

An RFID Interface for 3D Audio Web Consumption

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Research Directions

- Design innovative digital interfaces using RFID technology.
- Consider various kinds of application areas, such as in-car navigation systems and mobile systems.
- Initially, we focus on RFID applied to 3D audio interfaces.

RFID Interfaces

RFID Tags

- Use RFID tags as simple interfaces.
- Passive tags are smaller and simpler.
- NFC tags are already prevalent in smart card technology. But are limited to being scanned one at a time.
- Many UHF tags can be scanned simultaneously. Opens up for a variety of interfaces.
- Labelling, stacking, shuffling, etc. of tags possible.
- Covering certain tags so they are not scanned.

RFID Readers

- RFID readers can be installed permanently as part of the system (e.g. in the dashboard of an in-car navigation system).
- RFID readers can be mobile and/or handheld (e.g. integrated into a smart phone).

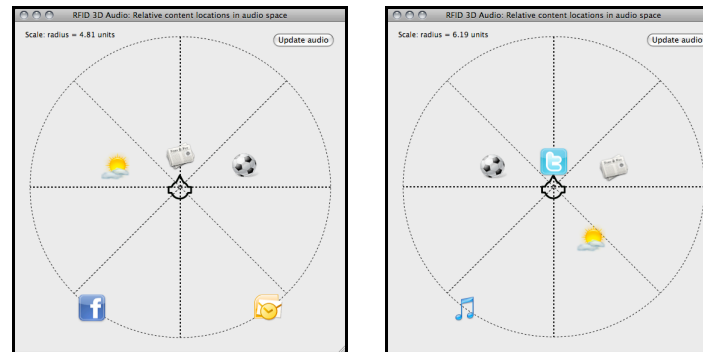
Application Areas

- We leverage UHF technology to complement 3D audio interfaces.
- We focus on consuming web content in eyes-free situations, for immediate application relevance, and ease of existing web technology.
- Eyes-free scenarios include driving, jogging, and standing in a crowded subway train.
- 3D audio provides a rich interface when eyes are already focused on another task.
- Speech, hand/head gesturing, small devices (including RFID tags) complement and complete the audio interface.

System Prototypes

RFID Implementation

- Tags correspond to different web content streams.
- If tag is in the range of the reader, associated content is streamed in 3D audio space.
- Sounds associated with newer arriving tags are located closer to the user, and at a better angle. Older sounds are pushed further away.
- User location in audio space is fixed.



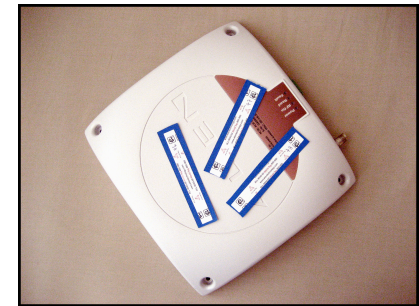
Mobile Implementation

- Content pre-selected on a dedicated screen.
- User moves in audio space through touch gestures and device shaking.
- Future work is to integrate RFID interface into mobile device.



RFID Technology

- Alien ALR-9650 UHF RFID reader.
- Range is 8 to 9 meters.
- Very efficient tag singulation.



Future Work

- More interactive RFID interfaces.
- Leverage efficient tag singulation of UHF technology.
- Integrate interfaces into different scenarios, beyond audio.
- Use memory storage of RFID tags as part of the interface.
- Consider combination of NFC and UHF systems for different applications, especially since NFC technology is implemented in many existing systems.

References

- Y. Vazquez-Alvarez and S. Brewster, "Investigating Background & Foreground Interactions Using Spatial Audio Cues," in *Proc. ACM Conference on Human Factors in Computing Systems (CHI)*, Boston, MA, Apr. 2009, pp. 3823-3828.
- J.T. Savolainen, H. Hirvola, and S. Iraj, "EPC UHF RFID Reader: Mobile Phone Integration and Services," in *Proc. IEEE Consumer Communications and Networking Conference (CCNC)*, Las Vegas, NV, Jan. 2009.