HoloPhysics

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OVERVIEW

HoloPhysics is a proof of concept educational physics visualization software designed to engage high school physics students. Utilizing augmented reality (AR), we allow students to interact dynamically with holograms to gain experience.
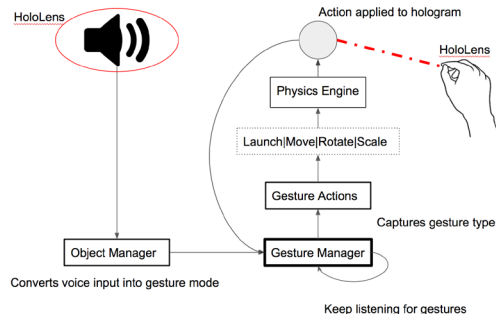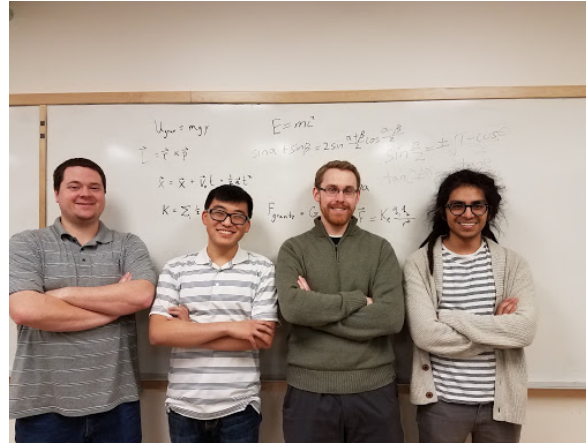

SYSTEM ARCHITECTURE

Scenes constructed in Unity and then C# scripts are attached in order to provide functionality.

We created an abstract PhysicsEngine class which contains methods shared across all levels.Eeach level has a specific PhysicsEngine that inherits from the abstract class and provides specialized methods.

HoloLens recognizes voice commands and hand gesture. Our system them interprets these to change modes of operation and perform various actions, as shown in the diagram below.

TEAM JARVIS

SYSTEM ARCHITECTURE

- Immersible experience by using AR
- Ability to see velocity and acceleration dynamically
- Real time interaction
- Engaging objectives
- Progressively more difficult levels
- Appealing visualizations

USER STUDY RESULTS

We demonstrated our app to various users, including several classes of high school science students and a physics teacher. Users from these studies responded unanimously that they felt that our app would help students gain a better understanding of physics concepts. .

LEVERAGED TECHNOLOGIES

We used the power of the Unity physics engine for basic movement and collision detection. HoloLens's ability to manage hologram locations in a 3D environment. HoloLen's voice command recognition and natural language processing.

STRUCTURE

Our App is divided into 4 modules to cover a variety of physics topics. Tutorials are available throughout the application to enhance the educational experience.
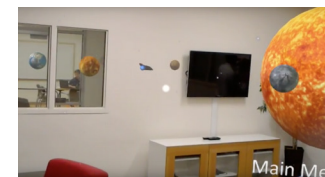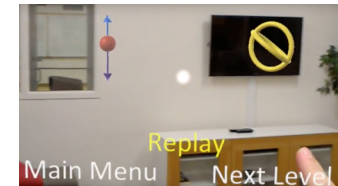
MODULES

Tutorial
Teaches users the basics of interacting with the App.

Kinematics
Students can experiment with simple kinematic situations to deepen their understanding of velocity and acceleration

Astronomy
Students experience gravity from multiple sources and see how orbital mechanics work.

Particle
Students are now exposed to electrostatic forces, where like charges repel and opposite charges attract.