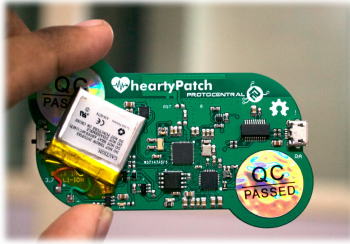


HeartyPatch – A wearable single lead ECG patch

Business plan for Hackaday best product prize 2017



Low cost wearable heart monitors that are currently available are usually based on optical measurements and the actual ECG-based ones are either too expensive or hard to use. Getting accurate R-R intervals for heart-rate variability (HRV) studies is also tricky with most heart-rate monitors. HRV is used for applications such as fitness and training, but it can also be used to detect some of the basic cardiac arrhythmias and therefore act as a continuous monitor for applications such as Cardiac rehabilitation, after a heart attack.

Market

The Market for wearable healthcare, fitness and diagnostic medical devices has increased several fold in the past 3 years and is projected to reach at least USD 4 billion by 2020. This will increase as devices get smarter and connected.

Some of the potential users of the HeartyPatch are:

- Medical professionals, caregivers and researchers (for continuous event monitoring)
- High performance sports and fitness professionals (for precision cardio training)
- High risk cardiac patients and people recovering from a cardiac attack

Competitive Advantage

- ECG-based R-R interval measurement (*as compared to optical heart-rate measurement*)
- Wide dynamic range for robust functioning during movement (*not available in traditional ECG monitors*)
- Machine Learning algorithms for automatic detection of Arrhythmia (*not available on heart-rate patches*)
- Small, wearable form-factor, disposable electrodes (*easy and hygienic to use as compared to fabric-based electrodes*)
- Open-source and non-proprietary – can be used with any software or algorithm

Our Solution

The HeartyPatch leverages the latest and greatest components such as the MAX30003 ECG front end chip which can also measure accurate R-R intervals (time between two ECG complexes) and the ESP32 WiFi/BLE SoC. Some of the highlights of this design are:

- Low-power operation with features such as detection of “Lead-on” conditions for battery saving
- Both BLE and Wi-Fi wireless on-board for flexible operation in different scenarios. Can send data to a phone for real-time monitoring or to a cloud platform for archival and analysis
- Open-source hardware and software, leaves room for expansion
- Compact, wearable and easy-to-use form-factor with the use of regular ECG disposable electrodes
- Onboard processing power to run heart rhythm classification algorithms to detect abnormal rhythms.

Financials & Funding

For the first round of funding, we are going to launch a Crowd-funding campaign on Crowd Supply by mid-September 2017. Current prototypes have been developed with our own funding with no external support now. We are targeting an approximate cost of \$50 / device. However, funding would be required in future for:

- Approvals and certifications (CE, FCC for consumer applications) and US FDA clearance for medical applications
- Clinical pilot trials
- Industrial design of enclosure with aesthetic and usability considerations

All project documentation and progress is available on Hackaday :

<https://hackaday.io/project/21046-heartypatch-a-single-lead-ecg-hr-patch-with-esp32>