Focus Plus Context Screens: Visual Context and Immersion on the Desktop

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Abstract

Focus plus context screens are wall-size low-resolution displays with an embedded high-resolution display region. Focus plus context screens allow users to view details of a document up close, while simultaneously seeing peripheral parts of the document in lower resolution. Application areas range from geographic information systems to interactive simulations and games.

1. Focus plus context screens

Many professional computer users, such as chip designers or geographic information specialists, work with visual documents that are too large and detailed to fit on their screens. Consequently, users have to access information sequentially using zooming and panning. *Focus plus context screens* are a new type of computer screen that addresses this issue. Focus plus context screens [Baudisch et al. 2001] are wall-size low-res displays with an embedded hi-res display. Image content is displayed across the high-res and the low-res display regions, such that the scaling of the display content is preserved, while its resolution varies according to display region. Focus plus context screens allow users to view details of a document up close, while simultaneously seeing peripheral parts of the document in lower resolution.

Figure 1a shows the display prototype that we will demonstrate at SIGGRAPH. The frame holds a piece of foam core that serves as a projection surface (4x3 feet). A projector that is located behind the user projects onto it, turning the foam core into a large low-resolution display, the *context display*. The foam core has a hole in the center directly into which an LCD monitor is embedded, the hi-res *focus display*. Customized software is used to display image content across both display regions, such that the scaling of the image is preserved, while its resolution varies across the two display regions. Content panned into the focus region is viewed in higher detail. In Figure 1a, the focus region provides enough resolution to allow users to see individual cars on a satellite image of San Francisco. At the same time, the context region allows the user to stay oriented by providing a visual context containing important landmarks.

We have applied focus plus context screens to several application areas. On a focus plus context screen, editors of print products can work on details while constantly being aware of the detail's context, making it easier to judge how a detail modification will affect the overall impression (Figure 1b). Our adaptation of the Linux operating system allows running visual applications requiring many windows or large windows (Figure 1c). In a videoconference scenario, focus plus context screens allow simultaneous display of the remote partner *and* the detail information that this person presents, e.g. readable text (Figure 1d). Focus plus context screens increase the level of immersion of virtual reality applications, such as first person shooter games (Figure 1d). These games require players to be constantly focused on a crosshair at the screen center and since human vision in the peripheral regions is limited to low-res, a focus plus context screen produces the same user experience as if the entire display was hi-res.

2. Conclusions

Focus plus context screens provide users with additional visual context that can be perceived using peripheral vision. This allows users to work faster and with fewer errors [Baudisch et al. 2002]. While focus plus context screens allow users to work effectively with large visual documents, they also increase the level of immersion in virtual worlds. Since only a portion of focus plus context screens is actually hi-res (similar to [Yoshida et al. 1995] with head-mounted displays), focus plus context screens are more than an order of magnitude less expensive than currently available projection array-based systems and also require less space [Hereld et al. 2000].
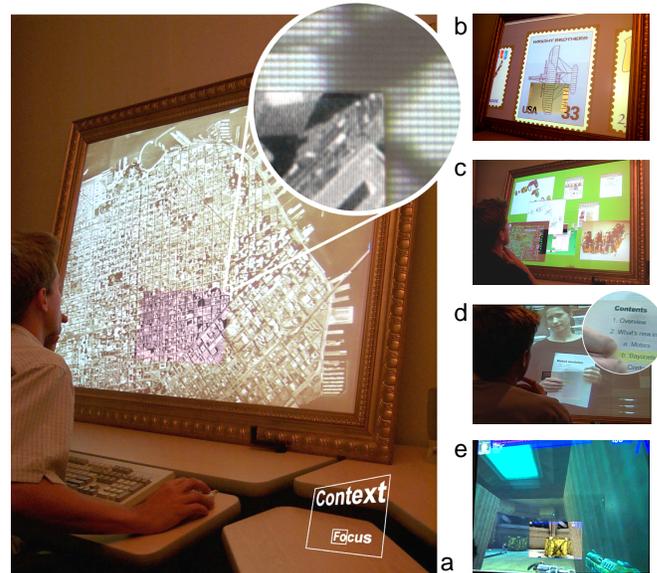

Figure 1: (a) Focus plus context screen prototype. The iconic illustration (bottom right) shows the location of the focus screen. The callout shows the different resolutions of focus and context area. Other application examples (b) Adobe Illustrator (c) Linux desktop (d) videoconferencing and (e) first person shooter game.

References

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