**Title of your project:**

**Merge Sorting Game**

**Student names:**

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**Project description:**

Data Structures serve as the foundations for some fields of computer science and are one of the essential skills for programmers to be familiar with.

Part of the problem is that many students find the material particularly abstract, challenging, and boring. This requires the use of approaches and tools to improve student engagement and performance.

We believe that interactive educational games are a powerful tool to encourage students'’ engagement by adding tangible experiences.

As students who study data structures, we decided to design tools to help students better understand abstract sorting algorithms.

We believe that the interactive visualized merge sort algorithm in our platform will help students to understand the concepts and logic behind it faster, and will drive them to keep on exploring.

Trial and error is an integral part of the learning process. Our vision is to provide data structures students with the opportunity to experience it firsthand while actually performing the algorithm step by step.

**Operational feasibility**:

Where, when and how does your proposed system work?

**For a VR training/online learning project.**

**Will it be used for the entire or partial lecture? if partially, how long will it be used each time?**

Merge sorting VR learning platform will be used for academic purposes. The platform will serve as a tool for understanding the logic and principles of sorting algorithms, specifically merge sorting. It will not replace a lecture, rather help users understand how to implement the logic into actual code. It will be implemented depending on the academic environment expectations, meaning that students who are struggling to understand merge sorting will require high use of this VR game.

**Do you plan to include any features to improve user engagement? Will users feel tired using the VR app? is there any way to improve usability?**

One way to improve user engagement is to allow the user to move freely around the VR environment. Interacting with objects and rearranging them according to the sorting algorithms will allow the user to be fully engaged and involved in the different steps of the process.

**Does the VR app require training for users? if yes, how do provide training or tutorials? who will provide it?**

Yes, we will implement the practice mode. They can practice until they are comfortable with their knowledge, and then play the game to evaluate their skills. It will also have an animation video as a tutorial.

**Will the VR app place any new demands on users or require any operation changes? For example: students can learn new concepts using the app, or students can work together on a project, or it generates more realistic learning environment via the VR app.**

It is individual work, for now, there are no operation changes.

**Is there any potential risk when users use the app?**

There are no risks.

**Will the user be involved in planning the VR app right from the software development project start?**

Yes, we need feedback from the users in order to make the app usability great.

**Technical feasibility**

VR functions:

Do you need to include the following VR interaction and features in your app? If yes, please check the box in front of each feature and provide more details. Please state if you think you have difficulty to implement each feature.

Note: please think about whether the feature is included in the one of unity tutorials.

1. [Yes] allow user to teleport to different places. Do the Unity tutorials include this feature? Yes / No
2. [Yes] allow users to freely walk around. Do the Unity tutorials include this feature? Yes / No
3. [Yes] allow users to grab an object and place it to different location. Do the Unity tutorials include this feature? Yes / No
4. [Yes] allow users to click a specific object. Do the Unity tutorials include this feature? Yes / No
5. [Yes] allow users to trigger an event. Do the Unity tutorials include this feature? Yes / No
6. [No] allow VR objects collide. Do the Unity tutorials include this feature? Yes / No
7. [No] allow multiple users to voice chat in VR environment, Do the Unity tutorials include this feature? Yes / No
8. [Yes] allow users to play audio clips in VR environment, Do the Unity tutorials include this feature? Yes / No
9. [Yes ] allow VR objects to perform simple animation in VR environment. Do the Unity tutorials include this feature? Yes / No
10. [No] allow users with visual impairment to access the VR environment. Do the Unity tutorials include this feature? Yes / No
11. [ Yes] require any user input? Please check [ ] camera, [ ] keyboard, [Yes] bluetooth controller, [ ] hand gesture or [ ] onboard sensors and others [ ] \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ? Please provide more details how the above input will be utilized in the VR app, for example: speech input can be used as input to control the app (using Unity speech recognition plugin), onboard sensor

VR modeling:

1. list VR objects
   * blocks
   * room
   * menus
2. list VR environment
   * main-room
   * practice - room
   * game - room
3. list VR avatars
   * no avatars for now

Additional features:

1. User management
2. Score/grade/performance update, calculation, storage and display
3. Virtual object management

Others:

* Does Unity offer you enough features to develop your app? If not, please explain.
  + Yes.
* Does Google cardboard mobile VR offer enough VR features for you to develop your app? Why?
  + Yes, we are going to use cardboard mobile VR, it has enough assets for us to use.
* Is there any technical difficulty of the VR app development that you think you may have? Be as specific as possible.
  + teleporting
  + animation
* List the VR components that you anticipate in your proposed system? for example: in a VR physics lab, need to include
  + rigid body simulation,
  + physics activity simulation,
  + the interaction between user and objects in the lab (e.g. grab a block), and so on.
* List other functions in the app, for example:
  + SignUp, SignIn, SignOut
  + Create list
  + GenerateList
  + GetHint
  + MergeSort
  + GetScore
  + SelectMode
  + ViewStats