Pratyush Varshney

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EDUCATION

- **Indian Institute Technology, Kanpur** — Kanpur, India
  Master of Science by Research in Computer Science and Engineering; CPI: 9.00/10.00 — *Jan'17 - Present*

- **Kamla Nehru Institute of Technology** — Sultanpur, India
  Bachelor of Technology in Computer Science and Engineering; 75.92 % — *Sep'09 - Jul'13*

RESEARCH WORK

- **Formal Verification of Controller for UAVs** — Verimag Institute, France
  Prof. Thao Dang — *Jun'19 - Present*

  Developing framework to verify the tight bounds of a Neural Network controller for UAVs in a closed loop system with nonlinear plant dynamics.

- **DeepControl: Energy-Efficient Control of a Quadrotor using a Deep Neural Network** — IIT Kanpur
  Prof. Indranil Saha — *Jun'18 - Mar'19*

  Synthesized controller for quadrotor by approximating Model Predictive Controller (MPC) using Deep Neural Network. The controller synthesized using the DNN required low computation hardware but is able to perform the trajectory tracking close to the MPC.

- **Reducing policy search space using Guide-Actor-Critic Algorithm** — IIT Kanpur
  Prof. Indranil Saha — *Jan'18 - Jun'18*

  Developed a Reinforcement Learning based algorithm to synthesize a controller for Quadrotor. The algorithm uses Actor Critic setup of Reinforcement Learning and reduces the vast policy search space using a guide network.

PUBLICATION

- **DeepControl: Energy-Efficient Control of a Quadrotor using a Deep Neural Network**
  Pratyush Varshney, Gajendra Nagar, Indranil Saha
  IROS 2019

PROJECTS

- **Neural Network Based Modeling and Control of Quadcopters** — IIT Kanpur
  Prof. Indranil Saha — *Jan-2017 - Jun-2017*

  Learned the Non-linear Dynamics of the Quadrotor using a Deep Neural Network using supervised learning. The autopilot was PX4 with Gazebo simulator. The DNN could predict the next state of the quadrotor given its present input and control.

- **Formal Verification of Artificial Neural Networks: A Survey** — Computer Aided Verification
  Prof. Indranil Saha — *Jul 2017 - Nov 2017*

  Performed an in-depth survey of formal verification strategies for Neural Networks. Analyzed and compared verification strategies including Abstract Refinement, Integer Constraint Programming and SMT based techniques.

- **Playing Atari Games using Reinforcement Learning** — Neural Networks
  Prof. Laxmidher Behera — *Jan 2017 - Mar 2017*

  Developed an reinforcement learning based python application that can play the Atari pong game with human level expertise using policy gradient technique.

- **Aayush: Online Medical Assistance Portal** B.Tech Project
  Prof. Abhay Kumar Agarwal *Jul 2012 - Mar 2013*

  Created a Java based web application for medical assistance. The users could locate and seek appointments from doctors, access medical reports, migrate to doctors with specializations etc. The platform also enabled the communication between doctors seeking medical advises from their peers.

EXPERIENCE

- **Indian Farmers Fertilizer Cooperative** New Delhi, India
  Senior Engineer *Mar 2014 - Dec 2016*
  - **Document Management System(DMS)**: Developed a DMS in J2EE-struts that can store documents in the Oracle database, provide quick access and provide access control mechanism for the users. This reduced a lot of overhead of maintaining and securing the valuable documents manually.
  - **Management Information System** : Implemented the module of Employee Leaves Management in the Management Information System(MIS). The module was developed in Oracle Application Development Framework.(ADF)
  - **Oracle ERP** : Created and deployed new forms and reports for the Oracle ERP system as per the users requirements.

- **Nokia (Formerly Alcatel-Lucent)** Gurgaon, India
  Software Engineer *Nov 2013 - Mar 2014*
  - **SIP Protocol Testing**: Part of a team that developed a tool for testing the Session Initiation Protocol(SIP). The tool could simulate SIP calls and interact with the CAMEL stack, alongside creating logs that were used for debugging.
  - **Instant Convergent Charging System(ICC)**: Implemented new functional requirements in the flexible and configurable convergent payment system - ICC. Developed new services for SMS and SIP, as per the clients requirements.

- **Aditya Birla Nuvo Limited** Jagdishpur, India
  Internship Trainee *Jun 2012 - Jul 2012*
  - **Conversion of Excel reports to online project** : Developed an online excel converter in Java for a web application. The converter generated formatted excel reports based on the data queried from the web interface of the application.

RESEARCH POSITIONS

- **Visiting Research Scholar** Verimag Institute, France
  Formal Verification of Autopilot Software for UAVs *Jun 2019-Jul 2019*
- **Senior Student Research Associate** IIT Kanpur
  A Framework for synthesizing robust motion primitives for UAVs *Jan 2017-Present*

POSITIONS OF RESPONSIBILITY

- Training and Placement Coordinator, KNIT Sultanpur.

- Served as Senior Executive Coordinator for Indian Society for Technical Education (ISTE), KNIT Sultanpur

- Served as Senior Executive Coordinator for Cultural Council, KNIT Sultanpur

- Served as Co-executive coordinator for Computer Society of India, KNIT Sultanpur

- Taught Programming in C, to the freshmen batch, KNIT Sultanpur

- Organized a disaster management workshop 'Haunt Future' in KNIT Sultanpur.

Achievements

- Secured All India Rank 653 in GATE 2015 among the 115425 shortlisted candidates.

- IBM Certified Academic Professional for DB2

- A+ Certification in J2EE- Struts with Hibernate from Hewlett-Packard Education Services(HPES)

- IBM 'The Great Mind Challenge' participation for the project on Smart City.

- Institute Merit Scholarship from UPTU consecutively for 3 years.

Awards and Recognition

- Secured Ist position in Programming competition organized by Computer Society of India (CSI)

- Secured Ist position in IT-BHU Robo-opus 2010 organized by Robosapiens

- Secured IIIrd position in the Embeded Security Challenge at CSAW'18 at IIT Kanpur

Students Mentored

- Mrinal Dogra (B.Tech CSE, IIT Kanpur)
  Project: Neural Network Based Modeling and Control of Quadrotors

- Amit Yadav (B.Tech CSE, IIT Kanpur)
  Project: Reinforcement Learning based control of Quadrotors

- Gajendra Nagar (B.Tech AE, IIT Kanpur)
  Project: Model-Predictive Control of Quadrotors

Technical Skills

- **Languages**: C/C++, Python, Java, SQL, MATLAB, Bash

- **Libraries/Technologies**: Tensorflow, Oracle Application Development Framework(ADF), J2EE-Struts, Oracle Forms and Reports, Eigen, Numpy

- **Robotics**: ROS(Robot Operating System), Gazebo, RotorS, px4-autopilot

References

- Dr. Indranil Saha
  Department of Computer Science and Engineering
  Indian Institute of Technology Kanpur
  Email: isaha@cse.iitk.ac.in

- Dr. Nikolaos Kekatos
  Verimag Research Lab
  Universite Grenoble Alpes, France
  Email: nikolaos.kekatos@univ-grenoble-alpes.fr

- Dr. Abhay Kumar Agarwal
  Department of Computer Science and Engineering
  Kamla Nehru Institute of Technology, Sultanpur
  Email: abhay.knit08@gmail.com