# VIRA

## Virtual Insight into Real Athletics

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# Project Plan

# Problem Statement

- **Problem:** Limited resources and learning experiences
- **Solution:** VR application with two modules
  - Special tests
  - Quizzes
- **Goals:**
  - Provide experience
  - Provide realistic simulations
  - Easy extension via modular design

# Conceptual Sketch

# Functional Requirements

The user should be able to do the following:

- Log in and navigate to a module
- Choose between guided and quiz mode
- View the athlete's limb in the module in multiple ways
- Review their progress and performance on modules over a period of time

# Non-Functional Requirements

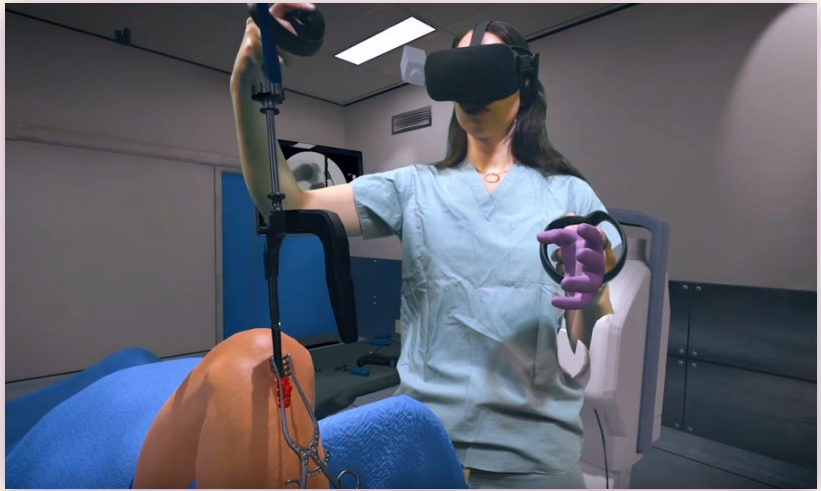
- Real-time response
- Health and well-being of the user
- Battery power
- Reasonably realistic and medically accurate

# Other Constraints/Considerations

- Environmental:
  - Real-time, direct interaction with user
  - Space to perform an injury evaluation simulation
  - Recognition of fine hand movements within close proximity
- Economical:
  - Limited by ECpE funds

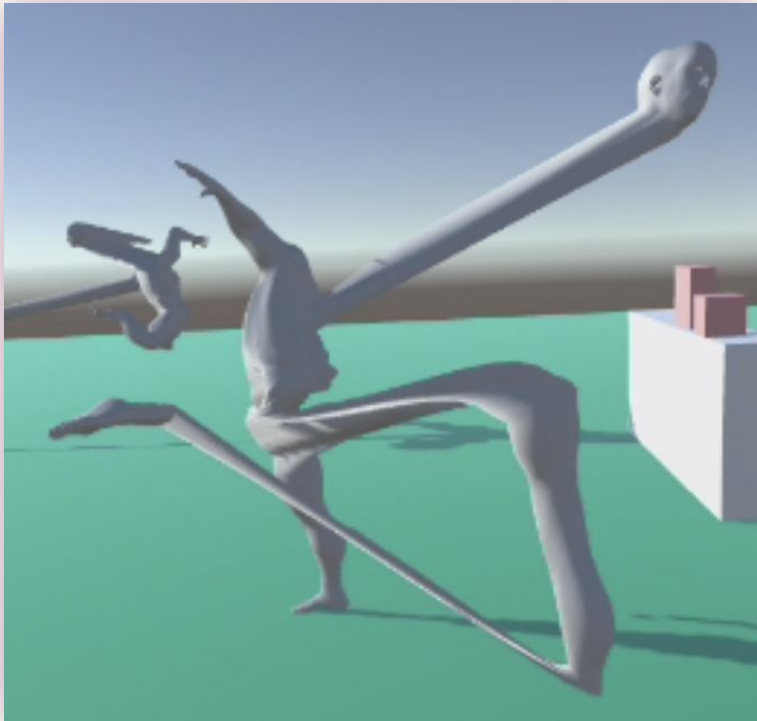
# Market Survey

- OMS: Oxford Medical Simulation
- OSSO VR
- Oculus/Children’s Hospital Los Angeles



# Potential Risks & Mitigation

- May not be able to acquire AR hardware
  - Switch to VR
- May not function as proposed if we use VR
  - Compromise on implementation decisions
- Must be medically/anatomically accurate
  - Use our athletic trainer resource
- No experience with AR/VR
  - Add extra buffer time
- Animation
  - Attention to detail of graphics



# Resource/Cost Estimate

Costs:

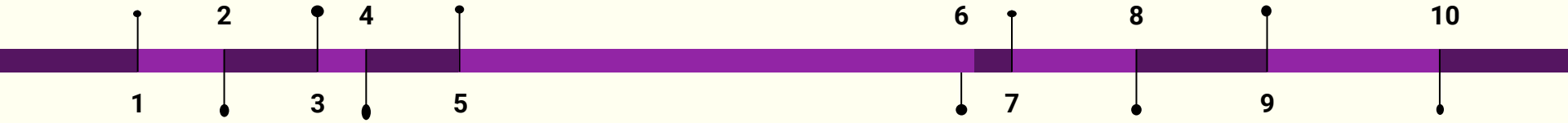
- Oculus Quest cost: 500 USD
- Quest case cost: 40 USD
- **Total resource cost:** 540 USD

Free:

- Unity IDE (with educational Pro licenses)
- MakeHuman
- Blender

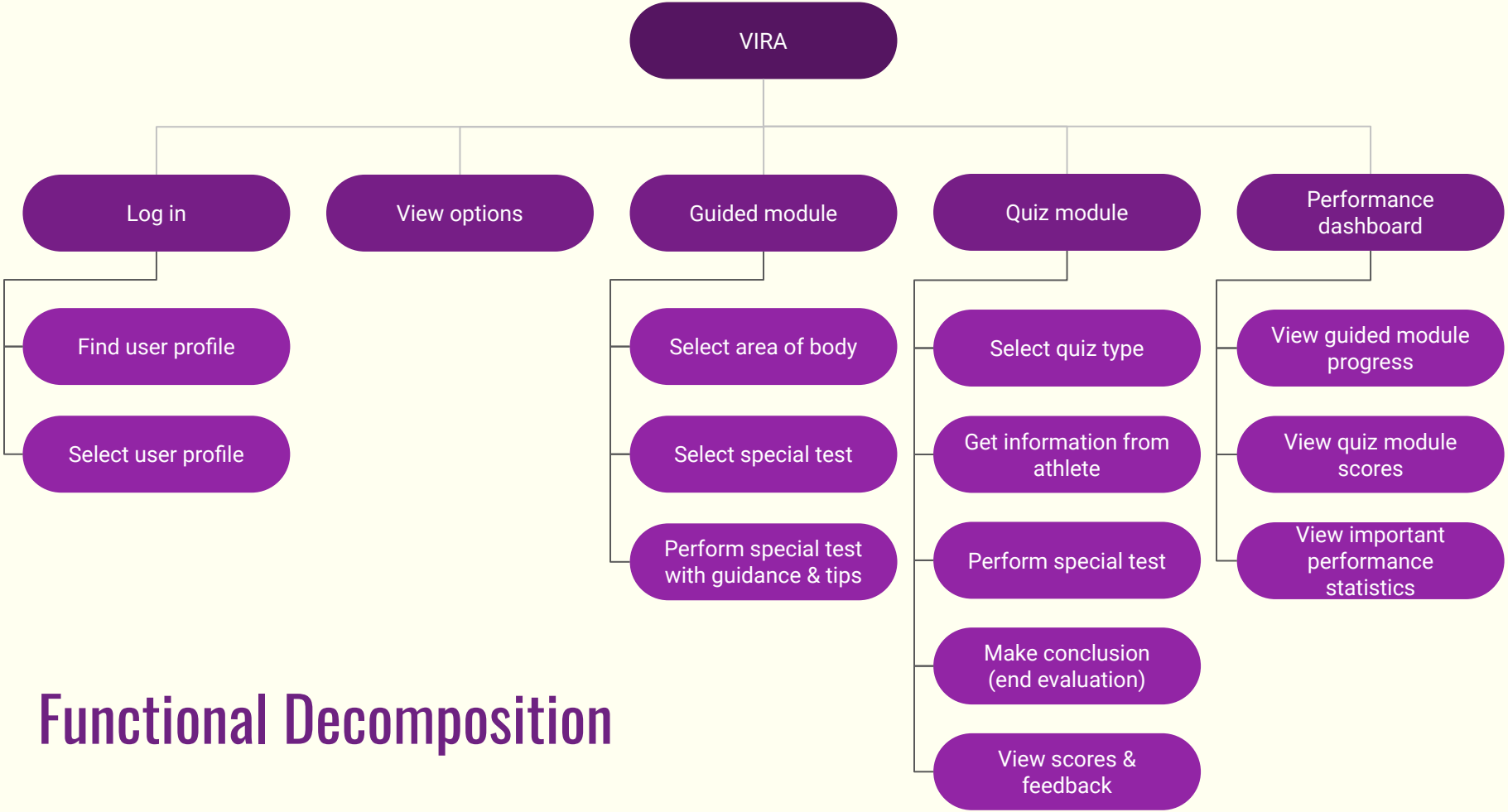
# Project Milestones & Schedule

1. Establish Unity to database connection - Jan 15th
2. Set up database - Jan 21st
3. Create user profile selection - Jan 27th
4. Create user home screen - Jan 29th
5. Create module selection - Jan 31st
6. Develop models for chosen limb(s) - Mar 30th
7. Create quiz module - Mar 30th
8. Create user performance dashboard - Apr 6th
9. Enhance graphics quality in Unity - Apr 13th
10. Create guided special test module - Apr 20th



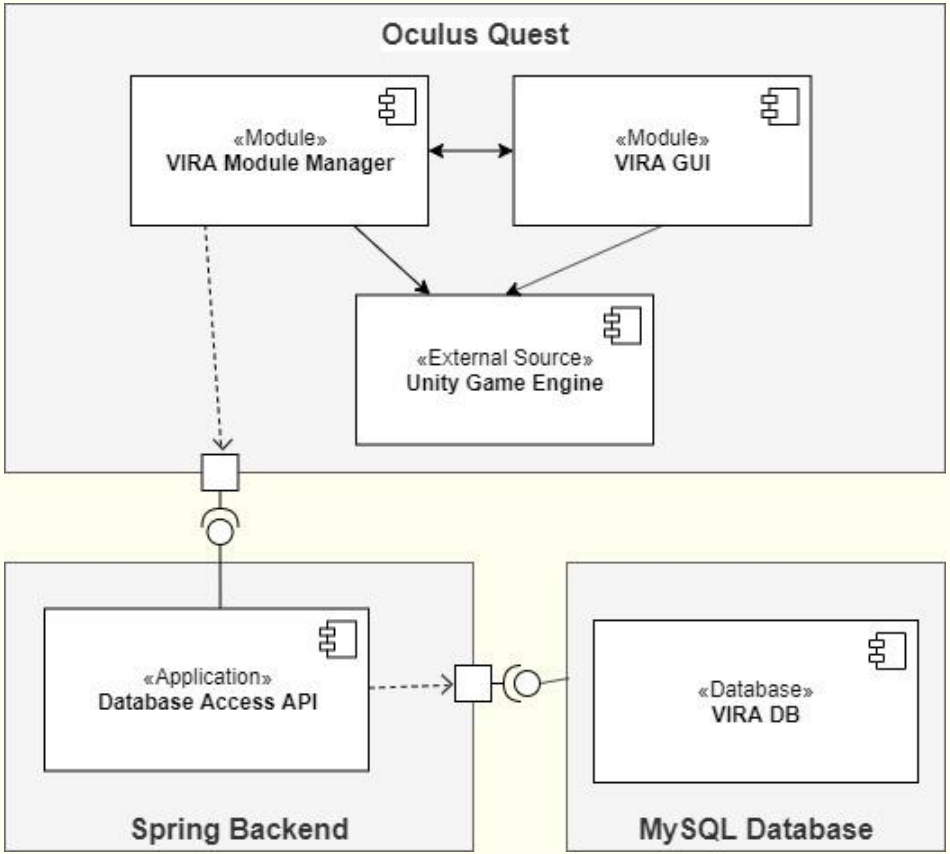

January → April

# System Design




# Functional Decomposition

# Detailed Design - Component Diagram



# Detailed Design - Database Architecture

| User | | |
|---|---|---|
| ID | Username | PIN |
| | | |
| | | |
| | | |

| Quiz_Special_Tests | | |
|---|---|---|
| ID | Quiz_ID | Test_Name |
| | | |
| | | |
| | | |

| Guided_Comments | | |
|---|---|---|
| ID | Guided_ID | Comment |
| | | |
| | | |
| | | |

| Guided_Modules | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ID | Name | Description | Patient_Position | Examiner_Position | Evaluative_Procedure | Positive_Test_Indicator | Implications | Modification |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| Guided_Progress | | |
|---|---|---|
| ID | Module_ID | User_ID |
| | | |
| | | |
| | | |

| Body_Area | |
|---|---|
| ID | Name |
| | |
| | |
| | |

| Body_Area_Guided | | |
|---|---|---|
| ID | Body_Area_ID | Guided_ID |
| | | |
| | | |
| | | |

| Quiz_Modules | | | |
|---|---|---|---|
| ID | Name | Description | Diagnosis |
| | | | |
| | | | |
| | | | |

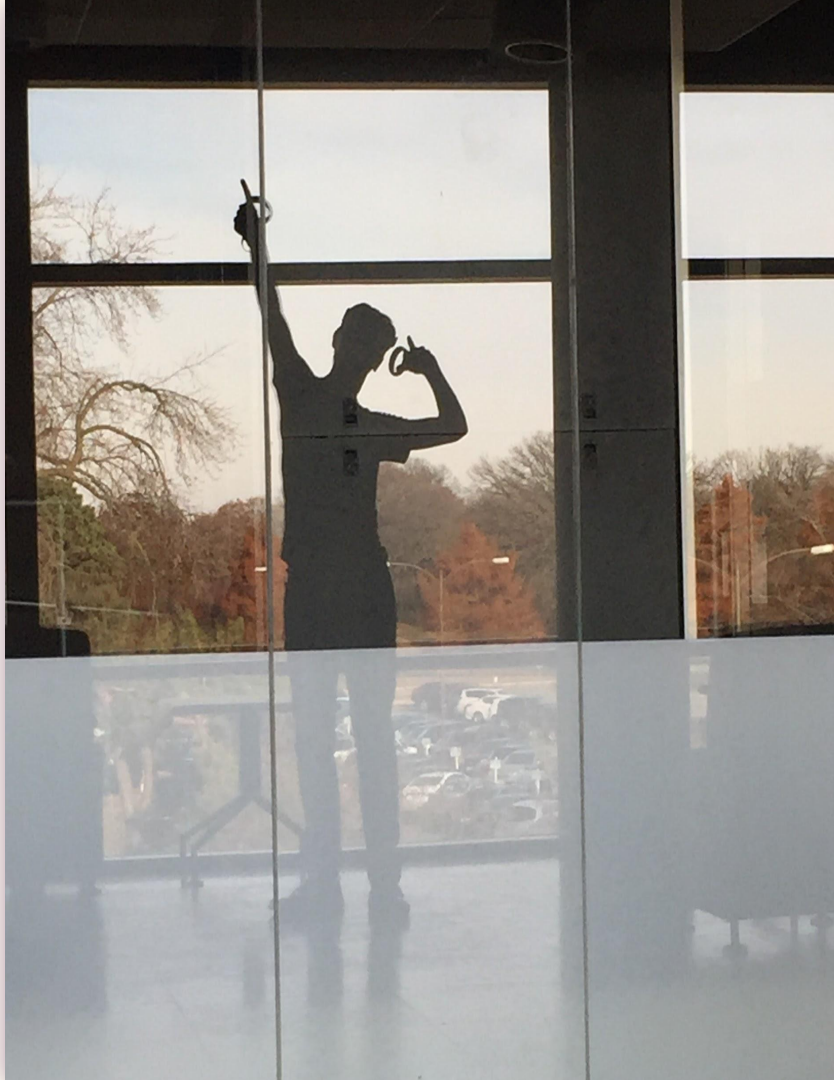
| Quiz_Progress | | | | |
|---|---|---|---|---|
| ID | User_ID | Quiz_ID | Score | Timestamp |
| | | | | |
| | | | | |
| | | | | |

| Quiz_Special_Test_Proficiency | | | |
|---|---|---|---|
| ID | Quiz_Progress_ID | Special_Test_ID | Test_Chosen |
| | | | |
| | | | |
| | | | |

| Quiz_Diff_Diagnosis | | |
|---|---|---|
| ID | Quiz_ID | Diagnosis_Name |
| | | |
| | | |
| | | |

# Technologies Used

- Hardware
  - Oculus Quest
  - Oculus Quest Controllers
- Software/Technology Platforms
  - Unity
  - MakeHuman
  - Blender



# Test Plan

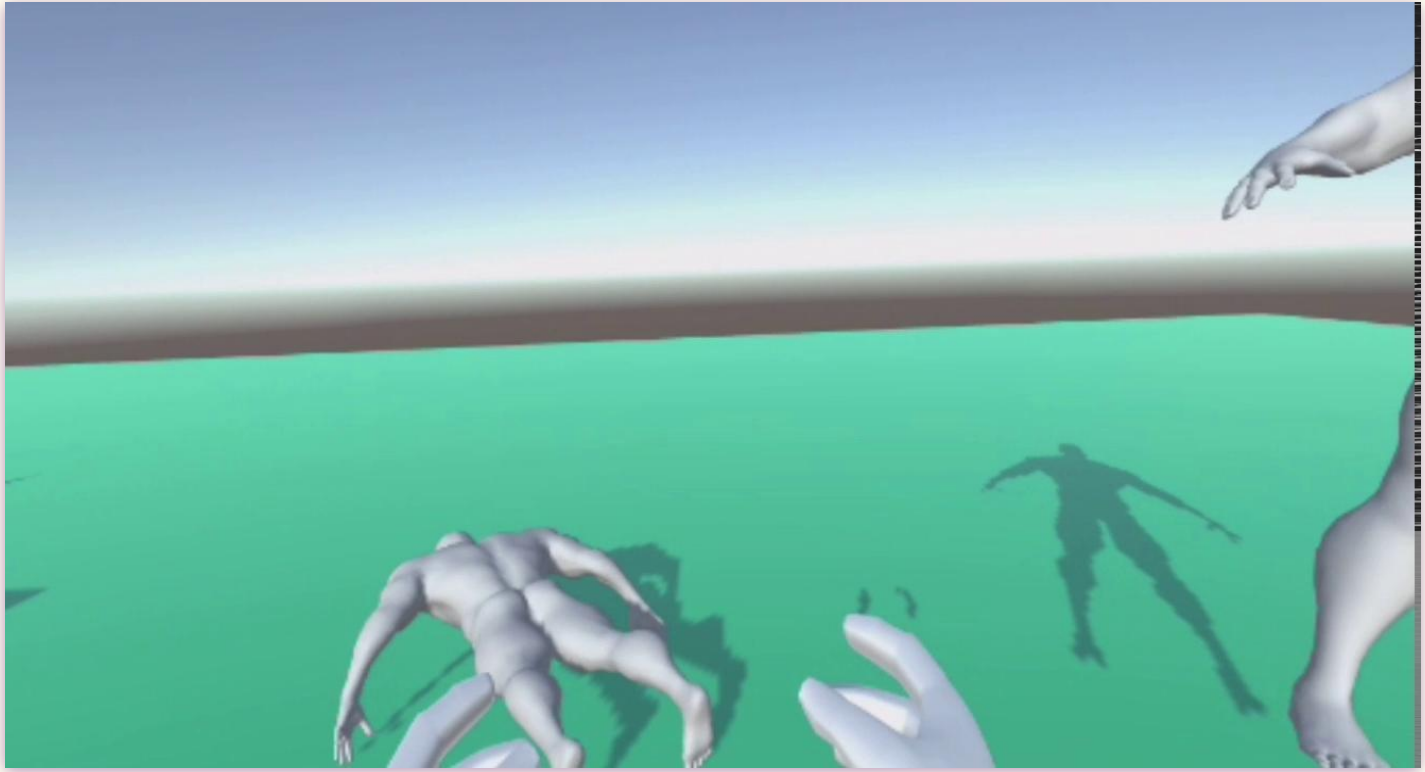
- Software and Hardware:
  - **Unity environment**
- Functional:
  - **Integration testing:** GitLab CI script
  - **System and acceptance testing:** Team and end-users
- Non-Functional:
  - **Usability testing:** Analyze how first-time users navigate VIRA
  - **Performance testing:** Monitor running speed, response time, battery consumption

# Prototype Implementations

Fall goal implementations:

- Athlete sitting on table
- Can move around the scene
- Can pick up an athlete
- UI for menus that we have so far
- “Tips” options for UI
- Inverse kinematics

# Prototype



# Conclusion

# Current Project Status with Respect to Milestones

The milestones we set for ourselves are meant to encompass the duration of our project:

- Create user profile selection
- Create user home screen
- Create module selection
- Develop modules for chosen limbs
- Create guided special test module
- Create quiz module
- Create user performance dashboard
- Set up database
- Establish connection between application  and database
- Enhance graphics quality in Unity

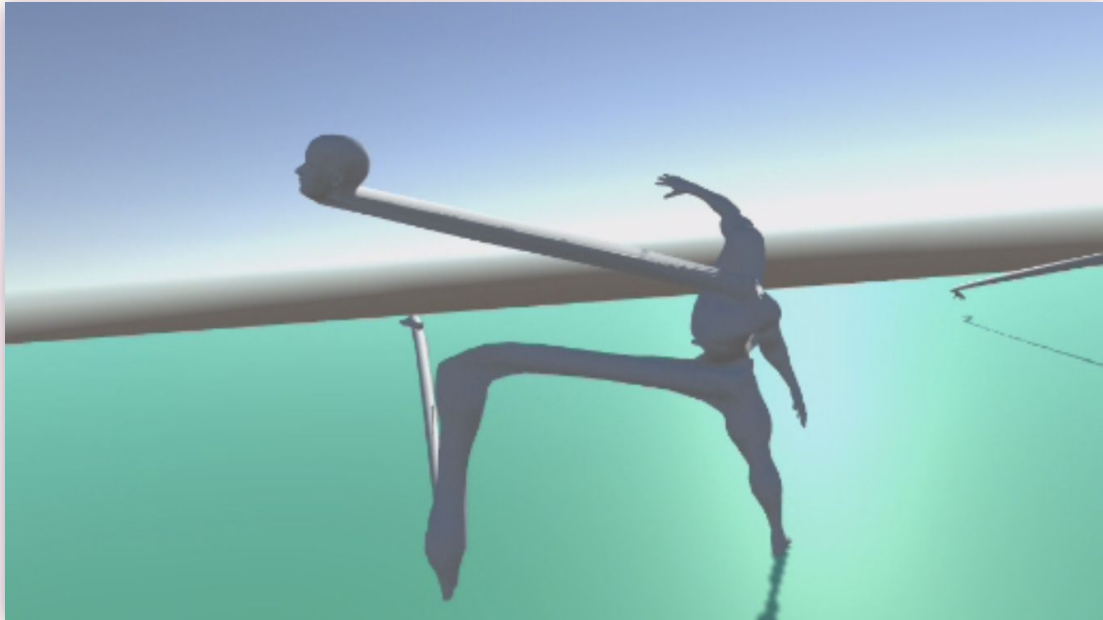
# Team Member Contributions

As a team, we have been able to establish goals on learning VR development, optimize Git for version control and sprint planning, and use Google Drive to organize our team documentation.

- Katie - Setting tasks/schedule, architecture design, researching limb movement
- Caroline - Assignment/schedule organizing, VR UI design
- Bailey - GitLab/sprint planning, C# scripts in Unity, liaison with athletic trainer
- Willem - Branding, document formatting, VR UI design
- Nate - MakeHuman and Blender model capabilities, experimenting with Unity

# Plan For Next Semester

- Create initial menu screens from user logging in to selecting a module
- Create backend server and connect application to database
- Create guided special test module
- Create quiz module
- Create muscle view
- Improve graphics quality



# Questions?

# Thank You!