

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 Gaussian mixture model clustering and logistic regression. Interfaced sensor with Raspberry Pi miccomputer (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

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|-------------------------|-------|
| C/C++ | ●●●●● |
| Python | ●●●●● |
| OpenGL/Polyscope | ●●●●● |
| liblGL/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 Beta 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, R.**, Jimenez Berumen, E., Hofmann, M., & Chien, E. (2024, July). Singular Foliations for Knit Graph Design. In ACM SIGGRAPH 2024 Conference Papers (pp. 1-11).
2. **Mitra, R.**, Makatura, L., Whiting, E., & Chien, E. (2023, July). Helix-Free Stripes for Knit Graph Design. In ACM SIGGRAPH 2023 Conference Proceedings (pp. 1-9).
3. Huang, K., Subedi, D., **Mitra, R.**, Yung, I., Boyd, K., Aldrich, E., & Chitrakar, D. (2020). Telelocomotion—remotely operated legged robots. *Applied Sciences*, 11(1), 194.
4. **Mitra, R.**, Boyd, K., Subedi, D., Chitrakar, D., Aldrich, E., Swamy, A., & Huang, K. (2020, October). Contact sensing via active oscillatory actuation. In 2020 3rd International Conference on Mechatronics, Robotics and Automation (ICMRA) (pp. 99-104). IEEE.
5. Huang, K., Chitrakar, D., **Mitra, R.**, Subedi, D., & Su, Y. H. (2020, July). Characterizing limits of vision-based force feedback in simulated surgical tool-tissue interaction. In 2020 42nd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) (pp. 4903-4908). IEEE.
6. Chitrakar, D., **Mitra, R.**, & Huang, K. (2020, November). Haptic interface for hexapod gait execution. In 2020 Fourth IEEE International Conference on Robotic Computing (IRC) (pp. 414-415). IEEE.
7. Huang, K., Su, Y. H., Khalil, M., Melesse, D., & **Mitra, R.** (2019, July). Sampling of 3dof robot manipulator joint-limits for haptic feedback. In 2019 IEEE 4th International Conference on Advanced Robotics and Mechatronics (ICARM) (pp. 690-696). IEEE.