Project Charter

Pediatric Tracheostomy Care Simulator

Colorado Children's Hospital

1. Introduction

Executive Summary

- Children's Hospital Colorado has always been ranked in the top 10 children's hospitals in the US by US News and World Report and as such it is at the cutting edge in delivering clinical care, education and research in the pediatric healthcare area.

- Our goal as a team is to help the Children's Hospital by innovating a new application with simulations for healthcare professionals to learn and practice routines involved in tracheostomy and potentially other procedures.

- A Tracheostomy is a surgical procedure that creates an opening in the trachea to either bypass a narrow airway and or to support lung ventilation.

- Our work focuses on postoperative care.

Business Problems/Opportunities

- Several complications may occur after the operation and practitioners need the experience to properly respond to them.

- Current simulation methods have limited realisticness, hence improving existing teaching methods, via more accurate simulations, would benefit the care and experience of patients.

2. Objectives and Scope

Business Objectives

- To improve a computer graphic-based platform to simulate clinical emergency scenarios related to pediatric tracheostomy care developed by the 2021-2022 Capstone group.

- To explore the feasibility of morphing the computer graphic platform to a virtual reality platform.

- To utilize computer graphic-based and virtual reality-based simulation to improve the ability of healthcare professionals (nurses, respiratory therapists and physicians) to manage these emergencies.

High Level Requirements

A. Audio Output

Audio output should be included to minimize the amount of reading of texts to create realism. Also, clinicians are keenly aware of the oxygenation level and pulse rate of a patient by listening to the audio signal from a pulse oximeter. A constant background audio output of a pulse oximeter will provide instant and continuous audio input as to the pulse rate and oxygenation level of the patient.

B. Video Output

The more detailed and accurate the video output is, the more realistic the simulation environment becomes. For example, depicting the color of the skin and chest rise either because the patient is spontaneously breathing or being ventilated successfully are important clues to the participant that the patient is ventilating oxygenating well.

C. Logic

The progression of a simulation module has to make clinical sense and computer graphic sense. To achieve "clinical sense", it has to be interactive. The scenario developed by the 2021-2022 Capstone group is a skeletal scenario. Though the scenario achieved its basic goals listed below, it is not "realistic" and appears to be "clunky" to non-CS observers.

Project Scope

In Scope:

- Enhance the "clunkiness" of the existing simulation
- Improve the "realness" of the simulation

- Improve the logical flow of the simulation
- Implement additional clinical scenarios once the previous points have been addressed

Out of Scope:

- Clinical scenarios unrelated to Pediatric Tracheostomy.
- Clinical scenarios that do not directly relate to patient care and complication after operation.

3. Project Approach

General Approach – Solution Delivery Process

- The Agile method will be employed to maintain the project in an adaptable fashion.

- Tickets/ tasks will be divided amongst subgroups of the team based on the tasks' respective difficulty and completion time.

- Parallel tickets will be completed on separate branches of the codebase and merged with a testing or main branch after completion.

- Regular meetings and inspections will occur within the team to ensure quality and punctuality of deliverables.

- A proof of concept will be created by the end of the Fall Semester, and then further scenario implementation will occur after then.

Assumptions

- The team will have access to graphical assets provided by the client.

- Any significant changes in the project will be presented to the client in order to receive feedback and criticism.

- The team will have access to the previous group's completed project for reference.

Project Risks and Issues

- The previous team's codebase may be unusable for any major changes we hope to make to it.

Project Changes

- Changes to project operations and updates to this charter will be set in meetings if it pertains to general objectives, but precise methods and approaches will be handled by the team. No direct approval by client required per request.

4. Project Plan

Key Deliverables

Project Charter (this document)

Improvement of the Current Working Module:

We currently have a working module that is very rough around the edges in its graphics, logic flow, realism, and its overall "clunkiness". Throughout the next two semesters, we will seek to improve upon both the logic and the overall graphic design of the current implementation as well as add more scenarios to create the most life-like version of this module that we can.

The first (Fall) semester will be entirely focused on the development of the first scenario. By the second semester, we will have a good understanding of the logical and graphic improvement implementations, and will be able to focus our efforts on improving the rest of the working module.

Estimated Timeline

Deliverable	Due Date
Project Charter	October 2, 2022
Project Plan	October 31, 2022
High Level Solution Design	November 7, 2022
Solution Construction and Testing	December 17, 2022

Complete First Scenario   End of Fall Semester

Scenarios Two through Four   End of Spring Semester

5. Key Stakeholder Roles & Responsibilities

<u>Stakeholder</u>	<u>Role/Responsibility</u>
Caroline Chang	Project Manager
Luke Pan	Software/Graphics
Aiden Colley	Software/Graphics
Bradley Sides	Data scientists/ML engineering
Davis Cohen	Data scientists/ML engineering
Pierce Angeloff	Software/Graphics
Allen Paradise	Professor
Dreycey Albin	Mentor
Kenney Chan	Client