Simplified 3D Motion Tracking

New method and camera configuration improves computer vision

UCF researchers have developed a motion tracking method independent of external components commonly relied upon by conventional approaches by utilizing environmental markers as reference points or pre-loaded models of the physical environment instead. The method consists of four cameras, such as digital video cameras, capturing a series of images from each quadrant of view when arranged in a square-shaped setup. The images are used to compute a series of positions and orientations of the object with attached cameras, reducing the complexity of computing an object’s three-dimensional motion. Simplified positions and motion tracking applications include video game controllers, human-computer interaction input devices for scrolling, pointing, and tracking, and input devices for interacting with virtual environments.

Technical Details
This new method is an inside-out vision-based tracking system based on cameras arranged in an orthogonal configuration of two opposing pairs. The arrangement of cameras moves along with the object being tracked, and can be mounted on a mobile platform for use in robotic applications such as tracking, localization, and mapping. A computing device receives a series of images from each camera and calculates successive positions for the object, simplified by the arrangement of cameras in conjunction with polar correlation of optical flow, in order to determine an object’s three-dimensional motion.

UCF Inventors
Niels da Vitoria Lobo, Ph.D.; Joseph J. LaVioila, Jr., Ph.D.; Prince Gupta

Benefits
• No environmental markers needed
• Functions without a pre-loaded model of the physical environment

Applications
• Human-computer interaction input devices
• Video game controllers
• Input devices for interacting with virtual environments

Tech Fields
Computer Vision

Keywords
tracking, motion, configuration, human-computer interaction

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If you or your company are interested in this opportunity, Contact:
Andrea Adkins | 407.823.0138 | Andrea.Adkins@ucf.edu | Tech ID# 31834, 32517
UCF Office of Technology Transfer | 12201 Research Parkway, Suite 501, Orlando, FL 32826