

AbstractID: 11280 Title: iBreathe: Monitoring Respiration with the Accelerometer in an iPod Touch

Purpose: The breathing pattern for respiration management is obtained by various methods, including infra-red reflector monitored by a camera (RPM by Varian), spirometer (ABC by Elekta), belt connected to a bellows (4D-CT by Phillips), or inductive belt (commonly used in sleep studies). We are exploring the use of the accelerometer in the widely available iPod-Touch as a wireless device to monitor the breathing pattern for respiration management in radiation therapy. This device has wireless communication built into a compact form factor and powered by a battery. It can potentially be a convenient portable device for acquiring breathing patterns. **Method and Materials:** The iPod-Touch has a three-axis accelerometer so that it can detect the magnitude and direction of the local gravitational field relative to its housing. The angular resolution achievable is 0.1 degrees. The iPod-Touch is placed on a Styrofoam platform with three adjustable legs for leveling. The platform is placed on the abdomen or chest of the patient, depending on the application. The change in inclination of the platform during respiration is detected by the accelerometer and recorded by the iPod-Touch. For the current study, the recorded inclinations are sent as an attachment in an email for analysis. **Results:** Breathing traces of healthy subjects were acquired. The amplitude of the change in inclination corresponding to tidal volume was greater than 5 degrees peak-to-peak. The breathing trace was recorded at >10 Hz. For a 10 breath-per-minute breathing cycle, there are >60 recorded samples per breath. **Conclusion:** The accelerometer in an iPod-Touch is sensitive enough to detect the breathing pattern and the recorded trace can be sent wirelessly for analysis. Further work will establish a wireless link between this device and a computer to continuously acquire real-time breathing data. Supported in part by NIH P01-CA59827.