

14th IEEE UAE STUDENT DAY COMPETITIONS
Academic year 2018 - 2019
Software Engineering Project (SEP) Competition
Virtual Reality for Education: The Water Cycle Game

I. Competition Rules

1. Only **IEEE UAE Students Members** are eligible for this competition.
2. Each institution can submit a maximum of two teams in this competition.
3. Each competing team shall have no more than five students.
4. The contestants shall not use any unauthorized or unlicensed software.
5. The source code and all relevant documentation shall be made available to the competition coordinator and the judges on the day of the competition.
6. Salient features of the software shall be documented with the aid of an A1 size Poster. A brief user manual shall also be provided.

II. Project Summary

Virtual Reality (VR) is now seen as one of the key technologies that is going to shape the future of computing. Virtual Reality is finding its way into various applications. One of the important applications that VR is seen to play an important role in is education. The purpose of this project is to design a Virtual Reality application for school students to learn about the earth's water cycle. The game will introduce the different concepts involved in the water cycle. The App will need to have a level of interactivity, using at least one possible interaction method (e.g. Gaze Control or Bluetooth controller). The VR App will also include at least one interactive mini game on the earth's water cycle that uses the interaction methods (such as Gaze Control).

III. Required Hardware/Software

The following hardware is required to implement and present the project

1. Google Cardboard Headset:

This is a very low-cost headset platform whose specifications has been developed and published by Google. Many low-cost (as low as AED 5.00) implementations of the Google Cardboard can be found and bought from electronics shops and also online marketplaces such as souq.com. Google Cardboard sets with Bluetooth controllers are also allowed.



2. Mobile phone compatible with the Google Cardboard:
Can be either an Android or an iOS phone.
3. A PC /Mac for cross-developing the application on.

The following are the software components can be used for the software development of the VR App:

1. Unity

<https://store.unity.com/>

It should be noted that any alternative cross-development package is possible (e.g. Unreal).

2. Google VR SDK for Unity

<https://developers.google.com/vr/develop/unity/download>

III. Technical Specifications

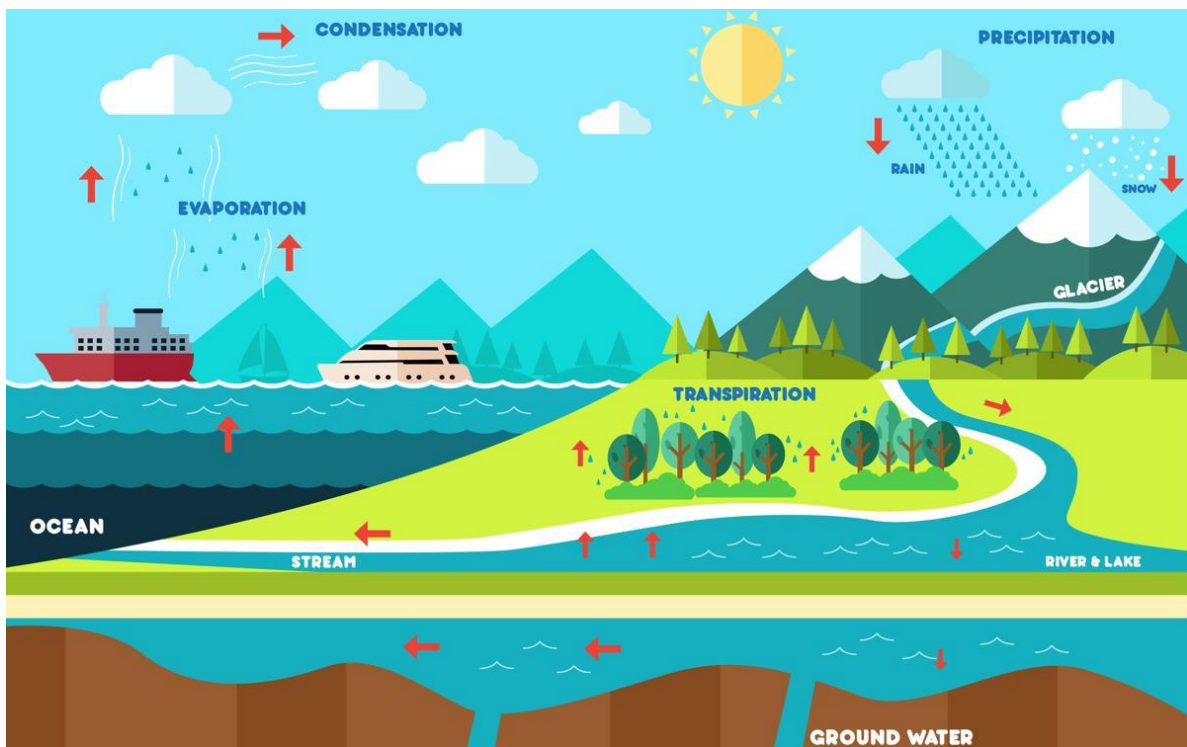
The Water Cycle App will be designed to provide a virtual environment to students, enabling them to learn about the earth's water cycle through entertainment. The YouTube videos below explain some background information on the Earth's Water Cycle.

https://www.youtube.com/watch?v=luSbuhg_qMc

<https://www.youtube.com/watch?v=al-do-HGulk>

<https://www.khanacademy.org/science/biology/ecology/biogeochemical-cycles/v/the-water-cycle>

The following infographic provides a nice overview of the components of the earth's water cycle.



Source: <https://sciencestruck.com/water-cycle-diagram>

The following features are the minimum required to be included in the App design:

1. Allow the user to be able to tour the water cycle geographic locations. The flow implemented in the App should include the path shown in the figure (using the red arrows) at the minimum. Extras will be awarded additional points under the "Innovation and uniqueness" scoring category.

2. The user should be able to control his path through the water cycle (either through gaze control or by using the Bluetooth Controller).
3. A robot companion will be available to explain to the user (in text format) the different phases of the water cycle.
4. At least one mini-game will be included in the App. The game should be in an educative form. Example of a mini-game is a game that explores the effect of global warming on the water cycle. The mini-game should be capable of providing a final score for the user after the game expires.

An example VR App on the water cycle is available on Google Play Store under the name of SplashSim: <https://play.google.com/store/apps/details?id=com.splashsim.splashsim&hl=en>

It should be noted that the example App stated above SplashSim is for illustration purposes only. The App does not meet all of the features required under this competition.

IV. Poster and User Manual

The students are required to provide:

- An A1 size poster to provide a concise software description, and depict the technical specifications / methodology / tools / techniques used in the development of the VR application.

V. Testing Procedure

Each team must provide A VR headset mounted with a smartphone device with the executable for the mobile application installed.

The judges will use the Google Headset to test the App including the mini-game.

VI. Evaluation

A panel of three judges, to be selected by the IEEE UAE Students Day Steering Committee, will assess the entries of the competition. The competition criteria that will be used for judging the entries are given below:

<i>Evaluation Criteria</i>	<i>Weight</i>
1. Functionality	50%
1.1 Water Cycle Tour Implementation	20%
1.2 Mini Game	10%
1.3 Robot Guide implementation	10%
1.4 Interactivity implementation. Interactivity through Gaze Control is mandatory. Bluetooth control implementations will be given 5% Bonus score.	10%
1. UI and Quality of Experience Is the app polished? Is the interface clear, simple and well-designed? Does the app crash? Does the app work in a way the user would expect?	15%
2. Innovation and Uniqueness	10%
3. Ease of knowledge delivery	15%
4. Poster	10%
Total	100%