RAHUL MITRA

Computer Science PhD student

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EXPERIENCE

Meshing for digital fabrication, Research Project

Boston University, Department of Computer Science

Sept 2021 – Present | Boston, MA

- Developed and implemented a novel remeshing technique to convert 3D models into digitally fabricable structures.
- Modelled remesh generation as a non-convex optimization model (Gurobi). Explored custom heuristics to speed-up solve time.
- In preparation for conference submission.

Real-time object detection aid for the visually impaired, undergrad. CS senior thesis

Trinity College, Department of Computer Science

Sep 2020 – May 2021 | Hartford, CT

- Configured NVIDIA's Jetson Nano microcomputer with a white cane to identify objects and provide audio feedback in real-time. Integrated, using Python, the Raspberry Pi V2 Camera with the Nano for real-time video input.
- Used the ssd-inception-v2 model and tensorflow API for image classification.
- Developed iOS application (Swift) for audio feedback and seamless bluetooth interfacing between user and microcomputer.
- Winner of best thesis award based on completeness, technical maturity and relevance.

Researcher, 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. Wrote code in C and Python to inerface sensor with Raspberry Pi microcomputer (used for data collection). Pub. [2].
- *Vision-based force-feedback in RMIS:* Examined deviation of haptic feedback from ground truth for acceptable performance in Robot-Assisted Minimally Invasive Surgery (RMIS). Explored models for node-to-node interaction in simulated tissue surface. Pub. [2].
- *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. [1].
- *Joint-limit haptic feedback:* Implemented point cloud generation/retrieval models for providing haptic feedback in teleoperated robots. Presented paper at ICARM. Pub. [5].

PROJECTS

- **Software:** Implemented perceptron algorithm, gradient descent (stochastic, adaptive, adaptive momentum), neural network, minimax algorithm from scratch. [code available on request]
- **Hardware:** (1) Implemented Wi-Fi localization model for robotic swarms. (2) Led a team of 3 undergads in building an autonomously navigated wheeled robot.

SKILLS AND COMPETENCES

C/C++	●●●●●
Python	●●●●●
Java	●●●●●
Git	●●●●●
Matlab	●●●●○
Blender/MeshLab	●●●●○
Mathematica	●●●○○
Gurobi Optimizer	●●●○○
SQL	●●○○○
English	●●●●●
Bengali	●●●●●
Hindi	●●●●○

EDUCATION

Ph.D. in Computer Science

Boston University

Sept 2021 – ongoing

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

B.Sc. in Computer Science & Physics

Trinity College

Sept 2017 – 2021

GPA: 3.95/4.0. President's Fellow in Physics, Phi Betta Kappa inductee, Summa Cum Laude.

INTERESTS

- Teaching: 6x undegrad and grad TA, Teach the teacher's program (volunteer), Tech Savvy (volunteer)
- Sports: Soccer, Biking, Formula 1
- Literature

PUBLICATIONS

1. K.Huang, **R. Mitra**, I. Yung, D. Chitrakar, “Telelocomotion - Remotely Operated Legged Robots”, MDPI Applied Sciences, 2021.
2. **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.
3. 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.
4. D. Chitrakar, **R. Mitra**, K. Huang, “Haptic Interface for Hexapod Gait Execution”, IEEE International Conference on Robotic Computing (IRC), Taichung, Taiwan, 2020.
5. 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.