GNG1103
Engineering Design

Deliverable E

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Team #: F08

Team Partners: Abdulla Albannai 300094358, Sofia Portela Granados 8846626, Kelly Shigeishi 300130179, Duncan Sheridan 300132531

Introduction:

The problem statement is to create an interactive, innovative , user-friendly and cost effective VR learning experience that helps students currently enrolled in Organic Chemistry visually understand chemistry molecules in 3D. Three prototypes are required with only the last one being comprehensive. The first prototype will here be only static models to show the different visualistation styles and to prove the viability of the forms. The second will be of the most important feature: the collision modelling engine. At this stage it will not have the final graphics. Finally, these will be integrated and various other assorted features will be added. The learning objectives and common mistakes/ misconceptions will be addressed: the final prototype will be able to assess the students' knowledge after each tutorial or VR learning experience.

Notably, because the product is software, there are not yet any foreseeable expenses; however, this may change if purchasing scripts etc. becomes necessary for reasons of skill or time. There is a $CAD 100 limit we can use in the unity store yet will try to create everything using the free molecules available or by designing them in solid works and importing them.

Milestones:

<u>First Prototype: Static Demonstration of Visualisations (1 March)</u>

Tasks:

- make 3-D model of molecule with different representations
- ball and stick (1 day)
- space filling (1 day)
- orbitals (2 days)

<u>Second Prototype: Collision Modelling (8 March)</u>

<u>Tasks:</u>

- produce models of solid figures of analogous form to molecules(1 day)
- create script to determine if collision attitude is correct(3 days)
- create script to determine if collision energy is sufficient(2 days)

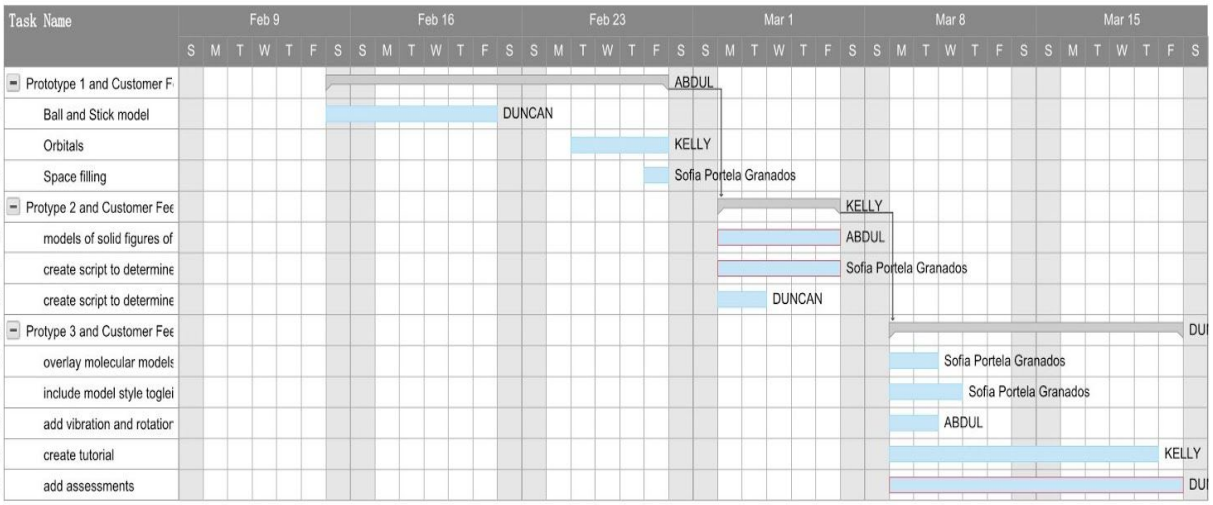
<u>Third Prototype: Comprehensive prototype (22 March)</u>

<u>T</u>asks:

- overlay molecular models onto collision modelling engine(2 days)
- include model style toggling control(1 day)
- add vibration and rotation animation(2 days)
- create tutorial(2 days)
- add assessments(2days)

F8 Chemistry software

smartsheet



Risk and Contingency , Test Plan

There is a risk that realistically modeling internal vibration and rotation will prove to add undue complexity. If this is the case, it may be better to show it with a simple animation. Additionally, orbitals may pose a challenge at the moment of collision due to a distortion of their forms. Thus some loss of realism at that instant may be unavoidable.We will continue to educate ourselves from youtube videos and asking the TA and Professor if we are not able to figure it out. Will test our prototypes at least 3 times before presenting it to the client. We have already shown an image made in solid works to the client and received feedback the client told us that he would like us to demonstrate that the reaction takes place in a solution first and how the molecules collide.

Conclusion:

We developed a Gantt chart of the tasks that need to be completed, with approximate dates of when each task needs to be finished, and we distributed tasks to each team member. We based the deadlines off of the milestone dates, and made sure to give ourselves plenty of time for each task, so that we are able to finish each task with high quality and no lack of time. In case certain aspects of the project do not go well, there are contingency plans made, so that we are able to get the most important aspects done. In order to do a good estimate of time to be taken in each task we utilized the formula taught in class :

$$Best\ estimated\ duration = \frac{3Pessimistic\ Duration + Optimistic\ Duration}{4}.$$

With an approximate total for the parts, we made sure to be under the given budget, so that we have flexibility to get more materials needed while working on the project. This project is a combination of parallel and series tasks. In other words a coupled tasks are group efforts with dependencies. We will try to work in parallel as much as possible in order to get the project done as quickly as possible and avoid dependencies.The critical path is a sequence of tasks that must be finished before the project can be finished . In this grant chart prototype 1 must be finished before the dependent one can start so if the prototype 1 can't be finished on time, then the whole project will take longer to the same extent. The critical path flows from prototype 1 → prototype 2→ prototype 3. In addition we will continue to update the Gantt chart every week to keep the group on track.