Jyotikrishna Dass

Postdoctoral Associate
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Research Interests

Machine Learning, Parallel Computing, Systems for Machine Learning

Education

- **Texas A&M University (TAMU)** — College Station, TX
  Doctor of Philosophy (Ph.D.); Dept. of Computer Science and Engineering (CSE) — *August 2021*
  - Dissertation: Efficient and Scalable Machine Learning for Distributed Edge Intelligence
  - Advisor: Prof. Rabi N. Mahapatra
- **Indian Institute of Technology (IIT)** — Guwahati, India
  *Bachelor of Technology (B.Tech.); Electronics and Communication Engg., **Minor** in CSE* — *May 2014*
  - Bachelor Thesis Project: Object Detection in Videos
  - Advisor: Dr. Prithwijit Guha

Publications

1. [*Under Review*] **J. Dass**, S. Wu, H. Shi, C. Li, Z. Ye, Z. Wang, and Y. Lin, ViTALiTy: Unifying Low-rank and Sparse Approximation for Vision Transformer Acceleration with Linear Taylor Attention, in 29^{th} IEEE International Symposium on High-Performance Computer Architecture (HPCA 2023).
2. [*Under Review*] **J. Dass**, D. Puckett, J. Jagannath, and Y. Lin, MILEdge: A Heterogeneous Multi-Accelerator System for Incremental Learning on Edge, in 29^{th} IEEE International Symposium on High-Performance Computer Architecture (HPCA 2023).
3. [*Under Review*] S. Zhang, Y. Fu, S. Wu, **J. Dass**, H. You, Y. Lin, NetDistiller: Empowering Tiny Deep Learning via In-Situ Distillation, in Advances in Neural Information Processing Systems (NeurIPS 2022).
4. **J. Dass**, R. N. Mahapatra, Householder Sketch for Accurate and Accelerated Least-Mean-Squares Solvers, in 38^{th} International Conference on Machine Learning (ICML 2021), Virtual, **Acceptance rate 21.47%**.
5. **J. Dass**, Y Narawane, R. N. Mahapatra and V. Sarin, Distributed Training of Support Vector Machine on a Multiple-FPGA System, in IEEE Transactions on Computers (TC 2020), **Impact factor: 3.131**, **Acceptance rate 21%** in the *Special Issue on Machine Learning Architectures and Accelerators.*
6. **J. Dass**, Y Narawane, R. N. Mahapatra and V. Sarin, FPGA-based Distributed Edge Training of SVM, in ACM/SIGDA 27^{th} International Symposium on Field Programmable Gate Arrays (FPGA 2019), Seaside, CA.
7. **J. Dass**, V. Sarin and R. N. Mahapatra, Fast and Communication-Efficient Algorithm for Distributed Support Vector Machine Training, in IEEE Transactions on Parallel and Distributed Systems (TPDS 2018), **Impact factor: 3.402**
8. D. Dang, **J. Dass** and R. Mahapatra, ConvLight: A Convolutional Accelerator with Memristor Integrated Photonic Computing, in IEEE 24^{th} International Conference on High Performance Computing (HiPC 2017), Jaipur, **Acceptance rate 23%**.
9. **J. Dass**, V. N. S. P. Sakuru, V. Sarin and R. N. Mahapatra, Distributed QR Decomposition Framework for Training Support Vector Machines, in IEEE 37^{th} International Conference on Distributed Computing Systems (ICDCS 2017), Atlanta, GA, **Acceptance rate 16.9%**.
10. K. Lee, R. Bhattacharya, **J. Dass**, V. N. S. P. Sakuru and R. N. Mahapatra, A Relaxed Synchronization Approach for Solving Parallel Quadratic Programming Problems with Guaranteed Convergence, in IEEE International Parallel and Distributed Processing Symposium (IPDPS 2016), Chicago, IL, **Acceptance rate 23%**.
11. **J. Dass**, M. Sharma, E. Hassan and H. Ghosh, A density based method for automatic hairstyle discovery and recognition, in Fourth National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG 2013), Jodhpur.

Patent

System and Method for Identifying a Hairstyle of a Person, *India 3955/MUM/2013*, application resulting from TCS Research internship

Proposal Writing

- **NSF 21-616: CISE Core Programs** *Aug. 2022*
  Medium: DILSE: Codesigning Decentralized Incremental Learning System via Streaming Data Summarization on Edge
  - PIs: Dr. Yingyan Lin (ECE), Dr. Anshumali Shrivastava (CS), Dr. César A Uribe (ECE), Rice
    Senior Personnel: Dr. Jyotikrishna Dass
  - Responsibility: Led the ideation, team creation, and proposal writing.
  - Status: ***Approved Funding*** ($1,200,000) , Abstract

- **META Networking Request for Proposals: Network for AI** *Aug. 2022*
  MILES: Multi-device Incremental Learning on Edge via Summarization
  - PI: Dr. Yingyan Lin (ECE), Rice
    Collaborator: Dr. Jyotikrishna Dass
  - Responsibility: Led the ideation, and complete proposal writing with budget plan
  - Status: ***Approved Funding*** ($50,000)

- **Rice Creative Ventures Fund: Conference and Workshop Development** *Mar. 2022*
  A2C2: Workshop on Automated AI Tools for Computing and Communication
  - Organizers: Dr. Jyotikrishna Dass, Chaojian Li, Dr. Yingyan Lin (ECE), Rice
  - Responsibility: Led the ideation, and complete proposal writing with budget plan
  - Status: ***Approved Funding*** ($10,000)

- **IEEE/ACM MICRO 2022 Tutorial** *Jul. 2022*
  Tutorial on Automated Tools for Fast Development of Deep Learning Networks and Accelerators
  - Organizers: Dr. Yingyan Lin, Dr. Jyotikrishna Dass, Chaojian Li, Yang Zhao, Yonggan Fu, Yongan Zhang, Rice
  - Responsibility: Led the complete proposal writing, and submission.
  - Status: ***Accepted***

- **NSF 22-507: Principles and Practice of Scalable Systems (PPoSS)** *Jan. 2022*
  Large: Zero-Touch Relational Systems for Massive Distributed Machine Learning
  - PIs: Dr. Chris Jermaine (CS), Dr. Ang Chen (CS), Dr. Anastasios Kyrillidis (CS), Dr. Yingyan Lin (ECE), Rice, Dr. Dong Li (CSE), UC Merced
  - Status: Not Funded

- **NVIDIA Academic Hardware Grants Program** *Jan. 2022*
  Edge-based Decentralized Incremental Learning System for Streaming Data
  - PI: Dr. Jyotikrishna Dass (ECE)
  - Status: Not Funded

- **NSF 19-566: Real-Time Machine Learning (RTML)** *Jun. 2019*
  Large:Algorithm/Hardware Co-Design for Real-Time Deep Learning on Heterogeneous Systems-on-Chips
  - PIs: Dr. Eun Jung Kim (CSE), Dr. Rabi Mahapatra (CSE), Dr. Shuiwang Ji (CSE), TAMU
  - Status: Not Funded

- **Facebook Research: Hardware and Software Systems** *Dec. 2017*
  Efficient Techniques and Hardware Architecture for Scalable and Distributed Kernel Methods
  - PI: Dr. Rabi Mahapatra (CSE), TAMU
  - Status: Not Funded

- **NSF 16-512: BIGDATA** *Feb. 2016*
  Enabling Multi-Scale Soil Hydroinformatics: A Fusion of Multi-Source Data for Discovery, Dissemination, and Display
  - PIs: Dr. Binayak Mohanty (HYDRO), Dr. Nick Duffield (ECE), Dr. Rabi Mahapatra (CSE), Dr. Matthias Krazfuss (STAT), Dr. Dan Goldberg (GEO), TAMU
  - Status: Not Funded

- **NSF 15-541: Cyber-Physical Systems (CPS)** *May 2015*
  A Software Defined Micro-Fluidic Framework for Automatic Characterization of Cancer Cells
  - PIs: Dr. Raktim Bhattacharya (AERO), Dr. Debjyoti Banerjee (MECH), Dr. Rabi Mahapatra (CSE), Dr. Tapasree Roy Sarkar (BIOSTAT), TAMU
  - Status: Not Funded

Teaching Experience

- **Department of CSE at TAMU** College Station
  Graduate Assistant Lecturer *Fall 2020*
  - **Instructor of Record** for CSCE 312:Computer Organization (Hybrid), introductory lab-based course with 40 undergraduate students from various majors
  - Mean rating of **4.2/5** on student course evaluation, where, 5 means *Deserves an Award, Excellent*
- **Department of CSE at TAMU** College Station
  Graduate Teaching Fellow (Mentor: Dr. Dylan Shell) *Spring 2020*
  - **Instructor of Record** for CSCE 483:Computer System Design (Hybrid), a project-oriented capstone course with 25 senior undergraduate students
  - Mean rating of **3.3/5** on student course evaluation
- **Department of CSE at TAMU** College Station
  Graduate Assistant Lecturer *Fall 2018*
  - **Instructor of Record** for CSCE 312: Computer Organization, an introductory lab-based course with 35 junior and senior undergraduate students from various majors (including 3 international exchange students).
  - Mean rating of **4.6/5** on student course evaluation
- **Department of CSE at TAMU** College Station
  Graduate Assistant Teaching *2014 - 2021*
  - Held multiple TA appointments as lab instructor to **1000+** undergraduate students across various semesters
    - CSCE 312: Computer Organization for *Dr. Aakash Tyagi* (**6 times**)
    - CSCE 206: Structured Programming in C++ for *Dr. Joseph Hurley* (**6 times**)
    - CSCE 111: Introduction to Computer Science and Programming (JAVA) for *Dr. Joseph Hurley* (**twice**)
    - CSCE 121: Introduction to Program Design and Concepts (C++) for *Dr. Michael Quinn* (**once**)
  - Managed a team of **50+** peer teachers and graders across various semesters.

Mentoring Experience

- **Graduate Students, Rice:** Mentoring following students in research
  - *Daniel Puckett* (PhD student) Co-designed accelerator, *under review* at HPCA 2023
  - *Jayeeta Jagannath* (Masters) Distributed machine learning, *under review* at HPCA 2023
  - *Shang Wu* (Masters) Vision Transformer models, *under review* at HPCA 2023
- **Graduate Students, TAMU:** Involved following Masters students in my PhD research resulting in their thesis and multiple co-authored works published separately in peer-reviewed venues.
  - *V.N.S. Prithvi Sakuru* (MS Thesis, 2016, now at Amazon, Seattle) at IEEE IPDPS 2016 and IEEE ICDCS 2017.
  - *Yashwardhan Narawane* (MS Thesis, 2018, now at NVIDIA, Santa Clara) at ACM FPGA 2019 and IEEE TC 2020.
- **Undergraduate Students, TAMU:** Mentored several CSE students to provide research and team-project experience
  - *Nathan Purwosumarto* (Sophomore), research in Spring 2021
  - *Rengang Yang* (Sophomore), research in Summer 2020
  - *Erik Swanson*, *Cole Bui*, *Alizain Ali*, *Edgardo Garcia Lopez*, and *Jose Garza* (Seniors) on a side project to build TAMU Bus Commute app as a part of their CSCE 431: Software Engineering course in Spring 2020.

Awards

- **NSF CISE Core Programs: Proposal** *Aug. 2022*
  Led the ideation, team creation, and proposal writing for *SHF: Medium: DILSE: Codesigning Decentralized Incremental Learning System via Streaming Data Summarization on Edge* which has been awarded $1,200,000 grant from NSF.
- **META Network for AI: Proposal** *Aug. 2022*
  Led the proposal for *MILES: Multi-device Incremental Learning on Edge via Summarization* which has been awarded $50,000 grant from META.

- **IEEE/ACM MICRO 2022: Tutorial** *Jul. 2022*
  Led the proposal for *Tutorial on Automated Tools for Fast Development of Deep Learning Networks and Accelerators* which has been selected as among the top-rated proposals to be delivered at MICRO 2022, Chicago, IL.
- **Rice University Creative Ventures Fund: Conference and Workshop Development** *Mar. 2022*
  Led the proposal for *Workshop on Automated AI Tools for Computing and Communication* which has been awarded $\$10,000$ to foster the development of workshop that enhance the reputation and quality of scholarship across the University.
- **Graduate Teaching Fellowship** *Jan. 2020*
  Among 18 fellows selected from across 15 departments in Texas A&M College of Engineering to teach as Instructor of Record. Winners of the competitive fellowship were chosen by the awards committee comprising several department heads and faculty members.
- **Best Ph.D. Thesis Poster Award** *Sep. 2019*
  Winner among 40 CSE Ph.D. candidates representing 14 Southeastern Conference (SEC) member institutions at the Annual Computing@SEC Conference, University of Alabama, Tuscaloosa ($100).
- **Graduate Assistant Lecturer** *Sep. 2018, Sep. 2020*
  Selected **twice** as Instructor of Record to teach CSCE 312: Computer Organization and Design, Dept. of CSE, TAMU (additional $500 as research support).
- **Teaching Assistant Excellence Award** *Mar. 2018*
  In appreciation of dedicated service, exemplary attitude, and significant contribution, Dept. of CSE, TAMU ($500).
- **IEEE IPDPS PhD Forum** *May 2016*
  Among 38 selected Ph.D. students to present research and network with senior academics and industry people through mentoring sessions.
- **Travel Grants**
  IEEE HiPC 2019, Hyderabad, India (TAMU: $500); ACM FPGA 2019, Seaside, CA (ACM: $950); IEEE ICDCS 2017, Atlanta, GA (NSF + TAMU: $1500); IEEE IPDPS 2016, Chicago, IL (NSF: $568); IEEE NCVPRIPG 2013, Jodhpur, India (TCS)
- **Competitive Engineering Entrance Exams** *May 2010*
  ◦ Secured All India Rank 2076 (among $455,571$ candidates: **top 0.41%**) in the highly competitive Indian Institutes of Technology-Joint Entrance Examination (IIT-JEE 2010) for admission to the B.Tech. program.
  ◦ Secured All India Rank 1246 (among $1,065,100$ candidates: **top 0.11%**) in All India Engineering Entrance Exam (AIEEE 2010).
- **Gold Medal for Academic Excellence** *May 2009*
  Awarded to the meritorious students who have been declared scholar for 6 years in succession at Delhi Public School, Vasant Kunj, New Delhi, India.

Presentations

- ICML 2021, Virtual
- Rice NeurIPS Workshop 2021, Ken Kennedy Institute, Rice University, USA
- Computing@SEC 2019, University of Alabama, Tuscaloosa, USA
- ACM FPGA 2019, Seaside, CA, USA
- IEEE ICDCS 2017, Atlanta, GA, USA
- CSE-Industrial Affiliates Program 2017, TAMU, College Station, TX, USA
- Amazon Summer Internship Project 2017, Seattle, WA, USA
- IEEE IPDPS 2016 PhD forum, Chicago, IL, USA
- Bachelor Thesis Project 2014, IIT Guwahati, India
- NCVPRIPG 2013, IIT Jodhpur, India

Work Experience

- **Electrical and Computer Engineering, Rice University** — Houston, TX
  Postdoctoral Associate, EIC Lab — *Sept. 2021 - Present*
  - Project: Multi-Accelerator system for incremental learning on edge, Codesigned accelerators for on-device vision transformer models
  - Mentor: Dr. Yingyan Lin

- **Transaction Risk Management Systems (TRMS), Amazon** — Seattle, WA
  Applied Scientist - Intern — *Jun. 2017 - Aug. 2017*
  - Project: Customer Behavioral Data and Modeling
  - Mentors: Bilal Fadlallah, Zhiguo Li, Christopher Jones

- **Multimedia, Graphics and Robotics Group, TCS Research and Innovation Lab** — Gurugram, India
  Research - Intern — *May 2013 - Jul 2013*
  - Project: Automatic Hairstyle Discovery and Recognition
  - Mentor: Dr. Hiranmay Ghosh

Technical Skills

- **Programming**: C/C++, Python, JAVA, MATLAB, R, HDL, Assembly
- **Technologies and Frameworks**: MPI, OpenCV, Tensorflow, PyTorch, GitHub, LaTeX, Unix scripting, HTML

Service

- **Program Committee:** DAC (2022), ICML (2021), NeurIPS (2021)
- **Reviewer:** NeurIPS (2016, 2020, 2021, 2022), ICLR (2021, 2022), ICML (2021), INDICON (2021), IJCAI (2020), GLSVLSI (2016), ICCD (2015)

- **Volunteering Education Initiatives during COVID-19** — Virtual
  Organizer and Instructor — *Apr. 2020 - May 2020*
  - Designed and taught a free online Python course ShiP.py:Learning to Py while Shelter-in-Place with a team of undergraduate and PhD student volunteers
  - Organized a free online Machine Learning course SHALA:Stay Home and Learn AI with a team of volunteers comprising professors, industry professionals, and students. Taught lectures on Linear Models and Kernelization

- **TAMUHack** — College Station
  Judge — *2020*
  - Participated as judge in TAMUHack (2020), one of the largest annual hackathons in Texas, hosted at TAMU.

- **Indian Graduate Student Association at TAMU** — College Station
  Vice-President of Advocacy and Student Adviser — *2014 - 2016*
  - Advocated for **more than 800** Indian graduate students at the university level Graduate and Professional Student Government which led TAMU Transportation Services to rescheduling couple of buses and their stops for improving the off-campus bus commute service.
  - Mentored new graduate students at both academic and personal level and organized the annual temporary summer hosting initiative to help in smooth transition and acclimatization to new lifestyle and graduate program in USA.

- **Student Research Week** — College Station
  Judge — *2015*
  - SRW (2015) is the largest student run research symposium in the nation highlighting student research at TAMU.

- **The Big Event** — College Station
  Volunteer — *2015, 2016*
  - The Big Event is the largest one-day, student-run community service project in the nation where tens of thousands of TAMU students come together every Spring to show their appreciation towards residents of Bryan and College Station.