

Ajinkya K. Mulay

MACHINE LEARNING ENGINEER · PRIVACY RESEARCHER

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Research Interests

Privacy, Federated Learning & AutoML: My primary focus is on learning, designing and building privacy-preserving federated systems and automated learning systems. My current research interests include privacy-preserving Machine Learning, Federated Learning and AutoML. Some of my past interests include Wireless Communications (3G and 4G) and IoT.

Education

Purdue University

PHD IN ELECTRICAL AND COMPUTER ENGINEERING

W. Lafayette, IN

Aug. 2018 - May 2023

- Advised by *Prof. Xiaojun Lin*
- Major GPA: 3.61/4.0

Indian Institute of Technology, Hyderabad

B.TECH (WITH HONORS) IN ELECTRICAL ENGINEERING

Hyderabad, India

Aug. 2014 - May 2018

- Advised by *Prof. Bheemarjuna Reddy*
- Major GPA: 8.88/10

Honors & Awards

2020	Invited Talk & Top 5% Paper , NeurIPS Pre-Registration Workshop	USA
2020	Graduate Research Assistantship , SuperPower Group, Psychological Sciences, Purdue	Indiana, USA
2017	Two-Year Graduate Teaching Assistantship , Electrical and Computer Engineering Department, Purdue	Indiana, U.S.A
2018	Winner and World Finalist for Emergensor Startup , Microsoft Imagine Cup, Japan National Final	Tokyo, Japan
2018	Winner , Third Business Plan Competition, University of Tokyo	Tokyo, Japan
2017	India-Japan Engineering Program Research Scholarship , University of Tokyo	Tokyo, Japan
2016	Undergraduate Teaching Assistantship , IIT Hyderabad	India
2016	Special Recognition & 8th Rank for Young Team , IEEE Signal Processing Cup	India
2014	Academic Excellence Award , IIT Hyderabad	India
2010	Recipient of the prestigious National Talent Search Examination (N.T.S.E) , Govt. of India	India

Publications

Ajinkya Mulay, Tushar Semwal, Ayush Agrawal, “FedPerf: A Practitioners’ Guide to Performance of Federated Learning Algorithms”

OpenMined

NEURIPS 2020 PRE-REGISTRATION EXPERIMENT WORKSHOP

Ajinkya Mulay, Anand Basawade, Bheemarjuna Tamma, Anthony Franklin, “DFC: Dynamic UL-DL Frame Configuration for Improving Channel Access in eLAA”

NeWS Lab, IIT Hyderabad

IEEE NETWORKING LETTERS

Ajinkya Mulay, Hideya Ochiai, Hiroshi Esaki, “IoT WebSocket Connection Management Algorithm for Early Warning Earthquake Alert Applications”

Esaki Lab, University of Tokyo

ACM/IEEE UCC, AUSTIN, TX, USA

Konkimalla Chandra Prakash, et. al., “A Novel Electric Network Frequency Classification Algorithm and an Electrical Power Signal Measurement Circuit”

LFOVIA Group, IIT Hyderabad

IEEE SIGNAL PROCESSING CUP, 2016

Skills

Focus Topics:	Differential Privacy, Federated Learning, Graph Algorithms, AutoML
Machine Learning	PyTorch, Tensorflow, Keras, Pytorch-Lightning, Scikit-Learn, PySyft
Data Analytics	Pandas, Numpy, Matplotlib
Programming	Python, Cpp, R, Go, LaTeX
Mobile	Swift, Dart, Flutter, XCode
DevOps	AWS, Azure, Docker
Languages	English (Proficient), Japanese (Basic), Hindi, Marathi

Experience

SuperPower Group, Purdue University

West Lafayette, IN, USA

MACHINE LEARNING TEAM LEAD

Aug. 2020 - Present

- Designing algorithms to examine effects of parameter uncertainty on statistical power and identify regions of robustness/reactivity in specified parameter values over a high-dimensional parameter space
- Designing a novel graph algorithm to identify robust parameter regions under constrained resources
- Built a Neural Network to reduce run-time and resource usage to less than 10% of the original
- **Technology Stack:** Python, PyTorch, Matplotlib, Pandas, Weights and Biases, R, Jupyter Notebooks, Git

OpenMined

Remote, USA

RESEARCH SCIENTIST

Mar. 2020 - Present

- Developing methods to characterize Private Federated Learning Systems and identify and track the performance of Federated Algorithms over varied environments with a single easy-to-use metric; proposal accepted at Pre-registration Workshop, NeurIPS 2020
- Demonstrated top 5 Federated Machine Learning algorithms on **100+** virtual mobile devices with an accuracy of over **99%** on LEAF datasets
- **Technology Stack:** PyTorch, Weights and Biases, PySyft, Matplotlib

NeWS Lab at IIT Hyderabad

Hyderabad, India

UNDERGRADUATE STUDENT RESEARCHER

Aug. 2017 - Apr. 2018

- Designed and developed an algorithm to reduce interference between eLAA-WiFi networks by 40% using Game Theory techniques
- **Technology Stack:** MATLAB, Python

Emergensor (Startup), University of Tokyo

Tokyo, Japan

CHIEF SERVER ENGINEER

Jul. 2017 - Dec. 2018

- Built and maintained the back-end for a mobile application used to notify people of local emergencies
- Reduced the map's refresh time by **60%** to improve user experience
- **Technology Stack:** Azure, Java, Google Maps API, Android Studio, Go, Python

Esaki Lab, University of Tokyo

Tokyo, Japan

RESEARCH INTERNSHIP

May 2017 - Jul. 2017

- Slashed the packet drop rate over a 3G IoT-Cloud network by **99%** by designing a dynamic ping-pong connection management algorithm
- **Technology Stack:** Go, Arduino, C

Research Experience

B.Tech Project at NeWS Lab, IIT Hyderabad

Hyderabad, India

DESIGN OF PROTOCOLS TO REDUCE INTERFERENCE IN UNLICENSED WIRELESS COMMUNICATIONS- WI-FI AND 3G (LTE)

2017-2018

Research Internship at Esaki Lab, University of Tokyo

Tokyo, Japan

DEVELOPED EFFICIENT IOT-CLOUD 3G COMMUNICATION ALGORITHMS

Summer 2017

Research Internship at WiCoN Lab, IIT Hyderabad

Hyderabad, India

IMPLEMENTATION AND SURVEY OF WI-FI SECURITY FLAWS AND HACKS

Summer 2016

Research Internship at LFOVIA Group, IIT Hyderabad

Hyderabad, India

DEVELOPED NOVEL MACHINE LEARNING CLASSIFIERS FOR AUDIO AND SPEECH DATA

2015-2016

Extra-Curricular

2020-21 **Active Blogger**, Topics- Machine Learning, Differential Privacy, MS/PhD Applications

2018-21 **Active Member**, HKN (Eta Kappa Nau), Purdue University

2020-21 **Active Member**, Startup Purdue, Co-Founded Happyou, a mental health SaaS startup

2014-18 **Soccer Member, Varsity Team**, Inter & Intra-Collegiate Events, IIT Hyderabad

2015-17 **Head of Finance**, ELAN, IIT Hyderabad's Techno-Cultural Fest, managed budget in excess of \$40K

2015-17 **Events and Workshop Manager**, Entrepreneurship Cell, IIT Hyderabad