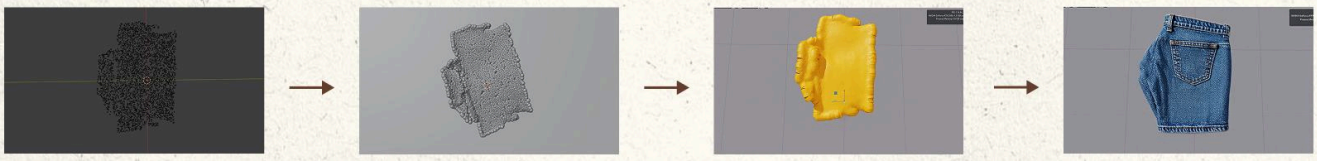
PROJECT 1 (Ongoing)
Soft Body Real2Sim & Profiling

Research Intern
Shanghai AI Laboratory
Jul 2025 - Present
Shanghai, On-site

上海人工智能实验室
Shanghai Artificial Intelligence Laboratory

PROCESS

Point Cloud Reconstruction in PhysTwin → Particles & Springs Reconstruction in Newton → Sim & Render in Isaacsim → (Preview) Add 3D Guassian



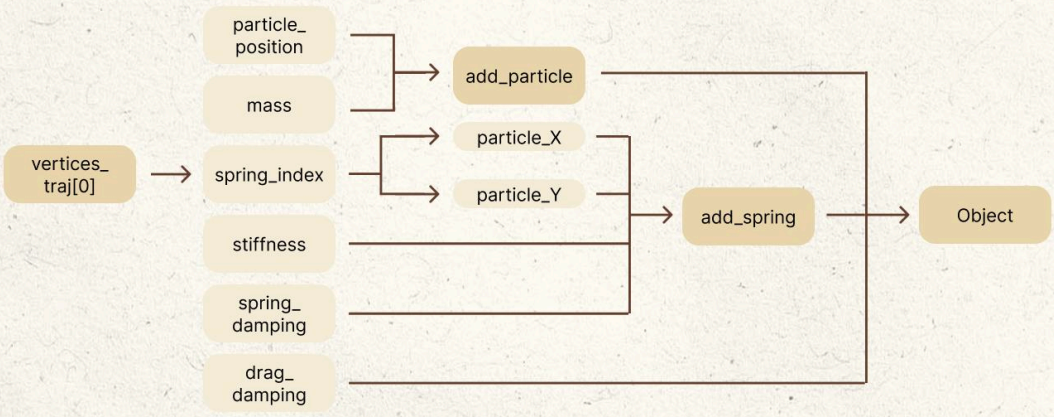
Point Cloud Reconstruction

Read from pkl (Real Data) → vertices_traj[0] →

- particle_position
- stiffness
- mass
- spring_damping
- spring_index
- drag_damping

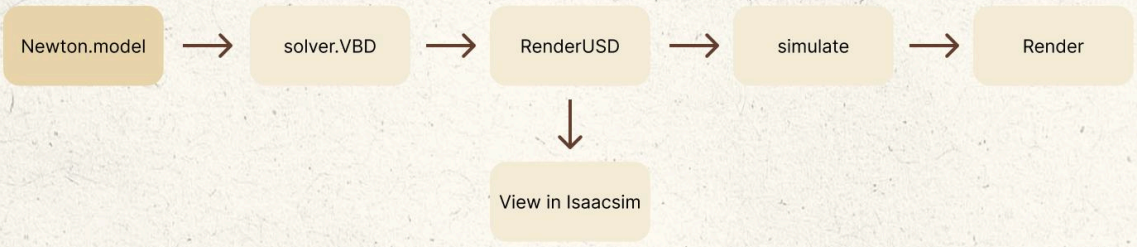
From the real data trajectory model, read the point cloud of the first frame of the trajectory and initialize the object's vertices, springs, mass, stiffness, damping, etc.

Particles & Springs Reconstruction



Using the particle_position and mass, we use “add_particle” to create all vertices; Based on the particle connection index corresponding to the spring, we connect springs; Based on all the vertices and springs obtained, we add the object's damping and create the model.

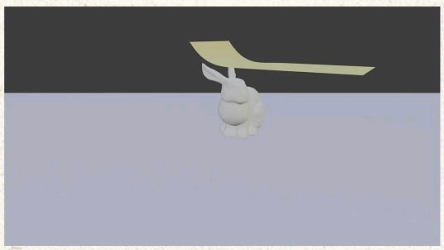
Sim & Render



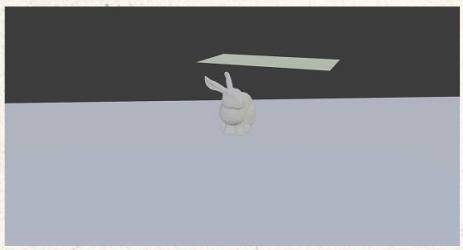
Add solver: VBD for Newton's model; Start running RenderUSD, save USD after simulate & render; Replay sim and render in Isaacsim

Why Choose Solver as VBD?

Better performance
than XPBD

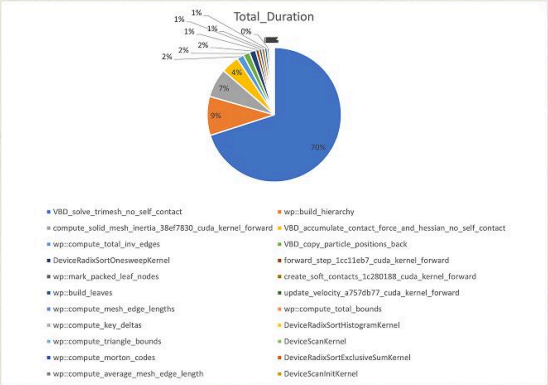


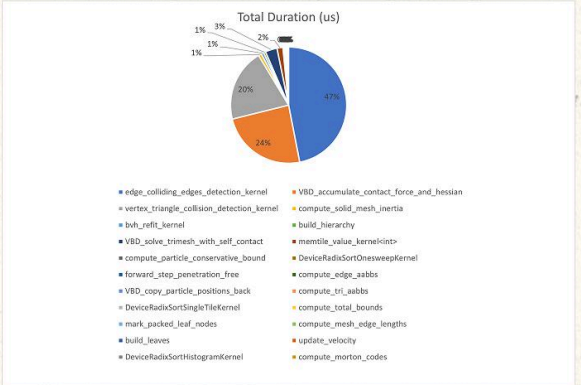
XPBD



VBD

VBD Kernel





no self contact

Most used: VBD_solve_trimesh_no_self_contact

self contact

Most used: edge_coliding_edges_detection_kernel

VBD_solve_trimesh_no_self_contact

Number of executions

Step: 1
Substeps per step: 3
VBD integrator iterations: 1
Number of colors: 3

Each substep executes
VBD_solve_trimesh_no_self_contact 3 times
for a total of 9 executions.

Number of particles

Total particles per step: 2145
Color 0: 715 particles
Color 1: 715 particles
Color 2: 715 particles

Complexity

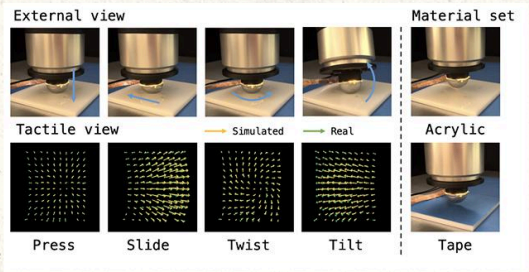
Single kernel launch: O(715)
(parallel computation for each color group)

Each step: 9 launches, total O(9×715) = O(6435)

Future Work

Add 3D Guassian
+
Reconstruct Tactile Sensor

DiffTactile



Real2Sim
FEM Reconstruct

PROJECT 2 (Ongoing)

Porting Graphics Simulation Kernels to Domestic Platforms

Research Intern

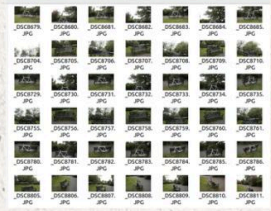
Shanghai AI laboratory

Aug 2025 - Present

Shanghai, On-site

上海人工智能实验室
Shanghai Artificial Intelligence Laboratory

Evaluate S80's support for custom kernels



Data

Train

Model

Eval

S80

Time: 23h
SSIM : 0.6604463
PSNR : 22.0039062
LPIPS: 0.3305458

4090

Time: 138.3739314s
SSIM : 0.6695974
PSNR : 22.2488270
LPIPS: 0.3239086

S80 has good support for custom kernels, but runs slowly

Repository: https://github.com/MooreThreads/LiteGS

Evaluate S80's support for migrating CUDA graphic kernels to MUSA

S80

.cpp .cu
CMakeList.txt

Convert CUDA functions & header files to MUSA

cmake build

./oceanFFT
-qatest

Compare src and ref in spatialDomain.bin: match.

Comparing src and ref in slopeShading.bin: match.

4090

cmake build

./oceanFFT
-qatest

Compare src and ref in spatialDomain.bin: match.

Comparing src and ref in slopeShading.bin: match.

S80 has good support for graphic kernels

Repository: https://github.com/NVIDIA/cuda-samples/tree/master/Samples/4_CUDA_Libraries/oceanFFT

PROJECT 3
Electrotactile VR Evaluation System

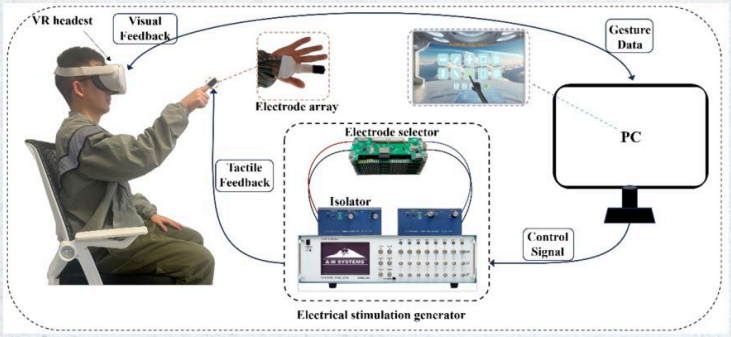
Researcher Assistant

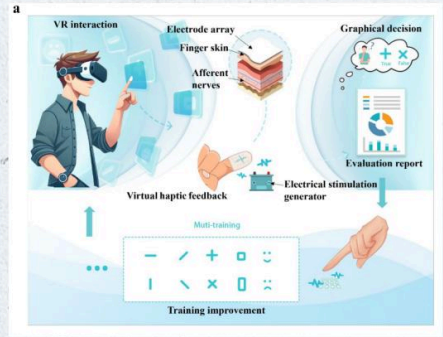
South China University of Technology

Nov 2024 - Apri 2025

Guangzhou, On-site

Overview

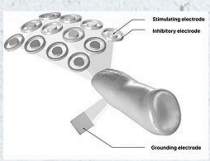




PC visual feedback → User interacts with relevant objects → Gesture data sent to the PC → Signal transmitted to electrical devices → Electrical stimulation delivered through electrode array → Tactile feedback created and experienced by the user

Process

Electrode design



→

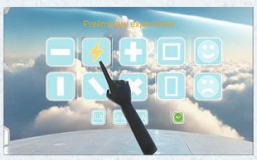
ESP32 & EMS32 Development

→

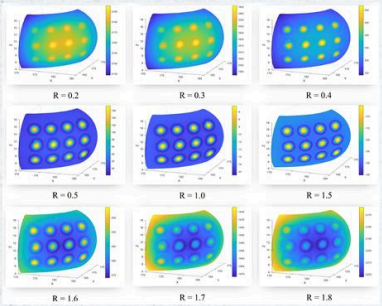
Experiment Design

→

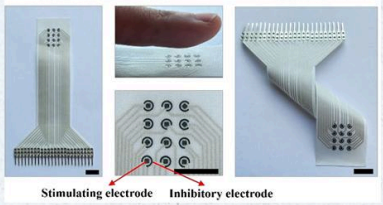
VR Construct & Communication



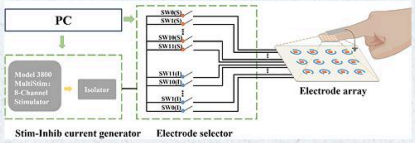
Electrode & ESP32



Inhibitory / Stimulating ratio

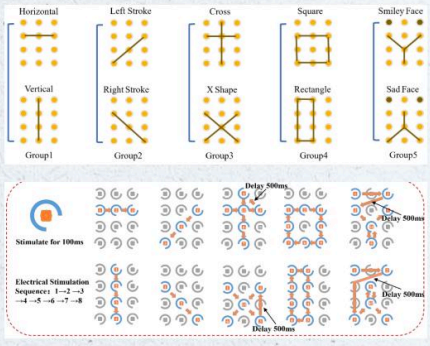


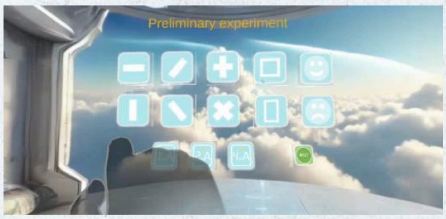
Electrode design



Channels control corresponding electrode arrays

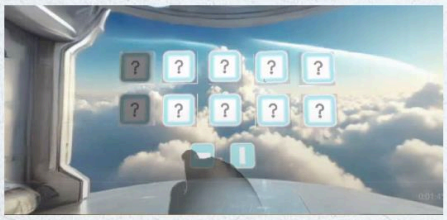
Experiment Design

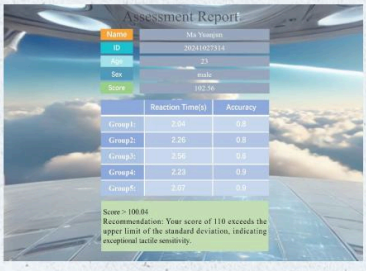




10 patterns were designed from simple to difficult, allowing users to adapt to the electrical stimulation of each pattern first.

On the left is the electrical stimulation sequence of the pattern dot matrix.

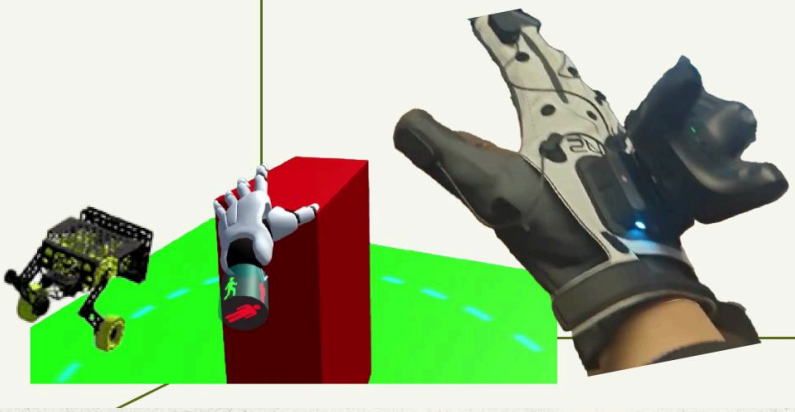




After the user clicks on an unknown pattern, the electrode prints a pattern and the user guesses it.

After all clicks are completed, print the test report, including the reaction time and accuracy of each group.

PROJECT 4
Robot Teleoperation & Simulation



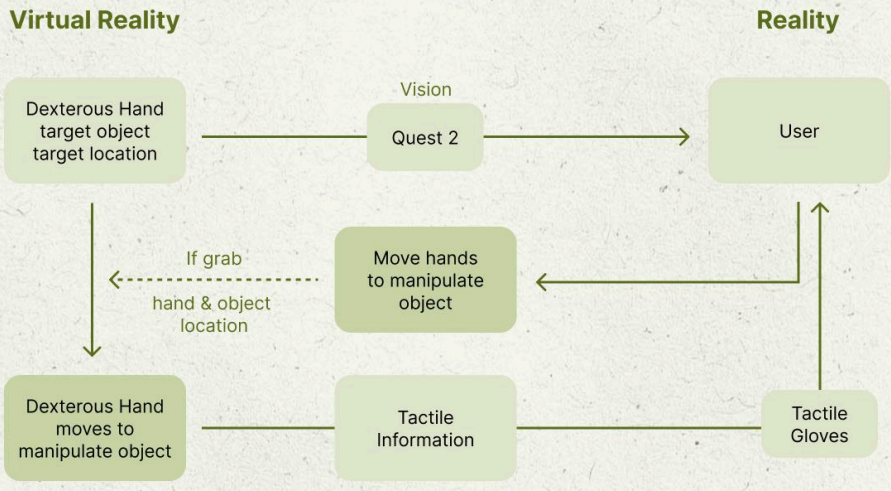
Research Assistant

BAIR, University of California, Berkeley

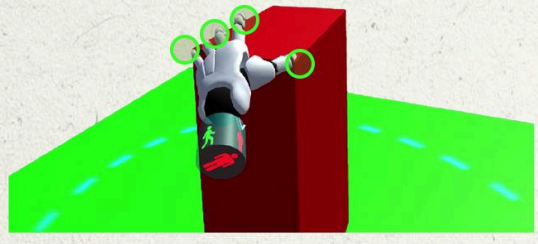
Mar 2025 - May 2025

Shanghai, On-site

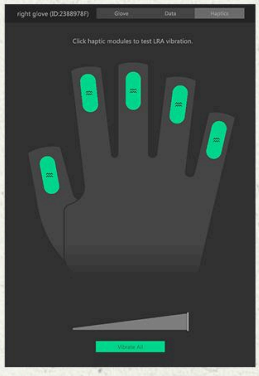
Overview



VR Setup & Tactile Gloves



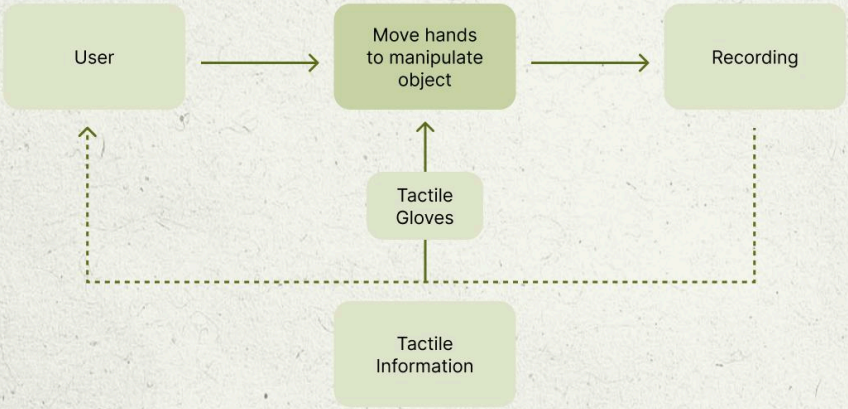
Setting up the gripper and target object in Unity



Set the tactile value

Teleopration

Simulation Mode



Future

Physical Mode
&
Integrated into our electrotactile gloves

Genesis Robot RL

Using reinforcement learning to train quadruped robot motion control in Genesis and exploring the possibility of integrating Genesis into “RoboVerse”.

THE END