Discovery Lab – Global (DLG)

accelerate innovations … grow innovators

6-Week VR Project

Build, share, and expand a continuously growing base of knowledge

ACCELERATE INNOVATIONS. GROW INNOVATORS.

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The Team - Team Lead and Building Team

[redacted] Who said there wasn't such thing as a floating building? The SADE program has shown me that in VR, anything is possible with enough devotion and time. All it takes is a couple individuals who are motivated and have time to kill.

[redacted] You always have time for the things you make important. That's what SADE has taught me, where I learned to manage a full time job, an internship program, my level of physical fitness, and other priorities all in the same summer!

[redacted] I have learned about a variety of different fields that interest me. I've also gotten to apply a variety of skills and develop new ones in a unique environment. In the end it all comes together into making something we can all be proud of.

The Team - Programming Team

[redacted] On the general side of things, I learned how to time manage my work offline and online. One of the greatest things I can take away from this program is learning how to absorb information in order to beat deadlines. This experience was definitely worthwhile.

[redacted] Among the many things I've learned from this program, I would say the most important would be learning to manage my priorities and focus on what truly matters. That's a skill that will be crucial in my life now and in the future.

Alek (BSCSE): This program has been a great experience for me. I have learned many things, professionally and personal, that I may not have learned otherwise. This was a great hands on, first experience with real-world work.

The Project

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Display how a VR environment can be used by researchers to..

- Create a space in which information can be easily stored, organized, shared and expanded on
- Allow researchers/guests separated by a vast geographical distance to work together on a project without the common issues associated with distance collaboration

The Molecule

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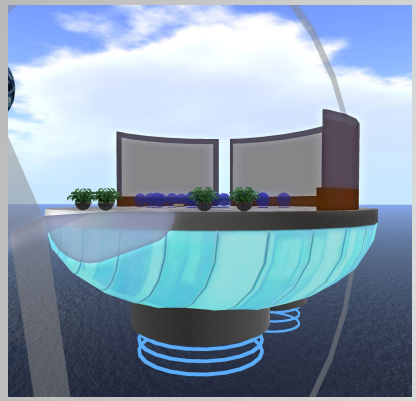
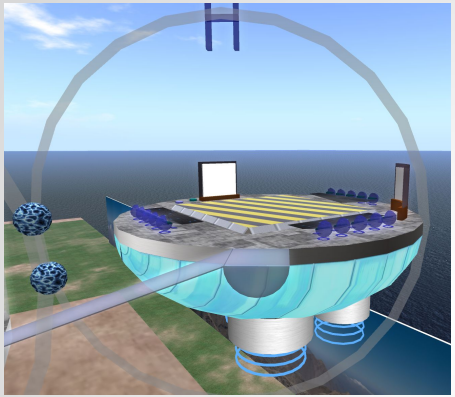
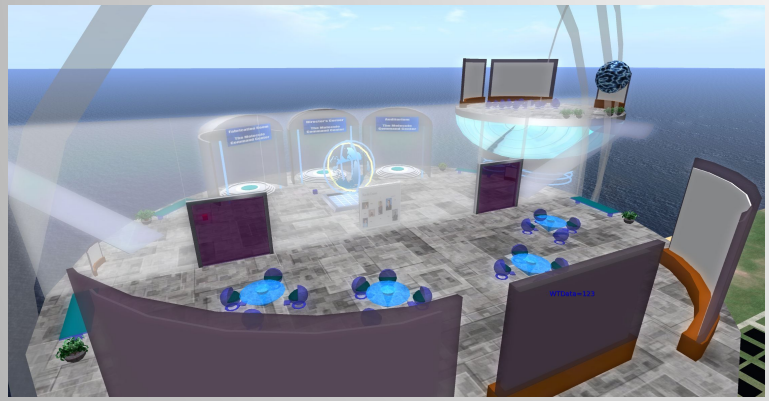


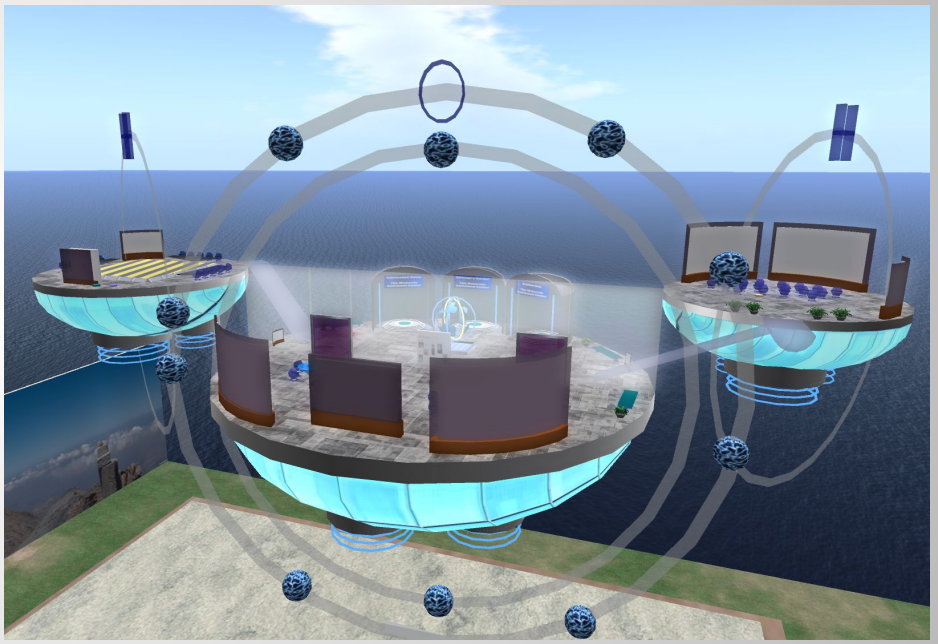
Presentation Room

Fabrication Room





Data presentation and main auditorium



The Molecule V3

The Molecule

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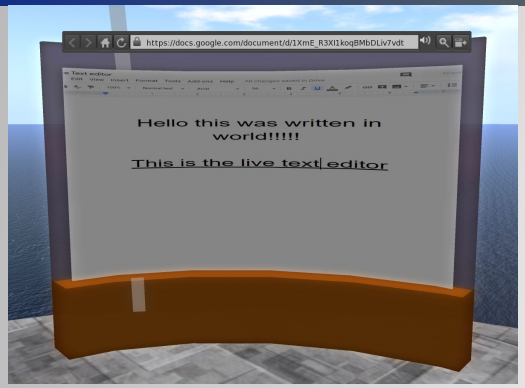
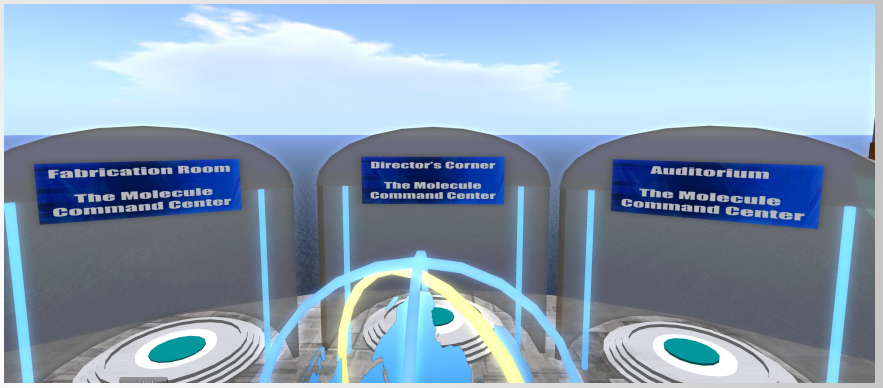
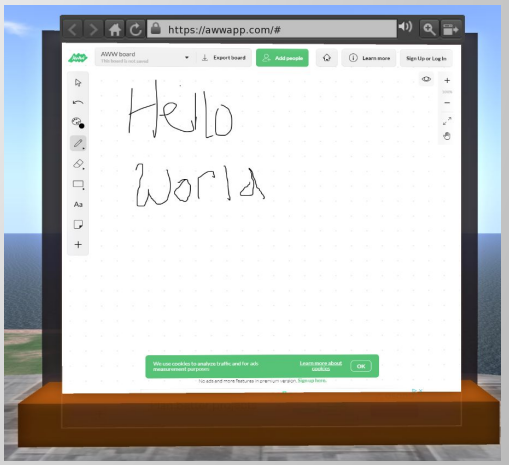


Live Text Editor using Google Docs



Teleport pads going to different sections of OpenCampus

VR Team meeting in The Molecule



In world whiteboard

The Molecule - Coding

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```
default
{
    touch_start(integer num_detected)
    {
        llSay(PUBLIC_CHANNEL, "Sending eMail report now");

        key id = llDetectedKey(0);
        string name = llDetectedName(0);


        llEmail("58009959-3b51-4065-acff-a42abc869ce4@lsl.secondlife.com" , "Testing"
,
            "I was touched by: '" + name + "' (" + (string)id + ").");

         llSay(PUBLIC_CHANNEL, "Email has been sent.");
    }
}
```

Code to send emails

```
vector position;
vector newPosition;
default
{
    state_entry()
    {
        position = (llGetPos() + <0.1, 0.1, 0.1>);
        llSensorRepeat("", NULL_KEY, ACTIVE|AGENT, 5.0, PI, 0.5);
    }
    sensor(integer num_detected)
    {
        newPosition = llGetPos();
        if (llVecMag(newPosition) < llVecMag(position))
        {
            vector oldPosition = llGetPos();
            llSetPos(oldPosition + <0.0, 0.0, 2.7>);
            llSetTimerEvent(5.0);
            llInstantMessage(llDetectedKey(0), "Welcome to the H2O Facility " + llGetDisplayName(llDetectedKey(0)));
        }
    }

    timer()
    {
        vector curPos = llGetPos();llSetPos(curPos - <0.0, 0.0, 2.7>);
        llResetScript();
    }
}
```

Code for the automatic sliding door

Teleport Code with Options

```
listen( integer channel, string name, key ID, string message){
if( channel ==100){
    if( message == "Main Port"){
         llSay(0, "Please right-click and select Teleport" );
       target = <83.17677,475.2215,68.24752+3>;
         offset = (target- llGetPos()) * (ZERO_ROTATION / llGetRot());
        llSitTarget(offset, ZERO_ROTATION);
        }else if(message ==  "Side Piece") {
        llSay( 0, "Please right-click and select Teleport");
        target =< 122.66364, 493.14456, 74.97083+3>;
          offset = (target- llGetPos()) * (ZERO_ROTATION / llGetRot());
        llSitTarget(offset, ZERO_ROTATION);
        }else if( message == "VRA_FabricationArea_V1"){
         llSay( 0, "Please right-click and select Teleport");
        target =< 37.52839, 466.71558, 75.50726+3>;
          offset = (target- llGetPos()) * (ZERO_ROTATION / llGetRot());
        llSitTarget(offset, ZERO_ROTATION);
        }
```

```
    state_entry()
    {
        llSetText("Teleport pad",<0,0,0>,1.0);
        offset = (target- llGetPos()) * (ZERO_ROTATION / llGetRot());
        llSetSitText("Teleport");
        llSitTarget(offset, ZERO_ROTATION);
    }

    changed(integer change)
    {
        if (change & CHANGED_LINK)
        {
            llSleep(1.0);
            if (llAvatarOnSitTarget() != NULL_KEY)
            {
                llUnSit(llAvatarOnSitTarget());
            }
        }
    }
```

Data Transfer - LSL

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```
key requestURL;

default
{

    state_entry()
    {
        requestURL = llRequestURL();      // Request that an URL be assigned to me.
    }

     http_request(key id, string method, string body)
     {
        if ((method == URL_REQUEST_GRANTED) && (id == requestURL) )
        {
            // An URL has been assigned to me.
            llOwnerSay("Obtained URL: " + body);
            requestURL = NULL_KEY;
        }
        else if ((method == URL_REQUEST_DENIED) && (id == requestURL))
        {
            // I could not obtain a URL
            llOwnerSay("There was a problem, and an URL was not assigned: " + body);
            requestURL = NULL_KEY;
        }
        else if (method == "POST")
        {
            // An incoming message was received.
            llOwnerSay("Received information from the outside: " + body);
            vector COLOR_BLUE = <0.0, 0.0, 1.0>;
            float  OPAQUE     = 1.0;
            llSetText(body, COLOR_BLUE, OPAQUE);
            llHTTPResponse(id,200,"Recieved.");
        }
        else
        {
            llHTTPResponse(id,405,"Unsupported Method");
        }
    }
}
```

LSL Code for data transfer and display

Data presentation board with invisible text display prim

Data Transfer - Python

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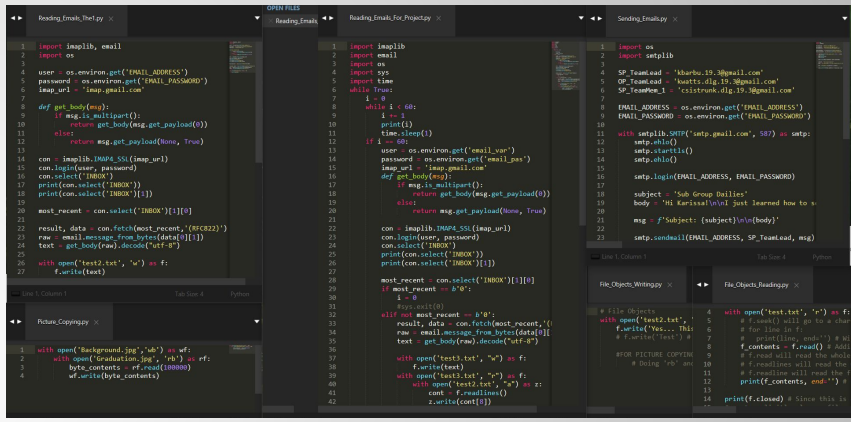
WTDataTransfer.py

```python
from urllib import request, parse

url = 'http://dm0007.dreamlandmetaverse.com:9252/lslhttp/07350986-565e-4291-b5e3-0c3c29da0bc7/'

data = {'WTData': str(123)}
data = parse.urlencode(data).encode()

req = request.Request(url, data=data)
response = request.urlopen(req)
print(response.read())
```

Code to transfer data between world. Data variable is what we use to package the info and then is sent through a url that is created by an object in The Molecule



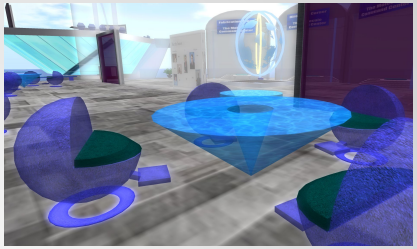
Code for writing/reading text files, copying pictures, reading/writing emails, and copying text from emails and putting it into a text file

```python
    return respData


if __name__ == "__main__":
    # Set the URL manually
    url = 'http://dm0007.dreamlandmetaverse.com:9252/lslhttp/0abf54f9-12d8-4ff8-9207-2fd9720402f5/';

    # Define the parameters
    message = 'New Script code'

    # Pass the information along to the prim
    info = submitInformation(url, message);
    print(info);
```

```
Scratch
C:\Users\megha\PycharmProjects\helloWorld\venv\Scripts\python.exe C:/Users/megha/.PyCharmCE2019.2/config/scratches/scratch.py
b"Megha's Box"

Process finished with exit code 0
```

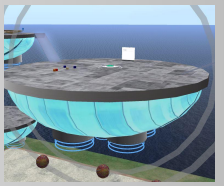
Getting code from LSL in Python to appear in the terminal

- Team Lead and Director's Liaison for the 6-Week VR Team, I worked with both the programming and building teams
- A lot of my work and progress was management based, but I also had a lot of in world progress such as:
  - Created the main design of The Molecule
  - Managed both teams and the project overall
  - Created OSF Poster for VR Project and attended the OSF event (showed off our project to audience)
  - Added functional chairs, tables, presentation boards, and a live text editor to The Molecule
  - Implemented and typed the data transfering code for The Molecule using Python and LSL




```
from urllib import request, parse
import os
import time
import serial
import string
import pynmea2


while True:
    port = "/dev/ttyS0"
    ser = serial.Serial(port, baudrate=9600, timeout=0.5)
    dataout = pynmea2.NMEAStreamReader()
    newdata = ser.readline()

    print("Searching Latitude and Longitude from $GPGGA")

    if newdata[0:6] == '$GPGGA':
        newmsg = pynmea2.parse(newdata)
        timestamp = newmsg.timestamp
        ts = timestamp
        lat = newmsg.latitude
        lng = newmsg.longitude

        body = ("Call 911, Take Aspirin, USE CPR~~~"
                + "EDT: " + str(ts.hour - 4) + ":" + str(ts.minute) + ":" + str(ts.second) + "~~~"
                + "Latitude: " + str(lat) + "~~~"
                + "Longitude: " + str(lng) + "~~~")

        time.sleep(60)
        # server.quit()

url = ''

data = {'GPS': str(body)}
data = parse.urlencode(data).encode()

req = request.Request(url, data=data)
response = request.urlopen(req)
print(response.read())
```

Integration of WT code

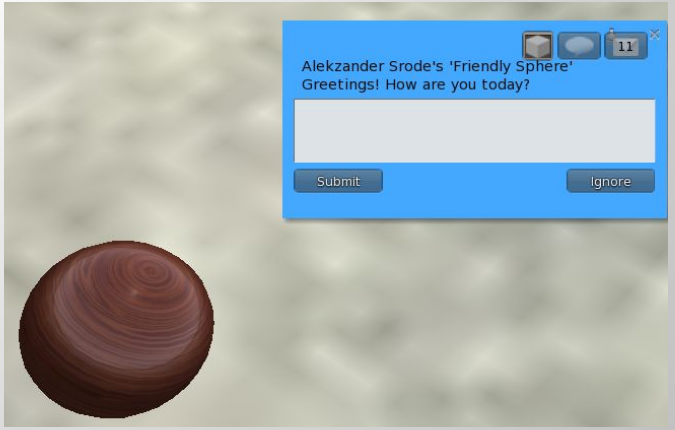


Base of The Molecule

Alek

- I was on the coding team of the VR project, which also included [redacted] and [redacted], which was in charge of making the objects in the command center interactable
- Since the molecule structure was the main part of the project, most of the accomplishments I made were a bit more minor compared to the building team
- The biggest goals I reached were as follows:
    1. Created a sliding door that will greet a person on entering and open/close automatically
    2. Got an interactable object that could have a conversation with you
    3. Studied a lot of Python and programmed some to read/write/copy text and picture files as well as send and read emails (Picture On Python Code Slide)
        a. The Python coding I did was during the Special Project, and managed to apply it to both the Special Project, and worked with the VR and Wearable Tech team as it helped to establish a communication between computer and the VR space

1



2

[redacted]

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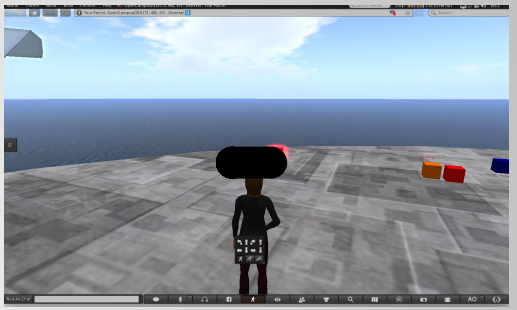
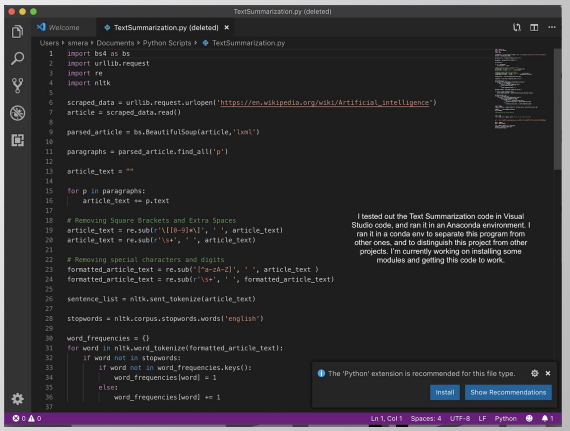
- I was on the coding team of the VR project which included [redacted] and Alek. We were responsible for adding functionality to the Molecule, which included many features such as:
  - Several teleportation pads set up around OpenCampus2019 that could teleport a user to and from the central area of the Molecule
  - A breathing effect to the Molecule (which was ultimately determined to use up too much server capacity so was not used)
  - Transferring data through a website or through an email that can be sent into or out of world
- Since I also worked on the special project, I learned a lot of Python and worked with some different Python scripts, like the text summarization one on the right.

Breathing/Glowing Effect



Python Code



[redacted]

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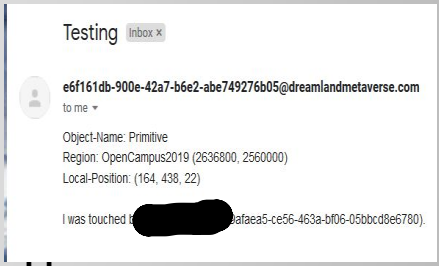
- I was on the coding team of the VR project which included [redacted] and Alek. We were responsible for making the building more functional overall
- Some of the features :
  1. Created the teleport function to the main molecule . This feature includes an option box allowing for a user to select where specifically they would like to go in the molecule
  2. Brought a powerpoint in world for users to click through with an option box attached
  3. Found a way to send emails out of world from a prim which took roughly 20 seconds to send out.
  4. As I worked on the special project, I found ways to transfer data such as strings and integers over to LSL to be displayed in world. This would be useful to display data from the wearable tech team
- As an organizational tool, I created a major codes doc to create collaboration and less overlap amongst the programming team

Teleport pad

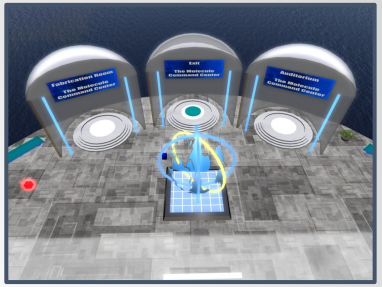
Emails



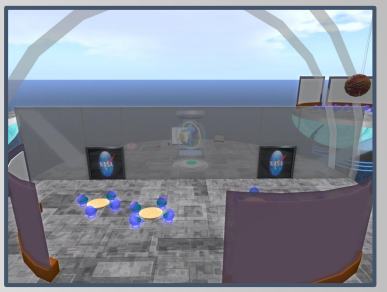
Powerpoint in World

[redacted]

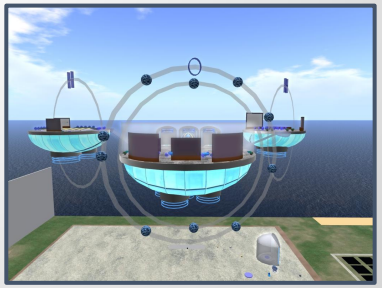
- I was on sub-team Alpha for the VR project, which specifically was in charge of the building and architecture of The Molecule.
- As such, I had many aspects of the Command Center that I worked on and completed.
- Some of my significant accomplishments included:
  1. Creating the holomap
  2. Creating the telepads
  3. Creating the electron cloud
  4. Retexturing the flooring and siding of the bases of The Molecule
  5. Creating the glass wall with screen doors (Alek made the doors functional and door are no longer labeled “NASA”)
  6. Creating the entrance booths for the teleporters
  7. Created the hoverpads (underneath the bases)
  8. Created the label letters (on the electron clouds)
  9. Placed chairs in the workshop room and textured the workbenches
  10. Building the sitting benches (far left in the picture)
- I also attended the STEM Outreach stress test that was for a native tribe to be exposed to the VR world.



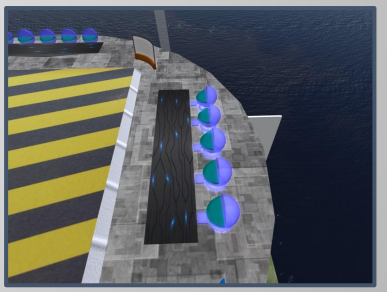
1, 2, 6, & 10



5



3, 4, 7, & 8



9

[redacted]

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This slide was for [redacted] and his documentation of what progress he made for the 6-Week VR project.
In addition to adding individual progress and documentation, each member was to say:

- what sub-team they were on/what their team was in charge of
- optional events they participated in
- any other information regarding important aspects of their participation and progress as apart of the SADE program

Summary

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We created a functioning center in the virtual world that can be used by researchers around the globe to collaborate and share new ideas. Not only is The Molecule pleasing to look at and visually compelling, it is also functional and has numerous stations/boards that researchers could use to develop their work inside the virtual world