Design of an Automated Calibration System for Electromagnetic Tracking Systems

ABSTRACT: Electromagnetic tracking systems used in virtual reality applications are subject to tracking error due to magnetic field distortions caused by metallic objects in the environment. The goal of this research was to create and evaluate an automated data collection systems and calibration methods to allow a hands-free calibration of a complex space with multiple physical objects in the environment. The need was for a suitable device to automatically collect data points for the physical reference system without causing further distortion to the magnetic field. The calibration device was designed in order to accurately position the electromagnetic receiver at user-specified grid points throughout the tracking environment, thereby allowing the calculation of position and orientation error at each location. Novel methods were created to avoid collision of the automated calibration device with objects in the environment. The tests showed that the density of calibration and the flexibility achieved with this device far exceed any previous methods used. This research built on our previous efforts to create a software system to assist in manual data collection for calibration.