

BIOGRAPHIX: For the Advancement of Patient Monitoring

A Compact Front-End Biosensor Data-Logger

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Summary: The aims of a 2nd version biosensor device is proposed and elaborated.

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 suggesting a discreet approach is favorable.

The 1st version similarly collects data as the 2nd version but instead wirelessly transmits the data to a receiver. To avoid the inconvenience of being near a receiver, the 2nd version is designed to store data on its own platform. This allows for less power consumption, smaller form factor and longer periods of data collection.

Currently, we have prototyped a chest-strap apparatus featuring electrocardiograph (ECG), galvanic skin response (GSR), skin temperature, and accelerometer sensors. This design aims to further reduce the footprint size while increasing functionality. The size of the current version can be seen in Figure 1 as well as the front and back of our printed circuit board. Each sensor communicates with a central microcontroller which then stores all collected data onto a microSD card. The device is battery powered by a 3.7V lithium ion cell which is charged via USB cable when plugged in. Figure 2 is a block diagram of the complete system which also includes a real time clock (RTC) for time stamping the data.

Raw data is compiled into a single file stored on the microSD card. In order for easy viewing of the recorded data, a Graphical User Interface (GUI) is included with the device [Figure 3]. The user is able to customize and view graphs of the ECG, GSR, etc. for specific times during the data collection period. Back-end signal processing is also implemented to get rid of noise and further improve quality of results.

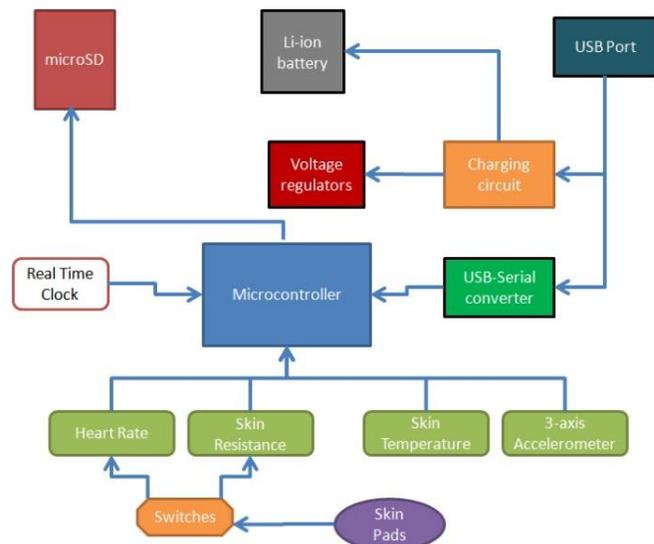


Figure 2: Block Diagram

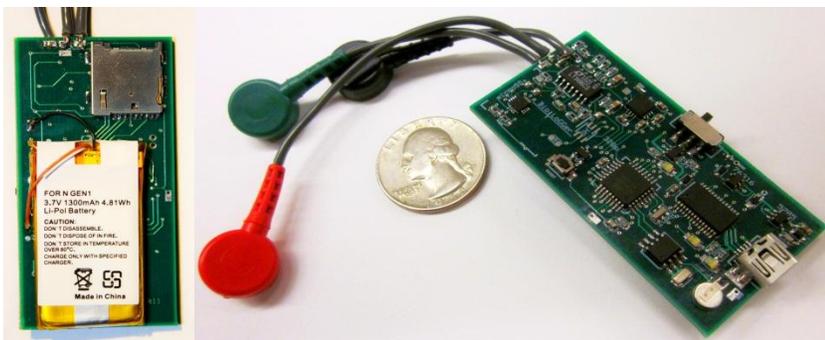


Figure 1: Back (Left) & Front (Right) of current data logger board

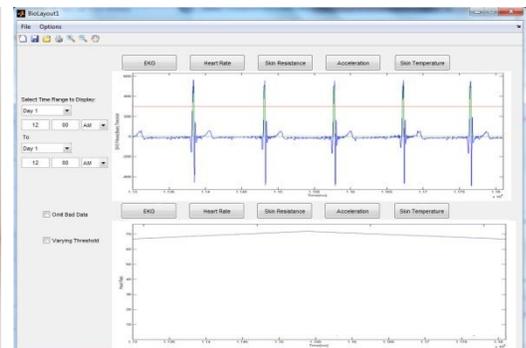


Figure 3: Graphical User Interface