

Sugarizer

Proposal - Google Summer of Code 2024

Personal Details

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- Country of Residence: India
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- Typical Available Working Hours: 09:00 - 20:00 (IST); 23:30 – 10:30 (ET); 03:30 – 14:30 (UTC)
- Language: English

Previous contributions to Sugar Labs projects -

1. Musicblocks v3-

- [#3705](#) (merged): Allows the vspace block to connect to the switch clamp.
- [#3693](#) (merged): Implements backspace functionality in the dissect number input field in the rhythm block.
- [#3444](#) (merged): Solves the issue of the browser crashing when the forward block has a very high input value.
- [#3718](#) (merged): Fixed corner cases with the silence block.
- [#3736](#) (merged): Fixed more corner cases with the silence block.

2. Musicblocks v4-

- [#381](#)(open): Updated the Dev.md file for better readability.

Previous Projects Around 3D models -

- NFT website
 - A static website that displays loaded 3D models built in Blender.
 - Technologies used-
 - ThreeJS
 - ReactJS

Other Projects –

- On campus Carpool Website
 - Users can create, join, and manage carpool rides, users can also accept or decline ride requests.
 - Used Google Maps API to autocomplete source and destination fields.
 - Technologies Used – ReactJs, NodeJs, MongoDB.
- Decentralized Donation Platform
 - Has the functionality to let users fund contracts using cryptocurrency, withdraw funds, and mint NFTs.
 - Technologies Used – ReactJs, NodeJs, Hardhat, EthersJs, Solidity

Project Details

Project Title

Sugarizer 3D Volume activity

Link To Partially Completed Project - <https://3d-volume-activity.vercel.app/>

(Note - Prior to usage, I recommend viewing the project tutorial via the '?' icon on the toolbar)

What are you making?

The 3D volume activity is a Sugarizer activity made to teach its users about different 3D volumes like cubes and octahedrons. It provides an interactive platform where users can visualize, manipulate, and explore various volumes to enhance their understanding of geometric concepts in a playful and engaging manner.

Featuring intuitive controls and vibrant visuals, the activity encourages hands-on exploration, enabling users to zoom in for detailed examination and interact with various customization options. Whether adjusting colors, selecting different volume types, or experimenting with different board backgrounds, users have the freedom to tailor their learning experience to suit their preferences and learning styles.

The different board backgrounds also have different frictions thus also showing the users how the volumes interact with varying frictions.

Furthermore, the activity promotes collaborative learning by facilitating shared experiences among connected users. Students can engage with peers, exchange ideas, and collectively deepen their understanding of 3D volumes.

I have also added functionalities that are available in other Sugarizer activities to maintain the consistency of the software.

How will it impact Sugar Labs?

Adding the 3D volume activity to Sugar Labs will fill a notable void, it will provide users with a specialized platform for exploring and manipulating 3D volumes. Unlike existing activities using 3D models such as the Planets activity, which concentrates on 3D planets, this new activity will facilitate interactive learning and experimentation with different volumes. It will cater to diverse learning styles and encourage collaboration; it enriches the educational experience within Sugarizer while deepening comprehension of geometric principles.

What technologies (programming languages, etc.) will you be using?

The primary programming language for this project is JavaScript, selected for its versatility. The additional frameworks utilized include:

- Three.js: Employed for displaying all the 3D volumes and the board. Three.js was chosen for its open-source nature, lightweight footprint, and proven track record in other Sugarizer activities like the Planets Activity.
- Cannon-es: Employed to add real world physics principles to the volumes and the board, it handles impacts and collisions between volumes. Cannon-es is a maintained fork of the original Cannon.js library. This choice was made because Cannon-es continues to receive updates, releases and is still maintained, whereas the original Cannon.js library has not seen a release since 2015.

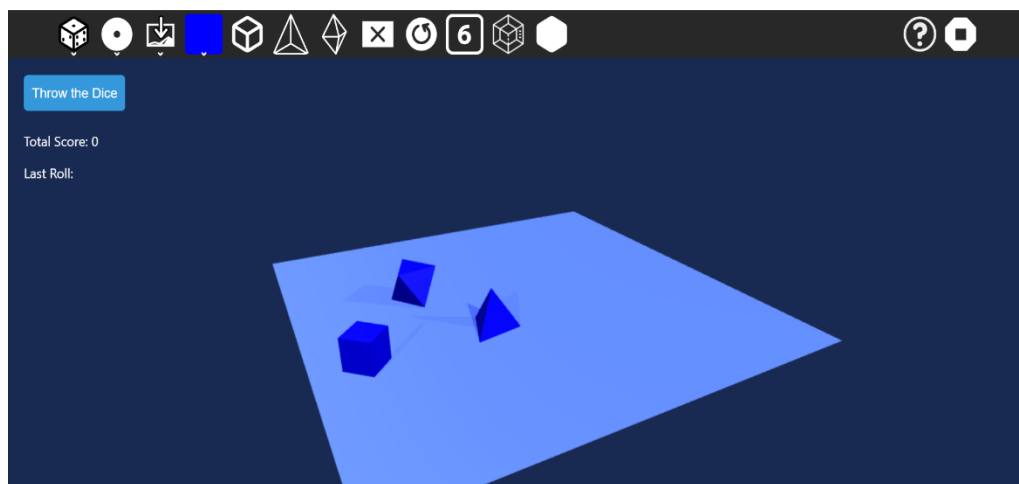
Implemented Features

I have successfully implemented nearly all features outlined in the [Ideas-2024.md](#) file for this activity. Below, I present the features that have been integrated into the activity:

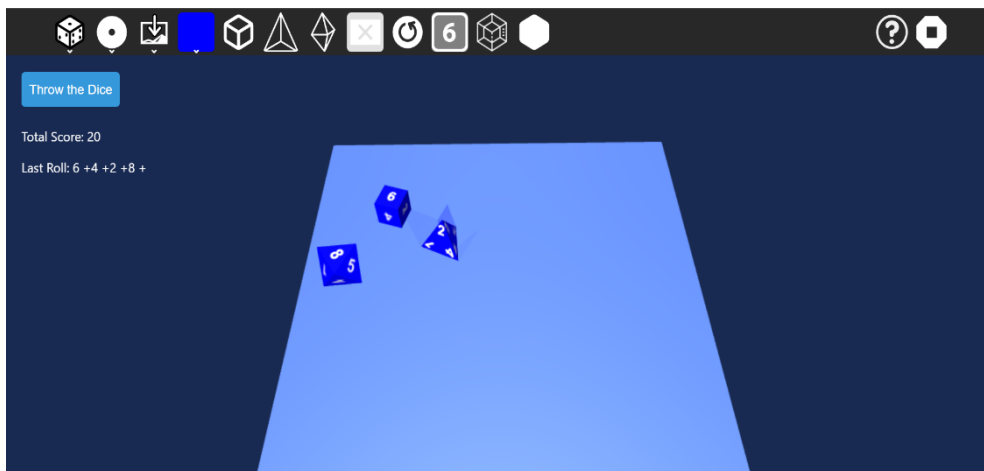
1. Adding volumes to the board

I have integrated adding three types of volumes to the board – Cubes (size 6); Tetrahedrons (size 4); Octahedrons (size 8). These can be added in three types – Without numbers on their sides; With numbers on their sides; Semi-Transparent (with a wireframe structure).

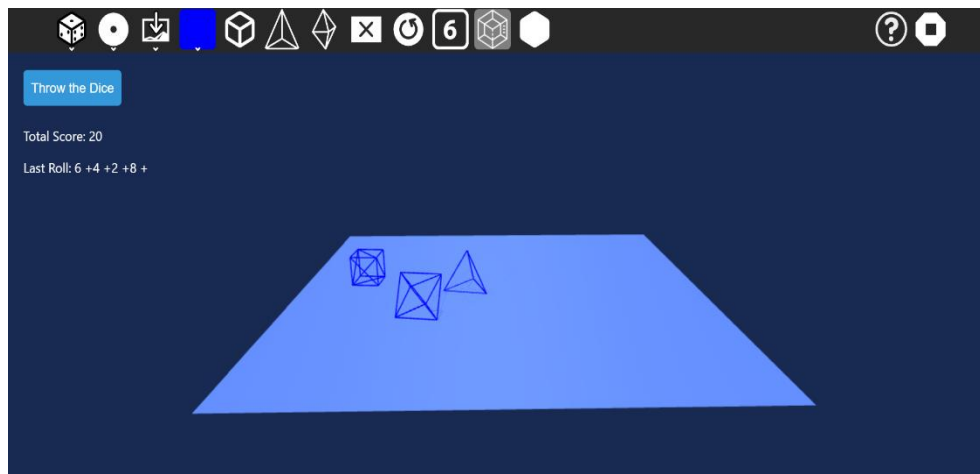
Users can add volumes to the board simply by selecting the type of volume they want to add from the toolbar and clicking anywhere on the board. This functionality is similar to the PhysicsJs activity which lets users add 2D shapes in a similar way.



If the users want to add a numbered volume, they can do so by selecting the number icon from the toolbar along with the type of volume they want to add and click anywhere on the board.



The users can add the semi-transparent volume in the same way as the numbered volume but instead of the number icon they must select the tesseract icon from the toolbar.

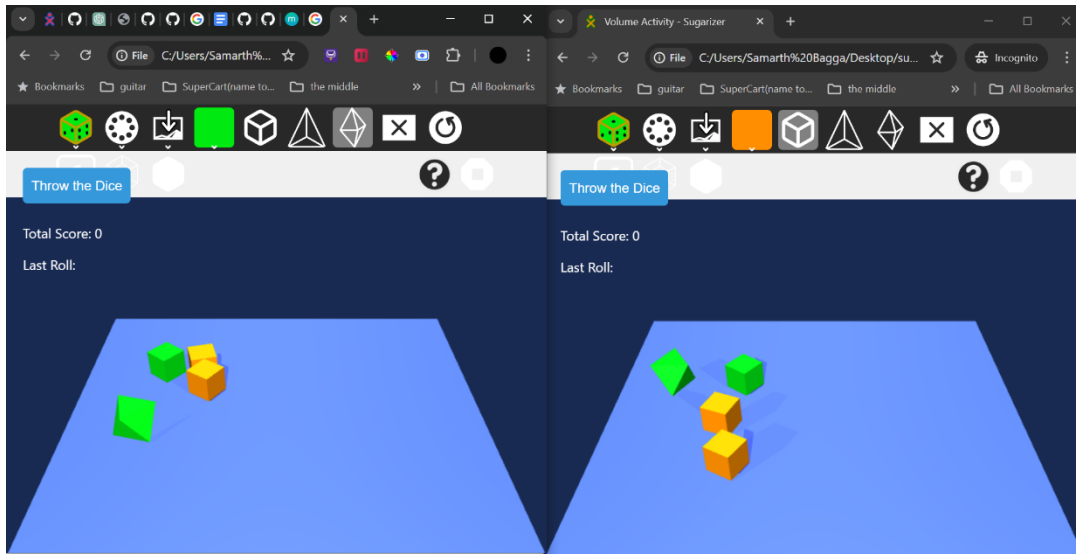


2. Removing volumes from the board

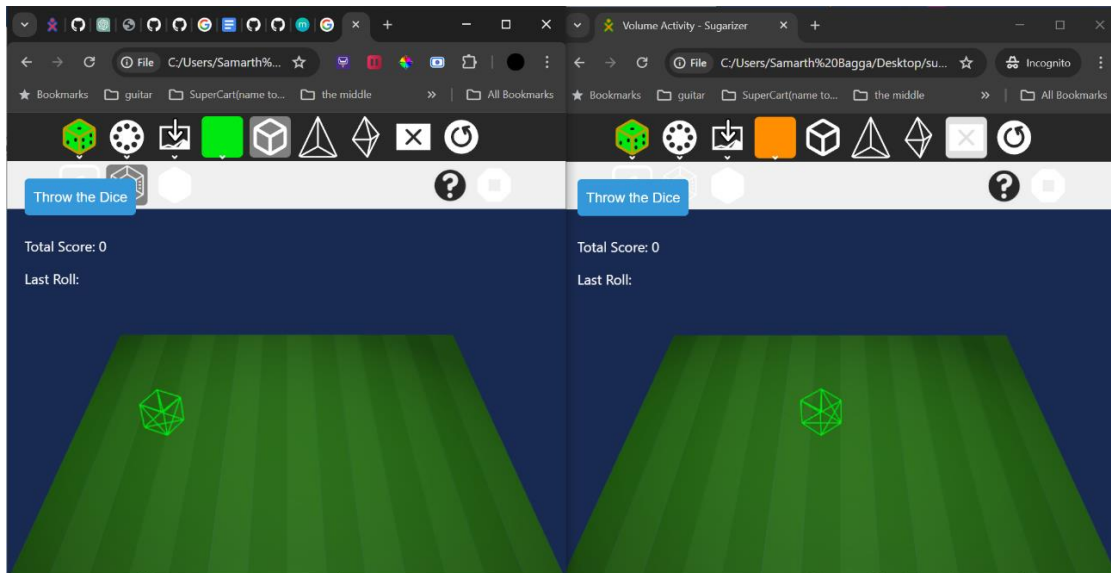
This feature again has been inspired from the remove mode of the PhysicsJs activity. To remove volumes from the board, the users need to click on the remove icon from the toolbar and then click on the volumes they want to remove from the board.

3. Sharing the activity

Users can share the activity on the server, allowing others to join and participate. Once joined, users can freely interact with the board and use all the functionalities. However, please note that this functionality is not working on the Vercel link provided as the link is just for the volume activity and does not contain the Sugarizer server implementation; instead, one can clone and run the repository provided in the personal details section of this proposal.

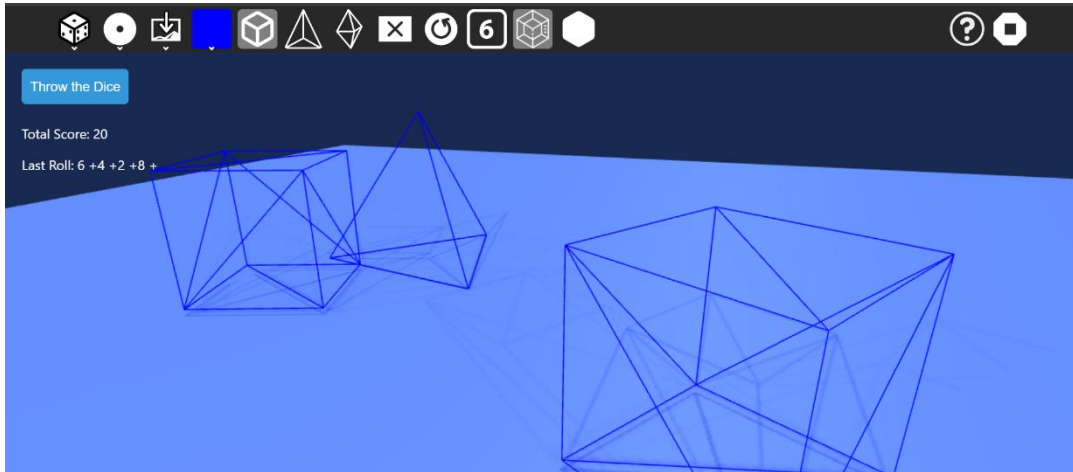


Currently, there is a known issue where the positions of the volumes may differ among connected users. This discrepancy arises from the random impact forces applied to the objects, intended to simulate the unpredictable shaking of the volumes. If selected, I will fix this issue in the coding period of GSoC.

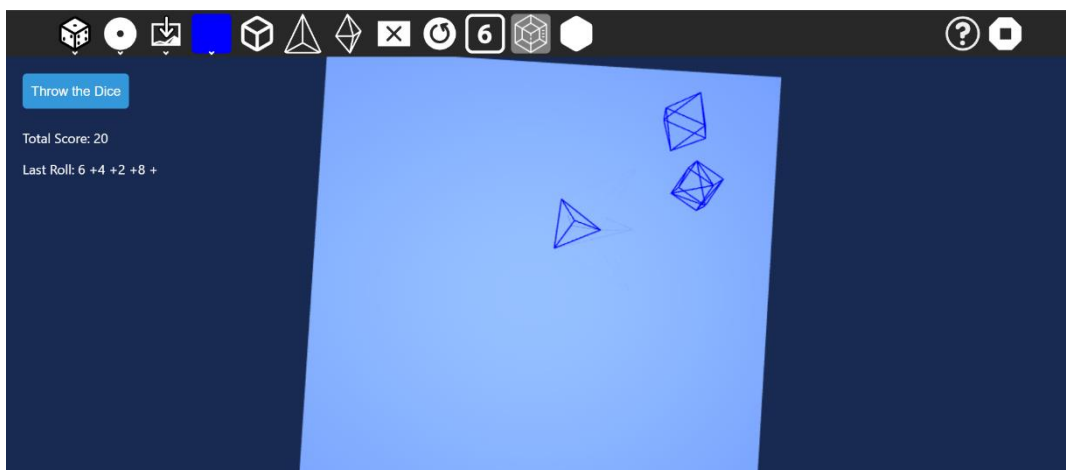
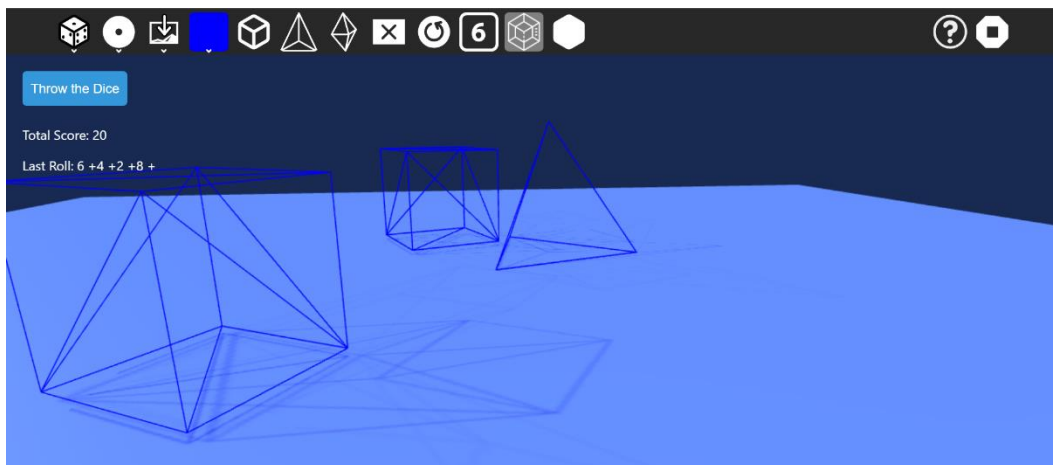


4. Zooming/Rotating the board

Users can easily zoom in or out on the board using their trackpad, scroll wheel, or touch gestures, enabling them to view volumes up close or from a distance with seamless control.

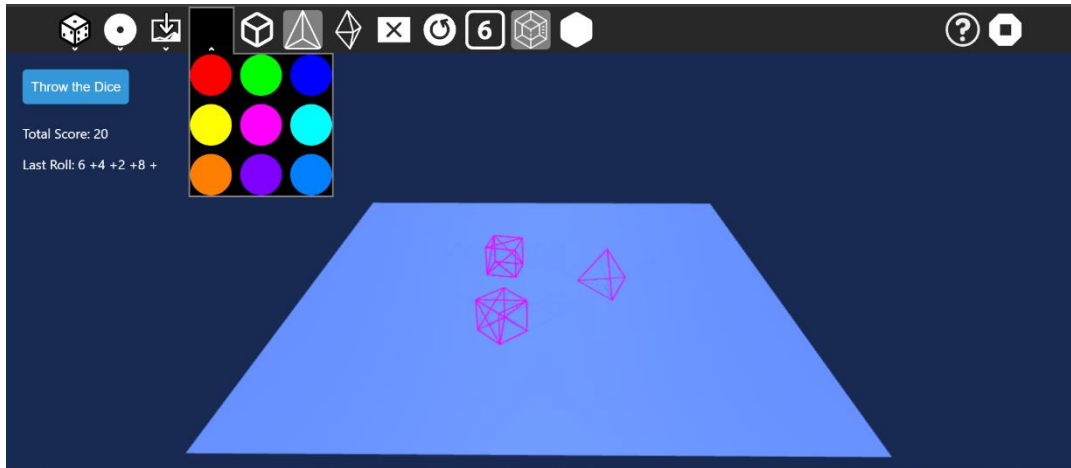


Users can manipulate the camera angle, providing flexibility to view the board from various perspectives. Simply by clicking and dragging the cursor towards the desired direction or through touch gestures, users can rotate the board.



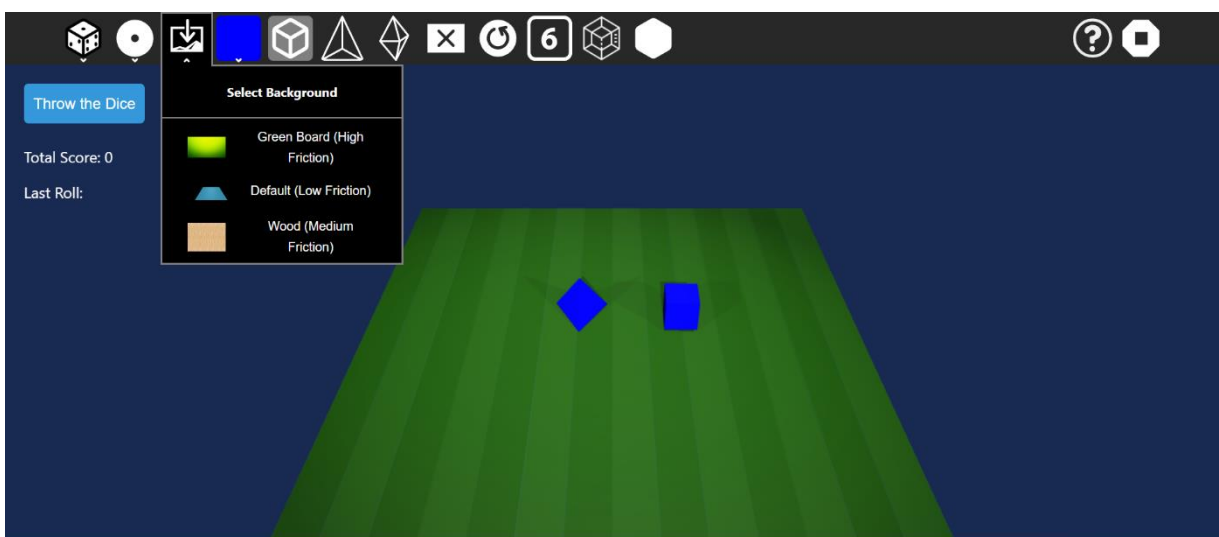
5. Changing volume colors

Users can change the colors of the volumes through the color palette. The default text and volume colors are taken from the buddy colors. But if no buddy colors are provided then blue as volume color and white as text color are used by default. This feature has been inspired from the Paint activity.



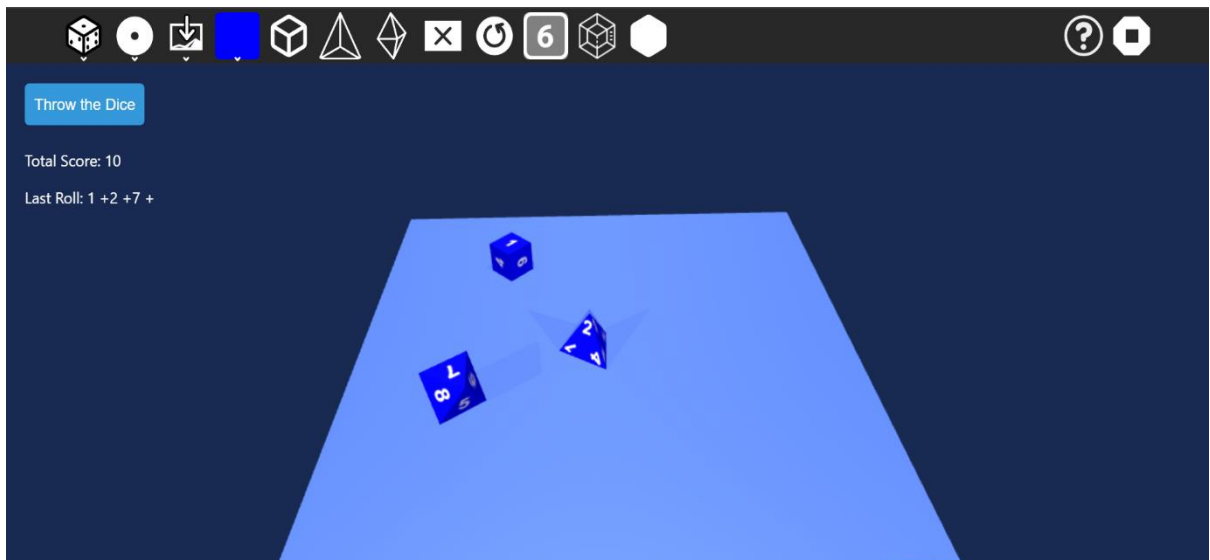
6. Changing board background

Users can change the background of the board. All the backgrounds have different frictions. Currently there are only three backgrounds available, I look forward to adding more.

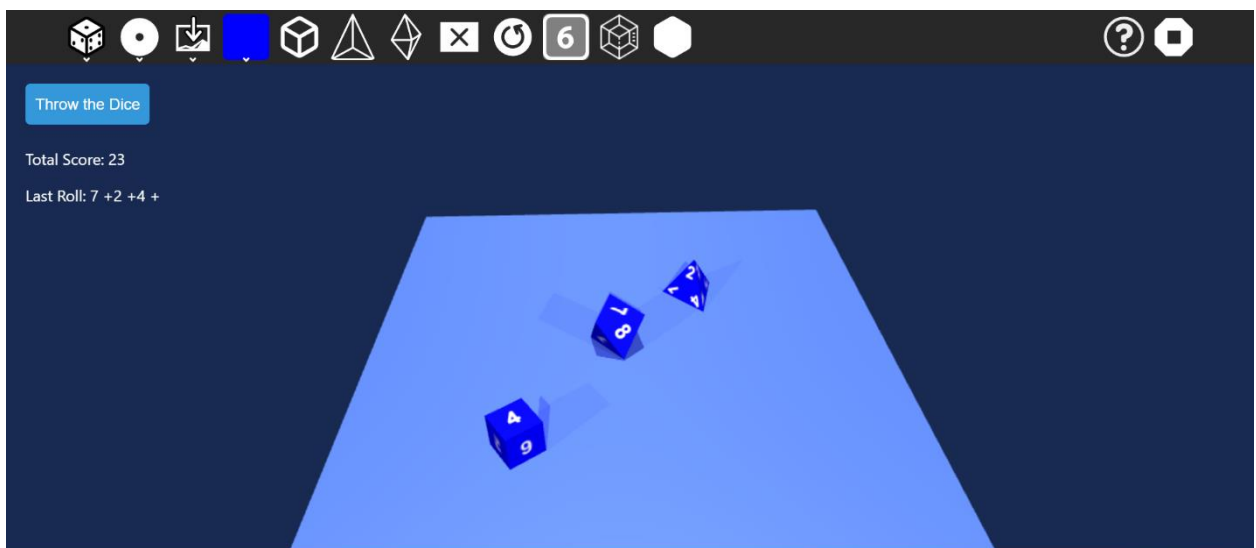


7. Getting the scores for the numbered volumes and shaking the board

Users can add numbered volumes to the board and calculate the total sum of the numbers facing upwards.

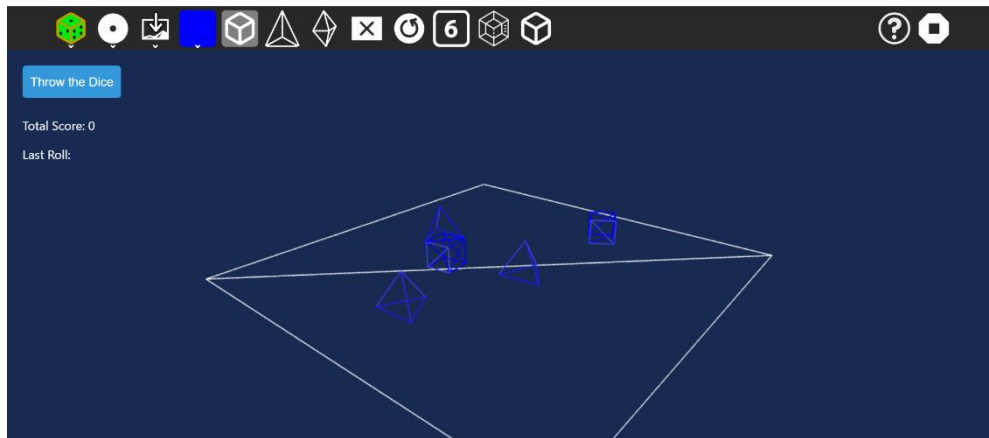


Users can shake the board by clicking on the throw dice button and get new numbers on top.



8. Making all volumes added to the board transparent

Users can toggle the transparency of all volumes added to the board by clicking on the 'toggle transparency' button on the toolbar.



Unimplemented Features

1. Add the three remaining volume sizes – 10, 12, 20.
2. Functionality to shake the board by shaking the device.
3. Improving the UI of the activity and make it responsive for different screen sizes.
4. Expand the selection of background options and include sliders for adjusting the red (R), green (G), and blue (B) values to customize volume colors more extensively similar to the color palette in the Paint Activity.

Timeline

<p>Community Bonding Period (May 1 – May 26)</p>	<p>During this period, I will interact with the mentors and the community and help in any way I can.</p> <p>Also, during this period, I'll release the partially completed activity for community use. Subsequently, I'll gather feedback from the community regarding bugs and suggestions for additional features to be incorporated into the activity.</p>
<p>Week 1 (May 27 – June 2)</p>	<p>Implement the addition of the volume with a size of 10, including its interactions with other volumes and the functionality to retrieve the number displayed on its top face.</p> <p>Provide the weekly progress report to the mentors.</p>
<p>Week 2 (June 3 – June 9)</p>	<p>Implement the addition of the volume with a size of 12, including its interactions with other volumes and the functionality to retrieve the number displayed on its top face.</p> <p>Provide the weekly progress report to the mentors.</p>
<p>Week 3 (June 10 – June 16)</p>	<p>Implement the addition of the volume with a size of 20, including its interactions with other volumes and the functionality to retrieve the number displayed on its top face.</p> <p>Provide the weekly progress report to the mentors.</p>

<p>Week 4 (June 17 – June 23)</p>	<p>Implement the functionality to shake the board by shaking the device and address the corner cases that arise from it.</p> <p>Provide the weekly progress report to the mentors.</p>
<p>Week 5 (June 24 – June 30)</p>	<p>Enhance the user interface of the activity by upgrading the design of the volumes and implementing a functionality to enable users to customize the board's color according to their preferences. Make the activity responsive on various devices.</p> <p>Arrange a demo session with the mentors to showcase the activity.</p>
<p>Week 6 (July 1 – July 7)</p>	<p>Test the activity. Fix bugs and corner cases within the activity for the midterm evaluation.</p> <p>Arrange a meeting with the mentors to ask for feedback before submitting the midterm evaluation.</p>
<p>Mid Term Evaluation (July 8)</p>	<p>Deliverables – Complete activity with all features mentioned in the Ideas-2024.md file.</p>
<p>Week 7 (July 8 – July 14)</p>	<p>Implement the features requested by the community during the community bonding period.</p> <p>Provide the weekly progress report to the mentors.</p>

<p>Week 8 (July 15 – July 21)</p>	<p>Address the volume position inconsistency issue within the shared activity. Enhance the shared activity functionality by identifying and resolving any other additional errors that may arise.</p> <p>Provide the weekly progress report to the mentors.</p>
<p>Week 9 (July 22 – July 28)</p>	<p>Expand the selection of background options and include sliders for adjusting the red (R), green (G), and blue (B) values to customize volume colors more extensively.</p> <p>Provide the weekly progress report to the mentors.</p>
<p>Week 10 (July 29 – August 4)</p>	<p>Release the activity for community engagement and soliciting feedback. Encourage active participation from the community to rigorously engage with the activity and identify potential errors. Conduct follow-up surveys to uncover any previously overlooked corner cases.</p> <p>Arrange a demo session with the mentors to showcase the activity and ask for feedback.</p>
<p>Week 11 (August 5 – August 12)</p>	<p>Fix the new corner cases and work on the feedback provided by the mentors and the community.</p>

Week 12 (August 12 – August 19)	Make the activity production ready. Engage with the mentors for the final time and seek feedback and incorporate any changes they wish to see.
End Term Evaluation	Deliverables – Fully developed activity incorporating both the initially proposed features and subsequent requests, polished to a production-ready state, and refined based on feedback from both the community and mentors.

Engagements during Summer

I have no commitments in the summer. I'll be home for the entire summer.

How many hours will you spend each week on your project?

I have mentioned my typical available working hours in the personal details section and, on an average, will be able to spend 35 hours per week on the project.

How will you report progress between evaluations?

I will ensure consistent progress reporting by sharing weekly updates and scheduling regular demo sessions and meetings with my mentors. Additionally, I'll actively engage with the community via Discord and Matrix, continuously releasing functional iterations for feedback and collaborative refinement.

Discuss your post GSoC plans. Will you continue contributing to Sugar Labs after GSoC ends?

Absolutely, my commitment to Sugar Labs extends beyond the conclusion of GSoC. I am eager to guide aspiring contributors looking to engage with projects within Sugar Labs. Furthermore, I am enthusiastic about assuming additional responsibilities within Sugar Labs and offering assistance wherever needed.