Cost-Effective Interactive Augmented Reality Table

Yeoh, Cher

This project presents a cost-effective interactive augmented reality device that relies on a user localization device and a finger tracking device. The user localization method consists of a low-cost web camera and several infrared LEDs. This solution focuses more on the software rather than the hardware to locate the user's displacement, allowing this device to be created without the aid of expensive hardware. The infrared LEDs emit infrared lights that are not visible to the human eye but visible to the web camera. Using the image captured by the low-cost webcam and an empirically devised user localization algorithm, the program is able to compute the real world coordinates of the user. The finger tracking is based on the Leap Motion device. After computing the location of the user and the position of the user's finger, the program is able generates a first-person point of view of the digital world that the user is able to interact with just the way he or she interacts with physical objects. Data is collected to test if this method of locating the user's position is accurate . Results has shown that margin of error of computing the user's X, Y and Z coordinates is within 2%. Possible applications of this device is to allow the user to simulate real world events. For example, a surgeon in training may use this device to practice his skills before operating on an actual human.

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