Xerus Medical Wireless ECG, PPG, and Accelerometer Headband

Status: Filled

Group Members: Hridyajit Delori, Nick Wong, Manpreet Nagra, Udai Grewal, Ramandeep Ramandeep

Sponsor(s):   Xerus Medical

Supervisor(s):   Farid Golnaragh, PhD, PEng, Professor/Director, Mechatronic Systems Engineering
Jean Gelinas, Xerus Medical

Project Description

Project Background

Headband

Sensors

ECG - multiple channels

PPG heart rate monitor

3-axis accelerometer, 50 Hz sample rate.

Mechanical

All electronics are self-contained in a single unit in the form of a head-worn band that fits

around the head, just over the ears.

Size: fits head circumferences from XXX to YYY.

No separate electrodes on wires shall be necessary for operation.

Must be comfortable and easy to use. Device should not be bulky, intrusive or interfere with mobility.

Device must be easily disinfected, withstanding typical disinfecting agents.

Must be sweat and splash proof.

Biocompatibility: should meet USP Class VI

Housing should be robust and should survive being dropped from a height of 1 m onto a

carpeted floor.

Device should weigh less than 120 grams.

Should be aesthetically designed.

Electronics

Store raw sensor data to non-volatile memory for up to 24 hours.

Micro USB port

a. For transferring stored raw data in MSC mode (or equivalent). USB transfer mode is optional if Bluetooth can transfer 24 hours of stored raw data in less than 5 minutes.

b. For charging battery

Rechargeable battery

a. 24 hour life, recording raw sensor datho(.)]TJETBT10 0 10Tm9Tm[a.)TJET EMC /P AMCID 0

Deliverables

Completion of this project will involve delivering:

- Prototype of the headband device
- Smartphone application that displays sensor data
- Final test report describing how the device was validated and how well it performed
- Design documentation, including:
    - Theory of operation
    - High level design
    - Implementation tradeoffs
    - Mechanical designs and drawings
    - Circuit schematics and PCB files
    - Firmware code files for the device
    - Software code for phone application
    - Test plans and associated test scripts.