VR Lab for Enhanced Learning

Engineering Design Review

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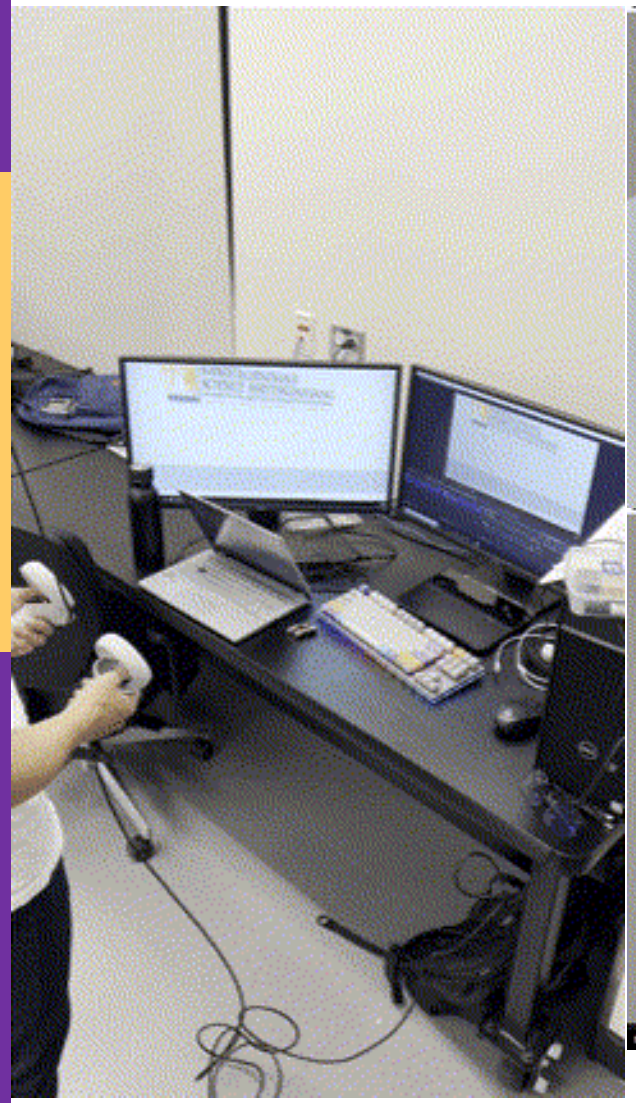
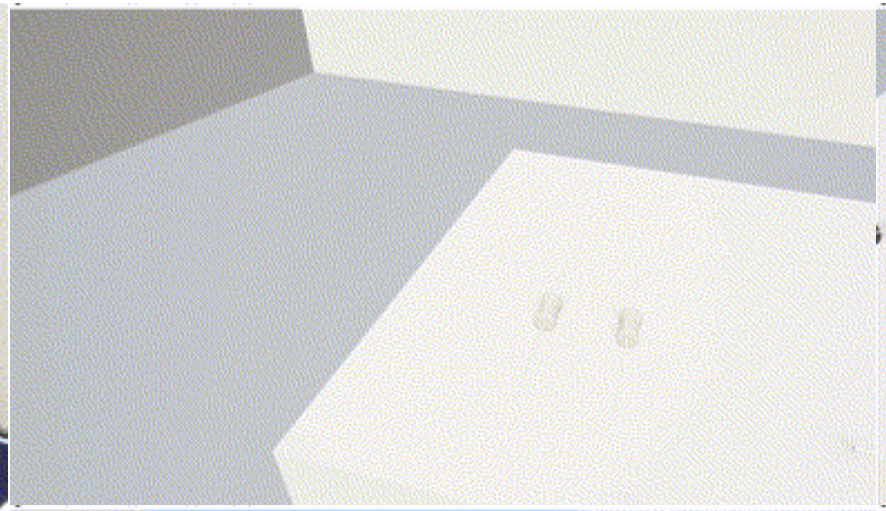
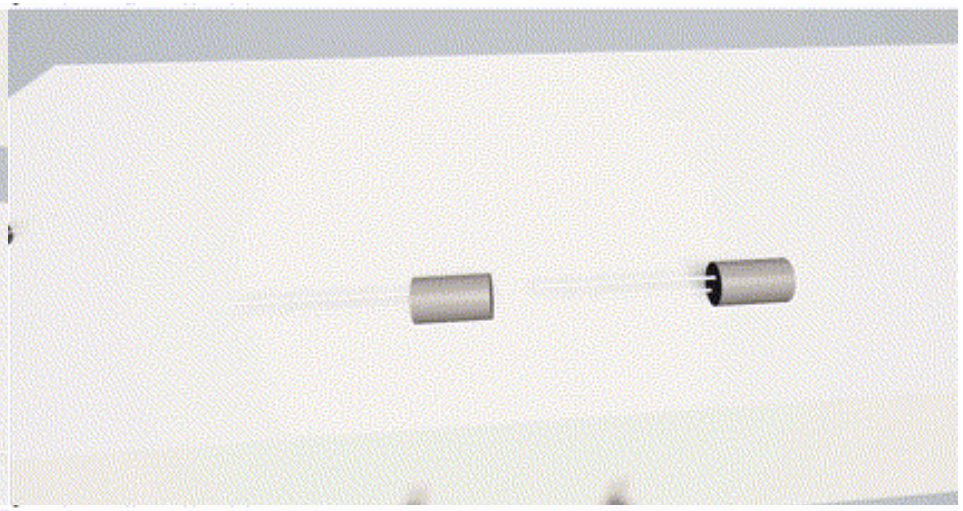
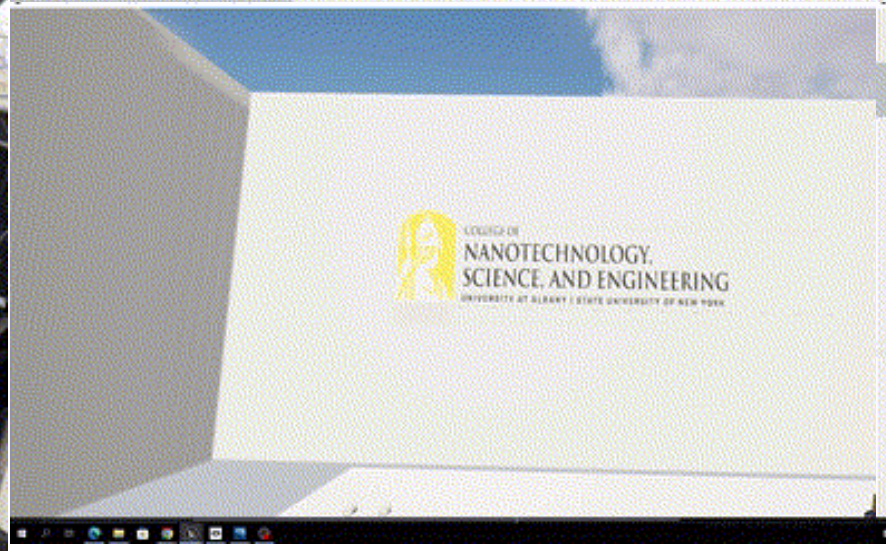
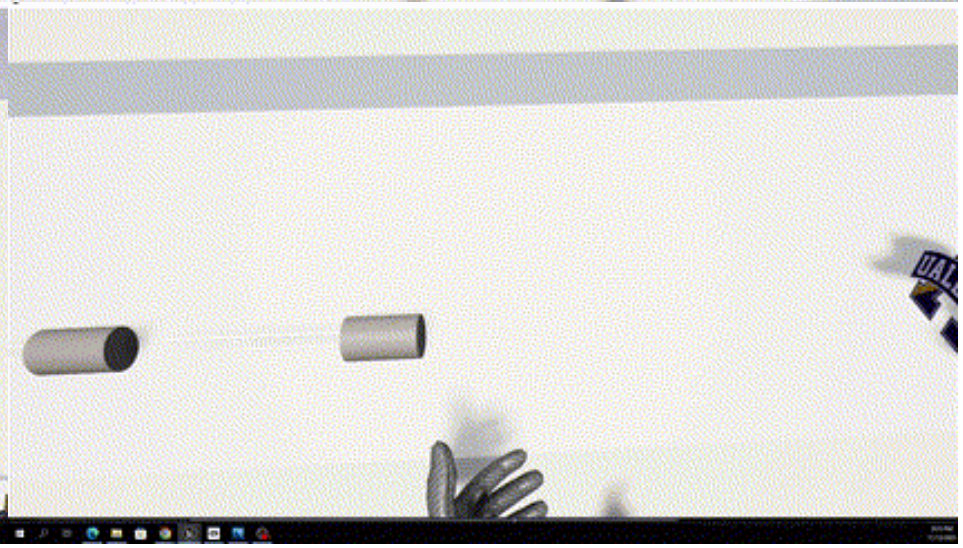
Recap







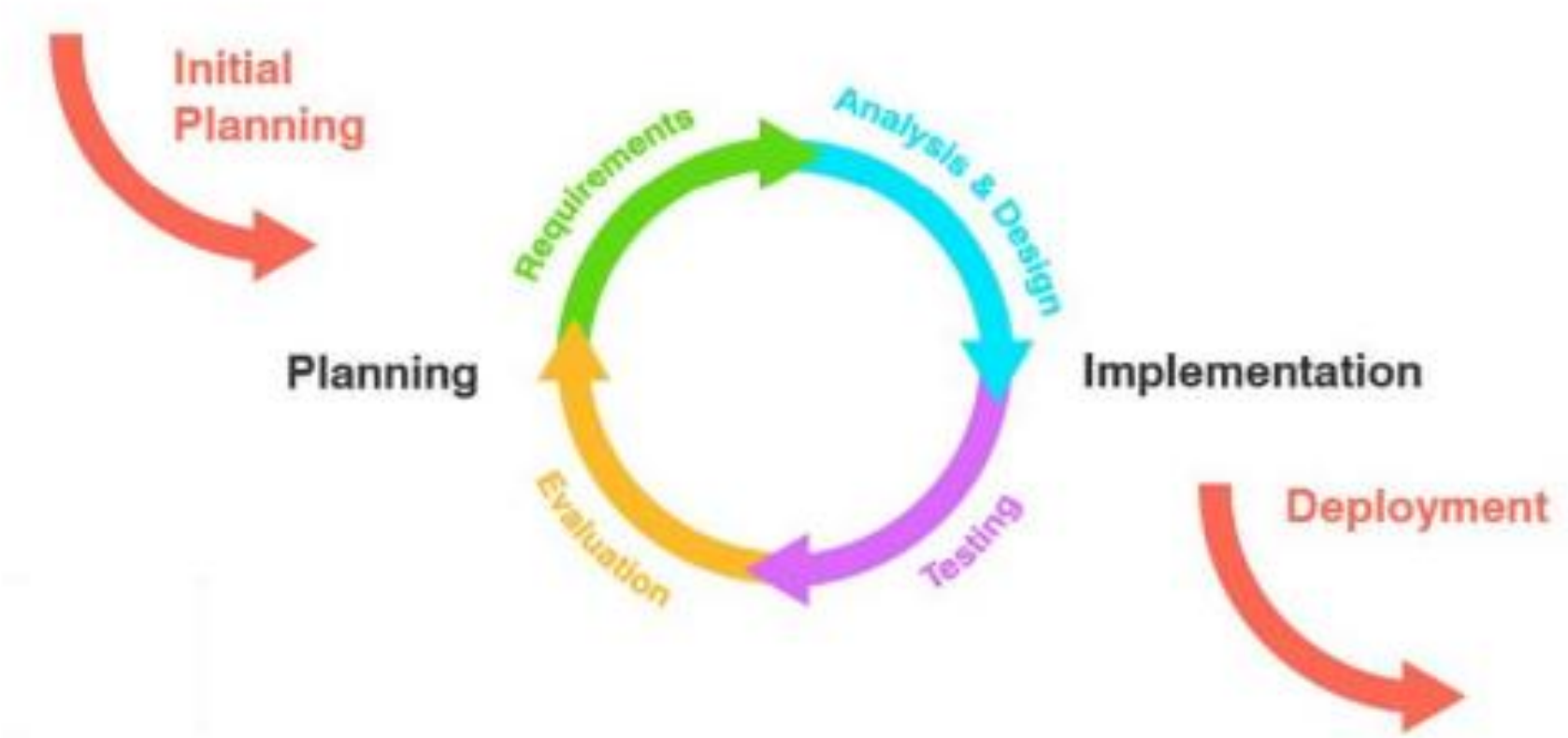




Agenda

- Iterative Design Process: Analysis & Design
- QoL Improvements
- Blueprint Visual Scripting (BPs)
  - User Interface Menus
  - User and Object Interaction
- Spice Application/Implementation
- Near Future Design

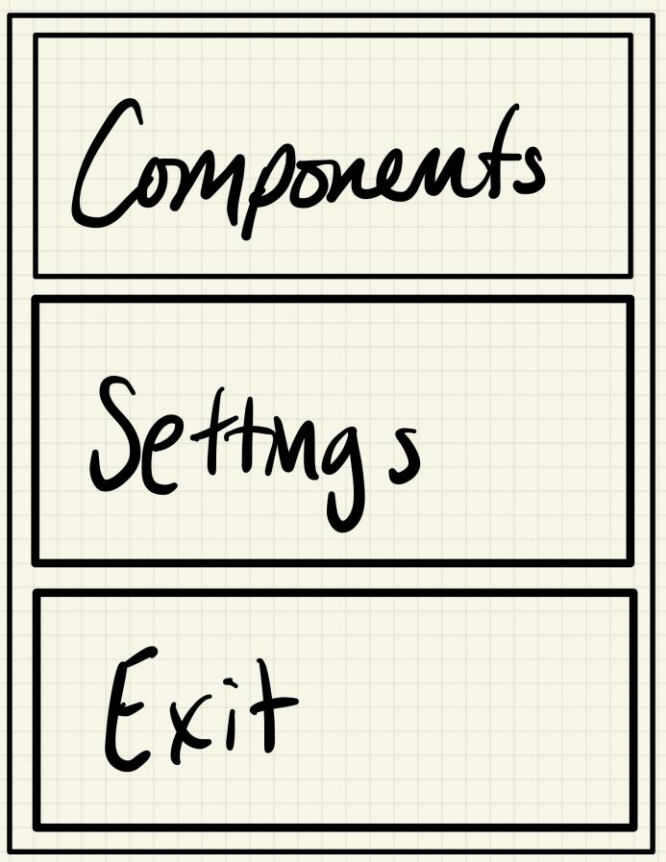
Iterative Design Process: Analysis & Design

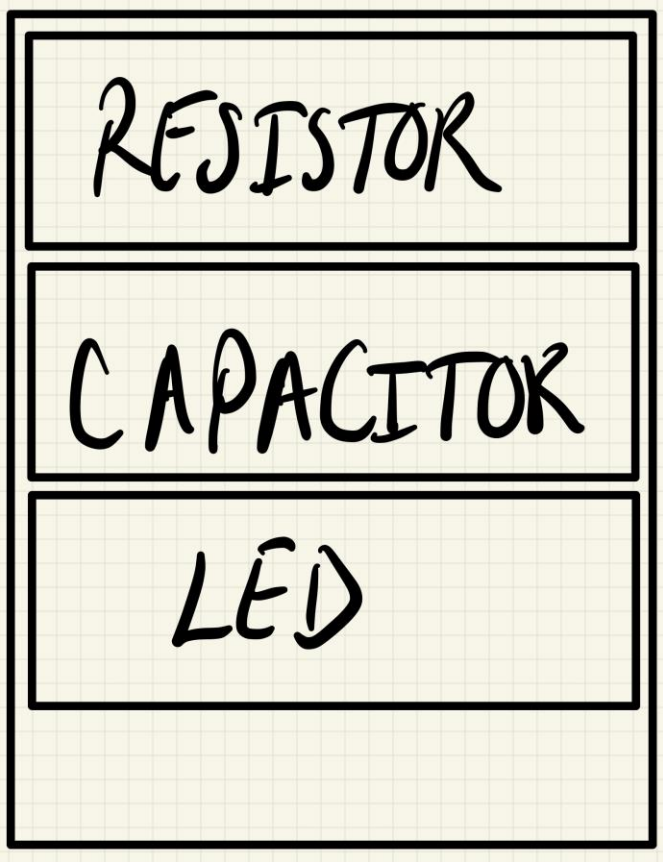


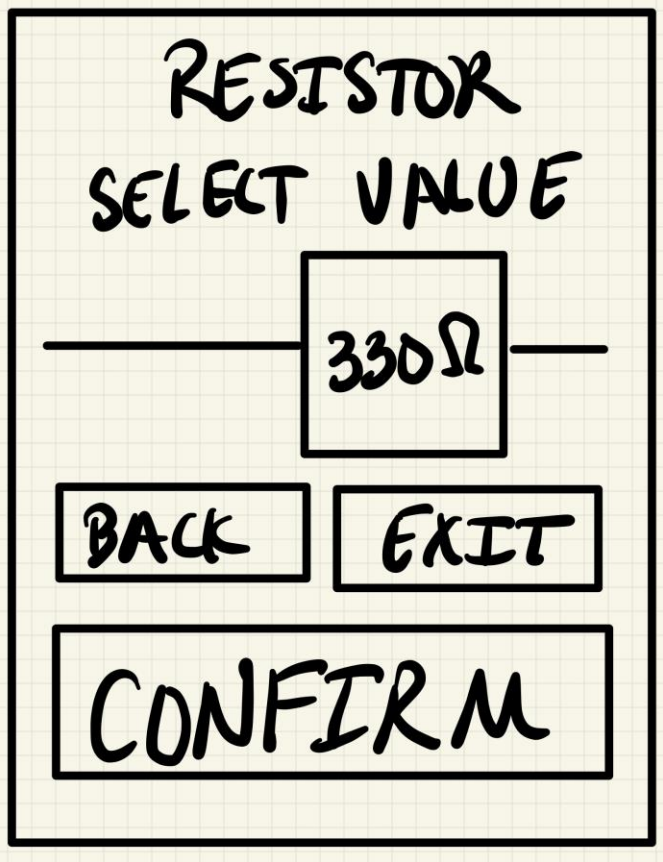
QoL Improvements

- Projects have been moved to GitHub for ease of access.
  - Access to files and projects locally through GitHub Desktop
- Device inputs expanded to support other VR hardware
  - Our program is no longer bound to only the Meta Quest.
  - Additions include the HTC Vive, and most devices supported by SteamVR

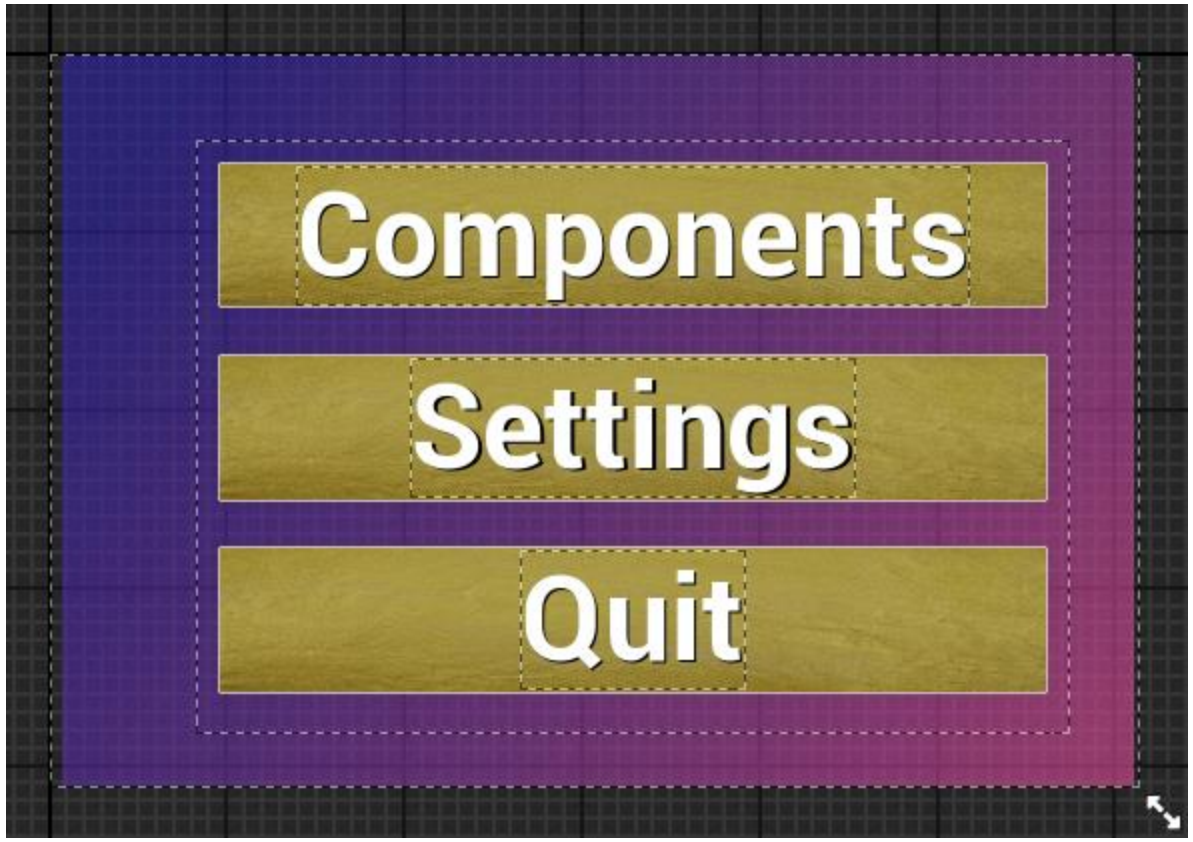
User Interface

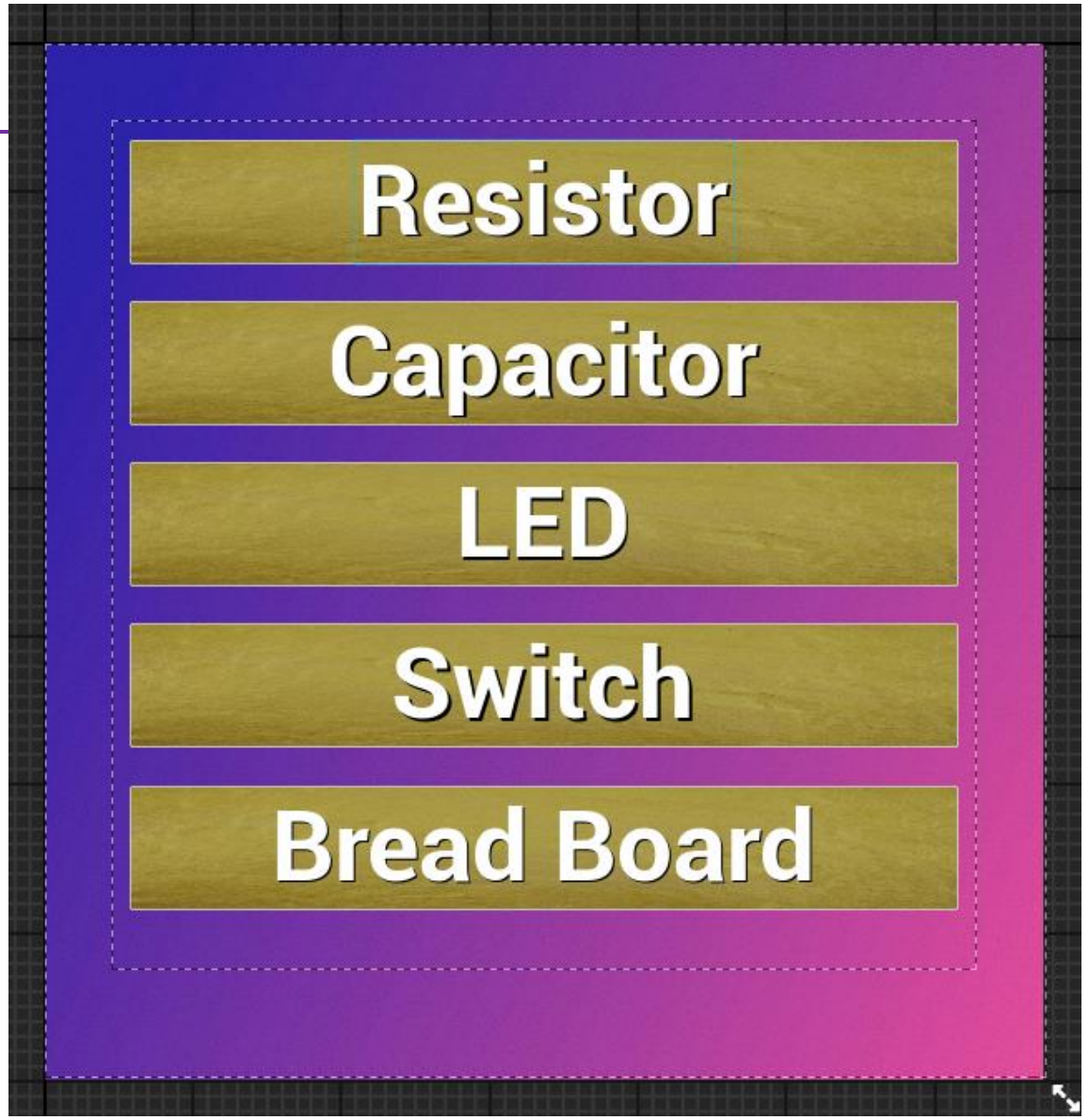






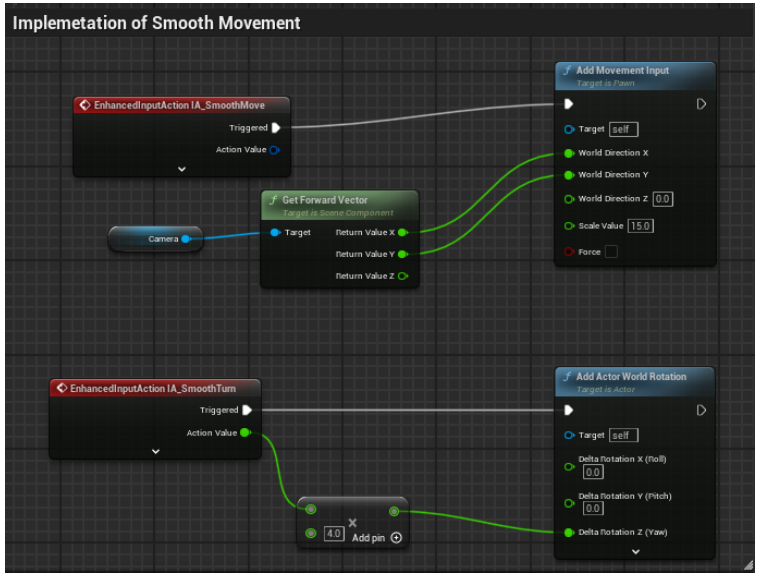
User Interface (cont.)





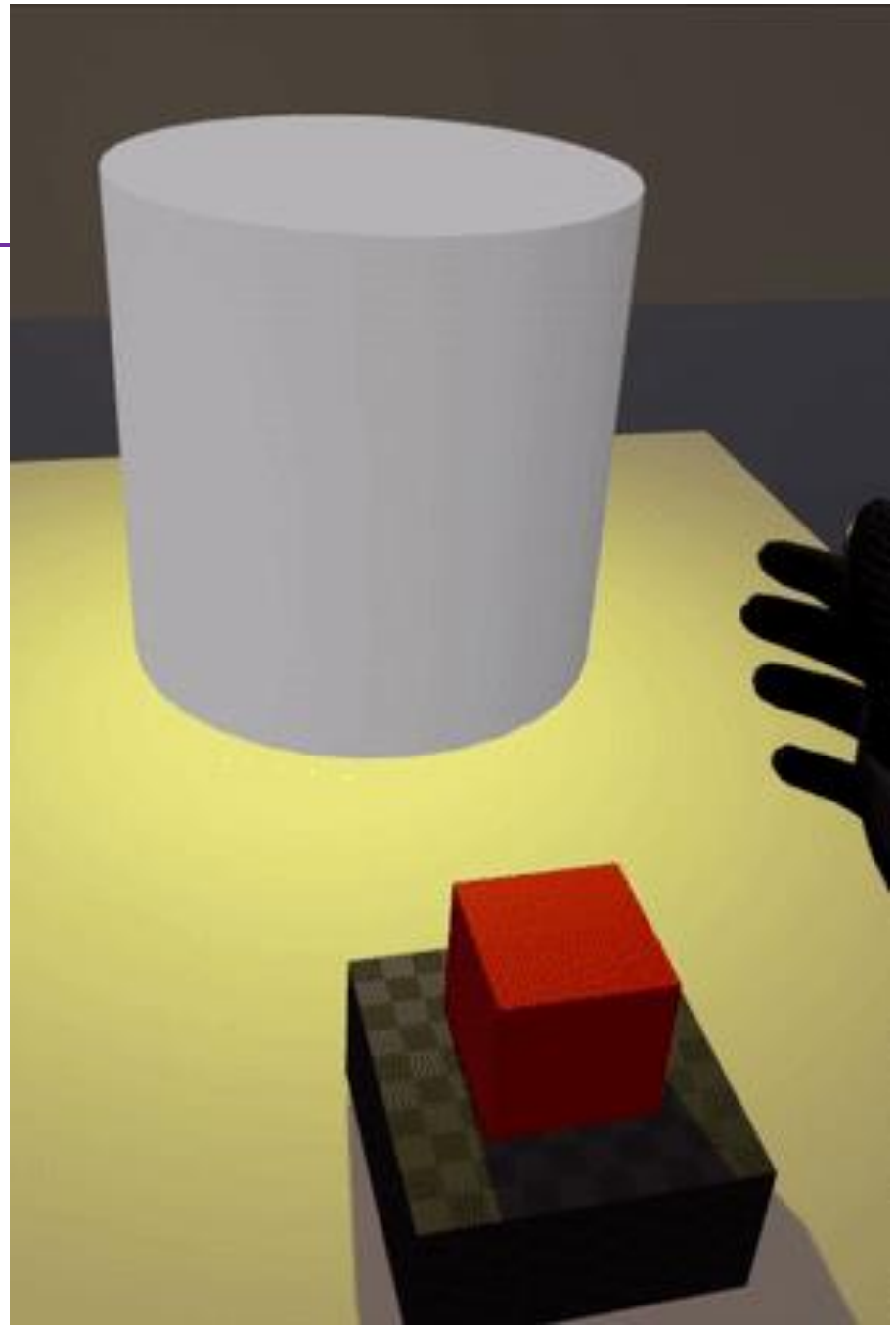
User and Object Interaction

- Fluid Movement
  - Implemented smooth, linear movement to character perspective.

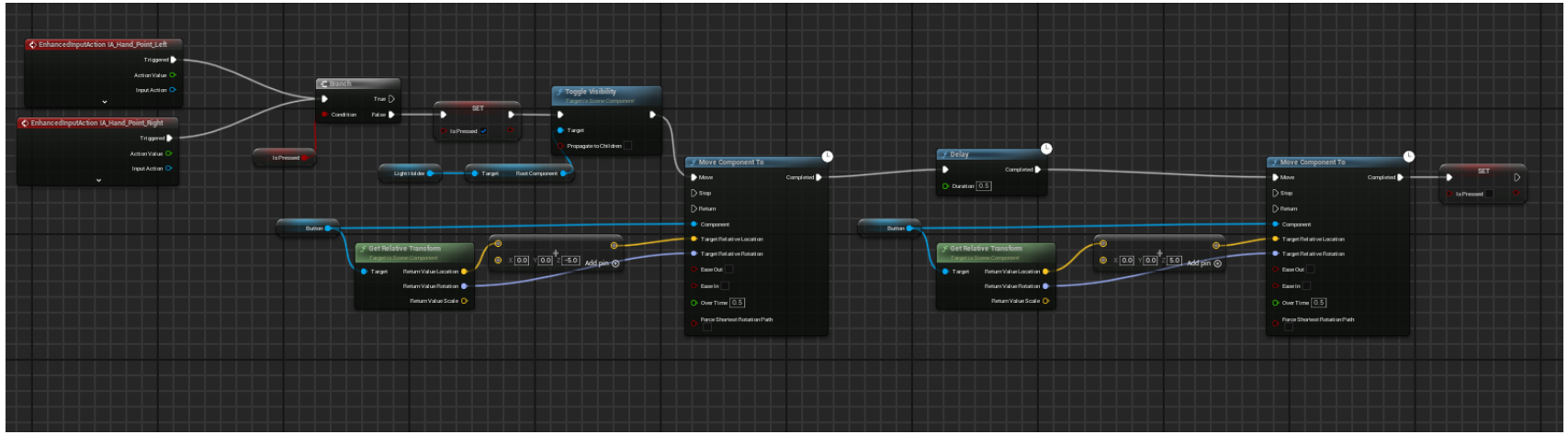


User and Object Interaction (cont.)

- Hand Collision
  - Created a new instance of user hands, allows for collision with objects without the need to grab them.
- Object Interaction
  - Developed a togglable button that behaves like a switch.
- Action-Based Functionality
  - Implemented variables and parameters, allowing button presses to affect other objects.



User and Object Interaction (cont.)



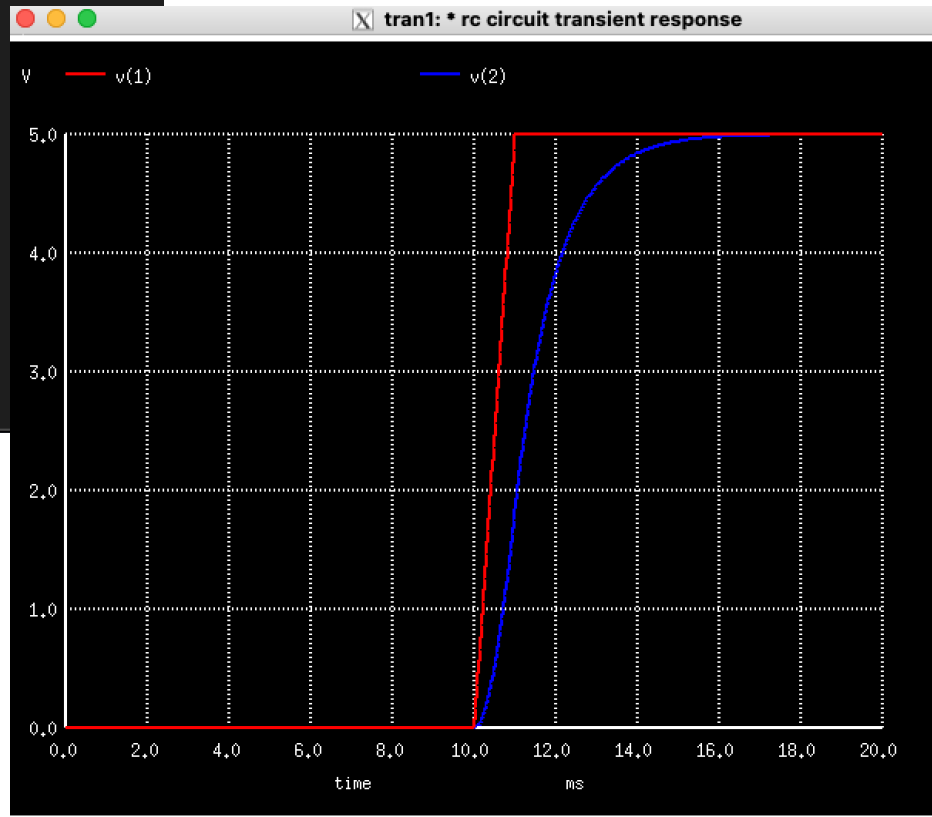
- In creating our button, we utilized collision to actuate
- For proper interaction, the user's hands also require to have collision spheres developed
- Issues arose with these collision spheres, which included being able to pick up surrounding circuit devices
- This was resolved with the creation of a custom collision preset

SPICE Application

- NGSpice Netlist

```
1   * RC Circuit Transient Response
2
3   *resistor connected between node 1 & 2
4   R1 1 2 1k
5
6   *capacitor connected between nodes 2 & 0
7   C1 2 0 1u
8
9   *piecewise linear input voltage
10  vin 1 0 pwl (0 0 10ms 0 11ms 5v  20ms 5v)
11
12  *transient analysis for 20ms, step size 0.02ms
13  .tran 0.02ms 20ms
14
15  *define run-time control functions
16  .control
17  run
18
19  *plotting I/O voltages
20  plot v(1) v(2)
21
22  write output.csv V(1)
23  .endc
24  .end
25
```

```
ngspice 1 -> RC

No compatibility mode selected!


Circuit: * rc circuit transient response

Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

Warning: vin: no DC value, transient time 0 value used

Initial Transient Solution
--------------------------

Node                                   Voltage
----                                   -------
1                                            0
2                                            0
vin#branch                                   0


No. of Data Rows : 1018
binary raw file "output.csv"
ngspice 2 ->
```



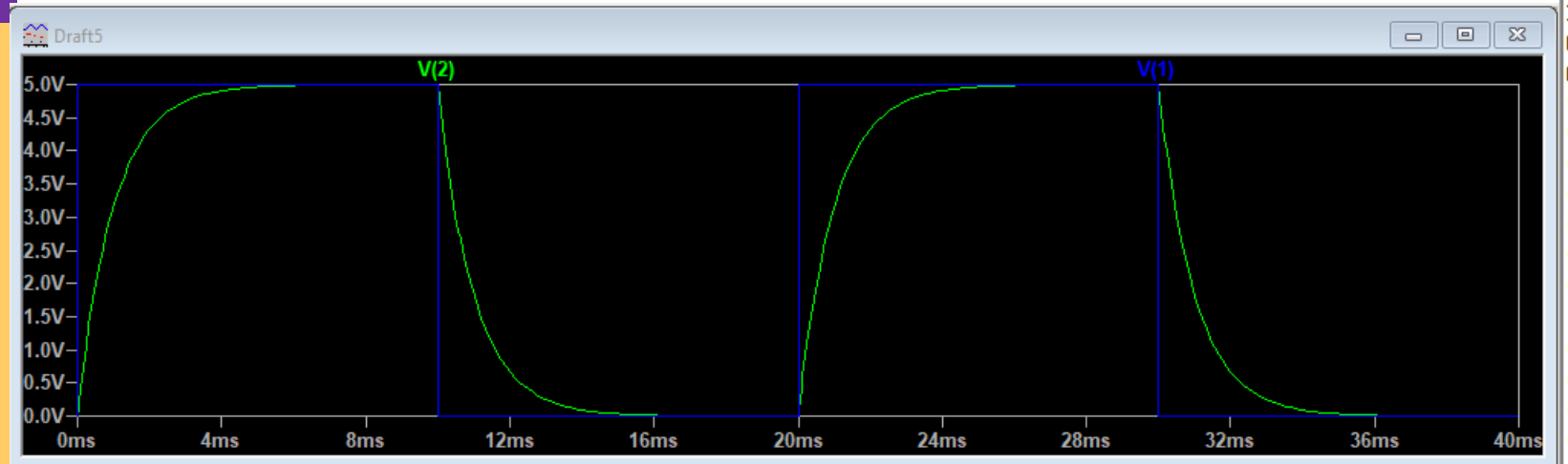
SPICE Application (cont.)

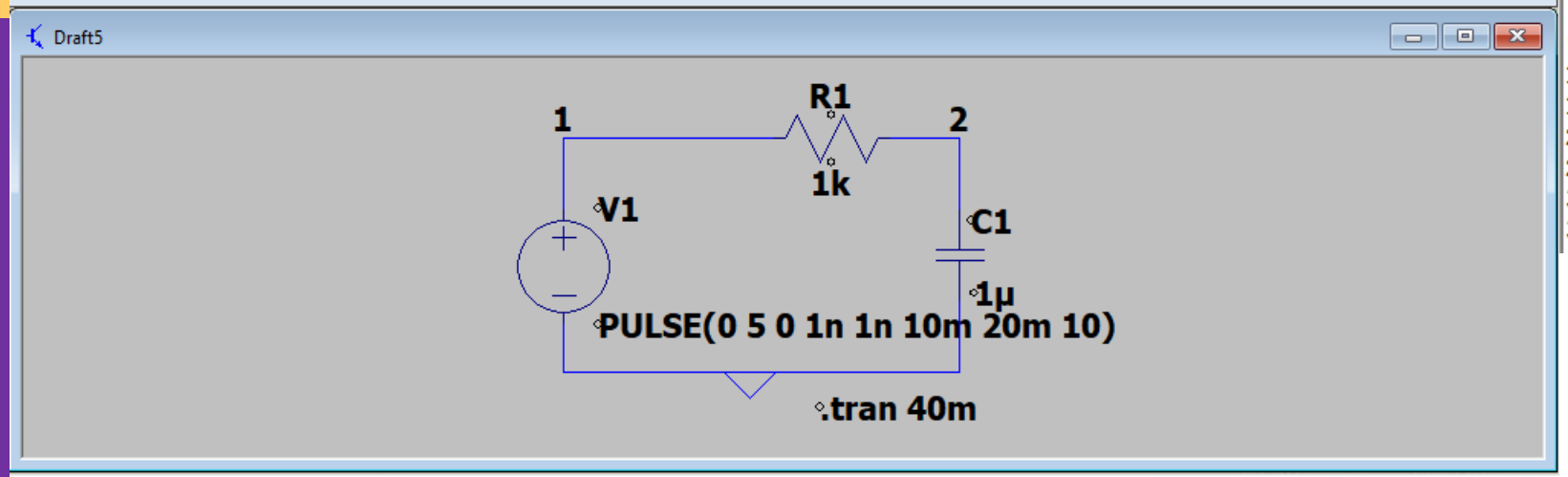
CSV file gathered from NGSpice after simulation

Title: * rc circuit transient response
Date: Wed Feb 21 15:43:08 2024
Plotname: Transient Analysis
Flags: real
No. Variables: 2
No. Points: 1018
Variables:
0timetime
1v(1)voltage
Binary:

SPICE Application (cont.)

- LTSpice Netlist

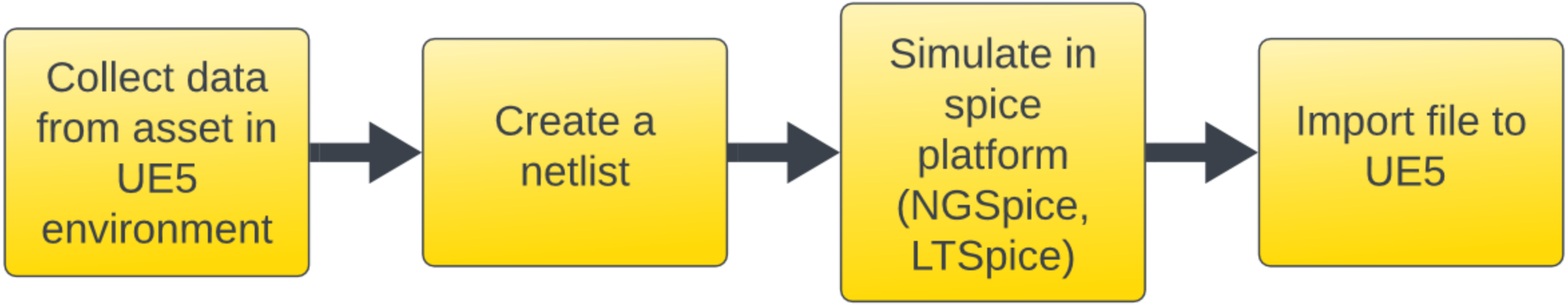




ExpressPCB Netlist: C:\Users\15184\OneDrive\Documents\LTspiceXVII\RC.net

```
"ExpressPCB Netlist"
"LTspice XVII"
1
0
0
""
""
""
"Part IDs Table"
"V1" "PULSE(0 5 0 1n 1n 10m 20m 10)" ""
"C1" "1µ" ""
"R1" "1k" ""

"Net Names Table"
"1" 1
"0" 3
"2" 5

"Net Connections Table"
1 1 1 2
1 3 2 0
2 1 2 4
2 2 2 0
3 2 1 6
3 3 1 0
```

SPICE Application (cont.)



What's Planned: Connection

- Integration between hand collision/object interaction along with spice simulation
  - Working breadboard/circuit builder
- Raw data imported into UE5 Project will be converted into a readable graph