Rahul Kumar

vernwalrahul.github.io
vernwalrahul@iitkgp.ac.in | +91 7261823455

EDUCATION

IIT KHARAGPUR
B.Tech in Computer Science
2016 - 2020
CGPA: 9.16 / 10.0

DAV KAPILDEV
Grad. May 2016| Ranchi, India
Grade : 95.4%

LINKS

Github:// **vernwalrahul**
LinkedIn:// **vernwalrahul**
Medium:// **@rahulvernwal**

COURSEWORK

Programming and Data Structures
Algorithms
Software Engineering
Database Management System
Compilers + Operating Systems
Artificial Intelligence (AI)
Machine Learning
Reinforcement Learning
Information Retrieval
Image Processing

SKILLS

Languages
• C • C++ • Python • SQL • Java
• Matlab • LaTeX
Libraries and Tools:
• Tensorflow • OpenCV • ROS
• OMPL • Docker • Flask

RESPONSIBILITIES

Instructor / Mentor
• MIT-IIT Robotics Workshop
• IEEE Robotics Winter Workshop
• Kharagpur Winter of Code 2017

Executive Head
• Code Club, IIT Kharagpur
• Kharagpur Open Source Society

PUBLICATIONS

[1] R. Kumar, A. Mandalika, S. Choudhury, and S. Srinivasa. Lego: Leveraging experience in roadmap generation for sampling-based planning. *Intelligent Robots and Systems, IROS, IEEE/RSJ International Conference*, 2019.

EXPERIENCE

AMAZON ROBOTICS | Software Engineer - Robotics Intern
May 2019 - July 2019 | Seattle, USA

- Built end to end Stack for hands free automation of box picking using UR10 (6DoF Robotic Arm).
- Designed perception module to identify boxes from time of flight image.
- Integrated controller, motion planning and calibration modules.
- Deployed entire stack to AWS code pipeline.

PERSONAL ROBOTICS LAB | University of Washington
Research Intern — Advisor: Prof. Siddhartha Srinivasa
May 2018 - July 2018 | Seattle, USA
Topic : Learning Sampling Methods for constrained space motion planning

- Devised non uniform sampling strategies to bias sampling in bottleneck regions.
- Devised algorithms to increase robustness of the generated graph.
- Our algorithm outperformed state of the art method on a wide range of problems | Accepted at IRoS '19

Working Areas - **Deep Learning, AutoEncoders, Constrained Space Problems**

PROJECTS

KHARAGPUR ROBO-SOCCER RESEARCH LAB
AI Team Member — Advisor : Prof. Jayanta Mukhopadhyay
Jan 2017 – Present | IIT Kharagpur
Objective : To build autonomous soccer playing robots

- Integrated path planning and Finite State Machines (FSM) architecture for Robocup Small Size League.
- Designed a simulator for robots using PyQT.
- Worked on kalman filter to tackle noisy data from camera images.

Research Areas - Multi-agent systems, motion planning, noise filters, robot soccer

DIGITAL LEGAL ASSISTANT
Open Soft 2019, General Championships, IIT Kharagpur

- Developed the stack to search for related cases and acts for a given natural language query.
- Used page ranking algorithms on citation graphs to determine the ordering of results and cases on over 50000 supreme court cases.

AWARDS

2019	Final Round Worldwide	Game of Drones | **NIPS'19** with **Microsoft**
2019	Final Round National	Smart India Hackathon
2018	**3rd** in National	**IBM Blockchain Hackathon**
2017	Worldwide	RoboCup SSL | First Indian Team
2016	**All India Rank 9th**	KVPY Fellowship
2016	**top 0.03%** (AIR 266)	JEE Advanced

OTHER PROJECTS

LEARNING A ROBUST WALK ENGINE FOR NAO ROBOTS

Jul'19 - Apr'20 — Advisor : Prof. Jayanta Mukhopadhyay

One of the major challenge in RoboCup Humanoid League is to enhance the speed and robustness of Nao walk engine. Together with my advisor, I worked to build a walk engine for Nao Robotcs through Reinforcement Learning. We evaluated various different algorithms like evolution strategies, PPO, DDPG, and Soft Actor Critic Method.
Working Areas: Reinforcement Learning, Evolution Strategies, Imitation Learning.

ACTION/EVENT RECOGNITION FOR SAFETY ANALYTICS

Dec'17 - Feb'18 — Advisor : Prof. Pabitra Mitra

Recognising actions in video clips by extending CNN in the time domain. The model developed to be most suited foran industrial setting like detecting accidents in a factory.
Working Areas: Computer Vision, ConvNets, Encoder Decoder Models

QUESTION GENERATION FROM RDF GRAPH VIA DISCRIMINATIVE RANKING

Aug'18 - Nov'18 — Advisor : Prof. Plaban Bhowmick

Developed an application to automatically generate Q/A pairs from RDF graphs. It involves identification of popular-entities, extraction of their relation with other entities using hop distance. Extracted tokens are then fed to tranforma-tions and ranking algorithm to produce a ranked list of questions.
Working Areas / Libraries: Knowledge Graph, Ranking Algorithm, SPARQL

MEDICAL OCR

Jan'18 - Mar'18

Worked in a team of 6 to build an OCR for detecting of medical professionals from prescriptions. Integrated Peter Norvig's spelling corrector algorithm to auto-correct misspelled words.
Working Areas: Computer Vision, Character Recognition, Spelling Correction

RRT SIMULATOR

Repository: RRTSimulator

Developed an interactive GUI interface to simulate a path generated by RRTs avoiding obstacles using Python and Qt. Added Features for low level skill testing of individual robots. Tools and Libraries: OMPL, PyQt, ROS.

BLOCKCHAIN CERTIFICATES

An application on digital certificates using blockchain technology to avoid fraud certificates and speed up the verifica- tion process.
Won 3rd prize at National Level Hackathon.

TECHNICAL BLOGS

- Creating Your Messenger Bot with Python — 21k views
- How Should I Start with CNN — 2.5k views
- An Introduction to Variational Auto-Encoder — 1.1k views