demoed in Eurohaptics 2010.

dynamic Haptics Library (dHL)

- Physics engine: Physics simulation
- dynamic Haptics Library: Autonomous tactile effect generation
  - Reduced development time for vibrotactile effect design
  - Physics-faithful feedback



Structure of dynamic Haptics Library



Ball-Wall Collision Demo

Gunhyuk Park, Seungmoon Choi, Kyunghun Hwang, Sunwook Kim, Jaecheon Sa, and Moonchae Joung, "The dynamic Haptics Library: Real-time Vibrotactile Rendering Library Using Dynamics Engine," Demoed in ISUVR, 2011

Conclusions

- Importance of haptic content is increasing.

- Technology for supporting convenient haptic content making is essential for the growth of haptics.

Thank you!

- Questions and comments to: choism@postech.ac.kr