Lokesh Krishna Rajan

✉ : **Email**

🌐 **Website**   in **Linkedin**   ✇ **Google Scholar**   🐦 **Twitter**   ⌨ **Github**   ☎ : +1-2135518252

EDUCATION

- **University of Southern California** — *Aug 2022 - Present*
  Ph.D. in Mechanical Engineering — Overall GPA: 3.68/4

- **Indian Institute of Technology Varanasi** — *May 2018 - May 2022*
  B.Tech in Electronics Engineering — Overall GPA: 8.68/10

SKILLS AND INTERESTS

Key competencies:	*Robotics, Controls, Deep Reinforcement learning, Optimisation*
Languages:	*Python, C, C++*
Tools and frameworks:	*Pytorch, Stable baselines, MuJoCo, Git, PyBullet, RAISIM, CMake, LaTeX*
Areas of interests:	*Learning based and optimal control, Athletic intelligence and dynamic motor skills of robots, Legged locomotion*

PUBLICATIONS

IROS 2023 (accepted)
Learning Multimodal Bipedal Locomotion and Implicit Transitions: A Versatile Policy Approach **arXiv, Video**
Lokesh Krishna, Quan Nguyen

ICRA 2022 + RA-L (accepted)
Linear Policies are Sufficient to Realize Robust Bipedal Walking on Challenging Terrains **IEEE Xplore, Video**
Lokesh Krishna*, Guillermo Castillo*, Utkarsh Mishra, Ayonga Hereid, Shishir Kolathaya

IROS 2021 (accepted)
Learning Linear Policies for Robust Bipedal Locomotion on Terrains with Varying Slopes **arXiv, Video**
Lokesh Krishna, Utkarsh Mishra, Guillermo Castillo, Ayonga Hereid, Shishir Kolathaya

CoRL 2020 (accepted)
Robust Quadrupedal Locomotion on Sloped Terrains: A Linear Policy Approach
Kartik Paigwar, Lokesh Krishna, Sashank Thirumala, Naman Khetan, Aditya Varma Sagi, Shalabh Bhatnagar, Ashitava Ghosal, Bharadwaj Amrutur, Shishir Kolathaya **arXiv, Video**

RESEARCH EXPERIENCE

Graduate Research Assistant — Aug 2022 – Present
Dynamic Robotics and Control Laboratory, USC Viterbi — **Lab's webpage**

Student Collaborator — Dec 2021 – Jun 2022
Movement Control Lab, MIT — **Lab's webpage**

Guest Researcher — Mar 2021 – Feb 2022
Movement Generation and Control Group, MPI-IS, Germany — **Lab's webpage**

Student Researcher — Mar 2020 – Jan 2022
Stoch Lab, RBCCPS, Indian Institute of Science — **Lab's webpage**

PROJECTS

hmm: a mujoco framework for learning human motor models with Deep RL   Jan 2022 – Jun 2022
Supervisor: Dr Nidhi Seethapathi, MIT   **Github (request access)**

· Developed a mujoco-based framework for seamless experimentation and modelling of human motor control and locomotor adaptation through Deep RL. The framework includes custom tools for integration with marker-based mocap data, model scaling, inverse kinematics and dynamics.

Agile Bipedal Locomotion Through Trajectory Driven Multi Stage Learning   Mar 2021 – Feb 2022
Supervisor: Dr Majid Khadiv, MPI-IS   **Github (request access), Video**

· Extended a controller framework for robust and agile bipedal manoeuvres through two-stage policy training. Stage 1 incorporated motion imitation from a reference motion generated through trajectory optimisation. Stage 2 involved further robustifying the policy to **contact uncertainties** and **pose perturbations** while integrating a few hardware quality costs to leverage sim-to-real transfer.

JerBot – a bio-mimetic bipedal robot

Under: Science and Technology Council, IIT Varanasi

Oct 2019 – Sep 2021

Github,Video

· Formulated an alternate design for addressing the problem of biped locomotion, mimicking the agile and superior locomotion skills of **Jerboa** . Fabricated our first prototype and did the mechanical validation of our hardware through **Heuristic and PD control, load testing, disturbance rejection, etc** and later built a custom **Open AI Gym environment** for experimenting with various Deep RL algorithms to learn optimal control strategies

AADOpt: Antenna Array Design and Synthesis through Optimisation

Supervisor:Dr. Manoj Kumar Meshram, IIT Varanasi

Jan 2020 - Jun 2021

Github, Report

· Proposed a novel design framework for the fabrication of Antenna Arrays by formulating it as an optimisation problem and solved it using the model-free and gradient-free Genetic Algorithm(GA).
· The end result is a novel design pipeline, with a threefold contribution, 1) A flexible and generalised design toolkit 2) allows the formulation of task-specific costs 3) accounts for various topological constraints

Intelligent Picking and Transportation Robot

Under: Group Project

Jun 2020 – Aug 2020

Video

· Designed a unique and cost-efficient industrial robot that could autonomously identify and displace objects inside a work space of enormous dimensions **4 x 2 x 0.9** m^3 payloads upto **2 kg**, to be deployed in warehouses.
· Developed a novel Software pipeline using **Over head Object Detection(Using Yolo V3) and 3D Grasp Estimation(using GR-ConvNet)** which could easily be deployed in any industrial robot.

TOWRpy - a simulation test bed for TOWR

Supervisor: Dr.Shishir N. Y. Kolathaya, IISc

May 2020

Github

· Built a **Simulaion Test Bed** in **Pybullet**, for validating the trajectories generated by **Trajectory Optimizer for Walking Robots(TOWR)**-*an open-source C++ library for trajectory optimization.*
· Developed both **visualization and simulation tools** that could be used for experimenting with **learning based techniques** to bridge the inherent sim to real gap in realizing TOWR generated trajectories.

ACHIEVEMENTS AND EXTRA CURRICULAR ACTIVITIES:

- Qualified for the **National Finale of Flipkart Grid 2.0 Robotics Challenge**(and emerged as one of the **top 3 teams all over India** under the problem statement **Intelligent Picking.**Certificate

- Won the **IIT Color**, and **Certificate of Merit** at **Gymkhana Awards 2021-22, 2019-20** from the IIT(BHU) Gymkhana, for my contribution to robotics in the institute.

- Won the **IBGAA Graduate Study Application Scholarship** from the IIT(BHU) Alumni Association.

- **Winner** of Pixelate a robotics event, held in **Technex 2019, IIT Varanasi.** Certificate, Video.

- **Winner** of **Mosaic** and Funkit, techincal events held in **Udyam 2019 by the Department of Electronics Engineering, IIT Varanasi.**Certificate 1, Github, Video, Certificate 2, .

- Showcased our project **JerBot** in **Engineer's Conclave** and represented the institute team in **DRDO SASE's UAV Fleet challenge** held in **Inter IIT Tech Meet 8.0, 2019**, hosted by **IIT Roorkee**

- Founded a student research group named **RoboReG** at IIT Varanasi, and successfully mentored projects from various domains of robotics Group's Website.