

# Design Review II



SciKids

Gwen Morris, Claudia Coronel, Samantha Earl

Sponsor: Elizabeth Glass

Mentor: Austin Sanders

# Scikids Client/Mentor

- Elizabeth Glass
  - Director of Career Development
- Austin Sanders
  - Graduate student



Figure 1 - Elizabeth Glass

# Problem Statement and Solution

---

# General Problem

- Market for STEM
  - Rapid job growth in comparison to workforce
- Sponsor Interest
- Increase sponsor reach

# Solution

- Gesture-based learning system
  - Recognizes and detects gestures
- Extensible modules
  - Easy for new developers to update
- Garner interest in specific areas
  - engaging and informative way using pedagogical methodology

# Requirements

1. Users will be able to use gestures as a means of navigation through the system.
2. Users will be able to create a profile and see personalized available modules.
3. Users will be able to save personal progression and set high scores.
4. System must be intuitive and easily extensible for future developers.

# Architectural and Implementation

---

# High Level Overview

- Navigational system (GUI)
- Local SQLite Database
- Gesture Mapping
  - Intel D435
  - NuiTrack SDK
- Scene Backend

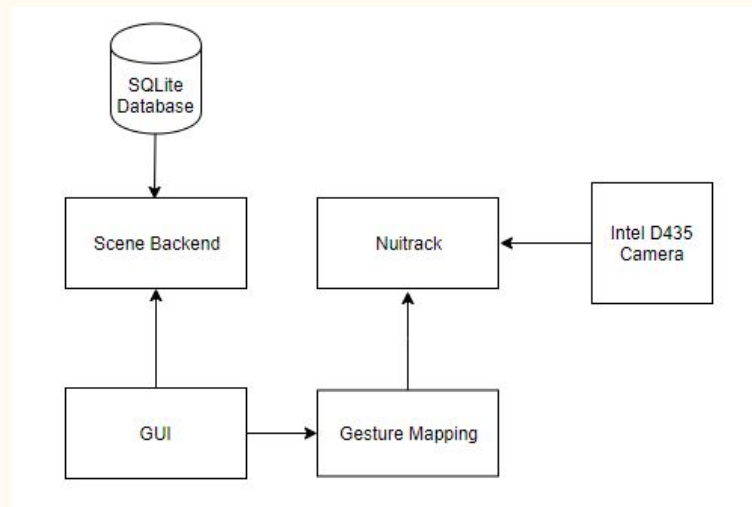


Figure 3 - Architecture Diagram



# Implementation Overview

- Intel RealSense D435 Camera
  - Has built-in depth sensors, RGB sensor, and infrared projector.
- NuiTrack
  - Middleware that can track a 3D skeletal body and has gesture recognition.
- Unity
  - A game development platform that is compatible with a wide range of technologies.

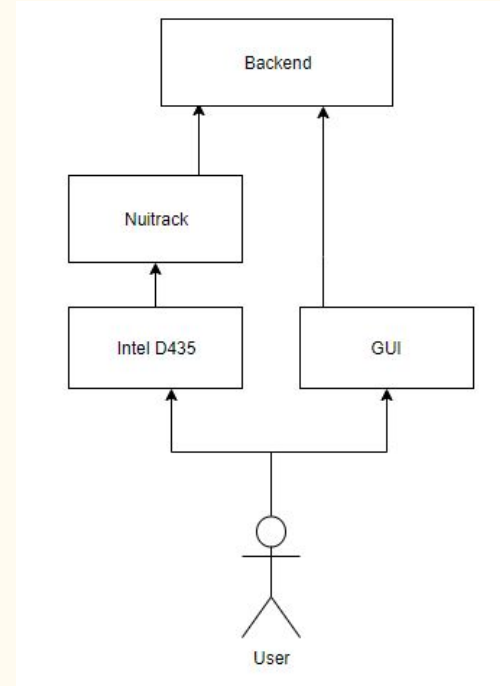


Figure 2 - System Diagram

# GUI/Database

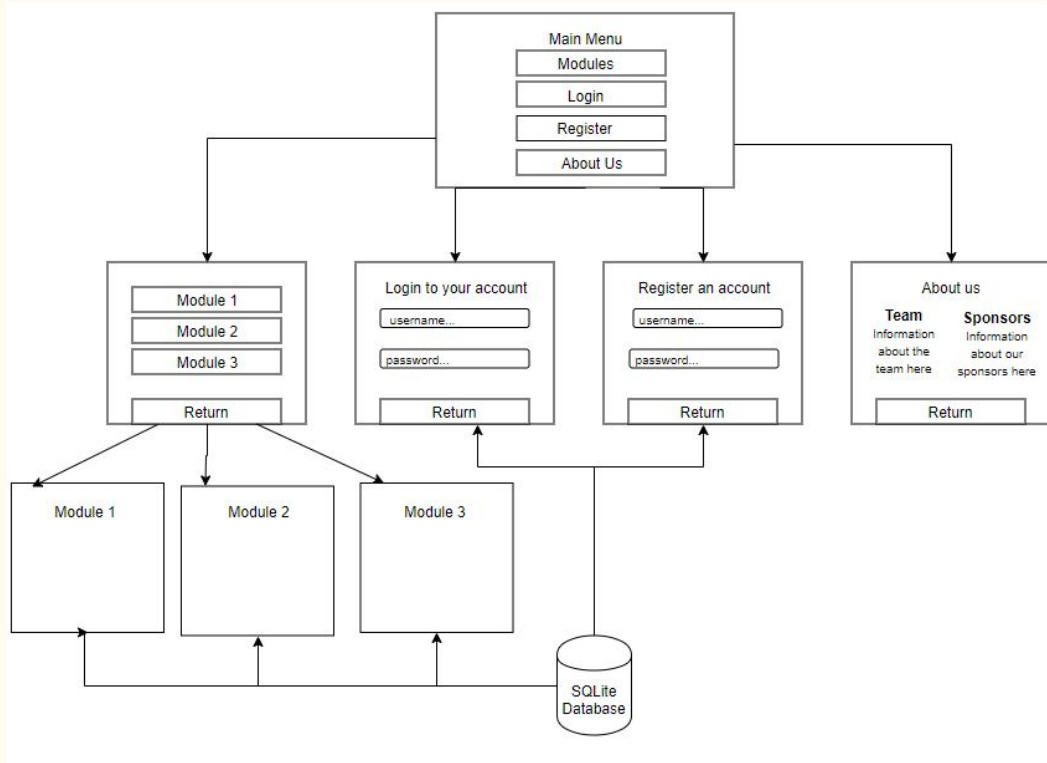
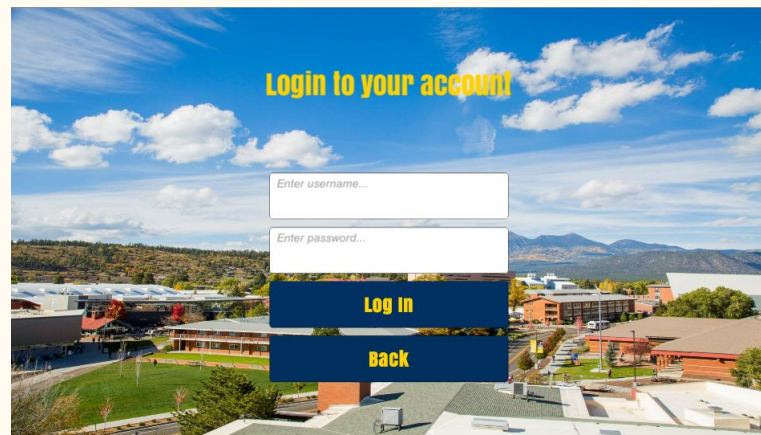


Figure 4 - Menu Layout

# Scene Backend

- Scenes contain the environments and menus of the project
- C# scripts, sprites, prefabs, animations, etc.
- Scenes in our system
  - Login
  - Registration
  - Each module
- Extensible



# Gesture Mapping

- NuiTrack - full body skeletal tracking software with gesture recognition
- Hand Tracker module
- C# scripts

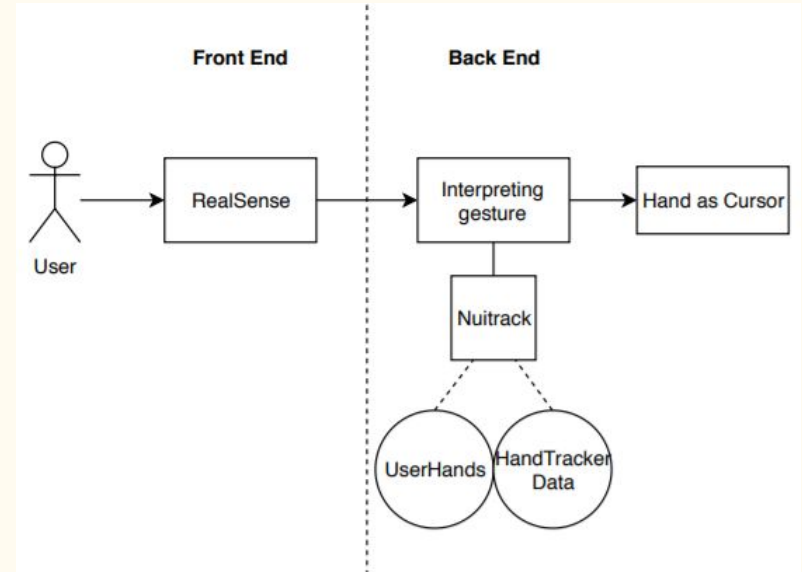
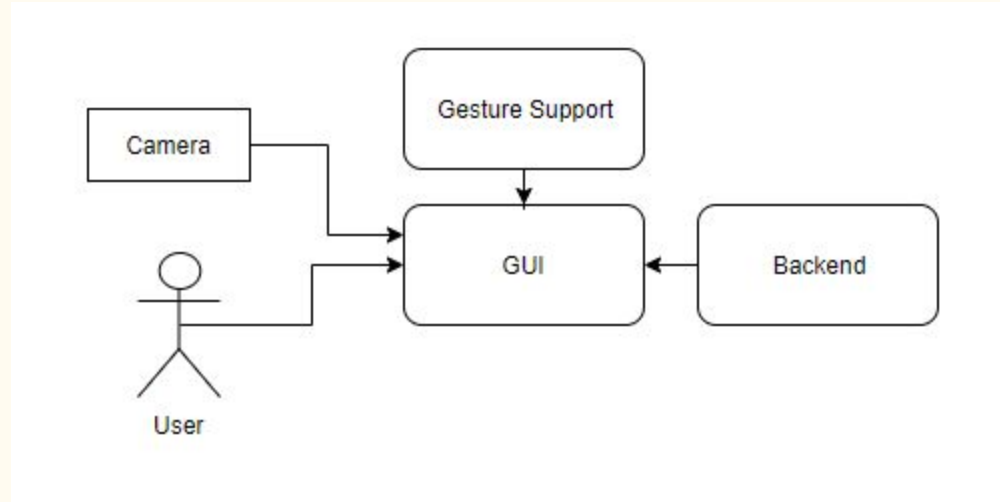


Figure 5 - Gesture Diagram

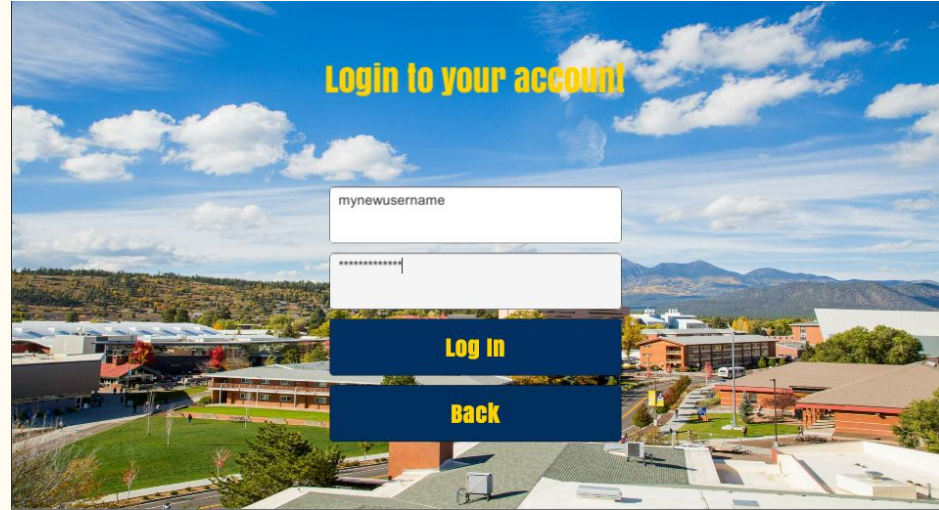
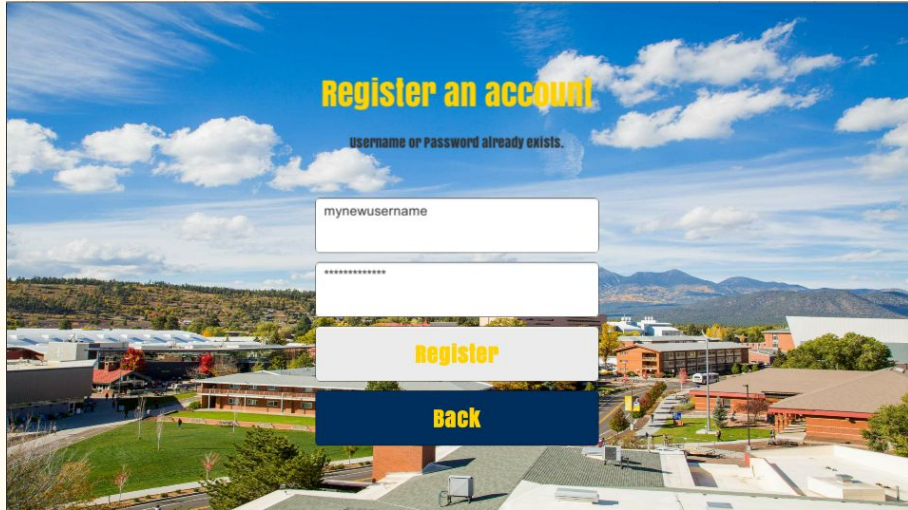
# Use Case



# Prototype Review

---

# Database



# Database continued...





# K-5 Module

<insert math game vid or gif>

# Implementation challenges and schedule

---

# Challenges and Resolutions

## Technology Risks

- Technology being used is *very* new.
  - Unity has a lot of community support, however there aren't as much community support with NuiTrack.
  - Resolution: Actively checking NuiTrack forums
- Accuracy issues
  - Tracking an open and closed fist
  - Resolution: Recalibrating the config files

## Business Risks

- Learning curve for users
  - Users must memorize gestures rather than symbols.
  - Resolution: A short tutorial
- User Fatigue
  - Long exposure may lead to muscle fatigue
  - Resolution: Have a time limit for each game.

# Schedule

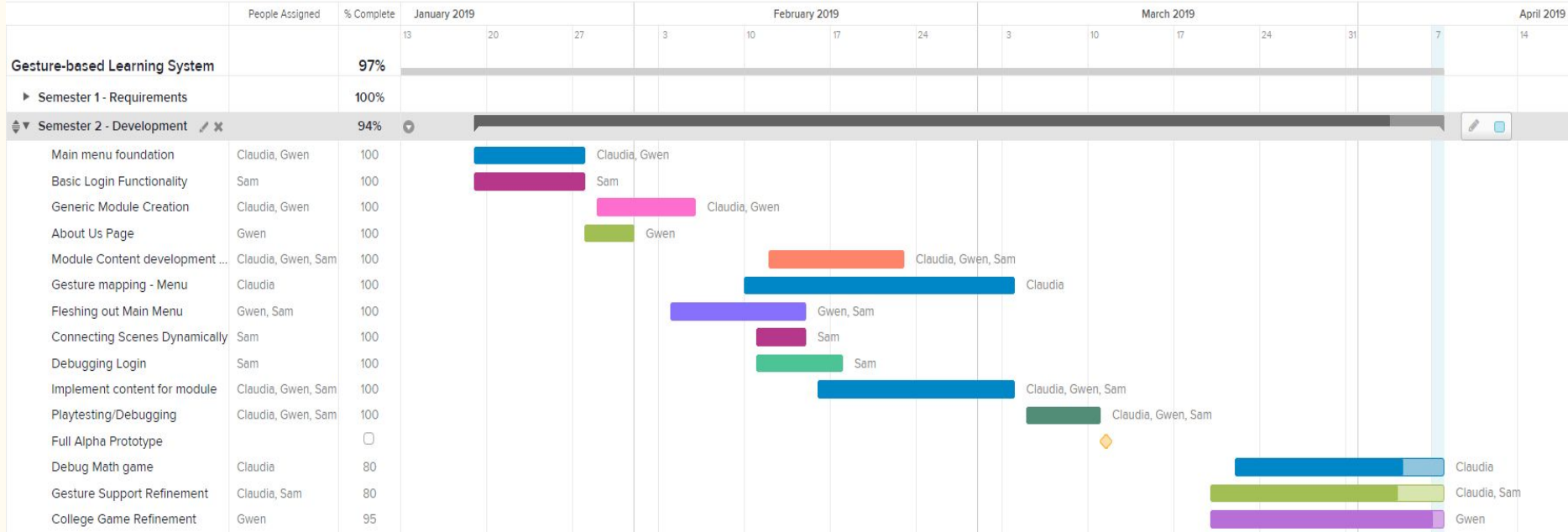


Figure 6 - Gantt Chart

# Testing Plan

- Unit testing
- Integration testing
- Usability testing

# Conclusion

---

# Conclusion

- Team SciKids, working with Elizabeth Glass
- There is a growing need for workers with an STEM-based education.
- We are creating a gesture based learning system to encourage users to pursue STEM careers.
- Extensible module-based platform with a local database and gamification elements.
- Challenges:
  - New technology
  - Accuracy issues
  - Learning curve for users
  - User fatigue