BAM Labs and Marvell: Monitoring Your Health While You Sleep

CASE STUDY

SUMMARY

The partnership between BAM Labs and Marvell has enabled the development of the BAM Labs Touchless Health Monitoring Service. Using the Marvell Plug Computer as part of its platform, BAM Labs, with their intensive focus on timely diagnosis and accurate data collection, has created a solution that is cost effective, easy-to-use, allows remote health monitoring and most importantly puts user experience first. The BAM Labs Touchless Health Monitoring Service eliminates intrusive wires for data gathering and increases the quality of patient care from caregivers.

BAM LABS OVERVIEW

BAM Labs was founded in 2006 by two former Apple product development professionals, Steve Young and Rich Rifredi, with a discipline for creating products that put the user experience first. The team includes experts in bio-signal analysis, scalable web services and embedded software development.

Striving to find a solution for monitoring vital signs while providing a satisfactory user experience, the company developed a revolutionary health monitoring system that is effortless to use and is a fraction of the cost of existing vital statistics monitors.

The BAM Labs Touchless Health Monitoring Service™ provides caregivers with a daily health monitoring service to monitor heart and breathing rates, help manage chronic diseases and reduce the risk of bedsores and nighttime falls without attaching wires to the patient. The founders also envision extending this technology to monitor individual health—ranging anywhere from performance athletes to parents with sick children.

PROBLEM STATEMENT

Sleep is a basic human need and the amount each person needs varies: infants require about 16 hours a day, teenagers on average need 9 and most adults require 7-8 hours with 6.5 hours being the least amount of sleep recommended by medical professionals. Sleep is a particularly elusive state for the elderly with 12-25% of healthy elderly report sleeping problems. As the body ages, different sleep requirements apply. Older adults do not experience as much deep sleep, sleeping less overall and generally complain about maintaining sleep.

With the health challenges of an aging population, caregivers need better tools to take care of the elderly who have the highest rate of chronic disease. Countries experiencing rapid increases in the elderly population must find ways to help caregivers take care of more people without sacrificing the quality of care. How could BAM Labs improve the business of caregiving for the elderly while gathering massive amounts of biometric data that could be useful for diagnosis and treatment?

Traditional sleep monitoring methods use a variety of leads and probes on the patient's face and body to gather data. This method can be quite invasive and the very nature of the data gathering system can affect the reliability of the data sample. The mission was to create a better sleep monitoring system that would enable data to be quickly gathered, stored, collated, and used to make more informed decisions.

Touchless Health Monitoring Applications

- Heart Rate Monitoring
- Breathing Rate Monitoring
- Sleep Analysis
- Fall Avoidance
- Bed Sore Avoidance

Benefits

- Increased patient satisfaction
- Improved caregiver work quality
- Increased quality of patient data
- Remote patient monitoring
- Increased patient safety
- Home health monitoring

Technology

Biometric Sensor

Network Device

CHALLENGES

Previously, health monitoring suffered from multiple drawbacks.

1. Monitoring patients included manual labor or preparing the patients with wires.
2. Data collection and storage was limited.
3. Remote access to data was difficult and in some instances impossible.
4. User experience was an afterthought.

In addition, finding ways to collect the data, "crunch the numbers", and seamlessly move it around the world so caregivers could have the information that would be useful in their diagnosis and treatment of patients was lacking.

SOLUTION

BAM Labs created a biometric sensor that can be placed under a mattress without any wires or leads and there is no disruption to the subject's physical environment. The sensor detects heart rate, breathing rate, motion, and presence in bed while the person sleeps normally. The biometric sensor and the Marvell Plug Computer collect the data and transmit it to a BAM Labs secure Cloud service the caregiver can access. Caregivers receive data on a variety of mobile devices like smart phones and tablets. The caregiver can monitor large groups of people while performing their regular duties, and react to events such as a person getting out of bed or falling. Caregivers can also review long term data trends for sleep quality and biometrics to identify adverse changes for early intervention.

WHY MARVELL WAS CHOSEN

BAM Labs chose the Marvell Plug Computer for its low cost, flexibility, customization and growth options. For healthcare environments the device needed to be quiet, without a lighted display and completely unobtrusive. BAM Labs worked with Marvell and its contract manufacturers to customize the perfect box to round out their solution. This setup is a fraction of the cost of existing vital statistics monitors.

RESULTS

In April 2010, BAM Labs initiated a pilot program in Japan which focuses on bed exits to reduce falls. A simple interface such as smart phone app or tablet alerts caregivers when a person gets out of bed and their location. Since data is gathered continuously while someone is in bed, massive amounts of patient health data is being captured in a short amount of time, providing valuable real time data. Currently the pilot program has captured more than 23 million data points and 94,000 were for bed exit events, during a twelve month period.

FOR MORE INFORMATION

BAM Labs: http://www.bamlabs.com
Marvell Plugs: http://www.plugcomputer.org

Health Monitoring Software

Sleep Monitoring Dashboard

Trending Report

"Our current monitoring service requires each sensor, in each subject's room to have some kind of data collection and wireless transference device. The plug computer was the perfect fit and as inventors ourselves we were extremely impressed with the design, technical capabilities and flexibility of this platform."

Steve Young
BAM Labs co-founder

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