



INTEGRATED MEDIA SYSTEMS CENTER
 A National Science Foundation Engineering Research
 Center at the
 UNIVERSITY OF SOUTHERN CALIFORNIA

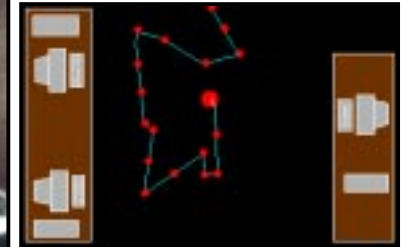
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Globe-All Vision System and Applications



USC STUDENTS, DEGREES

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BRIEF DESCRIPTION OF DEMONSTRATION

A modular framework for real-time segmentation, tracking and interpretation, based on a fixed, multiple-camera system that is functionally equivalent to a mobile pan-tilt-zoom platform.

UNIQUE OR DISTINGUISHING CHARACTERISTICS RELATIVE TO STATE-OF-THE-ART

- Compared to a standard mobile camera platform, this system provides the same functionality with similar accuracy in image quality and pan-tilt-zoom performance, but is faster, more robust and significantly less expensive.

APPLICATIONS

- Video-conferencing
- Surveillance

RECENT HIGHLIGHTS, LEVEL OF DEVELOPMENT, UPCOMING MILESTONES

- A working system that can successfully replace mobile pan-tilt-zoom camera systems has been developed. It has been successfully integrated into a real-time segmentation and tracking framework. The system includes a fixed setup of CMOS cameras and a PC with one or two video framegrabbers.

UNDERLYING TECHNOLOGIES

- Correction of lens distortion – Radial lens distortion is compensated by pre-computing pixel relocation maps.
- Intensity blending – Due to exposure differences, there is a visible transition in intensity from a frame to another. This transition is smoothed by computing each pixel in the overlapping region as a weighted sum of the intensities of contributing pixels.
- Camera calibration – A calibration step is performed off-line in order to get the perspective transforms between cameras, so that real-time warping of frames can be done with all known parameters.
- 2D mosaics, frame registration – The frames are continuously warped into a 2D mosaic, with intensity blending in overlapping areas.
- Virtual Camera – For any intermediate pan-tilt angles or zoom factor specified by the user, the system can synthesize novel views based on the 2D mosaic.
- Background learning / foreground segmentation – An adaptive statistical color model of the background is maintained over the entire field of view, and foreground objects are extracted as sprites (silhouette and texture).
- Tracking - The system determines the 3-D target position, and follows its motion, keeping it permanently within the Virtual Camera view.

LIST OF PUBLICATIONS, REFERENCES, URLs

- Mircea Nicolescu, Gerard Medioni, "GlobeAll: Panoramic Video for an Intelligent Room", *Proceedings of the International Conference on Pattern Recognition*, vol. 1, pp. 823-826, Barcelona, Spain, September 2000.
- Mircea Nicolescu, Gerard Medioni, "Electronic Pan-Tilt-Zoom: A Solution for Intelligent Room Systems", *Proceedings of the International Conference on Multimedia and Expo*, vol. 3, pp. 1581-1584, New York, NY, July 2000.
- Mircea Nicolescu, Gerard Medioni, Mi-Suen Lee, "Segmentation, Tracking and Interpretation Using Panoramic Video", *Proceedings of the IEEE Workshop on Omnidirectional Vision*, pp. 169-174, Hilton Head Island, SC, June 2000.
- <http://iris.usc.edu/~mnicos>

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