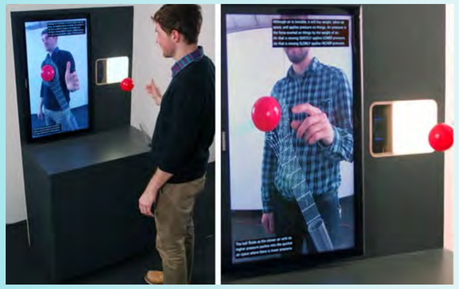
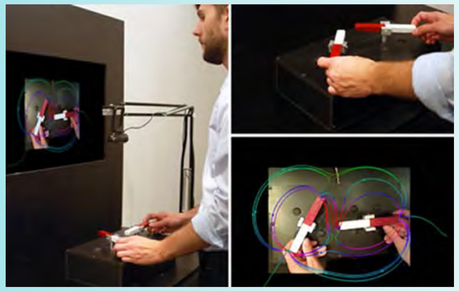
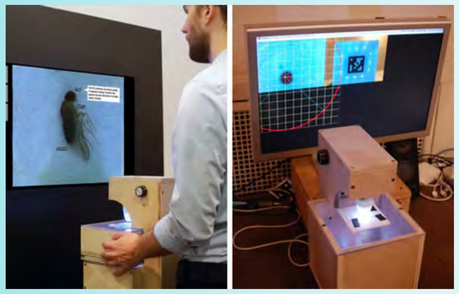
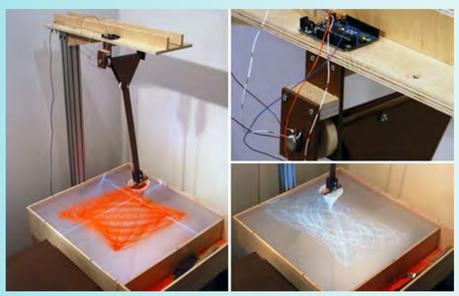
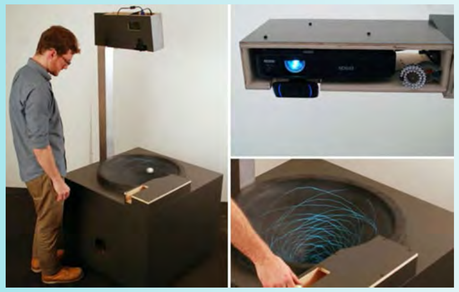
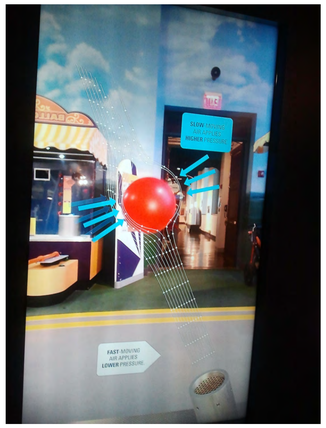
PROTOTYPING



ARIEL

AUGMENTED REALITY FOR INTERPRETIVE AND EXPERIENTIAL LEARNING

"Air Pressure Arcade" in The Franklin Air Show – *Classic Bernoulli Blower Device*

"Magnet Maps" – *Classic Bar Magnets Device*

"Chain Reactions" – *Classic Dominoes Device*

The ARIEL project has three parallel yet interwoven strands: prototyping, learning research, and platform development. Each has its own focus and goals, but the findings and outcomes reinforce the activity and process in the others. For example, as we prototype new device interfaces, we engage the learning research to test learning impacts with student populations. The learning research findings then inform the next stage of prototyping. Likewise, the technical needs that become evident during prototyping inform the platform development process.

The goal of the ARIEL project is the creation of an exhibit platform that uses scientific visualization techniques to transform modern visitor interaction with traditional hands-on exhibits. The project will ultimately demonstrate an innovative solution to a key problem faced by science centers: the reinvention of the exhibit experience for visitors with changing 21st century learning expectations.

The larger significance of our investigations is that the process for exhibit development may be transformed. To date, the prototype devices that we used have featured digital augmentations layered on top of an existing "classic" device that was originally designed for traditional use. The availability of mixed-reality applications may change the way that hands-on science learning exhibits are designed and constructed for maximum learning impact.

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www.fi.edu/ariel

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LEARNING RESEARCH

The ARIEL project seeks to understand the impact that augmented reality technology may have on informal science learning in a science museum exhibit.

The central research questions are:

> What variables influence engagement with the fixed-station and virtual environment applications?

> What configuration of variables produces optimal learning outcomes with respect to the identified project goals?

Approach

Knowledge-building framework, mixed-methods studies using prototype devices, middle-school student groups on field trips, pre- and post-visit conceptual knowledge surveys in classrooms, cognitive skills assessment during on-site intervention

Selected Publications

Yoon, S., Elinich, K., Wang, J., Van Schooneveld, J., & Anderson, E.: Scaffolding informal learning in science museums: How much is too much? *Science Education*. 97(6): 848-877, 2013.

Yoon, S., Elinich, K., Wang, J., Steinmeier, C., & Tucker, S. (2012). Using augmented reality and knowledge-building scaffolds to improve learning in a science museum. *International Journal of Computer-Supported Collaborative Learning*, *7*(4), 519-541.

Yoon, S., Elinich, K., Wang, J., Steinmeier, C., & Van Schooneveld, J. (2012). Learning Impacts of a Digital Augmentation in a Science Museum. *Visitor Studies*, *15*(2), 157-170.

See www.fi.edu/ariel for complete list.

SOFTWARE TOOLKIT

ARIEL Builder is free open-source software, developed to facilitate the use of augmented reality technology in informal science learning experiences. The target user community includes exhibit and program developers who work at hands-on science museums. While the software was developed with this community in mind, all developers are welcome to use ARIEL Builder.

Go to www.fi.edu/ariel to download.