RAGHAV SONI

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WORK EXPERIENCE

Member of Technical Staff - Oracle Bangalore, India
Manager: Mr. Ravi Malhotra *July 2023 - Present*

- Contributed to the development of a cloud-native control plane serving as an overlay service for a cloud-at-customer database solution, enabling automated management and updates.
- Played a key role in implementing RESTful APIs, in-memory metadata management, robust security protocols including key rotation, and comprehensive system patching.

EDUCATION

Indian Institute of Technology (BHU), Varanasi *July 2019 - May 2023*
Bachelor of Technology - Electronics Engineering; **CGPA : 9.53**

Independent Study Period *April 2018 - May 2019*
Dedicated to preparation for JEE Advanced 2019; **All India Rank : 2257**

St. Mary's Convent School, Vikasnagar *April 2017 - March 2018*
Class XII - Central Board of Secondary Education (CBSE); **Percentage : 97**

PUBLICATIONS

MELP : Model Embedded Linear Policies for Robust Bipedal Hopping Paper | Video
Raghav Soni*, Guillermo A. Castillo, Lokesh Krishna, Ayonga Hereid, Shishir Kolathaya*
2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

End-to-End Reinforcement Learning for Torque Based Variable Height Hopping Paper | Video
Raghav Soni*, Daniel Harnack, Hauke Isermann, Sotaro Fushimi, Shivesh Kumar, Frank Kirchner*
2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

ACADEMIC RESEARCH

Research Intern - Robotics Innovation Center, DFKI Bremen, Germany
Supervisor: Dr. Shivesh Kumar *May 2022 - September 2022*

- Designed and implemented reinforcement learning based controllers for underactuated systems, including a single hopping leg, acrobot, and torque-limited simple pendulum, leveraging algorithms such as PPO and SAC.
- Devised a novel system identification method to bridge the simulation-to-reality gap, enabling seamless transfer of reinforcement learning policies to real hardware.

Research Intern - Stochastic Robots Lab, RBCCPS, IISc Bangalore, India
Supervisor : Dr. Shishir Kolathaya *August 2021 - September 2022*

- Extended learning based linear policies by incorporating Spring Loaded Inverted Pendulum (SLIP) template model based reference trajectories, resulting in a robust and stable framework for dynamic hopping gait.
- Conducted comprehensive validation of the framework through rigorous simulation experiments in MuJoCo using a model of Digit by Agility Robotics. Successfully transferred the trained policies to real hardware with minimal sensory feedback, achieving preliminary results in real-world hardware testing.

Research Intern - Artifical Intelligence and Mechatronics Lab, IIT Bhubaneswar Bhubaneswar, India
Supervisor : Dr. Pandu Ranga *May 2021 - July 2021*

- Developed an open source Python library to generate reference trajectories for bipedal walking using a simple Linear Inverted Pendulum (LIP) model with ability to dynamically adjust step length for agile motion.

- Designed a PD controller for a humanoid robot Thormang3 in PyBullet simulation to track the LIP trajectories. Integrated dynamic turning and obstacle avoidance capabilities by utilizing sensor inputs, including depth cameras, for real-time environmental awareness and adaptive motion planning.

PROJECTS

Autonomous Intelligent Pick and Place Industrial Robot GitHub | Video | Report
Flipkart Grid 2.0 Robotics Challenge - National Finalists *July 2020 - January 2021*

- Conceptualized and developed an intelligent robotic system for object picking in simulated industrial environments, leveraging advanced deep learning techniques.
- Custom trained YOLOv3 (You Only Look Once) algorithm for Object detection and integrated Generative Residual Convolutional Neural Network (GR-ConvNet) in the framework to generate robust antipodal grasps from images of an RGB-D camera.
- Brainstormed a custom mechanical design inspired by a 3D printer, optimized for operation over large workspaces and capable of handling payloads up to 2 kg. Created a tailored URDF model using SOLIDWORKS and Blender.

Adversarial Chase and Run Cars GitHub | Report
Research Project - Under Science and Technology Council, IIT (BHU) *December 2021 - March 2022*

- Developed an Adversarial Chase and Run Cars custom gym environment to test and develop algorithms related to Multi Agent Systems, especially those related to Multi-Agent Reinforcement Learning.
- Tested various Multi-Agent Reinforcement Learning algorithms including a custom version of DQN and MADDPG.

Handwritten Character Segmentation and Recognition GitHub | Report
Exploratory project - Under the supervision of Dr. AK Singh, IIT (BHU) *August 2021 - December 2021*

- Developed a computer vision based solution to remove noise from the handwritten words and segment characters.
- Trained a custom made CNN using EMNIST extended dataset to take in segmented characters and make predictions from the visual image. Optimized the algorithm to work with rotated, thin, thick and noisy characters.

SKILLS

Programming Languages	C, C++, Python, Java
Tools and Frameworks	Shell Scripting, Tensorflow, OpenCV, PyTorch, Scikit, Mujoco, PyDrake, Sympy, Stable Baselines, GIT, Eigen, ROS, Maven, Spring boot, Dropwizard, Docker, OCI
Areas of Interests	Robotics, Optimal Control, Reinforcement Learning

LEADERSHIP

- **Joint Secretary 2021-22** - *Robotics Club, IIT (BHU)* - Served as Joint Secretary of the Robotics Club, overseeing event coordination, facilitating communication, and providing mentorship for various projects.
- **Technical Lead 2021-22** - *RoboReG, IIT (BHU)* - Led RoboReG, a robotics-focused research group at the institute, fostering research aptitude among group members through mentorship and research seminars.
- **Volunteer, Oracle India Pvt Ltd** - Actively engaged in volunteer initiatives focused on social upliftment and community development.

HONOURS AND ACHIEVEMENTS

- **Director's Gold Medal, IIT (BHU)** - Awarded in recognition of outstanding all round performance and phenomenal leadership qualities; conferred as the sole recipient among more than 1,000 graduating students.
- **DAAD-WISE Scholar** - Got nominated by DAAD-WISE program for a fully funded research internship in Germany.
- **National Finalist (among top 9 teams out of 2000)** - Flipkart Grid 2.0 Robotics Challenge