


Lokesh Krishna

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EDUCATION

- Indian Institute of Technology Varanasi** July 2018 - Present
Senior; B.Tech in Electronics Engineering Overall GPA: 8.53/10
- D.A.V. Boys Senior Secondary School, Mogappair** 2018
Class XII; Central Board of Secondary Education 95.6%
- D.A.V. Hr. Secondary School, Mogappair** 2016
Class X; Tamil Nadu Board of Secondary Education 98.6%

SKILLS AND INTERESTS

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

PUBLICATION(S)

- IROS 2021** **Learning Linear Policies for Robust Bipedal Locomotion on Terrains with Varying Slopes** [arXiv](#), [Video](#)
(accepted) *Lokesh Krishna, Utkarsh A. Mishra, Guillermo A. Castillo, Ayonga Hereid, Shishir Kolathaya*
- CoRL 2020** **Robust Quadrupedal Locomotion on Sloped Terrains: A Linear Policy Approach**
(accepted) *Kartik Paigwar, Lokesh Krishna, Sashank Thirumala, Naman Khetan, Aditya Varma Sagi, Shalabh Bhatnagar, Ashitava Ghosal, Bharadwaj Amrutur, Shishir Kolathaya* [arXiv](#), [Video](#)

RESEARCH EXPERIENCE

Guest Researcher	March 2021 – Present
Movement Generation and Control Group, MPI-IS, Germany	Lab's webpage
Student Researcher	July 2020 – Present
Stoch Lab, RBCCPS, Indian Institute of Science	Lab's webpage
Research Intern	March 2020 – July 2020
Stoch Lab, RBCCPS, Indian Institute of Science	Project page

PROJECTS

- JerBot – a bio-mimetic bipedal robot** October 2019 – Present
Under: [Science and Technology Council, IIT Varanasi](#) [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 **PID control, load testing, disturbance rejection, etc.**
 - Built a custom **Open AI Gym environment** for experimenting with various Deep RL algorithms to learn optimal control strategies. Currently using **Proximal Policy Optimization (PPO)**, to make the agent learn a robust gait sequence by **Reward shaping** in our simulated environment.
- AADOpt: Antenna Array Design and Synthesis through Optimisation** January 2020 - Present
Supervisor: [Dr. Manoj Kumar Meshram, IIT Varanasi](#) [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

June 2020 – August 2020

Under: Group Project

[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 m³** 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.

Study and Implementaiton of ANN's in Low Powered Embedded Systems

April 2020

Supervisor: Dr.Amritanshu Pandey, IIT Varanasi

[Github](#), [Report](#)

- Implemented a **framework for deploying Artificial Neural Networks** in low level embedded systems like **Arduino Nano** and compared it with state of the art Python based framework(Pytorch).
- Studied a set low level problems that could be effectively and efficiently fulfilled by leveraging the capabilities of a micro controller. (tasks like colour detection,sensor filtering,etc)

TOWRpy - a simulation test bed for TOWR

May 2020

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

[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 in environments for experimenting with **learning based techniques** to bridge the inherent gap in realizing TOWR generated trajectories and thereby learn optimal control strategies.

RaisimStoch2 - a simulation environment for Stoch2 in RAISIM

April 2020

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

[Github](#)

- Transferred the pre-existing simulation and testing code base of our in house robot Stoch2 from Pybullet to the relatively faster and accurate **RAISIM (Robotics and AI Simulation) simulation platform**.
- Developed simulation testbeds in the native implementation of **RAISIM** in C++ and the available python wrapper **RaisimPy** in order to quantify the trade off in **simulation time vs ease of implementation**.

RELEVANT COURSES TAKEN:

MA-101 Engineering Mathematics-I(Real analysis), **MA-102** Engineering Mathematics-II(Differential Equations and Linear Algebra), **MA-202** Probability and Statistics, **CSO-101** Computer Programming, **EE-211** Linear Control Systems (ongoing),**Deep RL Boot camp by UC Berkley**(unofficially)

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](#)
- **Winner** of Pixelate, an image processing based robotics event held in **Technex 2019, IIT Varanasi**.[Certificate](#), [Video](#).
- **Winner** of Mosaic, a machine learning-based computer vision event ([Certificate](#), [Github](#), [Video](#))and Funkit a digital circuit fabrication event([Certificate](#)), held in **Udyam 2019 by the Department of Electronics Engineering, IIT Varanasi**..
- Showcased the hardware implementation of our project **JerBot** in **Engineer's Conclave** and **DRDO SASE's UAV Fleet challenge** held in **Inter IIT Tech Meet 8.0, 2019**, hosted by **IIT Roorkee**
- A panel member and active participant of the **Robotics Club, IIT Varanasi**.Conducted various workshops and camps in robot simulation,control and learning.[Summer Camp 20, and 21](#).
- Founded a student research group named **RoboReG** at IIT Varanasi, and successfully mentored projects from various domains of robotics [Group's Website](#).