Infant Stimulus for *Apnea of Prematurity*

Biofeedback Solutions

Introductions & Titles



Chief Operations Officer Team Leader

Chief Engineering Officer Chief Marketing Officer





Chief Research Officer Chief Financial Officer Chief Technology Officer Chief Creative Officer



Explanation of Issue

 Apnea: stopped breathing during sleep

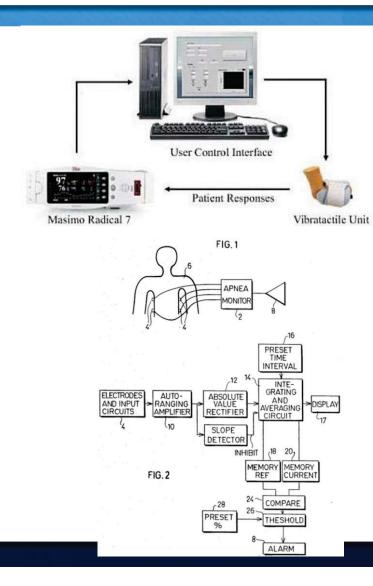
 Event also occurs in premature infants

 Current intervention: infant gently stimulated by hand



Background

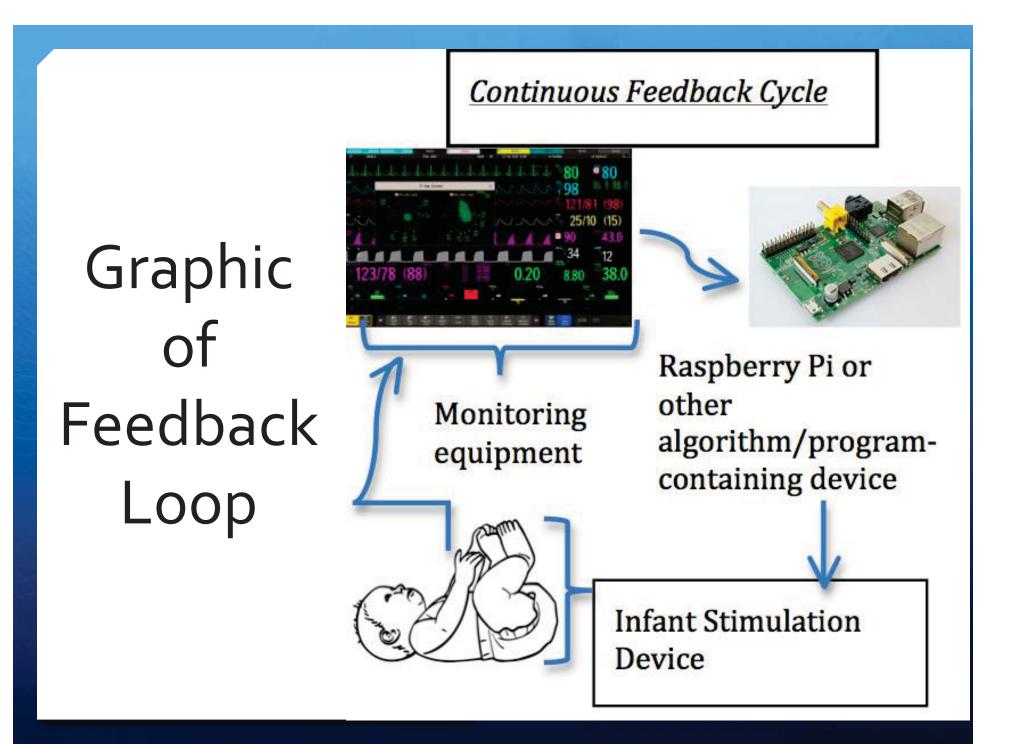
Proposed solutions



- Stimulation device that is 'stuck' on or comes in direct contact with the infant
- Stimulation device located on infant's foot
- Response to taste/smell and tactile stimulation during apneic episode
- <u>US Patent 5,555,891</u>: Vibrotactile stimulator system for detecting and interrupting apnea in infants
- <u>US Patent 4,630,614</u>: Apnea monitoring apparatus

Stakeholder Requirements

- The device must be able to:
 - Quickly detect an apneic episode
 - Quickly respond to a sensed apneic episode
 - Potentially: prevent apnea
- Furthermore, the device <u>must not</u>:
 - Use electric stimuli
 - Be injurious to the skin of the premature infant
 - Interfere with current equipment/tubing/cords



Design Input & Tech Spec's

Monitoring Equipment:

- Accurately & constantly monitor an output that is capable of differentiating apnea versus no apnea
- Be non-invasive of cabling, tubing, and other equipment currently in use

Raspberry Pi/Microcomputer:

- Detect apnea versus no apnea by instantaneously analyzing the data that is output to it by the monitoring equipment
- Signal the stimulation device in the event that apnea is detected

Stimulation Device:

- Non-invasive as possible
- Effective stimulation so as to disrupt apneic episode

Societal Implications & Concerns

- Cost of device, given medical equipment product requirements
 - Specialized materials (hydrogels, etc.)
- Safety concerns, given product application
- FDA and IRB approval
- Testing the device will be a challenge
- Manufacturing concerns include sterilization of patientcontacting parts
- Sustainability: some parts disposable, some re-usable
- Scope: implementation at UT Graduate School of Medicine

Overall Project Timeline

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QUESTIONS?