CS 6334 Virtual Reality

Project Pitch (5 points)

Submission due by Saturday, February 25 at 11:59 pm CT

Presentation in class on either Monday, February 27, or Wednesday, March 1

Purpose

To plan for and propose a semester-long team project on leveraging the virtualness of VR/AR in learning, training, or entertainment

Directions

1. Create a "Project Pitch" presentation (.ppt, .pptx, or .pdf) explaining your project. Your submission must be **50 MB or less**.

2. **Title:** On the first page, provide a project title, team name (make one), and team member names.

3. **Motivation:** On the second page, provide motivation for your project topic. Specifically, please address the following.
    - What is the problem that you are trying to solve?
    - Who are the target users? What are the users' needs?
    - How will your application satisfy users' needs?
    - Why does it have to be VR? Why not mobile or PC?

4. **Sketch:** On the third page, provide a high-level description of what would be accomplished during the project. Include a sketch to show the concept of your project.

5. **Storyboard:** On the fourth page, provide details of your project with a storyboard that highlights key interactions. Draw a storyboard that depicts:
    - **Virtual World:** Your storyboard should clearly show what your virtual world will be like. A few things to think about:
        - How does this world help you represent your idea/story?
        - What will be the interactable objects in your world?
        - What will be the non-interactable objects in your world?
        - What tasks can the user perform in this world?
    - **Travel:** Your storyboard should depict how travel will be implemented in your project. A few questions to think about while designing this storyboard:
        - How will your character move around? Will your character move using a controller?
        - Will it be a first-person or third person view?
        - Which travel technique you want to use?
    - **Selection and Manipulation:** The second storyboard should depict the selection and manipulation interactions you will integrate in your application. This is a good time to think about:
        - What will be the interactable objects in your scene?
        - Which selection technique will you use to select them?
        - What kind of manipulations do you want for the selected object? Is it movement, rotation etc.?
        - Are you going to provide any visual and audio cues to highlight

selection? What will these be?

- **System Controls:** Finally draw another storyboard describing how are you planning on building the system control interface. Here are some questions that you can try to answer:
    - What kind of information you want to highlight using the menu options?
    - Will it be a layered menu? If yes, how many layers and what will they represent?
    - What interactions you want to trigger using the menus?
    - Are you going to use some of the buttons in the controller? How do you map the buttons with commands? How many buttons you plan to use?

6. The project requirements are divided into two parts:

Basic Requirements:

These are the must haves and should be implemented by April 9 (Preliminary Prototype Deadline); every project should have all these features.

- **Interactable Objects:** The application should have at least 5 different types of interactable objects. Different types of objects mean having different interaction schemes and functions in the scene. (Example: In a virtual store, cart and items will have different interaction schemes so they are different. However, two items will have the same interaction schemes so they are not different.)
- **Travel:** The project should implement an effective travel scheme. You can implement movement using the Bluetooth controller, write movement scripts for your character or even implement teleportation as a mode of travel.
- **Selection and Manipulation:** You need to implement interaction schemes among different game objects in your scene. Selecting various game objects using a reticle pointer and manipulating (repositioning, rotating, scaling, etc.) them on button presses to provide richer interaction in the Virtual Environment is expected. Students are encouraged to use techniques like ray-casting and flashlight as well.
- **System Controls:** Implement menus to control the flow of your application and provide users with an easier and more guided way to use your application.
- **Physics and Collisions:** All the characters and game objects in the VE should follow appropriate physics (e.g.,: objects should not be floating in the air if they are not supposed to) and collision (objects should not pass through each other or the character, they should not fall below the ground plane, etc.).
- **Visual and Audio Cues:** The project should also make use of visual cues (e.g.,: highlights, color change, etc.) and audio cues to enhance user experience in VR. Note: You do not need to add these cues to every interaction in your application. Just add them wherever you think they will be effective.

Advanced Requirements:

Your project should have **at least 2** of the below mentioned functionalities:

- **Multiplayer:** You can implement a networking solution to support multiple players so that they can join a server and interact with each other in the VE. The changes made by one player should be visible to other players using the app. Photon is a networking framework that works very well with Unity for creating multiplayer applications.
- **Voice Chat:** If the project supports multiplayer functionality, adding voice chat can be a great enhancement. The players joining the app should be able to communicate with each other using this.
- **Avatars:** You can also create 3D avatars for your characters. Avatars should be supported for both single and multiplayer applications. The avatars should be realistic, i.e., they should be humanoid. Avatars made of just cubes and spheres will not be considered realistic. You can use 3D modeling tools such as Blender, Maya, ZBrush, etc., to design and create the avatars. Downloading avatars from the internet will not be considered an advanced requirement.
- **Animation and Rigging:** You can also work on adding animation and rigging components to your avatars. Make sure the animation and rigging should be done by yourself, i.e., adding bones and joints to custom models so that they can move. Some examples are facial expressions, walking, grabbing, hand movements, etc. You can use 3D rigging tools like Blender, Maya, Mixamo, etc. Downloading objects/avatars with custom rigs and animation will not be considered an advanced requirement.
- **Document Sharing/Presenting:** If multiple players are using the application simultaneously, they can share the content. For example, they can present PowerPoint presentations to other users in the Virtual Environment.
- **Computer Vison:** You can also add features like real-time object detection or hand tracking and implement a smoother way to interact in the virtual environment. You can make use of the phone's camera to track hands and even implement custom hand gestures. Face recognition could be another great idea to implement.
- **Intelligent NPCs:** You can create NPCs (Non-Playable Characters) and script their behavior in your virtual environment. You can have them interact with the player and the environment itself. You can make use of Unity AI API, and ML-Agents. The NPC behavior should be trained using an intelligent algorithm and should not be hardcoded using scripts (i.e., using for/while loops).
- **Mobile Sensors:** You can use the built-in phone sensors like an accelerometer and gyroscopes to obtain movement information. For example, you can use this in applications where users need to move their heads to perform certain actions like dodging projectiles. You can also utilize other sensors like magnetometers, temperature, or humidity sensors to create meaningful interactions.
- **Augmented Reality:** You can also develop an AR application, provided that the application satisfies all the basic requirements. You can use Unity ARCore, ARKit, Vuforia, etc., to implement this.

7. On the next page, describes what two advanced requirements you will implement with details.

8. On the next page, describe what the final prototype would have implemented, including three or more key features. You must list three or more key features with description and

details.

9. On the last page, provide a weekly timeline for this project. The timeline should include dates and tasks, starting from February 25 to May 4 (10 weeks).

Team Submission

1. Create a "Team" document (.doc, .docx, or .pdf) that lists the names of your team members and describes what each member contributed to the assignment.

2. Create a zip file (**.zip**) that contains your "Team" document and your "Project Pitch" presentation. Do **NOT** use any compression file type (e.g., .rar, .7z, .tar) other than .zip. Such submissions will **NOT be graded**, which will result in **0 points**.

3. **Submit the assignment as part of your group** in a zip file on eLearning under Team Project > Project Pitch

4. **Be prepared to provide the presentation** during class on the dates indicated above.

Individual Submission

- Download a peer evaluation form from Project->Project Pitch – Peer Evaluation.
- Fill out the form and submit it to Project->Project Pitch – Peer Evaluation.
- Submission should be made by Saturday, February 25 at 11:59 PM CT (1 point deduction for late/no submission).

Project Pitch Presentation

1. We will have two presentation sessions during the class. Schedule is as follow:
    - Monday, February 27: Team 1 through Team 10
    - Wednesday, March 1: Team 11 through Team 20
2. Everyone must attend both sessions. No exception.
3. Your team has 5 minutes to present your idea, so please do a couple of rehearsals
4. Here are some Dos and Don'ts
    - Dos
        1. Focus on the subject, attract attention
        2. If possible, use relevant visual illustrations (pictures, maps, charts, graphs, etc.)
        3. Use bullet points (or numbers) to structure the text
        4. Make clear statements about the essence/results of the research topic
    - Don'ts
        1. Don't write long full sentences on the slides
        2. Don't use distracting colors, patterns, pictures, decorations on the slides
        3. Don't use too complicated charts and graphs

Scoring

This assignment will be scored as indicated below. The maximum possible score is 5 points.

☐ The first page of your presentation includes a project title, team name, and team member names. **0.5 point**

☐ The second page of your presentation provides motivation for your project topic,

including answering three questions listed in "Directions". **0.5 point**

- ☐ The third page of your presentation provides a high-level description of what would be accomplished during the project. A sketch should be included to show the concept of your project. **1 point**
- ☐ The fourth page of your presentation provides a storyboard that highlights key interactions with descriptions. **1.5 point**
- ☐ The next page of your presentation describes what two advanced requirements you will implement with details. **0.5 point**
- ☐ The next page of your presentation describes what the final prototype would have implemented, including three or more key features with descriptions. **0.5 point**
- ☐ The last page of your presentation includes a weekly timeline. **0.5 point**

Deductions

Deductions will be applied as indicated below. The minimum possible score is 0 points.

- ☐ Your presentation contains more than nine pages. **1 point per extra page**
- ☐ You are not present for your team's in-class presentation. **2.5 points**
- ☐ You did not follow the presentation guideline (Dos and Don'ts). **2 point**
- ☐ You did not clearly present the details of your proposed approach with a storyboard. **1 point**
- ☐ Your submission is late. **1 point per day late**
- ☐ Your submission is not a .zip file. **5 points**
- ☐ Your submission is larger than 50 MB. **1 point per 10 MB over**
- ☐ Your supplementary files are not of the specified formats or do not contain the specified information. **1 point per file**
- ☐ You did not follow the specified naming conventions. **0.5 points per file or folder**
- ☐ You did not make a significant contribution to the submission. **2.5 points**
- ☐ You did not make any contribution to the submission. **5 points**

Academic Integrity

This is a team assignment, and you are expected to work with your team only. Teams are expected to complete their own work. If found guilty of academic dishonesty, you will receive 0 points on this assignment. Below is a list of things that are considered academic dishonesty:

Considered Academic Dishonesty:

- Copying ideas from other groups and/or external sources is considered academic dishonesty.
- Sharing your slides with other students who are not on your team is considered academic dishonesty.
- You must not look at project pitch slides from other years. This is a group project and we want you to think about the details of your VR application within your team.

Every submission will be checked for plagiarism. If found guilty, you will receive 0 points for this assignment without any exceptions, and your case will be reported to the department and/or university for further action.

These descriptions and timelines are subject to change at the discretion of the professor.