

Dhruv Kool Rajamani

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EDUCATION

Worcester Polytechnic Institute, 3.83/4.0

Master of Science in Robotics Engineering

Worcester, MA

Aug. 2019 – May 2021

Manipal Institute of Technology, 8.7/10

Bachelor of Technology in Mechatronics Engineering, Minor in Robotics and Automation

Karnataka, India

Aug. 2015 – May 2019

EXPERIENCE

Amazon Robotics | Advanced Robotics Co-op

Jan 2021 - Jul 2021

- **Grasping and Manipulation:** Designing algorithms to solve problems in grasp planning at Amazon Robotics.

Automation and Interventional Medicine Lab, WPI | Research Assistant

Sep 2019 - Jul 2021

- **MRI Robot for Stereotactic Surgeries (Thesis):** Creating a 3D Slicer extension to control a neurosurgery robot for DBS. Implementing deep-learning based segmentation to identify burr holes.
- **RL Toolkit for Medical Robots:** Designed a RL toolkit using OpenAI gym and the Asynchronous Multibody Framework (AMBF). Published a at IEEE-ROMAN on Collaborative suturing using Q -learning on the dVRK.
- **Human Intent Detection:** Multimodal sensor fusion to capture human intent to control a hand exoskeleton using object detection, pose detection, and marker tracking. Adaptive impedance controller to compensate for stiffness.

Delsys Inc. | R-D Engineering Intern

May 2020 - Aug 2020

- **Real-Time Communications Middleware:** Designed a Real-time Communications Middleware using protobufs and zeromq in dotnet core, C++ and Python to integrate Delsys Sensors with 3rd party sensors.

Maidbot | Robotics Software Engineer Co-op

Feb 2019 - Jun 2019

- **Sensor fusion:** Integrated TOF sensors over optimized I^2C using a DMA Controller for to populate dense pointclouds for SLAM. Integrated with ROS, Gazebo and docker to visualize coverage map using octomap.
- **Fleet Management and Maintenance:** Maintained a fleet of 200+ *Rosie*'s by writing firmware updates and bug fixes. Used a containerized OS deployments with ROS for the fleet.

Biorobotics Lab, EPFL | Research Assistant

May 2018 - Jul 2018

- **COMAN Humanoid Robot Simulation:** Designed two different Gazebo based simulation frameworks using OROCOS-RTT and ROS. Tested a continuum of gaits and interactions of compliant robots. (Video)

PROJECTS

Augmented End to End Speech Net | Python, Tensorflow

Paper, Git

- Encoder-Decoder network to modulate speech for patients suffering from high frequency hearing loss.

Mars Rover Prototype | Solidworks, Ansys, OpenCV

Mars Rover Manipal

- Developed an autonomous Rover capable of traversing harsh terrain, with a 6 DOF robotic arm and end effector

Underactuated Flexible Manipulator | Matlab, Python

video, Git 1, Git 2

- Trajectory tracking of a n-link manipulator using Differential Flatness, Linear Quadratic Regulator, PID.

AIM Lab Website | C#, dotnet, Postgres SQL, Linux, Markdown

Website

- Designed the AIM Lab Website with custom Markdown Rendering for all pages.

SKILLS

Languages: C++, C, Python, C#, MATLAB, JS, \LaTeX

Software: VTK, 3D Slicer, Tensorflow, ROS, Gazebo, Docker, Git, OpenAI gym, OpenCV, PlatformIO, MBED, RBDL

Protocols and Messaging: Protobuf, ZeroMQ, DDS, I^2C , CAN, SPI, UART, UDP, TCP, Websockets

ACHIEVEMENTS

- Graduate tuition sponsored by **National Institutes of Health (NIH)** #5R01CA166379.
- Awarded **\$10,000** for runners up in the Real-Time Sensor Fusion Challenge. (MRADiChallenge)
- Best Rover team in Asia; 8th out of 82 teams at URC, Utah, 2017. ([link](#))

- [1] Varier, V., **Rajamani, D. K.**, et. al. *AMBF-RL: A real-time simulation based Reinforcement Learning toolkit for Medical Robotics*. IEEE International Conference on Robotics and Automation (ICRA) 2021 *submitted*
- [2] Varier, V., **Rajamani, D. K.**, et. al. *Collaborative Suturing: A Reinforcement Learning Approach to Automate Hand-off Task in Suturing for Surgical Robots*. The 29th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN 2020), Naples, Italy.
- [3] **Rajamani, D. K.**, et. al. *Design Overview of a Planetary Exploration Rover for Unstructured Terrain*. 3rd International and 18th National Conference on Machines & Mechanisms (iNAComm 2017), Bhabha Atomic Research Center (BARC), Mumbai, India.
- [4] **Rajamani, D. K.**, et. al. *Design and development of a linear jawed gripper for unstructured environments*. Manipal Journal of Science and Technology, 3, no. 1 (June 2018). ([Link](#))