Kinect Station: Using Microsoft Kinect V2 as a Total Station Theodolite for Distance and Angle Determination in a 3D Cartesian Environment

Authors : Amin Amini

Abstract : A Kinect sensor has been utilized as a cheap and accurate alternative to 3D laser scanners and electronic distance measurement (EDM) systems. This research presents an inexpensive and easy-to-setup system that utilizes the Microsoft Kinect v2 sensor as a surveying and measurement tool and investigates the possibility of using such a device as a replacement for conventional theodolite systems. The system was tested in an indoor environment where its accuracy in distance and angle measurements was tested using virtual markers in a 3D Cartesian environment. The system has shown an average accuracy of 97.94 % in measuring distances and 99.11 % and 98.84 % accuracy for area and perimeter, respectively, within the Kinect's surveying range of 1.5 to 6 meters. The research also tested the system competency for relative angle determination between two objects.