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Module Code: CM3203
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Initial Plan – Virtual Reality Classroom to Gamify Education

My intent with this project is to create a classroom simulation in the Unity engine. It would be primarily for use with virtual reality systems, allowing students to become immersed in their education as well as providing teaching methods that are more fun and engaging. The program would be used in both primary and secondary education upon application of different content to the base framework.
The 3D environment would resemble a classroom, albeit created with low-poly models. It would be navigated via the user selecting areas or features that they want to travel to.
The users would have a relatively large amount of interaction with the systems involved, allowing for manipulation of the included objects and environments. A teacher should also be able to use the program to demonstrate the included "lessons" and environments, adding yet another tool that can improve their teaching methods.
The program could be adapted to higher-level, more specialised education via the expansion of the framework and the addition of extended functionalities.

Project Aims and Objectives

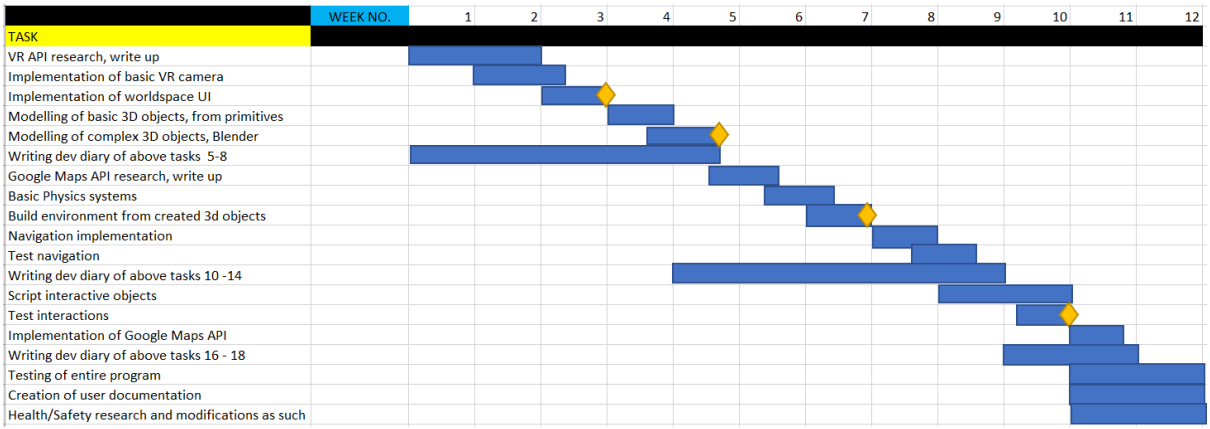
- Implementation of basic VR functionalities
    - VR is the main feature of this program and as such is the most crucial of the planned functionalities. Using the Unity VR API, a basic VR camera would be the first feature implemented that utilises user head tracking in order to move the camera around the world space. A world space UI is the next feature; an ever-present UI that also moves along with the camera that displays more essential information. This UI would be interacted with in the same way as the movement feature, the user would point the cursor at their desired menu option and push a button/click to access it.
- Modelling of 3D environment objects
    - The base objects, that will eventually be arranged to form the various environments within the program, will be created via the combination of geometric primitives within Unity. The more complex objects will be created in Blender and then imported into Unity.
    - These objects include typical classroom furniture, objects used for the exemplar physics and chemistry simulations etc.
- Implementation of exemplar educational content
    - A small content pack containing some "lessons" on various subjects will be bundled with the final program. These will include basic mechanics simulations, virtual representations of chemistry experiments, 3D mathematical geometry, virtual visits to historical and geographical sites etc.

This will be simple in nature and will exist only to demonstrate the program's core functionalities.

- Implementation of Google Maps API
  - The Google Maps API, which has a Unity version found on the Unity Asset Store, will be implemented as it contains Google Street View support. This will allow the aforementioned virtual visits to geographical and historical sites, through simple input of location data. As it is a familiar program to many, it should be easy to use, even within the VR environment.
- Implementation basic physics systems for simulations
  - Though Unity has its own baked in physics engine, I wish to create some specialised smaller physics "engines" to handle some of the virtual mechanics simulations to correctly reflect their real-world counterparts.
- Creation of navigable environment via arrangement of 3D objects
  - The entire 3D environment, or set of environments, will be constructed by arranging the previously create 3D objects. It should resemble a stereotypical classroom, with desks and blackboards.
  - This environment would then be made navigable, the user would simply have to point the cursor towards their intended locations and press a button/click. They would then be virtually "teleported" to their desired location.
- Conversion of 3D objects into interactables with their own unique functionalities
  - The previously created 3D objects would then have relevant script components attached, if they were required to be interactable. These scripts could be simple i.e. to make the object move, or more complex, for example, if the object were to be manipulated, destroyed or reconstructed by the user.
- Creation of simple, effective user documentation to ensure ease of use
  - Near the end of development, the program will be reviewed and an appropriate user guide and documentation that could be used to teach the user how to use the program and how to import/create customised content.
- Ensure program is intuitive/safe/easy to use
  - Upon completion of development, an extensive testing period would be undertaken to ensure all functionalities work as intended, the program has a relatively intuitive control system which is easy to use by all ages.
- Consideration of user health in relation to virtual reality
  - Some considerations will be taken at the end of development to combat some minor health issues caused by virtual reality, such as motion sickness or photosensitive reactions.

Attached below is a Gantt Chart displaying the identified tasks and the weeks in which I plan to do said tasks.
The tasks are derived from the above aims and objectives, which are broken down into their

components, creating small, achievable tasks that when brought together should produce the intended output program.



Milestones are displayed via the yellow diamonds:

1. Base VR framework and UI implemented (Review Meeting with Supervisor)
2. 3D objects created
3. 3D environment created (Review Meeting with Supervisor)
4. Navigable environment and interactable objects (Review Meeting with Supervisor)

At the end of week 12, I plan to have a final review meeting with the project supervisor to discuss the overall project and have a brief demonstration before the project viva.