Vertibles: Tangibles on vertical Interactive Surfaces

Bachelor's Thesis – 2010

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28.09.2010

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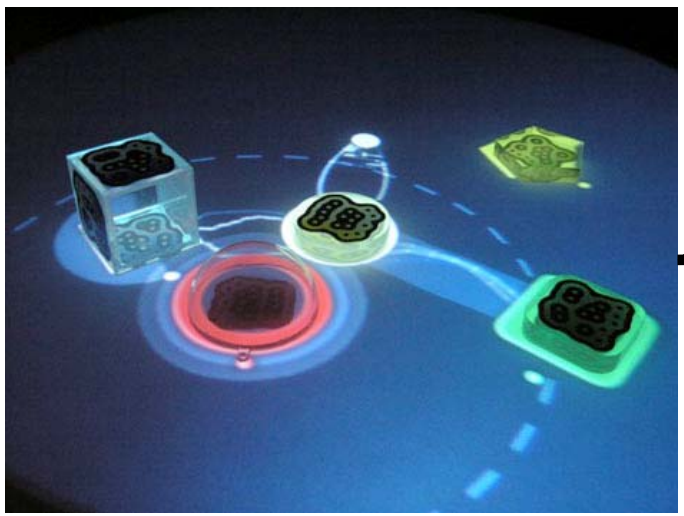
Motivation

[1] A multi-touch table

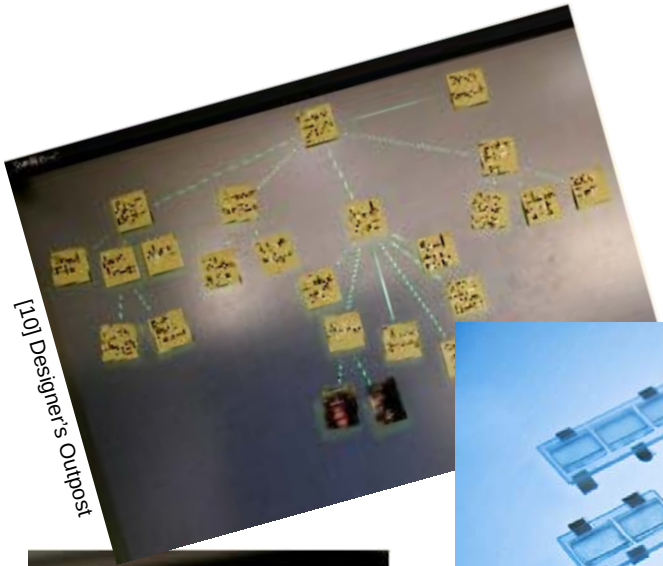
- pure multi-touch interactive surfaces
- advanced setups support artifacts for control ➔ TUI
- form changes from horizontal to more desktop like vertical displays



[2] The reacTable – a tangible user interface

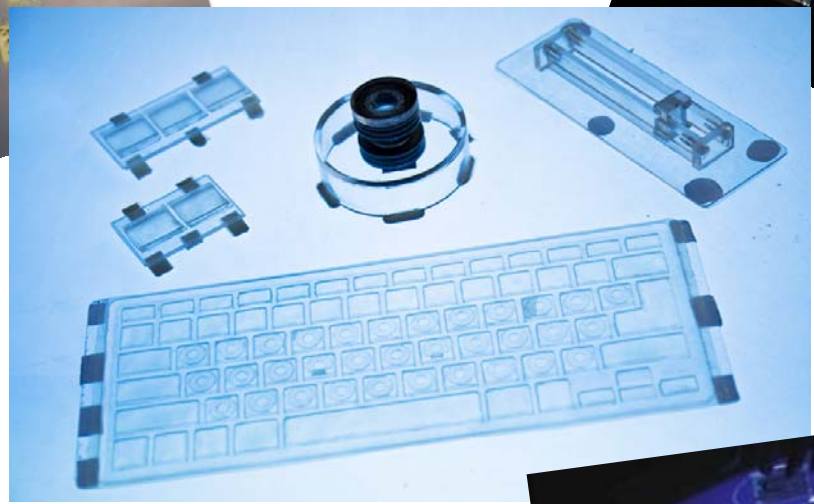
[4] The Curve

Related Work



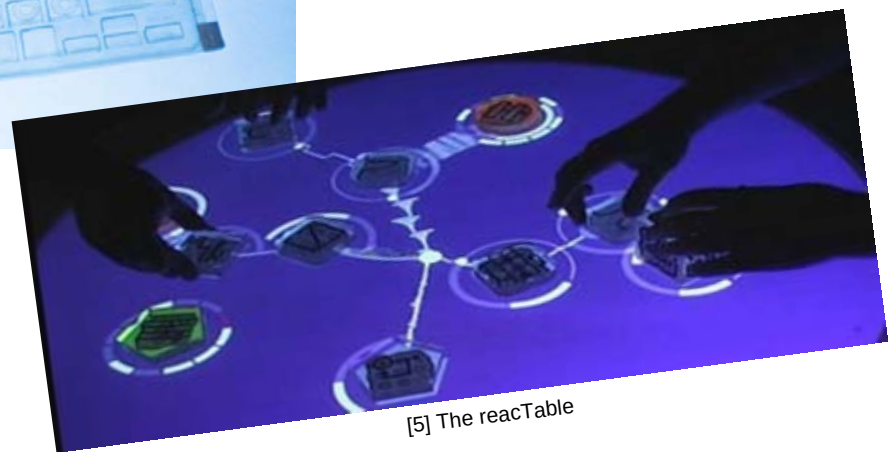
[10] Designer's Outpost

[7] DataTiles



[6] Slap Widgets

[9] Level-sensing glass, SurfaceWare



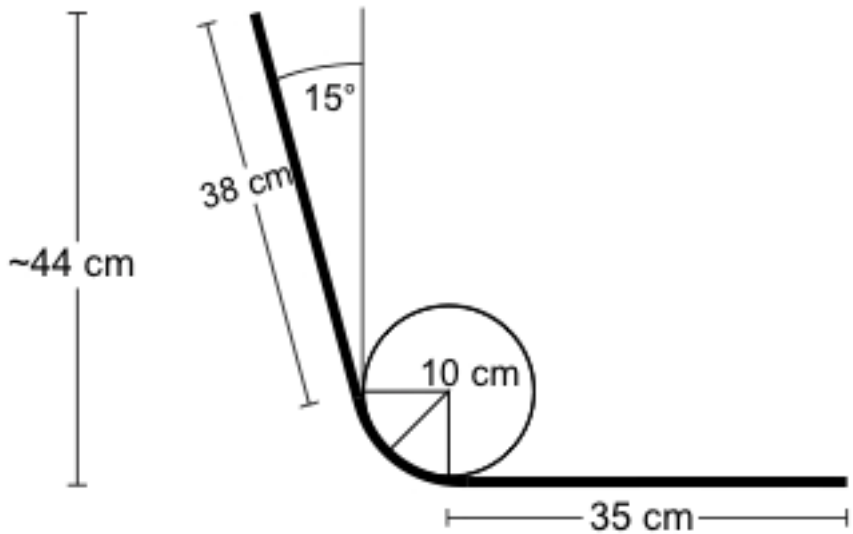
[5] The reacTable

Related Work

The Curve

- Designed by our institut
- Combines a horizontal and a vertical surface through a bended area
- Supports FTIR and DI blob detection

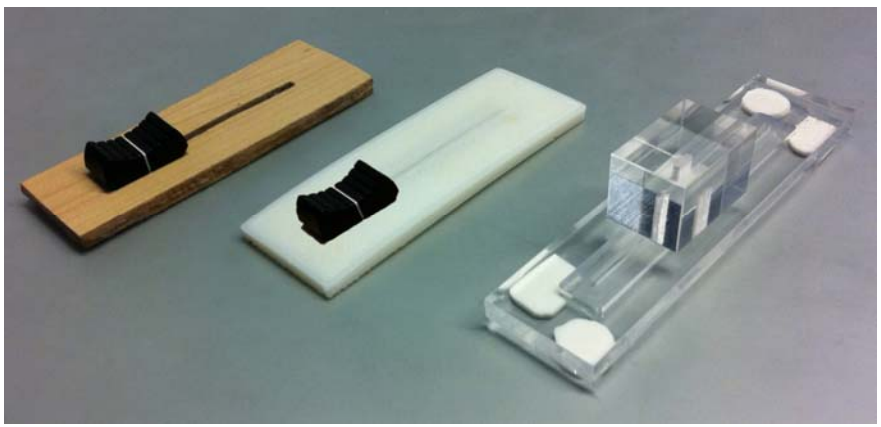
[4] The Curve

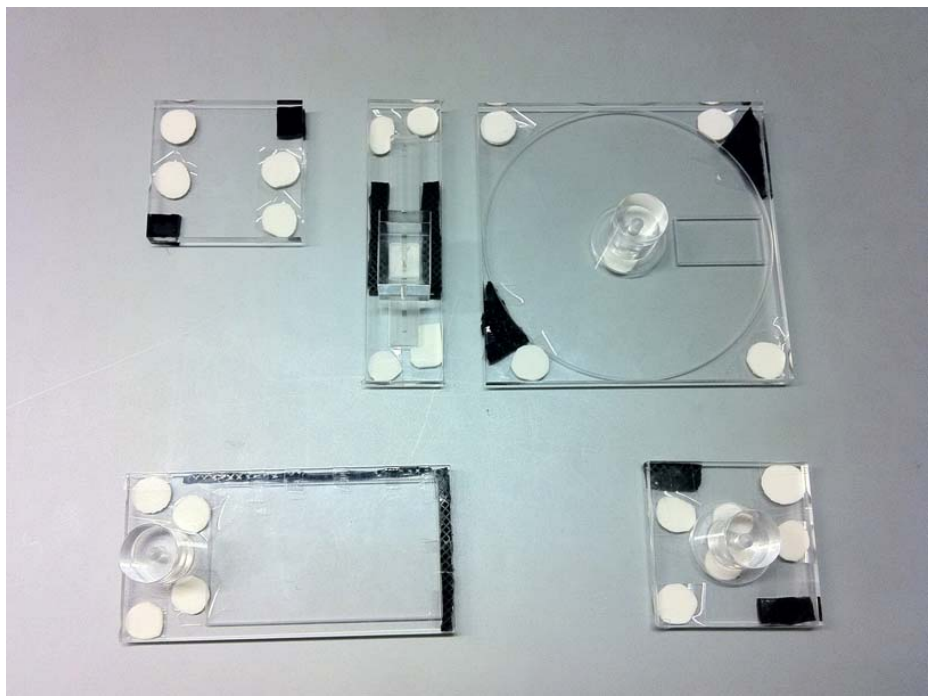


[4] The structure of the Curve

The Vertibles

- Different prototypes:
  - Wood
  - Plastic
  - Acrylic
- Acrylic:
  - Best trade-off between style and functionality

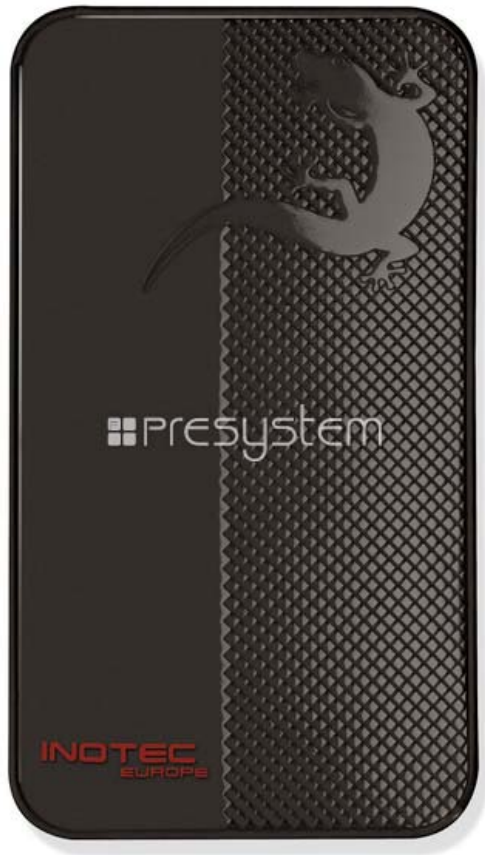




The Vertibles

Nanopads

- Difference to horizontal displays ➔ gravity must be conquered
- Usage of an adhering layer is needed
- Nanopads offer this effect
- Advantages:
  - High flexibility
  - High durability
  - Not expansive
  - No changes on the underlying system are needed

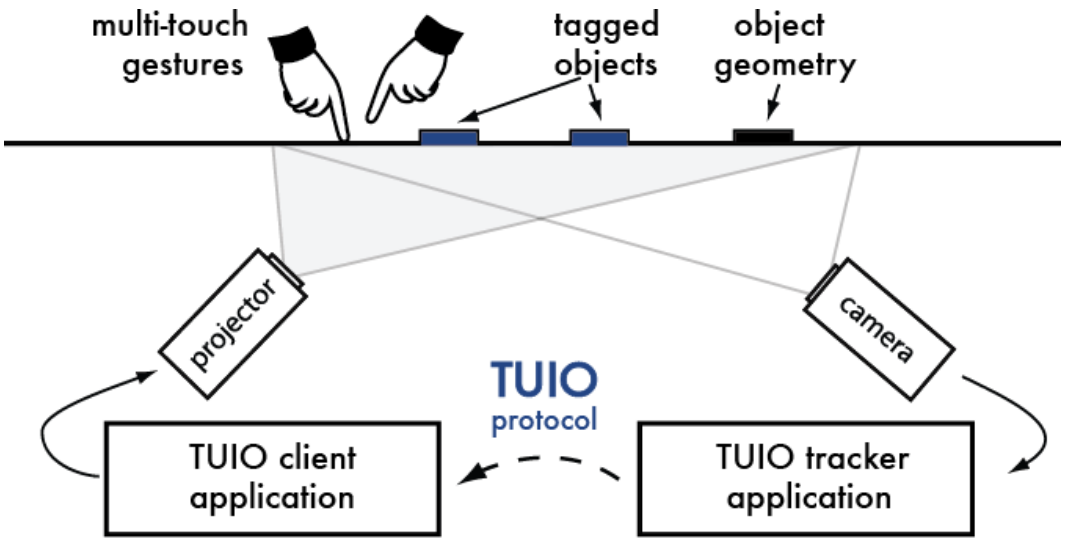


[3] A Nanopad by Inotec

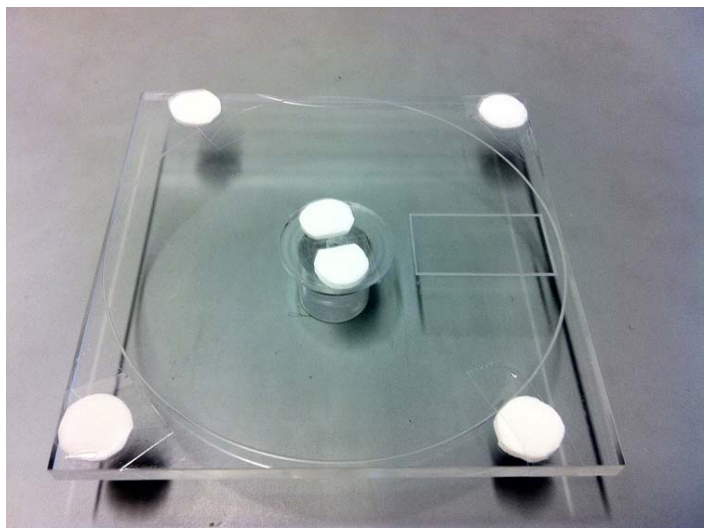
The Vertibles

Tagging & Tracking

- Tags are white spots glued to the surface of the artifact
- Usage of the TUIO system
- Client / server pattern with exchange of blob information
- Object recognition due distances between blobs



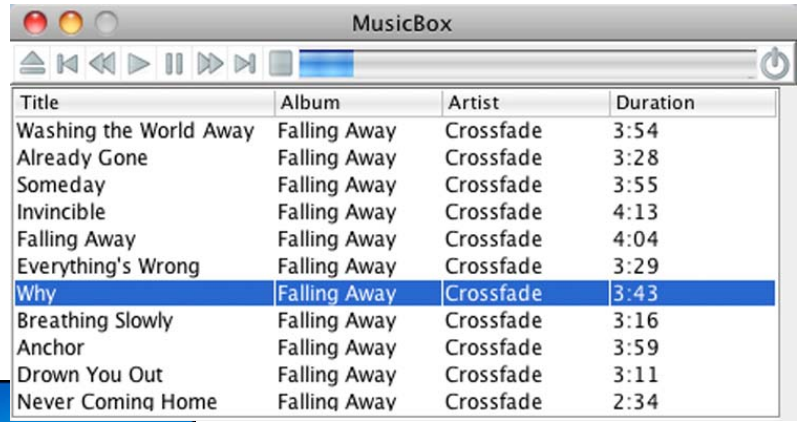
[8] Concept of the TUIO system

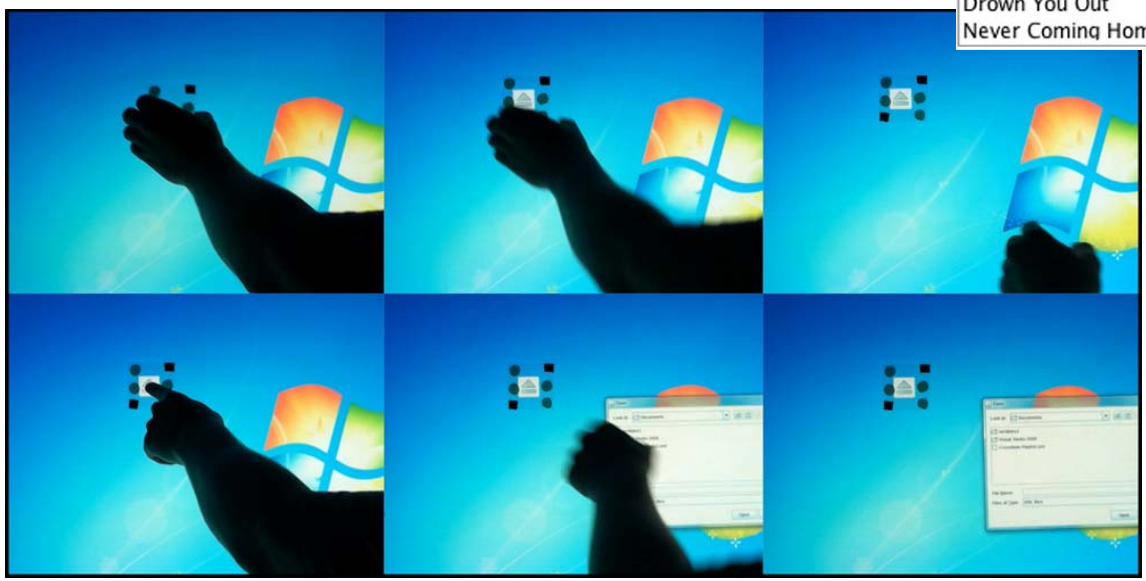


Demo Application

Music Player

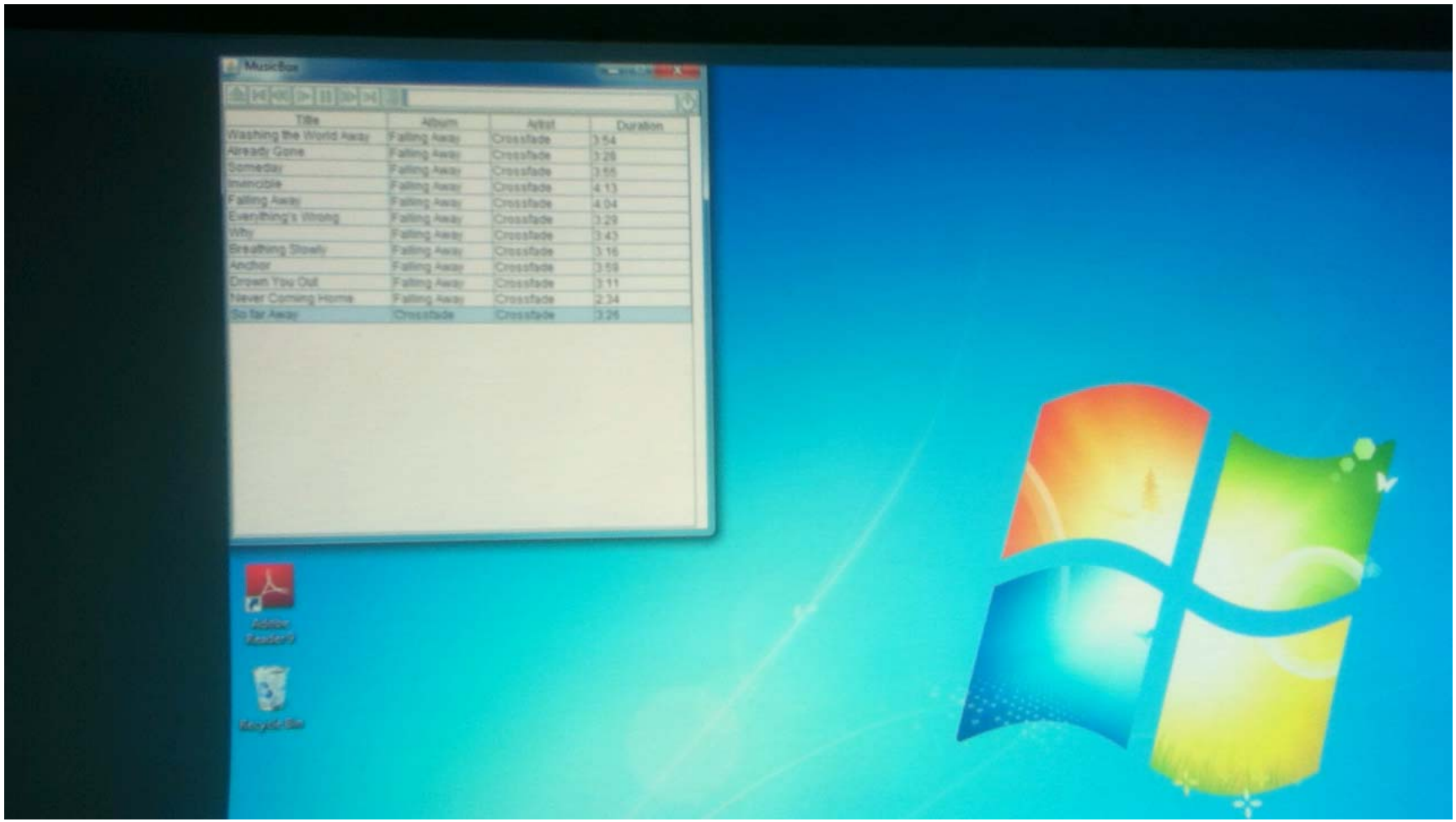
- Simple music player
- Can be controlled via GUI, Vertibles or both
- Application contains three parts:
  - Detection
  - Player
  - Bridge between those two parts



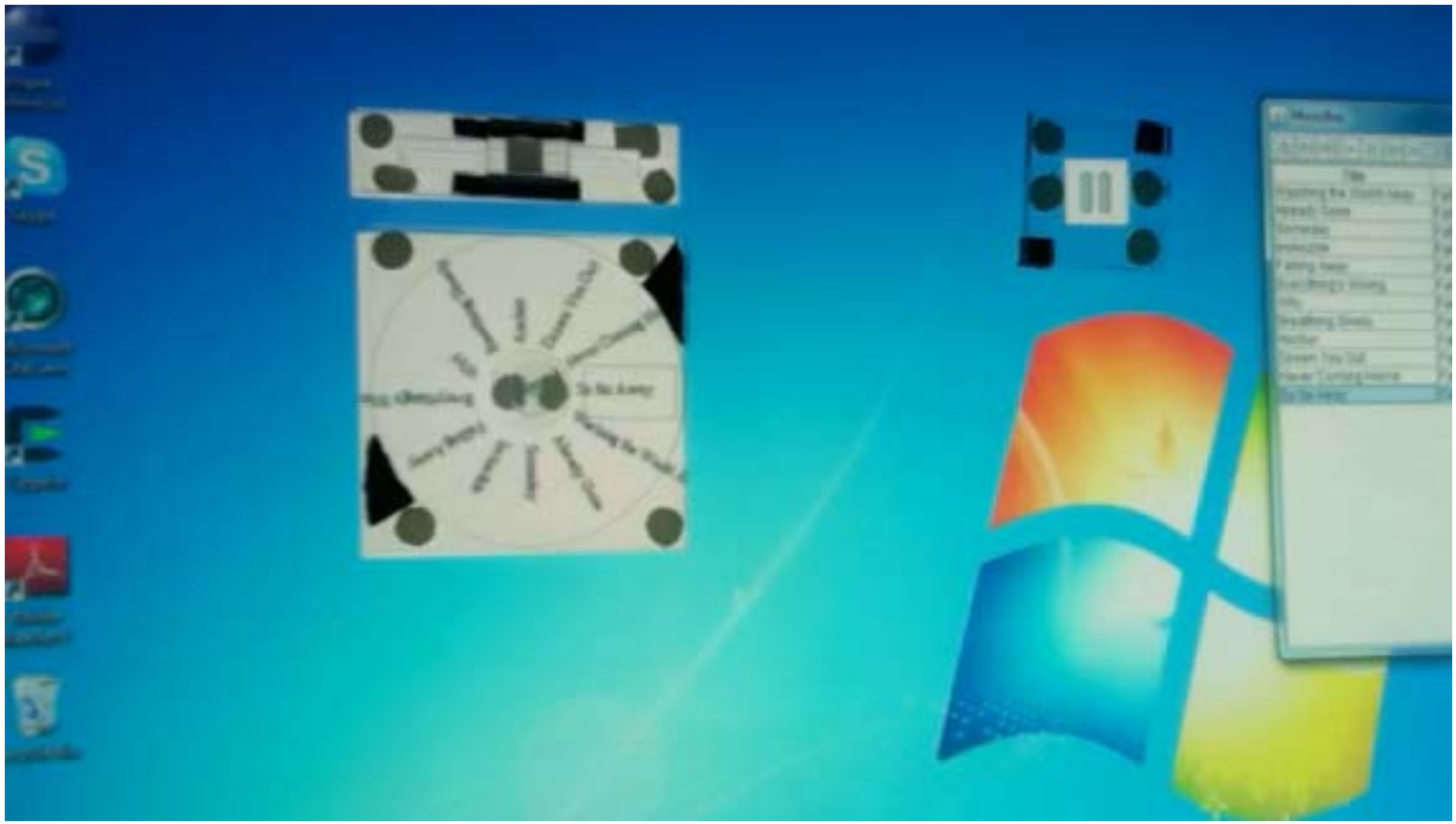


Demo Video

Demo Video


MusicBox
Title
Album
Artist
Duration
Washing the World Away
Falling Away
Crossfade
3:54
Already Gone
3:28
Someday
3:55
Invincible
4:13
Falling Away
4:04
Everything's Wrong
3:29
Why
3:43
Breathing Slowly
3:16
Anchor
3:59
Drown You Out
3:11
Never Coming Home
2:34
So far Away
3:26

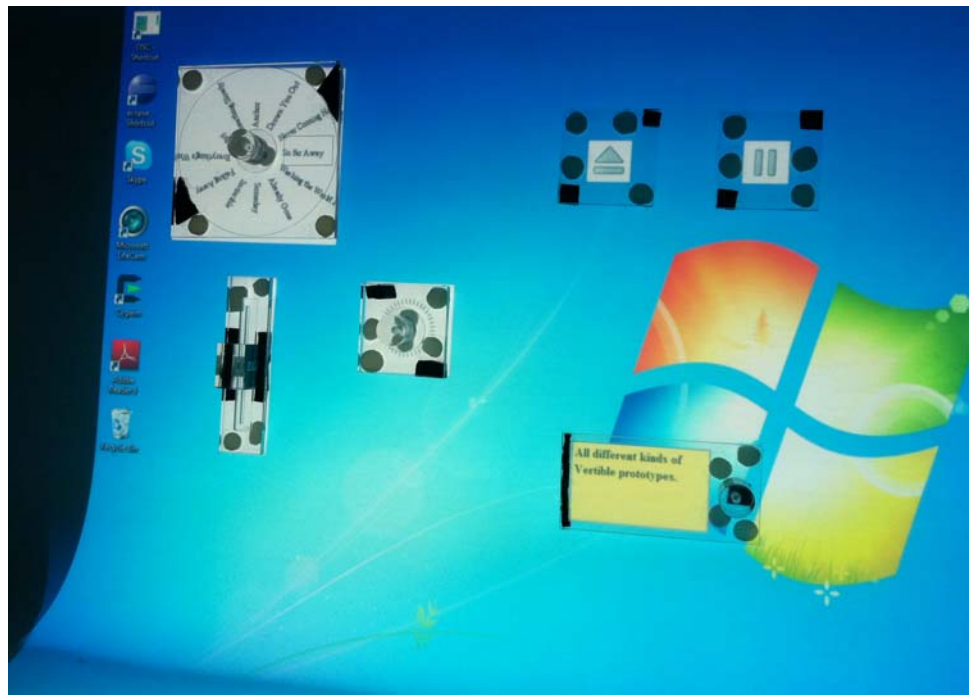
Demo Video



User Study

Structure & Execution

- half paper-based, half digital-based
- Four participants (between 20-30 years old)
- Short task, using the Vertibles as input and control elements



Findings

- Amenities of tangibles on the vertical
- Easy connecting step
- Enjoyed dealing with the artifacts

Conclusion & Future Work

Conclusion

- Similar to tangibles
- adding a second, adhering layer
- Detected by a diffused illumination setup
- Work on both vertical and horizontal displays

Future Work

- Software-based
  - Nearly endless possibilities for the digital shadow of the artifact
  - GUI kit with the help of tangibles (on horizontal and vertical surfaces)
- Hardware-based
  - Magnets instead of Nanopad adding metallic atoms to the compound of acrylic
  - Include storage devices on the tangibles for easier interaction and portability

References

- [1] http://zedomax.com/blog/wp-content/uploads/2009/04/multi-touch.png
- [2] http://www.onetonnemusic.com/mt-static/archives/reactable_1.jpg
- [3] http://presystem.hu/images/products/800x600/33801797.jpg
- [4] R. Wimmer, F. Hennecke, F. Schulz, S. Boring, A. Butz, Heinrich H. Curve: Revisiting the Digital Desk. NordiCHI'10, 2010.
- [5] S. Jordá and G. Geiger and A. Alonso and M. Kaltenbrunner. The reacTable: Exploring the Synergy between Live Music Performance and Tabletop Tangible Interfaces. TEI'07. 2007
- [6] M.Weiss, J.Wagner, Y. Jansen, R. Jennings, R. Khoshabeh, J. D. Hollan and J. Borchers. Slap widgets: Bridging the gap between virtual and physical controls on Tabletops. CHI'09, 2009.
- [7] J. Rekimoto and B. Ullmer and H. Oba. DataTiles: A Modular Platform for Mixed Physical and DataTiles: A Modular Platform for Mixed Physical and Graphical Interactions. SIGCHI'01. 2001.
- [8] http://www.tuio.org/images/diagram.png
- [9] Paul H. Dietz and Benjamin D. Eidelson. SurfaceWare: Dynamic Tagging for Microsoft Surface. TEI'09. 2009.
- [10] S. Klemmer and M. Newman and R. Farrell and M. Bilezikjian and J. Landay. The Designers' Outpost: A Tangible Interface for Collaborative Web Site Design. UIST'01. 2001.

Thank you for your attention!

Appendix