Infant Stimulus for Apnea of Prematurity
Explanation of Issue

- Apnea: stopped breathing during sleep
- Event also occurs in premature infants
- Current intervention: infant gently stimulated by hand
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

**US Patent 5,555,891**: Vibrotactile stimulator system for detecting and interrupting apnea in infants

**US Patent 4,630,614**: Apnea monitoring apparatus
Stakeholder Requirements

As per Dr. Stephens' input:

The device must be able to:

- Quickly detect an apneic episode
- Quickly respond to a sensed apneic episode
- Potentially: prevent apnea

Furthermore, the device must not:

- Use electric stimuli
- Be injurious to the skin of the premature infant
- Interfere with current equipment/tubing/cords
Graphic of Feedback Loop
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 patient-contacting parts
- Sustainability: some parts disposable, some re-usable
- Scope: implementation at UT Graduate School of Medicine
## Overall Project Timeline

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<th>Task/Activity</th>
<th>Milestone</th>
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### Milestones:

- **Overall Project Timeline**: Diagrammatic representation of project milestones.
- **Task/Activity**: Specific tasks or activities associated with each milestone.
- **Milestone**: Dates associated with each milestone.
- **October**: Month of the year.
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### Notes:

- **Overall Project Timeline**: Overview of project milestones and tasks.
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