

PhoneLens: A Low-Cost, Spatially Aware, Mobile-Interaction Device. Roudaki, et al. IEEE THMS. 2014.

What are the core research questions addressed by the work?

- How to overcome the shortcomings of both paper documents and mobile devices to enable interactions within a large workspace.

What motivates the work?

- Overcoming the shortcomings of both paper documents and mobile devices to enable interactions within a large workspace in a way that is low cost, low in computational complexity, robust, and portable
- The difficulty of replicating large form engineering document functionality on digital displays coupled w. inefficiency of parsing multivalent paper documents for specific information

How does the work understand the usage, capabilities, and limitations of paper?

- Physical paper documents are still resilient, in a digital age, because they have many advantages: ease of use, superior readability, availability
- In contrast to mobile devices: provides great flexibility and convenience to retrieve, modify digital information anywhere and anytime
 - Limitation of small screen size
- “By augmenting paper documents with digital information, a spatially aware, mobile interaction can overcome the shortcomings of paper documents and mobile devices”

What is the target application domain of the work?

- Potential applications in engineering and architecture
- Large-scale document (e.g. architectural plan) browsing

What are some proposed extensions to paper proposed by the work?

- Provide a spatially aware display to facilitate navigation in a large information space
 - System identifies the position of the mobile device within the workspace and displays the corresponding information in the area beneath the mobile device
- Mobile phone as sort of a magic window: Overlay digital information on multivalent paper documents
 - Enables viewing of multiple layers of information (e.g. an architectural floor plan, lighting, socket, etc.)
 - Enables annotation
 - Enables measurement
 - Enables Zooming

How are the proposed extensions implemented?

- Use of infrared LEDs and a Wiiremute device to track the mobile device's location
- Mobile phone as sort of a magic window: Overlay digital information on multivalent paper documents
 - Calculate relative position of the mobile device within the workspace and visualize the corresponding digital information

What are the results of the work? What are the implications of the results for future designs and implementations of paper-based technologies?

- Studies demonstrate the efficacy of the approach over traditional paper-based methods
 - Along with past studies, demonstrates the usefulness of an augmented-reality interface that enhances paper documents with digital information