Prateek Garg

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Academic Qualifications

Year	Degree/Certificate	Institute	CGPA/%
2017 - 2021 (Expected)	B.Tech in Computer Science (Minor in Robotics)	Indian Institute of Technology, Delhi	7.7/10
2017	CBSE (XII)	Rukmani Birla Modern High School, Jaipur	93.8%
2015	CBSE (X)	Rukmani Birla Modern High School, Jaipur	9.4/10

Work Experience

- **Research Intern at RIKEN Center for Advanced Intelligence Project, Tokyo** (*May'19-July'19*)
  - Performed an experimental study for **traffic state prediction** during **the Hiroshima disaster in August, 2018**
  - Prepared a comparative study between **RNNs** and Conventional Machine Learning Methods ***(SVMs, Random Forest)***
  - Conceptualized and merged **effects of various features** on **Q-K curve** of critical nodes during disaster
  - Compared the interpretation of spatio-temporal features obtained from ML models with **traffic flow theory**

  Co-Authored *a paper for submission to the* ***Transportation Research Record Journal (Under Review)***
- **Core Team Member at Peer Robotics, New Delhi** (*Sept'18-Present*)
  - Deployed **vision algorithms** for obtaining **Stereo-Image** and **extracting depth data** for SLAM purposes.
  - Used standard navigation packages in **ROS** to develop complete back end for **Autonomous Navigating Robot**
  - Programmed novel library implementing **Landmark Recognition** for estimating global state of robot. ***Paper in pipeline***
  - Developed *Human Detection* and *Object Detection* modules in integration with ROS to add safety features in the bot.
- **Project Associate at D-LIVE, Mahindra Autonomous Car Challenge, IIT Delhi** (*Feb'18-Aug'18*)
  - Received **Design Innovation Summer Award (DISA)** and sponsorship by *Institute R&D Dept., IIT Delhi*
  - **Improved odometry by 90%** using ZED Camera, GPS, IMU and obtained **correct loop closure results**
  - Worked on **ORB_SLAM2** to compute camera trajectory and sparse 3D reconstruction for **visual odometry**
  - Implemented **robot_localisation package** for accurate state approximation and integrating data from GPS

  Received a ***Letter of Recommendation*** *for exemplary results and excellent contribution*

Key Projects

- **UML Race Solver**, **Dr. Kazuki Yoshizoe**, Head, Search and Parallel Computing Unit, RIKEN AIP, Tokyo.(*June'19-Present*)
  - Designed ROS node for helping robot find path through maze and reach finish point in **least possible time**
  - Implemented **Monte-Carlo Tree search** for generating **potential future state** tree of the simulated robot
  - Currently working on training a model for predicting the **optimal policy**, given the potential future state tree
- **AI Bots**, **Prof. Mausam**, Department of Computer Science, IIT Delhi. (*July'19-Present*)
  - **Gene String Mapping**: Implemented ***Hill Climbing*** & ***Simulated Annealing*** search to find similarity between genes
  - **The Game of Cannon**: Made AI bot for the game by constructing ***MinMax Tree*** and implementing *Alpha-Beta Pruning*
- **Multi-Cycle Processor Design**, **Prof. Anshul Kumar**, Department of Computer Science, IIT Delhi. (*Jan'19-April'19*)
  - Developed a multi-cycle processor for **ARM** language, supporting memory access, arithmetic operations, functions
  - Designed on **VHDL**, using **Xilinx** for simulation and generation of bitstream so it works on **BASYS 3** board
- **Krivine and SECD Machine**, **Prof. Sanjiva Prasad**, Department of Computer Science, IIT Delhi. (*Jan'19-April'19*)
  - Designed Krivine and SECD machines for low level *toy language* with **lazy & eager** operational semantics
  - Converted the tokens to *Abstract Syntax Trees* using **Recursive Descent Parser** and programmed a *type-checker* for it
  - Generated low level code to be executed by the machines. Machines supported **scoping** and **recursion**
- **Search Engine**, **Prof. Amitabha Bagchi**, Department of Computer Science, IIT Delhi. (*Sept'18-Oct'18*)
  - Implemented an **Inverted Index**, a structure that stores web-pages in a format that allows efficient text search.
  - Implemented **Hash Table, AVL Tree** to store words and word-positions respectively, to allow quick access.
  - Developed three searches - **AND, OR, PHRASE** each of which displays web pages in order of relevance.

Scholastic Achievements

- **Reviewed** 1 paper for ***Transportation Research Record Journal***
- **All India Rank- 96** in *Joint Entrance Examination (Advanced), 2017* among **1.5 million** students
- **All India Rank- 99** in *Joint Entrance Examination Main (B.Arch), 2017* among **150 thousand** students
- Awarded *Merit Certificate* for being in **top 1%** in **Indian National Physics and Astronomy Olympiads, 2017**
- Awarded with **Kishore Vaigyanik Protsahan Yojana, 2016** Fellowship by **IISc Bangalore** securing **All India Rank 303**
- Completed **Vijyoshi National Science Camp, 2016** organised by **KVPY** with **IISc Bangalore** and ***Government of India***
- Awarded **Scholarship** for qualifying both stages of **National Talent Search Examination, 2015** by ***Government of India***

Technical Skills and Courses Done

- **Skills:** C, C++, Python, Java, OCaml, Bash, Tensorflow, Keras, Pytorch, Sci-kit Learn, VHDL, ROS, OpenCV, OpenGl
- **Coursework:** Advanced Machine Learning, Artificial Intelligence, Computer Architecture, Programming Languages, Computer Networks, Design and Analysis of Algorithms, Discrete Mathematics, Robotics Technology, Data Structures, Signals and System