

Preoperative Video Game for Young Patients

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Abstract

- ❖ The anesthesia process creates anxiety in young children
 - Kids tend to breathe irregularly through breathing masks that deliver anesthetics
- ❖ Work with ACHNW to create a solution
 - Solution needs to integrate with their preoperative workflow
- ❖ The goal is to create a fun, interactive game to:
 - Reduce anxiety
 - Encourage proper breathing
 - Distract from breathing through a mask

Problem to Solve

- ❖ Anesthesia process is stressful for young children
 - Being away from parents
 - Unfamiliar setting
 - Breathing through a mask

- ❖ Hospitals have expressed a need for a breathing game
 - No widely available solution
 - Needs to be integrated within the hospital's preoperative workflow



Project Objective

- ❖ Create a game that children can play before going into an operation
 - Allows them to receive coaching on breathing in anesthetic
 - Reduces anxiety going into the operation
- ❖ Currently planning to interface with onsite machines at ACHNW
 - Readings from these machines utilized to display feedback
 - Feedback used to encourage desired breathing patterns
 - Has adjustable feedback triggers based on age and weight of the patient



Background and Related Work

- ❖ Execution, rather than concept, is most important
 - Everyone loves video games already
 - Immersion, interaction, visual appeal
- ❖ Sevo the Dragon
 - Developed by Stanford's CHARIOT Program
 - Children customize Sevo's appearance
 - Sevo breathes fire to cook food, matching patients' breathing



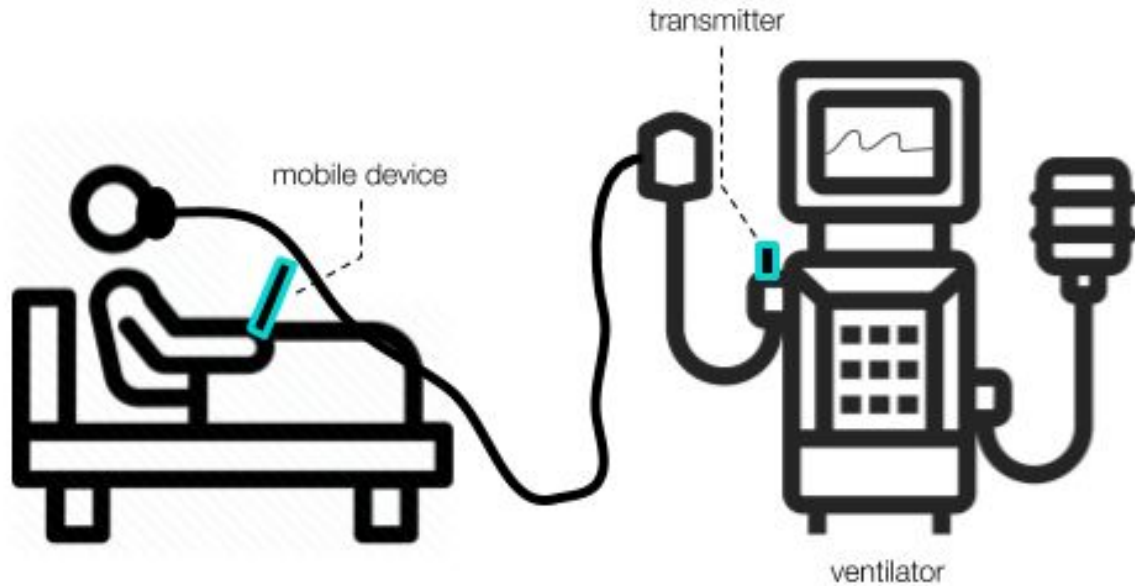
Credit: Stanford Children's Health



Design Goal and Architecture

1. **Ventilator data capture/transmitting device:**
Sends data from ventilator to mobile application.
2. **Mobile device:**
Receives breathing data and hosts application.
3. **Application:** synthesizes breathing data and provides a visual interface in the form of a breathing game.

Design Goal and Architecture





Project Risks

Risk	Reduction Measure
Children are encouraged to hyperventilate/hypoventilate (irregular breathing is encouraged).	The application will lead children towards ideal breathing patterns that are informed by patient demographic data.
Children are stressed out by the application.	The application will front a highly minimal interface. Users will not have a score or similar metric that might encourage a competitive experience.



Project Tasks

- ❖ Investigate hospital equipment
 - Understand method of data transmission
 - Understand method of data manipulation and calculation
- ❖ Decide which device/software we will use to implement game
 - Apple vs Amazon
 - Swift vs Java
- ❖ Design game
 - Method of communication (wired vs wireless)
 - General game design and functionality
- ❖ Implement game on software
 - Write code for game
 - Communicate game with hospital equipment
- ❖ Test game
 - Hospital Trial runs
 - Personal Testing if applicable
- ❖ Write final document



Project Schedule

Tasks	Dates
Background Investigation on hospital Equipment	11/14 - 11/28
Identify which software will be used	1/15 - 1/31
Begin Designing game	2/1 - 2/14
Begin Implementing game	2/15 - 2/28
Begin Testing of game	3/1 - 3/15
Final Document	3/15 - 4/15



Project Deliverables

- ❖ Design Document
 - Contains a listing of each major hardware and software component
- ❖ Game source code
 - Directly from game development software
- ❖ Final Report



Project Personnel - Students

- ❖ Will Baker – CS major, formerly BMEG, responsible for acquiring medical data
- ❖ Gavin Glenn – CS major, responsible for miscellaneous additions to code
- ❖ Jackson Gregory – CS major, has taken Game Design and Mobile, responsible for levels
- ❖ Jared Harris - CS major, has taken Game Design, responsible for player character
- ❖ John Ostermueller - CS major, frontend and design experience, responsible for UI
- ❖ John Shelnuttt - CS major, has taken Mobile, responsible for coding mechanics



Project Personnel - ACNW

- ❖ Staci Allen – Pediatric Anesthesiologist at Arkansas Children’s Northwest and Assistant Professor at UAMS.
- ❖ Ashlynn Young – Pre-op and Post-anesthesia Care Unit nurse at Arkansas Children’s Northwest.



Project Facilities and Equipment

- ❖ Arkansas Children's Northwest – Where the game will be implemented, team members will visit to get an idea of the facility
- ❖ GE Avance CS2 – Monitors patients' breathing, provides readings for our game
- ❖ Amazon Fire Tablets – Used to run the game