Purpose:

To investigate the feasibility of a low-cost respiratory motion monitoring system based on the Microsoft Xbox Kinect sensor.

Methods:

We improved Kinect’s inherent depth resolution from 1 cm to 1 mm via a motion magnification system. Using the Kinect software development kit, we programmed the Kinect to capture depth images and determine the average depth over a thoracic region of interest, viewed almost parallel to the subject’s surface. Kinect respiratory traces (average depth vs time at a rate of 30 Hz) were acquired from four volunteers and compared with those simultaneously acquired using a commercially available strain gauge respiratory gating system.

Results:

The correlation coefficient (CC) between Kinect and strain gauge traces varied from 0.958 to 0.978, with a mean CC of 0.969. This strong correlation was also demonstrated by the joint probability distribution and visual inspection.

Conclusions:

This work demonstrates the feasibility of using the Kinect for respiratory motion tracking. Traces are similar to those of a clinically used strain gauge system. The Kinect-based system provides a new and economical way to monitor respiratory motion.