Rohin Garg

Senior Undergraduate | IIT Kanpur

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EDUCATION

INDIAN INSTITUTE OF TECHNOLOGY, KANPUR
Bachelor of Technology, Electrical Engineering | Minor in Machine Learning
Expected April 2020 | Kanpur | Dean's List (2017-2018) • Cum. GPA: 8.94/10.0

D.R.A. BHAVAN VIDYALAYA | AISSCE (CBSE) (High School) • 95.4%
2016 | Chandigarh, India

TAGORE INTERNATIONAL SCHOOL V.V | AISSE (CBSE) (Secondary School) • 10.0/10.0
2014 | New Delhi, India

HONORS & AWARDS

2018	**Dean's List**	Academic Excellence Award
2018	**Grade A***	Outstanding performance in Complex Analysis
2017	**Grade A***	Outstanding performance in Fundamentals of Computing
2017	**Scholarship**	Indian Army scholarship: All India Merit
2016	**All India Rank- 420**	Joint Entrance Exam Advanced of 180,000 candidates
2016	**All India Rank- 2472**	Joint Entrance Exam Mains of 1.2 million candidates
2014	**Grade 5 Pianist**	Trinity College London

PUBLICATIONS

INTENT AWARE RECOMMENDATIONS | Submitted For Review To The Web Conference 2020
Rohin Garg, Samarth Aggarwal, Abhilasha Sancheti, Bhanu Prakash Guda, Iftikhar Ahamath Burhanuddin
Pre-print Link: gargrohin.github.io/files/intent.pdf

RESEARCH EXPERIENCE

INTELLIGENT GROUND VEHICLE | Team Member
September 2019 - Present | IIT Kanpur | vision-iitk.github.io

- Member of a team aiming to participate in IGVC (*github.com/IGVC-IITK*), organized by Oakland University and AUVSI.
- Currently working to build a ground vehicle capable of autonomously navigating lanes while avoiding obstacles.
- Working on Visual SLAM algorithm design and implementation by fusing LiDAR and Camera.
- Working with Rapidly Exploring Random Tree algorithm for path planning and motion control.

CAUSAL REASONING IN NLP | SemEval 2020 Workshop Competition
Jan 2020 - Present | IIT Kanpur | competitions.codalab.org/competitions/21691

- Working on creating Ensemble Models to detect Counterfactual Statements.
- Working on identifying cause and effect in statements.
- Application: Detecting cause and effect in financial documents.

INTENT AWARE AGENTS | AI Research Intern
May 2019 - September 2019 | Adobe Big Data Experience Lab

- *Submitted to WWW 2020 for review.* (First Author): *link to pre-print: https://gargrohin.github.io/files/intent.pdf*
- Worked on Intent aware recommendations, that guide a user to a goal, i.e. a long term objective.
- Conceptualized a formal definition of Intent in the domain of user behaviour analysis.
- Introduced novel training methods, neural architectures and a custom loss function to train intent-aware agents inspired from the Reinforcement learning and time series prediction models .
- Designed evaluation functions to evaluate our work on different, more generalized datasets.

MUSIC INFORMATION RETRIEVAL | Undergraduate Researcher
Dec 2018 – April 2019 | Prof. Vipul Arora, MIR Lab, IIT Kanpur

- Code and Report: *github.com/gargrohin/Melody-Extraction-from-Polyphonic-Music/blob/master/Report/final_report.pdf*
- Worked with Prof Vipul Arora to extract melody of different instruments from polyphonic music.
- Used the SF-NMF (Source Frequency Non-Negative Matrix Factorization) algorithm to pre-process the raw spectrogram to give enhanced inputs to Conv-RNN neural network.
- Provided a novel extension to SF-NMF, i.e. Melody specific SF-NMF that gave more flexibility to different possible melody lines to enhance by learning matrix representations.

REALTIME OBJECT TRACKING | Visual Recognition
Jan 2019 – April 2019 | Prof. Vinay Namboodiri, IIT Kanpur

- Code and Report: *github.com/gargrohin/Visual-Recognition/blob/master/Object%20Tracking/Report.pdf*
- Applied real time object tracking algorithms (SORT) using YOLO v3 on IIT Kanpur's surveillance cameras dataset.
- Used future frame prediction using generative adversarial networks to replace Kalman Filters in SORT algorithm.
- Improved the results using domain adaptation to IIT Kanpur's surveillance domain.

EDGE CACHING IN WIRELESS NETWORKS | Research Internship
New York University, Polytechnic Institute
May 2018 – August 2018 | Prof. Shivendra Panwar, NYU

- Code and Report: *github.com/gargrohin/Edge-Caching-Algorithms/blob/master/report/Edge_Caching_report.pdf*
- Implemented Virtual Networks, both sparse and dense on GENI, a testbed supported by National Science Foundation.
- Created novel caching methods for dense small cell deployments for future 5G networks.
- Implemented Realistic web-content request patterns using Zipf's law for testing the methods using simple caching algorithms on GENI.

PROJECTS

CONVEX HULL - RANDOMIZED | Randomised Algorithms
August 2018 - December 2018 | Prof. Surender Baswana, CS648

- Code and Report: *github.com/gargrohin/Smallest-Enclosing-Circle*
- Considered Incremental and Geometric approaches to find the Smallest enclosing circle for a set of n-dimensional points.
- Incremental approaches turned out to be the simplest and didn't require much geometric knowledge.
- Proved and verified the expected algorithmic complexity to be $O(n)$.

INERTIAL NAVIGATION SYSTEM | Information of Technology System Design
May 2018 - August 2018 | Prof. Amay Karkare and GT Silicon Pvt. Ltd

- Code and Report: *https://github.com/gargrohin/IoT-localization/blob/master/Project%20Report.pdf*
- Aim: Correcting systematic heading drift using dual foot-mounted configuration.
- Used a motion detecting device from each foot to identify the path traveled real time.

SONAR | Object Detection
Nov 2016 - Jan 2017 | Electronics Club, IIT Kanpur

- Used Arduino, Processing software, Servo-motor and Ultrasonic sensor to make a miniature object detector.

INDUSTRIAL EXPERIENCE

ADOBE | AI Research Intern
May 2019 - September 2019 | Big Data Experience Labs, Bangalore, India

- Did a 3 month internship as an AI research intern at BEL labs, Adobe.
- Worked under 2 research scientists on Intelligent Agents for smart user interfaces for Adobe Experience Cloud.
- Brainstormed for over 2 weeks to come up with innovative ideas, 3 of which were combined to formulate our final problem statement: designing an Intent aware recommendation system.
- Did extensive literature survey, implemented various pre-existing solutions and novel algorithms using python and Pytorch framework.

NEW YORK OFFICE, IIT KANPUR | Software Engineering Intern
May 2018 – August 2018 | IIT Kanpur

- Studied the Circuit Breaker Microservice to monitor application services.
- Deployed Prometheus Alertmanager service using Pushover API for notifications on Pod failures.

TEACHING

TEACHING ASSISTANT | Control System Analysis
Dec 2019 - Present | IIT Kanpur

- Help in making and grading assignments for the course.
- Conduct Lab sessions, which involves writing code and clearing doubts for the students.

RELEVANT COURSEWORK

COMPUTER SCIENCE AND ELECTRICAL ENGINEERING

Visual Recognition
Machine Learning for Signal Processing*
Randomised Algorithnms
Reinforcement Learning (NPTEL-Lecture Series)*
Introduction to Machine Learning
Internet of Things - System Design
Data Structures and Algorithms
Modern Control Systems* (level 2)
Control System Analysis (level 1)
Fundamentals of Computing
Digital Electronics
Electromagnetic Theory
Microelectronics
Introduction to Electronics

MATHEMATICS AND SCIENCES

Neurobiology*
Probability and Statistics
Linear Algebra
Complex Variables
Partial Differential Equations
Ordinary Differential Equations
Real Analysis
Physics 1: Classical Mechanics
Introduction to Logic
Modern Art*
Literature and Censorship

(* Ongoing)

LANGUAGES AND SKILLS

PROGRAMMING

Over 5000 lines:
Python • C++ • LaTeX • Matlab
Over 1000 lines:
C • Shell • Arduino • Processing • Robot OS
Deep Learning:
PyTorch • Tensorflow 2.0 • Keras

SPOKEN & WRITTEN

Native fluency:
English, Hindi
Reading fluency:
Sanskrit
Very-Basic Understanding
German • Japanese • French

EXTRA CURRICULARS

COUNSELLING SERVICE

Student Guide
Helped in conducting orientation for more than 800 incoming freshmen. Personally mentored 6 freshmen to help them blend in the new campus culture of IIT Kanpur,as well as provided them emotional assistance when they needed help and support.

ELECTRONICS CLUB

Secretary
Conducted Workshops and Lectures for students regarding basic electronic principles. Helped in making problem statements for institute level competitions. Maintained the club components.

MUSIC

Grade 5 Pianist
as recognised by Trinity College London.
Music Club, IIT Kanpur
Performed on several occasions with our band, participated in several music events and competitions at both intra and inter institute level.

SPORTS

Member: Sports Contingent-IIT Kanpur
Member of Institute Lawn Tennis team.