Computer Graphics

Project Proposal**: Semester Project**

Topic**: AR Mini Application**

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AR Mini Application

Introduction:

"*I regard **[augmented reality]** as a big idea like the smartphone*."

-- Tim Cook

Augmented Reality or AR is basically allowing humans to experience the real-world environment and real-life objects without actually going to that environment. This experience is simulated to with the help of the computer-generated perceptual information, using multiple sensory modalities including visual, haptic, olfactory etc.

What is the key value of AR?

The primary value of augmented reality is the manner in which components of the digital world blend into a person's perception of the real world, not as a simple display of data, but through the integration of immersive sensations, which are perceived as natural parts of an environment.

History:

The earliest systems were invented by in the early 1990s, initiated by US Air Force's Armstrong Lab. Later, this was used into providing the consumers with a different source of entertainment. Further, the early commercial success helped in the expansion of this technology into wide variety of fields including education, warfare and even into architecture.

What makes it different from VR?

Virtual Reality or VR is the perception build entirely on the virtual information. It stands different from AR on the grounds of real-life experience and added information. AR which just adds virtual objects onto real environment. VR on the other hand has a complete virtual and computer-generated environment.

PROJECT IDEA

Introduction:

In the modern world, AR has helped into helping or rather we can say aiding the humans to render the virtual objects into real-life situations, helping the simulators to better understand what the actual situation would look like.

Urban Planning and Interior Designing has been one of the sectors where AR has helped by simulating the reality maps, buildings and interior designs. They help in collaborative viewing by superimposing the designs onto the real-world.

Problem Statement:

In this project, we aim to create an app which would help the users to see how a particular object would look-like when they would place that in their rooms. We aim to create a prototype which can be further scaled to commercial uses.

The app would initially contain a list of already fed list of some regular use items like a flower vase, showpieces etc. which the user can select and then select the simulation button and point the camera towards the place where they want to place the particular object. The app would render a possible view of how the object they would look when placed at that particular place.

Further, we would scale the app to allow the user to input their own objects along with their dimensions to have an AR view of the object.

Motivation and Challenges:

Interior Designing is a thing which fascinates everyone. Right from a 5-year-old kid to Senior citizens, who doesn't want to design their room in the best way possible as per their taste. We intend to create an app which would simulate you the objects which you want to place so that you can better design your own personal space.

Challenges to this project are:

- **Simulation Errors:** AR apps are known to have a lot of discrepancies when it comes to simulate virtual objects into real world. They tend to show rendering errors or misjudge the position and space an object would take. This leads to lot of excess work when the simulation is actually implemented.
- **Physics Involved:** Even though the rendering may be perfect, the other challenge in front of us is to check whether the calculations used by the app are in line with the real world and they aren't being any misjudgments. It's a difficult task for us to implement the app accurately for each point where the camera would be pointed by the user.

The challenges are entirely due to our lack of knowledge of app building and hands-on practice of AR and its related fields.

Pipeline:

The project flow would be as follows:

- We would make a blueprint of how our app would look like. This step would include the designing of the UI/UX of the app. Further, the app's features would also be decided.
- Next, step would be to implement the AR technologies to simulate the objects into real-world. This step would include sorting out all the rendering related issues.
- In this step, we would test out our app into real-world and sort out any discrepancies which it has and improve the user experience.
- At last, we would make the term paper, live demo videos, PPTs to be submitted along with the final project code.
- This step is to scale the app at commercial level and possible launch of the app. (Intended to work upon this after the final project submission during the sem-break.)

Tech stack to be used:

- Git/GitHub
- Visual Studio Code
- Android Studio
- Augmented Reality Markup Language

Results:

We would create an app which with the help of AR simulate the objects onto how they would look like when they're placed somewhere in real world.

A term paper, live demo and a PPT containing details of our project would also be made.

Metrics:

A key measure of how accurate/realistic the simulations are is done in the real-world. The software must accurately derive real-world co-ordinates without the use of camera so as to provide an accurate simulation. Further, we would compare our work with various independent organizations working in the field of AR, particularly with the Interior designing simulations.