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High accuracy optoelectronic jaw motion dynamic tracking system

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There are numerous methods to trace the mandibular motion nowadays, such as graphical method, electromagnetic fields, ultrasonic devices and optoelectronic devices. In this study, we presented a novel high-accuracy marked optoelectronic jaw motion tracking system and related algorithms. Comparing to the popular ultrasonic-based JMA devices and other developed optoelectronic devices, which are heavy and can cause occlusal interference during tracking, our lightweight devices are optical-based detection system including a mandibular tracer, an eyewear facebow device, and stereo-vision cameras. Eyewear facebow and mandibular tracer provided information regarding the locations and relative movement of upper and lower jaws. Using OpenCV-based self-developed algorithm and post-iterative compensator, we were able to record the dynamic jaw movement in virtual environments with a high accuracy of mean error is 65.6 µm in x, y, and z directions, and our RMS errors are less than 101.2 µm at working distance. The lightweight devices had minimal occlusal disturbance and provides smooth motion-tracking experiences. The accuracy of our system is at least a quarter order better than other techniques, and it is relatively low-cost.

Biography

Yuan-Min Lin is an Associate Professor at the Department of Dentistry, National Yang-Ming University, Taiwan. He is the head of the Laboratory of Digital Dentistry and Dental Materials. Dr. Lin is also the founder of the Enlighten Materials company, a company focusing on the 3D printing and bioprinting materials

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