Rahul Kumar

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ACADEMIC DETAILS

Education	Institute	Year	CPI / %
B. Tech: Computer Science and Engineering	IIT Kharagpur	2016- Till date	**9.20 / 10**
Intermediate	DAV Kpildev, Ranchi	2014 - 2016	**95.4 %**

PUBLICATIONS

- **LEGO: Leveraging Experience in RoadmapGeneration for Sampling-Based Planning**
  by Rahul Kumar, Aditya Mandalika, Sanjiban Choudhury, Siddhartha Srinivasa
  in Intelligent Robots and Systems, IROS, 2019 IEEE/RSJ International Conference, (Macau, China). Nov 2019 PDF

RESEARCH EXPERIENCE

- **Amazon Robotics, Seattle**
  Software Engineering Intern May'19-July'19
  Topic: End to end system to demo box stacking using a robotic arm
  Worked to build end to end stack for hands free automation of box picking using UR10 (6-DoF robotic arm).Designed perception module to identify boxes from time-of-flight image using clustering and plane fitting methods.Integrated controller, motion planning and calibration modules.
  Working Areas: Perception, Path Planning, State Machines, Robotic Automation and Controls

- **University of Washington**
  Summer Intern, Personal Robotics Lab May'18-July'18
  Topic: Learning Sampling Methods for Robot Motion Planning
  Devised non-uniform sampling strategies that favor sampling in bottleneck regions to accelerate the planning process simultaneously maintaining its quality in smoothly changing environment.
  Research Areas: Deep Learning, Variational AutoEncoders, Graph Space Planning, Constrained Space Problems
  Advisor: Prof. Siddhartha Srinivasa

- **Kharagpur RoboSoccer Students' Group,** IIT Kharagpur
  Software Teamm Member Feb'17 - Present
  Objective: To build Autonomous Soccer Playing Robots
  Implemented path planning algorithms and Finite State Machines (FSM) Architecture for RoboCup Small Size League Robots, Designed a simulator for robots using PyQt, Worked on Kalman Filter to tackle noisy data from Camera, enhancing World Model of the Game State.
  Research Areas: Multi-agent systems, motion planning, noise filters, robot soccer
  Advisor: Prof. Jayanta Mukhopadhyay

PROJECTS

- **Action/Event Recognition for Safety Analytics** Dec'17 - Feb'18
  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

- **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. Database was made of around 50000 supreme court case. Used page ranking algorithms on citation graphs to determine the ordering of results and cases.

- **RRT Simulator**
  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.
  Repository: https://github.com/vernwalrahul/RRTSimulator/

- **Question Generation from RDF graphs via Discriminative Ranking** Aug'18 - Nov'18
  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 tranformations and ranking algorithm to produce a ranked list of questions.
  Advisor: Prof. Plaban Bhowmik

- **Medical OCR**
  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.

- **Blockchain Certificates** (IBM Blockchain Hackathon)
  An application on digital certificates using blockchain technology to avoid fraud certificates and speed up the verification process.

RESPONSIBILITIES

- **Instructor** (MIT-IIT Robotics Workshop) *(Guide: Prof. Sudeshna Sarkar , 1st May'17 - 15th May'17)*
  Conducted a fortnight long Robotics workshop for higher school students Introduced basics of C, C++, Processing and their applications in the field of robotics

- **Image Processing Mentor** (IEEE Robotics Winter Workshop)

  Conducted a week-long IP workshop for 1st and 2nd year undergraduates at IIT Kharagpur, teaching basic Image Processing using OpenCV and C++.

- **Mentor, Kharagpur Winter of Code, 2017** (IIT Kharagpur)

  Mentored a couple of students in KWoC (organized by Kharagpur Open Source Society) which is a 5-week long GSoC-styled programme for students who are new to open source software development.

AWARDS AND ACHIEVEMENTS

- **KVPY 2016.**
  Secured All India Rank 9th in one of the presitigious examination initiated by Department of Science and Technology, Government of India

- **IIT JEE Advanced 2016.**
  Secured All India Rank 266 in JEE Advanced 2016.

- **Robocup 2017.**
  First team from India to qualify for SSL, Robocup 2017 held in Japan, among top 24 teams across the globe.

- **Best Fresher, Conquest, Kshitij 2017**
  Participated in an Robotics Event at Kshitij 2017 , Asia's largest techno-management fest. Awarded the best fresher at IIT Kharagpur.

- **IBM Blockchain Hackathon, Kshitij 2018**
  Secured 3rd position in the national level hackathon organized at Kshitij, 2018.

TECHNICAL SKILLS

- **Languages** C, C++, Python, Matlab, LaTeX
  Libraries and Tools Tensorflow,OMPL , OpenCV, ROS, PyQt, Octave
  Field of Interest Computer Vision, Path Planning, Machine Learning, Decentralised Systems.