

Rohit Sonker

| +91-8172820993 | rohitsonker96@gmail.com | [GitHub](#) | [Personal Homepage](#) |

EDUCATION

Indian Institute of Technology (IIT) Kanpur, India

July. 2014 – June 2019

- Master of Technology (Dual Degree) in Mechanical Engineering — CGPA 9.3/10
- Bachelor of Technology in Mechanical Engineering — CGPA 7.9/10

GRE: V 163/170, Q 164/170 — TOEFL iBT: 116/120

PUBLICATIONS AND PRESENTATIONS

- Vaisakh Shaj, Dieter Büchler, **Rohit Sonker**, Philipp Becker, Gerhard Neumann “Hidden Parameter Recurrent State Space Models For Changing Dynamics Scenarios” [Submitted, Under Review]
- **R. Sonker** and A. Dutta, “Adding Terrain Height to Improve Model Learning for Path Tracking on Uneven Terrain by a Four Wheel Robot,” in IEEE Robotics and Automation Letters, vol. 6, no. 1, pp. 239-246, Jan. 2021, doi: 10.1109/LRA.2020.3039730. ([Link](#))
- **Rohit Sonker**, Ayush Mishra, Palvika Bansal, Anup Pattanaik “Techniques for Medical Concept Identification from Multi-Modal Images”, in CEUR Workshop Proceedings, Vol-2696, 2020. ([Link](#)) (**Oral Presentation**)
- (**Poster**) *Learning Based Control for Mobile Robots on Uneven Terrain*, Research Scholar Day, IIT Kanpur 2018

RESEARCH EXPERIENCE

Inverse Dynamics learning with Kalman Networks for Manipulator Control

July 2021 - Present

Researcher, Karlsruhe Institute of Technology, Advisor - Prof. Gerhard Neumann

Germany

- Researched on learning of forward and inverse dynamics models using probabilistic recurrent Kalman networks which combine Kalman filtering with deep learning
- Created offline and online inverse model learning frameworks benchmarking different network architectures
- Utilized the models under feedforward control regime for trajectory tracking by Franka Manipulator
- Extending approach to multi-modal learn inverse dynamics model for pneumatic artificial muscle Robot

Model based Learning for Path Tracking on Uneven Terrain

July 2018 - June 2019

Master's Thesis, Indian Institute of Technology Kanpur, Advisor - Prof. Ashish Dutta

Kanpur, India

- Used dynamics model learning with model predictive control (MPC) for path tracking by mobile robot
- Analysed effect of planning horizon, controller frequency, used action sampling with cross entropy method for MPC
- Introduced terrain height data to learning to improve tracking performance and increase generalisation of model
- Results showed a significant improvement over standard baseline controllers, work published in IEEE RAL

Incorporating Advice in Reinforcement Learning

May 2018 – July 2018

Summer Intern, University of Texas at Dallas, Advisor - Prof. Sriraam Natarajan

Dallas, TX, USA

- Researched on adding advice under human-in-loop learning paradigms for various reinforcement learning (RL) algorithms
- Combined advice preferences given by multiple sub-optimal experts by Expectation Maximisation to shape policy
- Techniques used helped remove targeted noise in learning and motivated early learning for useful behaviours

Moving Target Enclosure by Group of Turtlebots

May 2016 – July 2016

Undergraduate Researcher, Indian Institute of Technology, Advisor - Prof. Laxmidhar Behera

Kanpur, India

- Used cyclic pursuit strategy for cooperative control of multiple agents to enclose and follow moving target
- Tested algorithm in ROS on a group of turtlebots which successfully converged into formation around target

PROFESSIONAL EXPERIENCE

Data Scientist

July 2019 – Present

Pricewaterhouse Coopers US Advisory

Mumbai, India

PwC Certified AI Modeler, completed projects and developed Proof of Concepts using ML techniques

Medical Concept Detection from Multi-Modal Images (ImageClef2020)

- Worked on multi-label image classification to predict a concepts in radiographic images of different modalities
- Utilized various techniques such as transfer learning, clustering, association rule mining, K-NN image retrieval
- Secured 2nd Position globally at ImageClef2020 Hackathon, presented & published work at CEUR Clef Conference

Database Entity Matching with NLP

- Developed a database entity matching NLP algorithm with similarity search TF-IDF, word2vec and Sentence Encoder embeddings
- Adapted method for different use-cases led to full client engagement utilized across various workstreams
- Deployed model as end to end AWS hosted pipeline for mapping entities in discrete datasets

Model Monitoring Framework - MLOps

- Developed a model monitoring framework to analyze performance over time in AWS
- Automated quality checking on data and analysis of distribution drift in different data tables over time

COVID-19 Projection Model

- Developed a time varying SIRVD simulation model for COVID19 projection scenarios for over 50+ countries
- Model 15% more accurate as compared to standard IHME projections
- Extended model with a vaccination compartment and ARIMA projections to model infection rate
- Project capability led to additional client engagements worth over \$700K lasting over an year

Teaching Assistant

July 2018 - April 2019

ME762: Intro to Robotics & ME763: Robot Manipulators

IIT Kanpur, India

- Graded course assignments, performed invigilation duties and clarified student doubts during dedicated office hours
- Held regular doubt clearing sessions to address problems of students in assignments and coursework to ensure smooth conduction of course

SELECTED COURSE PROJECTS

Object Detection harness for Visually Impaired | *Engineering Design*

Jan 2019 – April 2019

- Created a wearable harness with object detection and proximity sensing capabilities to assist visually impaired
- Developed a prototype using mobile phone camera, laptop, depth sensors and Arduino micro-controller to give out voice description of surrounding objects to the user

Modelling Tax Compliance Behaviour | *Multiagent Systems*

Jan 2017 – April 2017

- Developed an agent-based evolutionary model to analyze tax compliance trends in a population of 10k individuals
- Introduced factors such as ‘Neighborhood(Network) Effect’ and ‘Perceived Audit Rate’ to make simulation realistic
- Results correctly predicted tax compliance rates and gave insights on improvement of tax collection

Redundancy Resolution For 3DOF Manipulator | *Neural Networks*

Jan 2018 – April 2018

- Developed an Single Network Adaptive Critic (SNAC) algorithm for redundancy resolution of a 3DOF manipulator
- Tested control algorithm for reaching and trajectory following tasks

TECHNICAL SKILLS

Languages: Python, C/C++, MATLAB, R

Deep Learning: PyTorch, Keras

Other Softwares: Robot Simulation (ROS, Mujoco, Pybullet) and Design (Solidworks, Inventor)

CO-CURRICULAR ACTIVITIES

Core Team, Institute Counselling Service

April 2018 – April 2019

Indian Institute of Technology Kanpur

Kanpur, India

- Worked in a team of 8 members coordinating with institute counsellors, faculty members and over 200 volunteers to provide academic, financial and emotional support to students
- Led a team of 60 Orientation Team Member and 50 Buddies to effectively conduct an 8-day orientation program for over 1000 new students to ensure their smooth transition to the campus life
- Managed a tutoring program with over 50+ mentors spread across different subjects and student hostels
- Planned the student selection process for Student's Benevolence Fund Scholarship, collaborating with Faculty to conduct interviews

Learning and Development Team

July 2019 - June 2020

Firm Development Activities - PwC US Advisory

Mumbai, India

- Identified key areas to upskill professionals and developed a year long plan for internal trainings after discussions with the leadership team - program led training of over 100+ folks across multiple offices
- Created and single-handedly managed a dedicated training structure for AI techniques by collaborating across competencies within PwC

RELEVANT COURSES

Computer Science and Math

Fundamentals of Computing	Calculus
Data Structures and Algorithms	Linear Algebra & ODEs
Multi-Agent Systems: Games, Algorithms & Evolution	Partial Differential Equations
Machine Learning	Complex Analysis
Neural Networks	Quantitative Methods for Decision Making

Robotics and Control

Introduction to Robotics	Control Systems
Robot Motion Planning	Vibration Control
Robot Manipulators: Dynamics & Control	Compliant Mechanisms
Mechatronics	

Specialization In Reinforcement Learning (Offered by University of Alberta on Coursera)*

Fundamentals of Reinforcement Learning	Prediction and Control with Function Approximation
Sample-based Learning Methods	A Complete Reinforcement Learning System (Capstone)

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