Operational Description (Theory of Operation)

The Head Motion Sensor (HMS) is an accessory to HS-Stim (HS) unit. It provides a hand free control to HS unit. It is designed to fit behind the user's either ear with ease. It achieves the hand free control by detecting the head motion patterns generated by the user and comparing it to the predefined head motion pattern. If user generates the intended head motion pattern a control message is sent to HS unit.

The main components are:

Microcontroller: for analysis of gyroscope data, controlling and maintaining all the external devices and internal peripherals.
Gyroscope: a 3-axes gyroscope capable of measuring angular velocities in 3-axes and generate raw data for head motion analysis,.
Radio : operating at 2.4 GHz band, using ANT protocol to maintain a communication link between the HMS and HS units. Any messages that need to be transferred to HS unit is passed to communication layer through the processor and gets transmitted by the radio using one of three frequencies in the range of 2403 and 2481 MHz. The operating frequencies are determined during pairing with the HS unit. The HMS and HS units both utilize a frequency agility algorithm where the frequency of the communication is changed by both units if congestion is detected in the operating frequency.
Lithium/ion battery: for providing power to whole unit. The units are charged with a custom charge dock connected to the mains through a medical grade wall adapter
LEDs- used for user interface.