RAHUL MITRA

Computer Science PhD student

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EXPERIENCE

Game Development and Research Intern

LightSpeed Studios, Tencent America

📅 May 2024 – Present   📍 Los Angeles, CA

- Designed and implemented (Python/C++) a pipeline to render quad elements over models from the GarmentCode dataset.
- Investigating novel meshing techniques for rendering and knitting of yarn level models.

Research Assistant, Computer Graphics Lab

Boston University, Department of Computer Science

📅 Sept 2021 – Present   📍 Boston, MA

- Conducting research in novel geometry processing techniques for tasks in digital fabrication, meshing, and vector field design.
- Developed techniques to enforce manufacturing constraints in remeshing of input models for computational knitting. Implemented pipeline in C++ (OpenGL), Python (Gurobi). **Presented at SIGGRAPH 2023.** Pub. [2].
- Developed a robust remeshing technique for computational knitting, further broadening user-design space and extending the method of Pub. [2] to diverse input models. Implemented pipeline with GUI in C++ (libIGL/Geometry-Central, Polyscope/OpenGL, Gurobi). **Presented at SIGGRAPH 2024.** Pub. [1].

Real-time object detection aid for the visually impaired

Trinity College, Department of Computer Science

📅 Sep 2020 – May 2021   📍 Hartford, CT

- Implemented a system to provide real-time audio feedback on a white case using NVIDIA's Jetson Nano microcomputer. Integrated (Python) the Raspberry Pi V2 Camera with the Nano for real-time video input and configured the ssd-inception-v2 model with tensorflow for image classification.
- Developed iOS application (Swift) for audio feedback and seamless bluetooth interfacing between user and microcomputer.
- Awarded best Computer Science Senior Thesis Prize

Research Assistant, Perceptual Robotics & Automation Lab

Trinity College, Department of Engineering

📅 Sep 2018 – May 2021   📍 Hartford, CT

- *Vibration-based sensor:* Modelled contact-sensing as vibration-classification problem. Classified data using Guassian mixture model clustering and logistic regression. Interfaced sensor with Raspberry Pi micrcomputer (C/Python). Pub. [4].
- *Vision-based force-feedback in Robot-Assited surgery:* Examined maximal deviation of haptic feedback from ground truth for tolerable performance in Robot-Assisted Surgery. Explored models for node-to-node interaction in simulated tissue surface. Pub. [5].
- *Haptic Interface for Robot Locomotion:* Developed software and experimental protocol to compare a haptic interface vs keyboard and joystick interface for legged robot-locomotion. Conducted user-studies and statistically interpreted results. Pub. [3] & Pub. [6].
- *Joint-limit haptic feedback:* Implemented point cloud generation/retrieval models for providing haptic feedback in teleoperated robots. Presented paper at ICARM. Pub. [7].

SKILLS AND COMPETENCES

Skill	Rating
C/C++	●●●●●
Python	●●●●●
OpenGL/Polyscope	●●●●●
libIGL/Geometry-Central	●●●●●
Eigen	●●●●●
Java	●●●●●
Git	●●●●●
Gurobi Optimizer	●●●●●
Matlab	●●●●○
Blender/MeshLab	●●●●○
Mathematica	●●●○○

EDUCATION

Ph.D. in Computer Science

Boston University

📅 Sept 2021 – ongoing

Focus: Computer Graphics, Geometry Processing, Digital Fabrication, Optimization.

B.Sc. in Computer Science (hons) & Physics (hons)

Trinity College

📅 Sept 2017 – 2021

GPA: 3.95/4.0. Summa Cum Laude, Phi Betta Kappa & Sigma Pi Sigma (physics honor society) inductee

AWARDS

- Eurographics Widening Participation Scholarship ('24)
- President's Fellow in Physics (class of '21)
- Faculty Honors (All semesters at Trinity College) ('17 - '21)
- Full tuition scholarship, Trinity College ('17)

PUBLICATIONS

1. **Mitra, Rahul**, Megan Hoffmann, Erick Jimenez Berumen, and Edward Chien. "Singular Foliations for Knit Graph Design" In ACM SIGGRAPH 2024 Conference Proceedings, pp. 1-11. 2024.

2. **R. Mitra**, L. Makatura, E. Whiting, E. Chien, 2023, July. Helix-Free Stripes for Knit Graph Design. In ACM SIGGRAPH 2023 Conference Proceedings (pp. 1-9).

3. K.Huang, **R. Mitra**, I. Yung, D. Chitrakar, "Telelocomotion - Remotely Operated Legged Robots", MDPI Applied Sciences, 2021.

4. **R. Mitra**, K. Boyd, D. Subedi, D. Chitrakar, E. Aldrich, A. Swamy, K. Huang, "Contact Sensing via Active Oscillatory Actuation", IEEE International Conference on Mechatronics, Robotics and Automation (ICMRA), Shanghai, China, 2020.

5. K. Huang, D. Chitrakar, **R. Mitra**, D. Subedi, Y.H. Su, "Characterizing Limits of Vision-Based Force Feedback in Simulated Surgical Tool-Tissue Interaction", Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Montreal, Canada, 2020.

6. (Poster) D. Chitrakar, **R. Mitra**, K. Huang, "Haptic Interface for Hexapod Gait Execution", IEEE International Conference on Robotic Computing (IRC), Taichung, Taiwan, 2020.

7. K. Huang, Y.H. Su, M. Khalil, D. Melesse, **R. Mitra**, "Sampling of 3DOF Robot Manipulator Joint-Limits for Haptic Feedback", 2019 IEEE International Conference on Advanced Robotics and Mechatronics (ICARM), Osaka, Japan, 2019.