VR Physics Lab

Concept

This project will bridge the gap between the theoretical outcomes of mathematical equations and real-world outcomes by representing the equations virtually and allowing users to visually see how these changes take place. The application will need to synced between multiple devices to allow an instructor to view all other users simultaneously. Having a multiplayer component is necessary so the instructor can aide users in-app and also allows for the possibility of users to work together as they would in an actual classroom or lab space.

Potential subjects to explore with this idea

* Catapult
* Pendulum Arc
* Sounds Waves
* Gravitational Forces
* Rolling objects

Prototype Objectives

1. Accurate mathematics
2. Input equation system to recognize variables
3. A whiteboard system to detect player writing
4. Easy to use
5. Save data for teachers to view
6. Options for players
   1. Display math equation only
   2. Adjust variables in math equation
   3. Change complexity of equation (ex: what happens if we add wind resistance)
7. At least 1 demo tests:
   1. Catapult

Learning Loop (for prototype)

1. Teacher presents an equation for the classroom
2. Students put headsets on and input the equation
3. Students attempt to solve equation in headset (on a marker board)
4. Students then play the simulation and see if their results match
5. Repeat as necessary
6. Then allow students to play with the variables, adjusting them and testing the results

Physics Equations

Catapult:

Equation links –

1. PHET link - <https://phet.colorado.edu/en/simulations/projectile-motion>
2. <https://www.sciencebuddies.org/Content/PDFs/ProjectIdeasKits/Phys_p089/Phys_p089_20131021.pdf>
3. <https://sites.google.com/site/physicsofacatapult/home/equations>
4. <https://sciencing.com/calculate-muzzle-velocity-7669736.html>

Uses for catapult:

* Determining trajectory of the projectile
* Determining impact of the projectile against an object
* Determining distance a projectile will travel before reaching ground on equal level
* Show how changes to the variables affect the results
  + Changes to mass of projectile
  + Changes to initial launch velocity of projectile
  + Changes to distance between the projectile launch point and wall between the arc of the projectile

Features

This is just a list of tasks and features that need to be added to the current iteration of the project.

* Make the rock function as a pooled object
* Allow user to type numbers into the equation
* Improvements to UI useability
* Hand Control for the Quest?