USING AUDIO CUES TO SUPPORT MOTION GESTURE INTERACTION ON MOBILE DEVICES

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Motion gestures are performed by translating and rotating a device in 3-D space

BENEFITS OF MOTION GESTURES
- Facilitate smartphone use while distracted [1]
- Expand the input space for mobile phones [2]
- Provide shortcuts for multi-step smartphone commands [3]

CHALLENGES TO GESTURE ADOPTION
- Users must be made aware of available gestures
- Users need opportunities to practice gestures while receiving real-time feedback [3]
- Continuous visual feedback is not always feasible since the screen may not be visible at all times

PROPOSED SOLUTION
In an effort to address these challenges, we've developed audio-based training and feedback systems, Glissando and Silenzio, that **provide feedback** on the system's interpretation of user input for the spatial component of motion gestures. Glissando additionally **provides a spatial representation** of the desired gesture.

PRELIMINARY FINDINGS
We found that while both techniques provide adequate feedback, users prefer Glissando's continuous feedback.
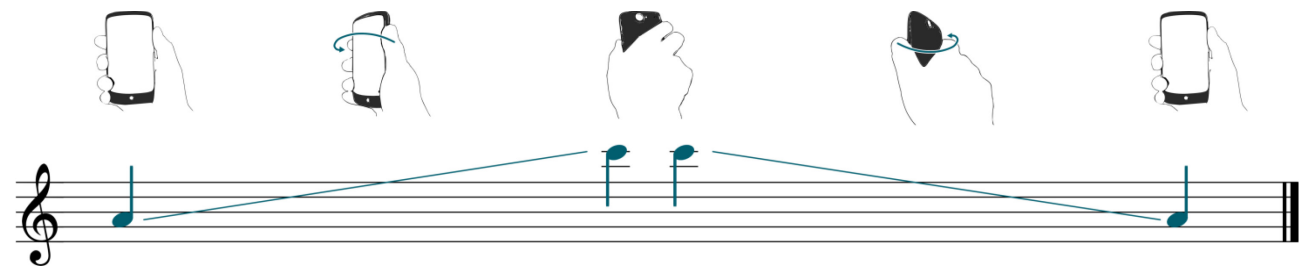
CURRENT WORK
- Incorporating additional gestures
  - Creating a framework for mapping gestures to audio feedback
- Investigating imposing temporal constraints on gestures in an educative way
- Exploring the use of motion gestures and Glissando to support mobile interaction for vision disabled users
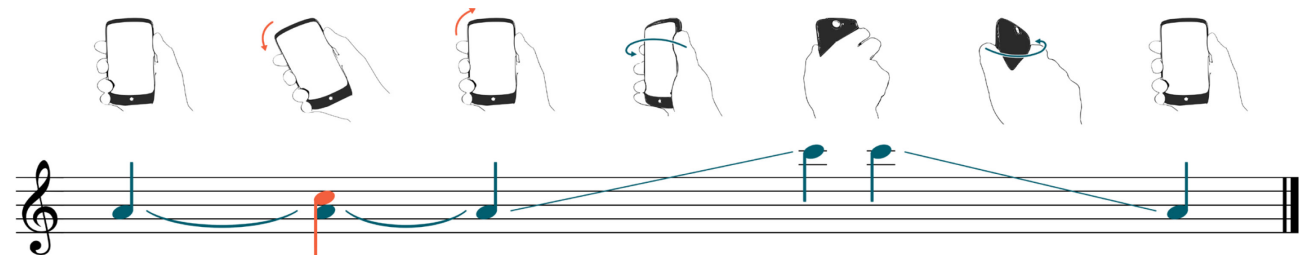
REFERENCES
[1] Negulescu, M., Ruiz, J., Li, Y., and Lank, E. Tap, swipe, or move: attentional demands for distracted smartphone input. *Proc. of AVI '12*, ACM (2012), 173180

[2] Ruiz, J., Li, Y., and Lank, E. User-defined motion gestures for mobile interaction. *Proc. of CHI '11*, ACM (2011), 197–206

[3] Ruiz, J. and Li, Y. DoubleFlip: a motion gesture delimiter for mobile interaction. *Proc. of CHI '11*, ACM (2011), 2717–2720
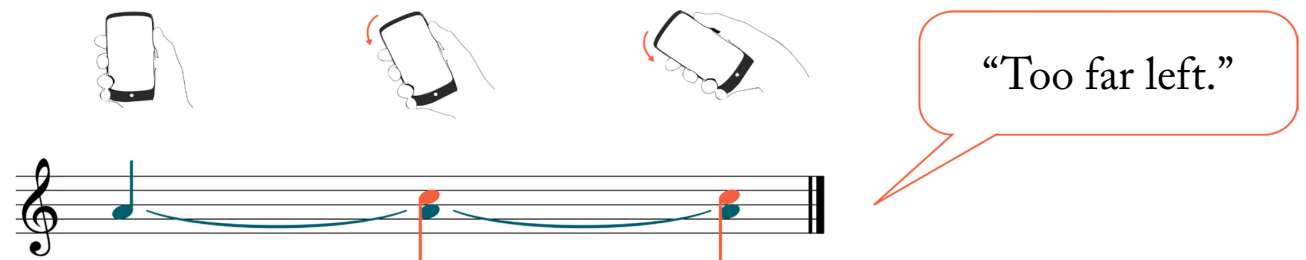
CONTINUOUS FEEDBACK

Glissando plays continuous audio feedback as the gesture is performed, allowing users to manipulate input before an unsuccessful gesture is detected.

NON-VERBAL WARNING SYSTEM

A note mapped to an undesirable direction is added once sufficient deviation from the correct gesture occurs in that direction.

VERBAL ERROR MESSAGES

Upon completion of a gesture or detection of an extreme error, Silenzio and Glissando inform users that the gesture is correct or identify the user's error.

Video demonstration
http://hci.cs.colostate.edu/audio-cues/chiwip2014.mov

Extended abstract PDF
http://hci.cs.colostate.edu/audio-cues/chiea2014.pdf

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