Shashwat Suri

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Education

University of British Columbia — August 2023 – Present
Master's in Science, Majoring in Computer Science — *Vancouver, British Columbia, Canada*
- GPA: 4.0
- Awarded: International Tuition Award

University of British Columbia — August 2016 – May 2021
Bachelor's in Science, Majoring in Computer Science — *Vancouver, British Columbia, Canada*
- GPA: 3.7
- Awarded: Outstanding International Student Scholarship (OIS)
- Accomplished 16 months of industry experience under the Co-op program

Publications

SimMaterial: Evaluating Materials through Differentiable Simulations — March 2025
Targeting IEEE International Conference of Computer Vision — *Honolulu, Hawaii*
- Used Time Varying Gaussians to track the deforming object through optical flows
- Used a physics-informed neural network and a differentiable simulator to get good estimations of simulation materials

Learning Simulatable Models of Cloth with Complex Constitutive Properties — January 2025
Submitted to 2025 IEEE Major Conference — *Vancouver, Canada*
- Used Differentiable Simulations to learn spring mass connections, and dampening and material parameters to represent cloth-like materials.

CasCalib: Cascaded Calibration for Motion Capture from Sparse Unsynchronized Cameras — August 2024
IEEE International Conference on Automatic Face and Gesture Recognition — *Istanbul, Turkey*
- Used a cascading style of calibration to address Multiview calibration and synchronization.
- Paper was built on top of my Directed Study DLT Project

HAR: Human Activity Recognition — August - December 2019
BC AI Showcase 2019 — *Vancouver, BC*
- Predicted human activity using smartphone accelerometer data
- Used Multi-class Logistic Regression (MLR) and Radial Basis Functions (RBF)

Research Projects

SDF Colliders in Material Point Method — September–December 2024
Sensorimotors Lab — *Vancouver, BC*
- Implemented collider detection using Signed Distance Fields (SDFs) colliders
- Implemented code for Rendering,Detecting and Handling Collisions in Material Point Method in Nvidia Warp

Learning Heightfields through Physical Rendering — January–April 2024
Visual AI for Humans Lab — *Vancouver, BC*
- Leveraging Differentiable Rederers like Mitsuba 3 to learn heightfields

- Representing Objects as a combination of heightfields helps in storage and texturing of meshes

Database: Human NeRF shape accuracy   September – December 2023

Visual AI for Humans Lab and Sensorimotor Systems Lab   *Vancouver, BC*
- Implemented simultaneous capture of humans through motion capture, video capture, and scanning as a way to test shape accuracy of implicit models
- Have currently checked the database on multiple models including DANBO, NPC, and Vid2Avatar

Camera Preconditioning for Self-Calibrating Neural Body Models   September – December 2023

Visual AI for Humans Lab   *Vancouver, BC*
- Used preconditioning for self-calibrating NeRF models using ZCA whitening to improve the robustness of NeRF models against camera noise
- Observed a marked difference against synthetic camera noise on multiple Human NeRF models

Direct Linear Transformation for Human Pose Estimation and 3D Plane Reconstruction   Jan – May 2021

Visual AI for Humans Lab   *Vancouver, BC*
- Formulated a closed form solution for 3D-Reconstruction using human pose estimation
- This work was used and credited in 2 thesis: M-NeRF and CasCalib

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Work Experience

Research Assistant - University of British Columbia   May-July 2024

Sensorimotors Lab   *Vancouver, BC, Canada*
- Processing 3D Human Data Capture for Lululemon
- Deformation fields were used to interpolate shapes between periodically captured humans

Research Assistant - University of British Columbia   January – May 2024

Visual AI for Humans Lab and Sensorimotors Lab   *Vancouver, BC, Canada*
- Executed a 3D Capture Dataset of Humans under Dr. Helge Rhodin and Dr. Dinesh Pai
- The project offered ground truth meshes of humans, a calibrated tri-camera setup, and evaluated the leading shape estimation models

Software Developer - Mott Macdonald Canada Limited   May 2021 - August 2023

Digital Advancement Network   *Vancouver, BC, Canada*
- Implementation of potential traffic collision avoidance solution using computer vision-based predictive algorithms and vehicle tracking.
- Co-developed a Geometry Data Management firmware to attach archivable, nested metadata to engineering models.

Research Assistant - University of British Columbia   January – May 2021

Visual AI for Humans Lab   *Vancouver, BC, Canada*
- Researched Direct Linear transformations and their application in human pose estimation under Dr. Helge Rhodin.
- Developed human tracking scripts through visual computation to research the accuracy and robustness of my closed-form implementation.

Software Developer Co-op - Mott Macdonald Canada Limited   May – December 2019

Digital Advancement Network   *Vancouver, BC, Canada*
- Developed for Safestroll - A smart city app to guide kids in safely navigating between school and home.
- Designed and implemented a .NET library to facilitate functional independence between Station-based and modeling geometry.

**Software Developer Co-op - Mott Macdonald Canada Lim-January – August 2019
ited**

Digital Advancement Network *Vancouver, BC, Canada*
- Implemented novel meshing algorithms to achieve interoperability within engineering design software.

Project Lead - University of British Columbia **January 2020 – May 2020**

Emerging Media Labs *Vancouver, BC, Canada*
- Project Lead for 3D Metabolism – an Augmented Reality (AR) solution to aid Biochemistry and Microbiology students visualize metabolism.
- Designed an AR app SynesthesiAR to map Fourier Transform pitch detection into visuals.

Specialized Skills

Vision Skills
- **Neural Radiance Fields** - Experience with NeRFs implementations, especially ones involving humans (ANeRF, DANBO, NPC) and self-calibrating NeRFs (SCNeRF, BARF, FocalPose, CamP)

- **Gaussian Splatting** - Explored various uses of Gaussians, including Optical Flow (4DGS, DeformGS), Shape from Tempate and Simulation capablities like PhysGaussian
- **Optical Flow and Deformation** - Worked with popular 4D Optical Flow works like 4DGS, DeformGS and shape of motion, as well as shape from template problems in rigid and nonrigid templates.

- **Classic Vision Techniques** - Have implemented and compared various classic Vision Techniques including SfM, PointNet, Bundle Adjustment, Text Analysis/Synthesis, CNNs, GANs etc

Graphics Skills
- **Simulation and Optimization** - worked with Different Eulerian, Lagrangian, and hybrid simulations using NVIDIA's Ecosystem (Omniverse, Warp, USDs) and Blender
- **Geometry Processing** - Familiar with civil engineering object representations, platforms like Blender, Unreal, and Unity, Implemented various meshing algorithms including simplification, remeshing, etc.
- **Rendering and Rasterization** - Assisting teaching courses on graphics currently, can work on shader files, worked on various shading and reflection algorithms

Machie Learning Skills
- **Deep Learning and Neural Networks** - Have worked with MLPs and CNNs for various architectures, LSTMs and GNNs for Reinforcement Learning Models, Attention Cross Attention Transformer models like GPT and ViT.
- **Classical ML Techniques** - Linear Regression, SGD, KNN, KMeans, Radial Basis Functions, Bayesian Networks etc.

Programming Languages: Python, C++, C#, Julia, Matlab, SQL, GLSL, GLTF, C, JavaScript, Java

Paradigms: Pytorch, Pytorch3d, Torchvision, Gymnasium (Reinforcement Learning), Eigen, Libgl,

Platforms: Blender, Rhino, CAD, Unreal, Unity, GitHub, Azure