TECHNOLOGY

Augmentarium

OVERVIEW

Recent advances in sensor technologies have enabled the acquisition of very high resolution images that demand high-resolution displays. There has also been an increasing trend towards the generation and analysis of very high-fidelity time-varying datasets in scientific simulations. These simulations can range from several terabytes to a few petabytes and contain multiple superposed scalar and vector fields. Such datasets are used to study everything from the evolution of planets and stars to the principles of life itself. These trends, coupled with Moore's law advances, have allowed us to model and render in unprecedented detail. This has prompted an increased attention to high resolution displays that have truly revolutionized how scientists and engineers view their data. This visual detail is affording new insights as well as opportunities for education and training in a number of application domains, both scientific and commercial. However, current generation displays lack flexibility to provide visual detail based on the user's needs and the application's requirements. They effectively assume that every pixel is equally important. This is neither how the human visual system handles complexity nor how most real-world applications behave.

Researchers at the University of Maryland have designed the Augmentarium, a revolutionary facility that will be a unique assembly of projection displays, robotic mounts, CPU-GPU clusters, human vision and human-computer interaction technologies to study visual augmentation of human intelligence for a variety of applications. All the elements of the Augmentarium: projectors, cameras, robot mounts, compute and render nodes will be connected to each other through a high-speed low-latency quad data-rate Infiniband interconnect. The projector-camera pairs will be used to provide feedback-assisted display on the screen as well as display surfaces in front of the screen. The robotic mounts will point the projector-camera pair at the location higher detail is desired. If that region is already being rendered to by some other projector, the system will identify the source of that rendering, and coordinate with that display unit to carry out intensity blending and appropriate image fusion. For the objects that are in front of the display screen, we plan to illuminate them from projectors from multiple directions to augment their surfaces with projected information (such as location of tumors in image-guided surgery planning) that is invariant to their motion. The programmatic-robot mounted projector-camera pairs will use feedback to achieve registration on such projection-augmented objects.

Advantages
· Flexibility to provide detail based on user's needs and application's repuirements
· Focuses on important details instead of treating all pixels as the same
Applications
· Education and training
· Data visualization

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Additional Information

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EXTERNAL RESOURCES

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