

BIOGRAPHIX

A COMPACT FRONT END BIOSENSOR DATA LOGGER FOR THE ADVANCEMENT OF PATIENT MONITORING

FEATURES:



Electrocardiography (ECG)

Implemented with LT1496 low-power amplifier, utilizing active current feedback stabilization. A clear PQRST waveform is detectable. ECG can be used to analyze the wearer's activity, stress, and several other factors.



Galvanic Skin Response (GSR)

Achieved through measuring a voltage division across an unknown skin-resistance in combination with a known resistance. GSR can provide perspiration levels of the wearer through situations such as stress and exercise.



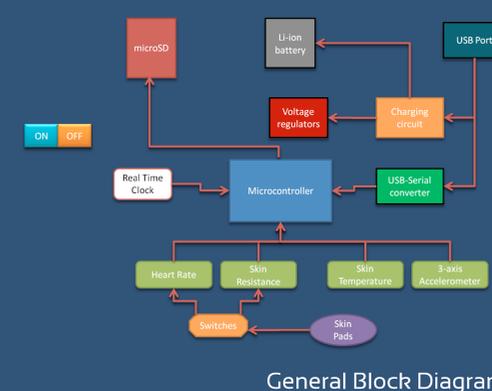
3-axis Accelerometer

Utilizes a +/- 3g, low power, variable-capacitive ADXL335 device. Through the accelerometer, a patient's various activities such as mild or heavy exercise and periods of extended rest such as sleep can be analyzed.

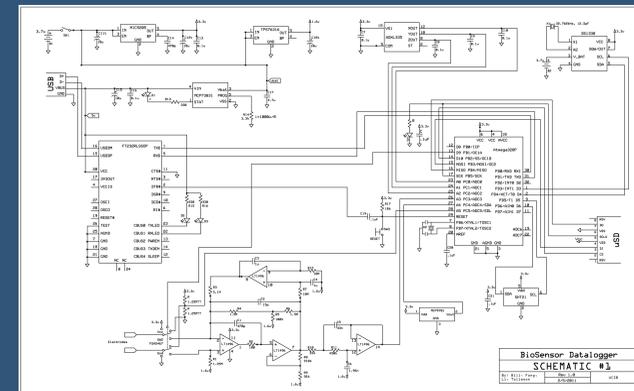


Skin Temperature

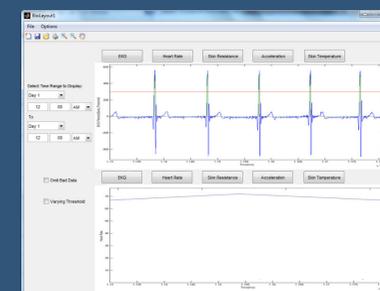
Implemented with the MCP9701 temperature IC. Correlation between skin temperature and the other sensors can further aid the deduction of the wearer's conditions.



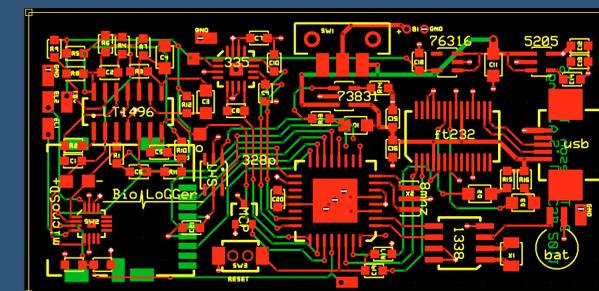
General Block Diagram



Sensors and data recording is managed by an on-board micro-controller (model ATmega 328P)

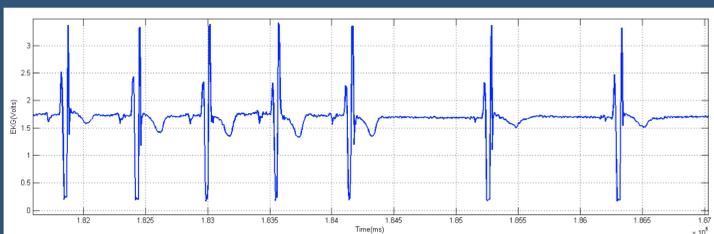


Graphical User Interface for data analysis



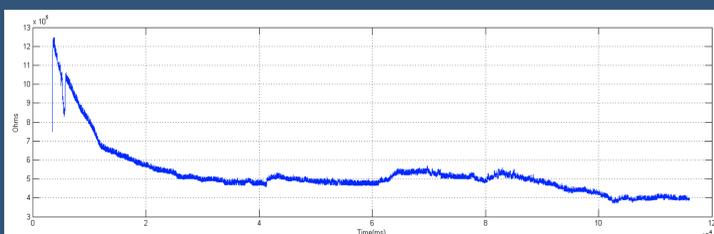
Layout of the PCB.

SAMPLE RESULTS:



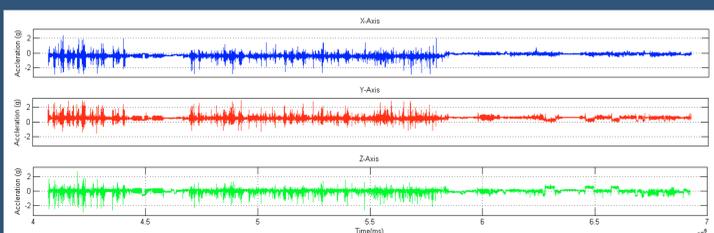
ECG:

Heart rate drops almost instantaneously after subject lays down from standing position.



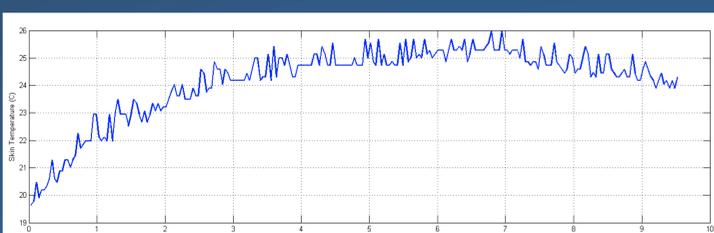
GSR:

Skin resistance drops significantly as subject perspires during a workout or increased activity.



Accelerometer:

Periods of intense activity and rest are easily recognized in addition to periods in which the subject goes from standing to laying position.



Skin Temp:

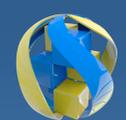
Skin temperature rises as subject begins exercise.

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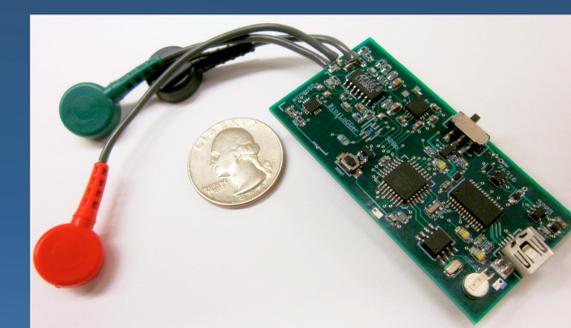


ABSTRACT:

A low-cost, unobtrusive system of collecting and reporting patient biological signals is advantageous in many aspects of healthcare. One such aspect is the reduction of cost in patient monitoring, where patients not in need of direct medical attention can be screened outside of hospitals and clinics. Another aspect is in the research of treatments of illnesses. Data points could provide correlation statistics, as well as feedback to automated drug-delivery systems. Furthermore, long term monitoring and tracking is beneficial in the detecting and identifying of chronic symptoms.

Existing implementations of patient monitoring devices consist of large devices strapped to a patient's body. Although the data from such devices are accurate and reliable, the comfort and convenience of the wearer becomes a concern. Long-term use of such devices potentially obstructs the wearer's quality of life, therefore a discreet approach is favorable.

Power is supplied by a rechargeable Lithium-ion battery, storing 1300mAh of charge, and providing more than a day of data-logging.



Size of board: 1.25in x 2.5in