



# Virtual BioChem Lab

SD5\_Stone

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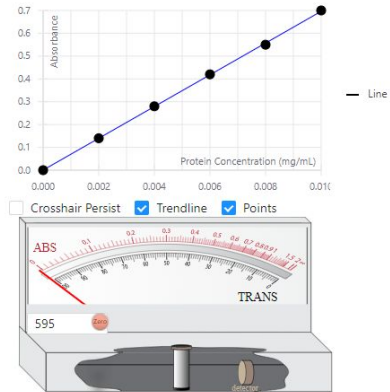
# Addressed Problem

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- Giving the student a virtual environment
- Converting the 2D lab into 3D

Module 1: Protein Concentration Determination

Reset Feedback



The first step is to zero-out the spectrometer. To do this use an empty tube and zero out the spectrometer.

Step 2: Click on Test Tube #1 and drag it into the spectrometer.

	A	B	C	D	E	F
	Tube ID	0.9% NaCl (mL)	Dye (mL)	Mystery Protein mg/mL (mL)	Final protein concentration (mg/mL)	Absorbance Reading
1	#1	1	4	0	0.000	
2	#2	0.5	4	0.5	0.007	



Dr.Shiba: How may I help?



# Addressed Problem

- Using new tools to apply lab logistics
- Students get familiar with lab





# How - Design

# Development challenges, issues, choices, and how addressed

- Coloring fluids
  - Create fluid object inside beaker/tube with unique color for each
- Spectrometer dial inaccurate
  - Accept readings within range
- Unique mystery protein every playthrough
  - Make components modular





# How - Practices/Tools

# Software Development Practices

- Sprint Planning

- 🔍 Scoping

- Google Sheets with Tasks



- 📅 Planning

- Weekly Sunday Meetings








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	A	B	C	D	E	F	G	H
	Week	State	Priority	Owner	Task	Extra info		
1	3	Completed	1	Everyone	Set up communication			
2	3	Completed	2	Everyone	Learn basics of Unity			
3								
4								
5	4	Completed	1	Noah & Alejandro	Create up room			
6	4	Completed	1	Jon & Evelyn	Look for models (beaker, pipet, test tube, etc)			
7	4	Completed	1	Andrew	Create first person controls			
8								
9	5	Completed	1	Alejandro & Evelyn	Create fluid/liquid physics			
10	5	Completed	1	Andrew	Combine all components into one scene			
11	5	Completed	1	Noah	Adding textures and lighting to the room			
12	5	Completed	2	Jon	Pipette HUD (draft is in Drive folder)			
13	5	Completed	2	Noah	Bi-weekly report for Dr. Chen			
14	5	Completed	1	Jon	Get more assets	Get last of the assets from the GitLab issue		
15	5	Completed	1	Evelyn	Create assets in blender	Create glove box asset		
16								
17	6	Completed	3	Jon	Make the pipette HUD transparent (and blue) and add menu for mouse only scroll control			
18	6	Completed	2	Jon & Alejandro	Create asset texture variants	Create beaker and pipette texture variants with different labels from lab		
19	6	Completed	1	Noah	Add notebook for scratch notes	Press a button to open a new scene that has a notebook for you to write notes.		
20	6	Completed	2	Andrew	Work on how to pick up items and "hold" them correctly			
21	6	Completed	2	Andrew	Make it so that items can be set on the table and not fall off or roll off			
22	6	Completed	3	Jon	Add labeling functionality for tubes			
23								
24	7	Completed	1	Noah	Add notebook functionality	Be able to open the notebook and type in it. Possibly do this by pausing other actions while the menu is open.		
25	7	Completed	2	Evelyn	Create mesh for glove box			
26	7	Completed	1	Evelyn	Create lab bench in blender			
27	7	Completed		Evelyn	Write up documents regarding functional requirements of project			
28	7	Completed		Andrew	Export project to WebGL and host it so that Dr. Chen can test it			
29	7	Completed	1	Alejandro	Change color by click for a beaker			
30	7	Completed	3	Jon	Add tasks system			
31	7	Completed	2	Andrew	Look into using git to version control our project			
32	7	Completed	3	Jon	Make objective markers & pipette labels follow player	Always pointed toward player so they are more readable		
33								
34	8	In Progress	1	Alejandro	Add multiple mesh to a beaker (this would split the colors, meaning I can change part of the color for a beaker)			
35	8	In Progress	3	Jon	Add progress bar & current task to top of HUD			
36	8	Completed	1	Jon	Finalize tasks: Make list of tasks based on video shared by Stone			
37	8	Completed	4	Mark	Change to allow buttons to be pressed			

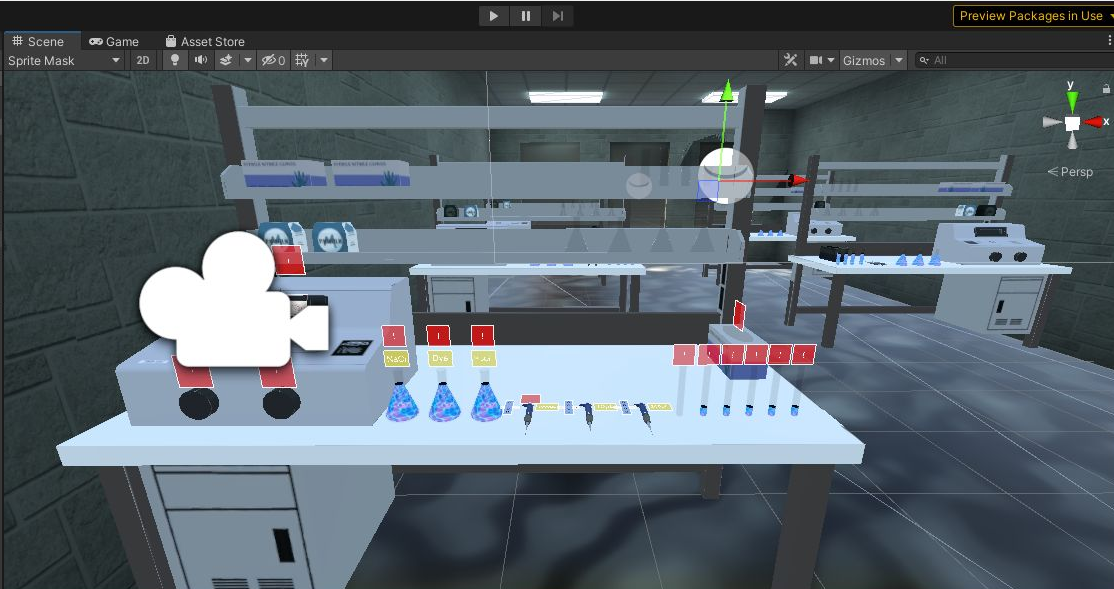
# Tools Used

- Unity 
  - Game engine used for 2D and 3D games
  - Used through scripting games (C#)
- Blender 
  - Creating 3D Models
- Discord & Google Meets   
  - Weekly Meetings

## Tools Used (Cont.)

- YouTube & Google  
  - Tutorials to learn how to use the tools
  - Figuring out how to fix issues

- room
  - Game manager
  - Directional Light
  - Room
  - Lab Table
  - Lab Objects
  - Lab Table
  - Spectrometer
  - Lab Table (1)
  - Lab Table (2)
  - Lab Table (3)
  - Lab Table (4)
  - Player
  - NotebookManager
  - MenuManager
  - EventSystem



Inspector

Changes History

Search

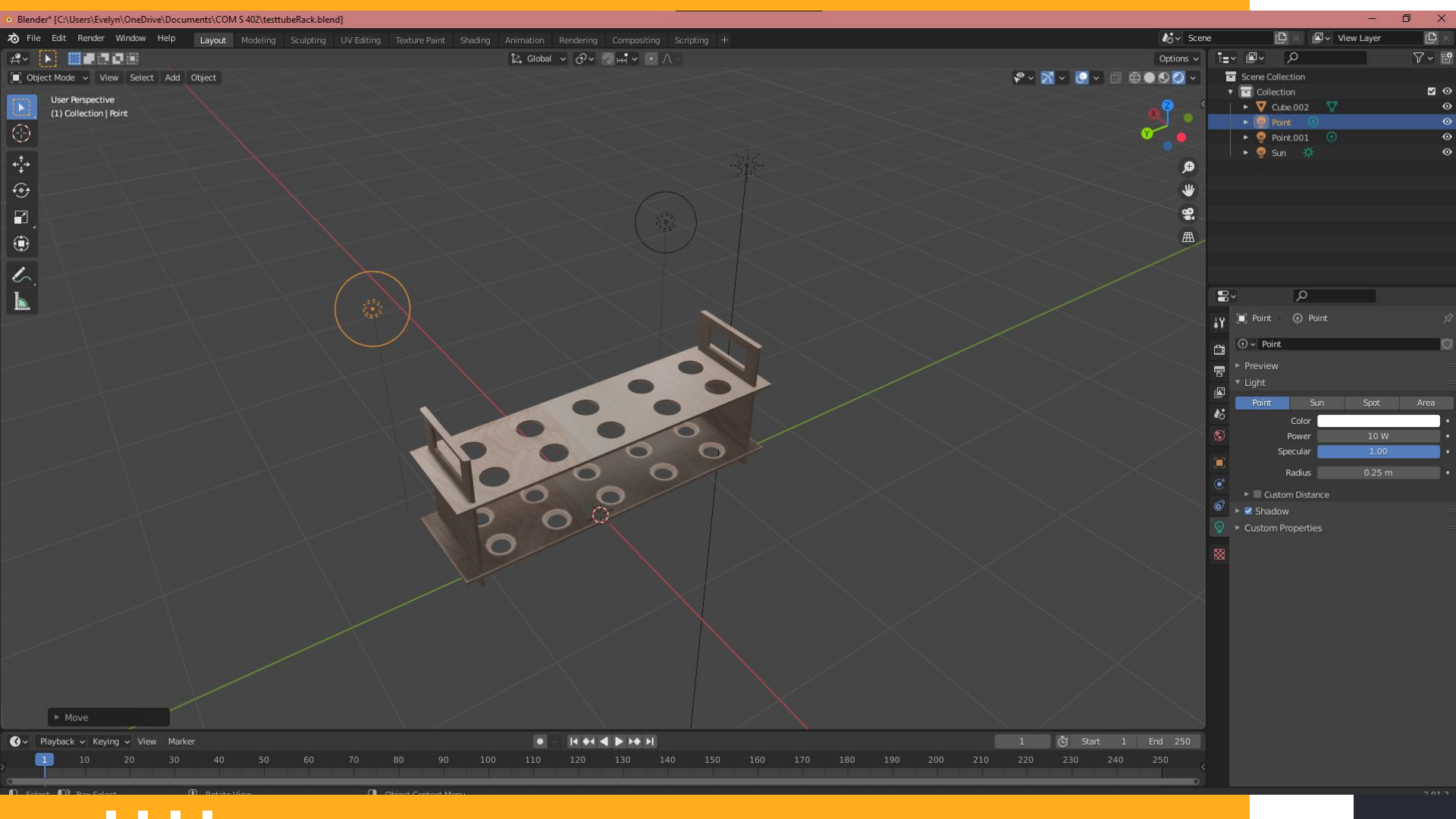
Publish Changes ( 0 )

No changes to display.

Summary

Publish

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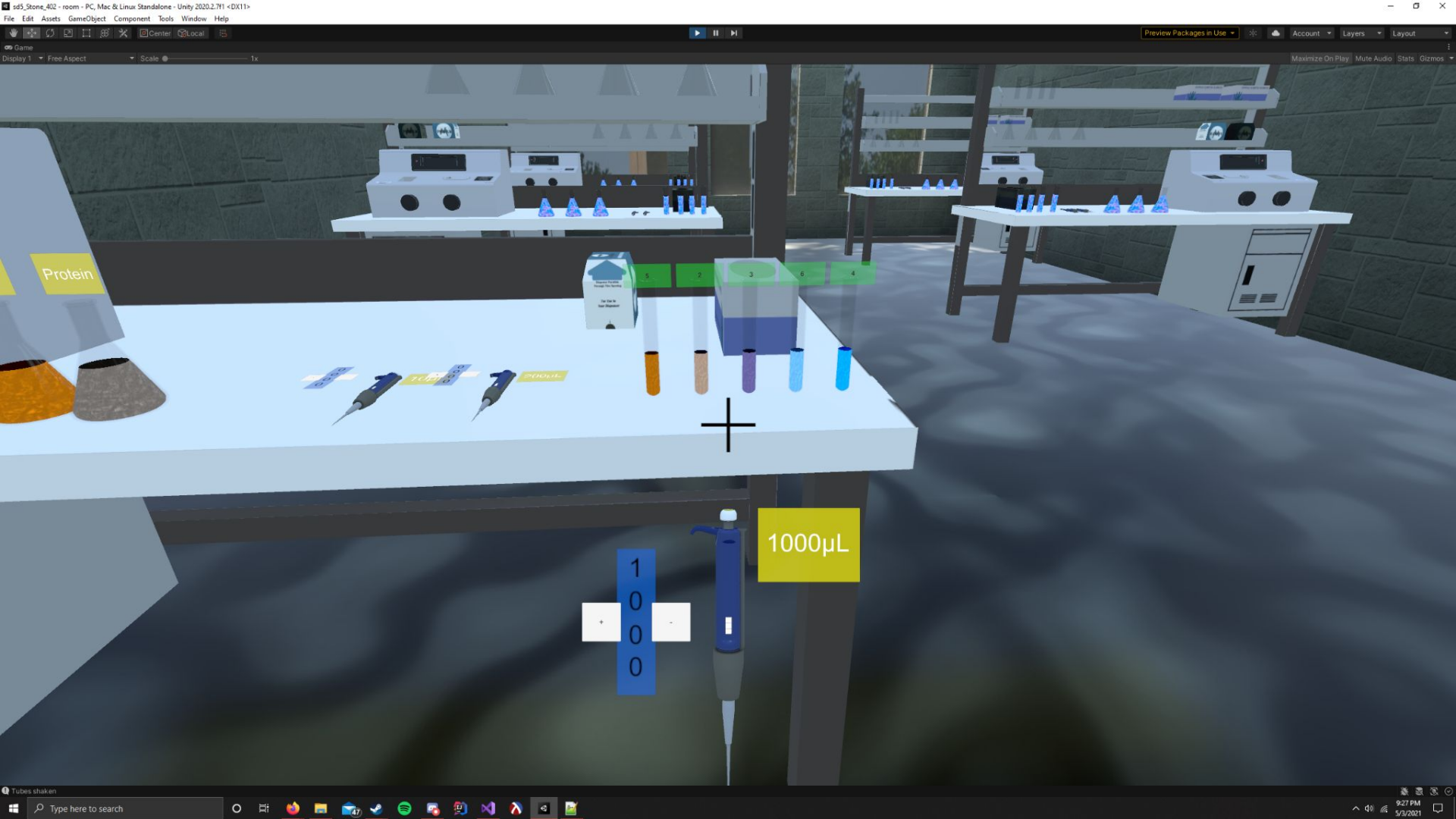




# What Was Done

# What Was Done

- Task System
- Fluids
  - Adaptable heights
- Spectrometer
  - Dial rotation
- Notebook
- Lab environment
  - Models and interactions



Protein

5 2 3 6 4

1000µL

1  
0  
0  
0



Notebook





# Contributions

# Contributions

- Andrew:
  - Player movement, exporting project, new room
- Alejandro:
  - Liquid physics
- Noah:
  - Menu, notebook, communications
- Evelyn:
  - Models, website, keeping us on task
- Jon:
  - Task system, object interaction, a little bit of everything



# Limitations of Design

# Limitations of Design

- 2D lab in react
  - Difficult to reuse code
- Unity/Unity Collaborate
  - Not built for Git
- Open Source
  - Building our own models/fluid system
- Learning new tools
  - Unity, Blender

# Quick Demo

Here's what our project looks like.





# Thanks!

Any questions?