

Babalung Apnea Monitor

Houston, United States Namitete, Malawi

Jordan Schermerhorn

Organization type:

nonprofit/ngo/citizen sector

Project Stage:

Idea

Budget:

\$1,000 - \$10,000

Website:

<http://www.oedk.rice.edu>

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Project Summary

Elevator Pitch

Concise Summary: Help us pitch this solution! Provide an explanation within 3-4 short sentences.

50% of premature babies will stop breathing at night. We have designed a \$20 monitor to detect neonatal apnea, suitable for the developing world.

About Project

Problem: What problem is this project trying to address?

Apnea is common in premature infants, who often lack the neurological and muscular development to breathe correctly on their own. Maternal malnutrition is a major risk factor for premature delivery, and nearly half of 12 million premature babies born in developing countries experience apneic episodes. Monitors used in hospitals the United States are power-intensive and extraordinarily expensive, leaving primary health care centers in the developing world relying on nurses to keep vigil. Major cost, power, and personnel constraints in these settings motivated a desire to develop a simple way to tackle this problem at a ward-based level with the dual purpose of easing the burden on overworked healthcare professionals and providing long-term patient respiratory data to doctors.

Solution: What is the proposed solution? Please be specific!

Our team has constructed a durable prototype capable of detecting apnea in premature infants for under \$20, powered by self-sustaining RFID technology. The Babalung monitor combines diagnosis and treatment, including a stimulatory element intended to automatically stir the baby out of the apneic episode without professional intervention. Radio integration automatically logs hourly respiratory rates and instances of abnormal breathing, accessible by a mobile phone. The modification central to our vital signs monitor is an automated treatment response to irregular breathing. Respiratory distress in premature infants usually results from neurological underdevelopment; our light vibration system activates a more conscious response, comparable to the current treatment of having a nurse tap the foot. The combination of diagnosis, treatment, and data collection saves lives while conserving the valuable time of nursing staffs strained far beyond capacity.

Impact: How does it Work

Example: Walk us through a specific example(s) of how this solution makes a difference; include its primary activities.

Oxygen deprivation for neonates has significant long-term consequence. In addition to serving as an indicator for sudden infant death syndrome, regular apneic episodes in neonates force the heart to work harder, often causing cor pulmonale (failure of the right side of the heart). More burdensome effects are compiled under the umbrella term "failure to thrive": an inability to meet physical and mental developmental milestones strongly associated with poverty later on in life. These episodes frequently go undetected, as current diagnosis relies on constant observation - impossible in busy wards with such tremendously low nurse-to-patient ratios. Giving nurses the ability to identify infants in respiratory distress allows for patient triage, and logging respiratory rate automatically allows doctors and nurses to track a patient's growth and disease progress over time. Our solution will also make a significant difference in the mental health of neonatal nurses. Respiratory rate is usually logged by observation: a nurse will examine a baby for 60 seconds, counting breaths. With 35 patients per nurse, this task is grossly unfeasible to complete on an hourly basis. By providing an system to log data they typically do by hand, they can focus on other aspects of their jobs while feeling a sense of greater security regarding the health of their patients.

Sustainability

Marketplace: Who else is addressing the problem outlined here? How does the proposed project differ from these

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Our competitors right now are few: teams from other universities have attempted to tackle the problem of neonatal vital monitoring, but none of these devices have caught on. Our user-friendly mobile interface, built-in treatment system, and lower cost (\$20 vs. \$42 for the most affordable alternative) differentiate us from the competition: these key changes can push us over the adoption hurdle. We hope to begin with field tests at a Rice University partner hospital - St. Gabriel's in Malawi - this summer. After incorporating user feedback, we hope to expand to other Rice clinical partners, each run by a different nonprofit. Our secondary phase of growth will be expansion to other clinics run by those nonprofits, with the primary challenges of funding and infrastructure.

Team

Founding Story

This venture began as a class project, but our "aha!" moment came when we realized just how many similar projects - many of which won competitions and accolades here in the U.S. - had somehow failed. In thinking of unique ways we could alter the product to improve adoption by hospitals and clinics in the developing world, we had an epiphany. In order to overcome the struggles medical practitioners face when dealing with new technologies, we needed to provide an additional incentive for THEM - not just for the health of the patient.

About You

Organization:

Breath Alert Team, Rice University

About You

First Name

Jordan

Last Name

Schermerhorn

Twitter URL

Facebook URL

About Your Organization

Organization Name

Breath Alert Team, Rice University

Organization Country

, TX, Houston, Harris County

Country where this project is creating social impact

, XX, Namitete

How long has your organization been operating?

Less than a year

The information you provide here will be used to fill in any parts of your profile that have been left blank, such as interests, organization information, and website. No contact information will be made public. Please uncheck here if you do not want this to happen..

Innovation

How long have you been in operation?

Still in idea phase, but looking to launch soon

Which of the following best describes the barrier(s) your innovation addresses? Choose up to two

Cost, Quality.

Social Impact

Please describe the goal of your initiative; outline what you are trying to achieve

We hope to cut instances of death from apnea in premature infants by 40% in wards that have adopted our system, improve the diagnostic capacity of doctors in rural clinics, and increase ward productivity by saving time in vital sign collection.

What has been the impact of your solution to date?

Most of our time to date has been spent in actual device production: as engineering students, we started from scratch in October and at present we have a functional prototype. We've assessed the mechanical durability of our sensors and the limitations of battery life, network capacity, and product life, and we've conducted informal tests of both vibratory stimulation and respiratory data collection on healthy full-term infants - both to great success. On the business front, we've constructed a concrete plan for launch and expansion and we have addressed regulatory conditions for testing and sales of medical devices in the U.S. and abroad.

What is your projected impact over the next five years?

Over the next year we hope to conduct field testing and obtain approval to begin a clinical trial. Should a conclusive, replicable study indicate that our device improves diagnosis and reduces infant deaths over the standard of care (visual monitoring & foot tapping), we will have a basis for mass production. Our goal within five years is to have 500 neonatal wards fully equipped with an army of our monitors throughout Africa and Latin America, with at least one government partner.

What barriers might hinder the success of your project? How do you plan to overcome them?

Our team consists entirely of engineers, and in order to effectively implement this health innovation, we're going to need to expand our skill sets to include some business acumen. While there's no substitute for learning-by-doing, several of our team members are spending their final year in school taking courses on engineering economics, marketing, and design. We also attended a social innovation start-up workshop as a team this January.

Working with unreliable nonprofit partners would be a significant barrier; we hope to distribute our device through proven channels. Far more nonprofits are focused on neonatal health than directly on technology transfer, and we believe these would be more receptive to working with us.

Winning entries present a strong plan for how they will achieve and track growth. Identify your six-month milestone for growing your impact

Complete modifications based on feedback from field testing in preparation for clinical trial.

Identify three major tasks you will have to complete to reach your six-month milestone

Task 1

Complete app development for three platforms (text-based mobile phone, smartphone, and tablet)

Task 2

Successfully obtain funding for summer field testing in Malawi

Task 3

Achieve IRB approval and file patent application

Now think bigger! Identify your 12-month impact milestone

Begin clinical trial at one project site, with early distribution to 3 others.

Identify three major tasks you will have to complete to reach your 12-month milestone

Task 1

Refine device into final form suitable for mass production.

Task 2

Identify distribution channels and long-term cost profile.

Task 3

Forge relationships with partner nonprofits for post-trial distribution.

Sustainability

Tell us about your partnerships

Rice University has provided us access to partner clinics for field testing, including St. Gabriel's hospital in Malawi and centers run by the Baylor College of Medicine Pediatric AIDS Initiative in Botswana, Lesotho, and Swaziland.

Are you currently targeting other specific populations, locations, or markets for your innovation? If so, where and why?

Our innovation is not location-specific - it could be implemented anywhere. We intend to begin by targeting mid-sized hospitals and clinics with flexible, trained staff in the Least Developed Countries, where need for such a device is greatest.

What type of operating environment and internal organizational factors make your innovation successful?

Our technical expertise and clinical experience are our prime advantages: we can make changes to our software, applications, and physical structure on the fly, and we have a strong intuitive grasp of user needs. We're beginning as students with university support, and can therefore afford to advance the project without a steady revenue stream for three more months.

Please elaborate on any needs or offers you have mentioned above and/or suggest categories of support that aren't specified within the list

We could also offer technical expertise.