Praveen Kumar / Prof. P. C. Pandey (Supervisor): “An Inertial Sensing Module for Movement and Posture Monitoring for Assisted Living,” *M. Tech. dissertation*, Department of Biosciences and Bioengineering, Indian Institute of Technology Bombay, June 2013.

ABSTRACT

Fall is a major problem for the elderly persons and persons suffering from neuromuscular disorders. Movement and posture monitoring can help in alerting the emergency service and relatives in case of such an occurrence. The project objective is to develop a sensor module for tracking motion of a body part to which it is attached by continuously monitoring its orientation and acceleration. For this purpose, an inertial sensing module (ISM) is developed. It consists of a microcontroller, an integrated sensor having tri-axial accelerometer and tri-axial gyroscope for sensing the linear acceleration and angular velocity, and non-volatile memory for recording the sensed variables. Bluetooth has been used for controlling the ISM operations and for data transfer. Data acquisition can be carried out using sample-by-sample transfer or burst mode transfer. The sensor data have been tested for accuracy and precision. A real-time fall detection algorithm has also been implemented. The module can be used as a recording device for actigraphy for diagnosis of sleep disorders. It can record data continuously for approximately 2 hours at a sampling frequency of 100 Hz. A number of such modules wirelessly connected to a central processing unit can be used as a system for continuous monitoring of movement and posture of the person and can serve as an aid for assisted living.