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 a pipeline (Python/C++) to render quad elements over cut & sew patterns (and extends to general 3D models).
- Investigating novel remeshing 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 cane 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 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	Level
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 (BU)

📅 Sept 2021 – ongoing

Focus: Computer Graphics, Geometry Processing, Digital Fabrication.

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

Trinity College (TC)

📅 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 (TC, '21)
- Computer Science Senior Thesis Prize (TC, '21)
- Faculty Honors (All semesters, TC)
- Full tuition scholarship, (TC, '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.