A game based virtual campus tour

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Abstract. The aim of the application is to create a virtual reality game, whose purpose is to showcase the facilities of SRM University, while doing so in an entertaining manner. The virtual prototype of the institution is deployed in a game engine which eases the students to look over the infrastructure, thereby reducing the resources utilization. Time and money are the resources in concern today. The virtual campus application assists the end user even from a remote location. The virtual world simulates the exact location and hence the effect is created. Thus, it virtually transports the user to the university, with the help of a VR Headset. This is a dynamic application wherein the user can move in any direction. The VR headset provides an interface to get gyro input and this is used to start and stop the movement. Virtual Campus is size efficient and occupies minimal space. It is scalable against mobile gadgets. This gaming application helps the end user to explore the campus, while having fun too. It is a user friendly application that supports users worldwide.

1. Introduction

Virtual reality refers to using software to generate the realistic images that replicate a real environment, and for simulating the physical presence of the user. VR can be defined as a 3-D environment simulation using a combination of hardware and software, based on user input.

The end user would feel as if he is physically present, while using a VR application. User Input could be either gyroscopic, controller or voice-based input. The latest VR Hardware equipment is the head-mounted display(HMD), which is a wearable headset. Graphical output can be displayed on a computer monitor or any mobile device. Audio output can be rendered through speakers.

Every year, thousands of students aspire to join SRM University. Before joining the college, it is essential for them, and their parents to know about the facilities the college offers. Hence, many of them come from all parts of the world to check out the campus resources it offers. This is essentially a waste of their time and money. We aim to create an application that looks exactly like the university, except that it is virtual. The students and parents can sit at home and get a tour of the campus. The game, which is in first person, begins in a situation where the character is stuck inside a building at the university. The user must keep moving till he comes out. If needed, the user can move to different parts of the campus, thereby checking out what the campus has to offer. Input is got through the gyro sensor in the VR headset. At any moment, the user can choose to keep moving or stop and look around the current position. This offers a much better experience when compared to the previous app, which is just a collection of 360 degree photos. This application is multi-platform and hence can be used on all mobile devices. We hope this app will help the aspiring students.
2. Study over Literature
The following Table 1 shows the study over Literature

| Ref | Merits | Demerits | Issues solved | Concerns |
|-----|--------|----------|---------------|----------|
| 1   | Minimum human supervision needed. | Availability is static | A video surveillance system is developed based on Virtual reality | The system lacks scenarios dealing with multiple camera video surveillances. System doesn’t cover about the time dependent microscopic biological data which would require spatial judgments. |
| 2   | Helps in the exploration phase of the biological analysis. System provides continuous monitoring for physical therapy. Can display what cannot be shown to the naked eye. This system is compatible and user-friendly. | Addresses only about the exploration phase. Not yet properly evaluated with real-time users. Exact details not implemented. Static system. The sensor in system cannot detect beyond visual blocks. Game experience can be improved Only few concepts implemented. | Exploration phase analysis can be done even without prior knowledge about the underlying biological processes. The system allows visualization of properties during or after the execution of any physical work. Displays tourist information before the tourists decide to travel. The system is capable of using any commodity Wi-Fi ensuring better tracking. Head Tracking, Position Tracking | Remote sessions and customizable exercises are not implemented. Will be more realistic if the users can move around. Sound feedback system & movement features are missing. The total range coverage needs to be improved. Can add a provision for movement. |
| 3   | | | | |
| 4   | | | | |
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| 7   | | | | |
| 8   | | | | |
| 9   | | | | |
system.

| All disciplinary resources are put in a single interface and its size is less too | Data Insecurity. | Interesting, since some solutions are given in the form of a game | Need to reduce the risk involved in loss of data in an unstable network |

### 3. Proposed Methodology

A virtual world is created simulating the features and infrastructure of SRM University campus compatible to both android and IOS operating systems. This is done using Unity game engine for the design and Microsoft Visual Studio IDE for implementing the logic involved. The architecture of the system is given in figure 1. To make the user experience more interactive the application is made in the form of a game, where the user can move throughout the virtual world. The movement of the user is made possible through continuous gyroscopic inputs from the mobile device.

The application offers a better experience since it is able to simulate a user's physical presence in this environment. Anyone would be able to know the features and infrastructure that the campus has to offer. The virtual world enables dynamic viewpoints overcoming the static viewpoint frames of previous applications. This is more attractive, user friendly and more interactive as the application is in form of a game.

The application is scalable as it is compatible in Windows, Android and IOS operating systems. Despite being compatible in various operating systems the application is very compact in size. The biggest advantage of this application is its time efficiency. The average time taken for the user to complete the virtual campus tour is much more efficient than what previous applications had to offer.

![Figure 1. System Architecture](image)

### 4. System Operation and Performance

The game starts with a splash screen after which the user is teleported to a random point in the campus. The goal of the game is to come out. Input from the user is got at every instance of the game. They can either choose to move forward or stop, look around and decide which direction to proceed.
in. At any point, if the user looks downward, more than a particular angle, the movement starts. To stop the movement, the user needs to look upwards at the same angle. Thus, minimal effort is required from the user’s side. The performance of the system is given below:

1. Designed a logical flow diagram as to how the game will work.
2. Created a basic VR World.
3. Coded the logic for automatic movement and stopping with respect to gyro input in C Sharp.
4. Tested the code in the basic VR world.
5. Created the building as per how it actually is present.
6. Modified the code to facilitate moving up and down stairs.
7. Added basic functional characteristics of rooms inside the building.
8. Added further detailing to make to improve the realistic effect it has on the user.

Unity 3d Version 5 was the tool used to create the virtual world. Certain special elements were created using Blender and imported to Unity. Virtual Campus offers better perception through its dimensional view when compared to the photo view offered by the previous application.

![Figure 1. Game Flow Chart](image1)

![Figure 3. Screenshot of the working Application](image2)

Figure 2 And figure 3 shows the game flow chart and screen shot of the working application. Our application is compared with the previous application named SRM Virtual Reality in Table 2. The chart shows the features of both the applications.

| Table 2. Comparison Chart |
|---------------------------|
| **Size** | **Scalability** | **View** | **Features** |
| SRM VR 40 MB | Android | Static | - |
| Virtual Campus 25 MB | Android, iOS | Dynamic | Motion Sensor |
5. Conclusion

Thus, a user-friendly application has been created to showcase the resources and facilities that SRM University has to offer. Thousands of aspiring students wishing to join this university can now see its well-equipped infrastructure from a remote location. Now there is no need for the students or parents to come all the way to the campus to know what it offers, thus time and money is saved in a great manner. In the virtual world of the university the user starts at a random location and can move to different parts of the campus by moving his head accordingly wearing the HMD (Head Mounted Device). The user is thus able to visualize the overall features that the campus has to offer. Also, the time taken for the user to complete the campus tour is also minimal. The app is very light and is being used in different platforms.

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