Low-Cost, Fun and Colorful Glove for 3D Hand Posture Estimation System

Yeoh, Chin

Traditionally, human-computer interaction has been relegated to the keyboard and mouse. Today's technologies, for example, 3D cameras and depth sensors, allows human to interact with computers in a completely new and innovative way, by using their hand posture as an input system to the computer. Many of these technologies are still expensive and limited use in the general market. What my project has done is create a cost-effective alternative technology for a hand posture input system, utilizing only a webcam, a colorful glove and with my Yeoh Colorful Glove Hand Posture Estimation (CGHPE) Algorithm (written in C#). Yeoh CGHPE Algorithm can be explained into three parts. First, it translates the incoming webcam information into computer-processed image. Then, from that image, it calculates the hand posture by comparing the relative angles, sizes and distances formed by the gloves' colorful patterns through creative application of mathematical models. Lastly, the calculations are translated into a 3D hand model display (in Unity game engine). The calculation speed of my algorithm is approximately 35 to 45 milliseconds, which allows my colorful glove hand posture estimation system to work in real time with negligible lagging experience. The result fulfilled my engineering objective. The effectiveness of Yeoh CGHPE Algorithm is demonstrated through several applications, including presenting a PowerPoint presentation, playing video games (Space Shooter), controlling 3D animated character (FightBOT), and playing Colorful Piano. With the only required materials for my project being a commercially available web cam and a colorful glove, my project has proven to be a low-cost and fun method for a hand posture estimation system.

Awards Won: