Srivatsan Sridhar

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Research Interests: Blockchains, security, machine learning, information theory

Education

Stanford University — Stanford, CA
MS and PhD in Electrical Engineering — 2019 – present

Indian Institute of Technology Bombay — Mumbai, India
B.Tech. with honors in Electrical Engineering. (GPA: 9.85/10.0) — 2015 – 2019
Minor in Computer Science and Engineering

Awards and Honors

- **Edward W. Barnholdt graduate fellowship** 2019
- **President of India gold medal** (ranked 1st by GPA in IIT Bombay) 2019
- **Prof. K. C. Mukherjee Award** (best B. Tech. project in EE, IIT Bombay) 2019
- **Top 1% in National Standard Examination in Physics** (NSEP, India) 2015
- **KVPY Fellowship** with **all India rank 57** (Indian Institute of Science) 2013
- **Silver medal in Dr. Homi Bhabha Young Scientist Competition** 2012

Work Experience

Subspace Labs Inc. — Jun – Sep 2021
Security Researcher

- Performed a security audit of Subspace Network – a new Proof-of-Storage consensus protocol
- Proposed an efficient solution to the "long-range attack" using sequential AES encryptions and fraud proofs

Research Experience

Proof-of-Stake Blockchains Under Bandwidth Constraints — Mar 2020 – present
Mentor: Prof. David Tse (Stanford University), Prof. Mohammad Alizadeh (MIT)

- Modeling bandwidth constraints and spamming attacks in blockchain networks
- Studying the impact of network congestion on security and throughput of blockchains

Optimization using Random Projections — Jan – May 2020
Mentors: Prof. Mert Pilanci, Prof. Ayfer Özgür (Stanford University)

- Proved new tight lower bounds for least squares optimization using Gaussian projections
- Proposed a near-optimal shrinkage estimator based on the James-Stein estimator

Compression for Genomic Data — Sep – Dec 2019
Mentor: Prof. Tsachy Weissman (Stanford University)

- Demonstrated lossless and lossy compression methods for Nanopore genome sequencing data
- Achieved 50% reduction in size with negligible impact on basecalling accuracy

Secure Multiparty Computation — Jul 2018 – Aug 2019
Mentors: Prof. Sibiraj Pillai, Prof. Manoj M. Prabhakaran (IIT Bombay),
Prof. Vinod M. Prabhakaran (TIFR, Mumbai)

- Studied communication and randomness lower bounds for secure multiparty computation
- Proved the optimality of a 25-year old protocol for secure computation of 2-bit AND
- Adjudged as the best B. Tech. project in EE, IIT Bombay for the year 2019

RF Fingerprinting for Bluetooth Receivers — May – Jul 2018
Mentor: Prof. Anantha P. Chandrakasan (Massachusetts Institute of Technology)

- Used RF Fingerprinting to classify and authenticate bluetooth transmitters using their raw signal
- Designed feature extraction and a neural network to achieve more than 90% classification accuracy

Onset Detection Methods for Piano Music — May 2017 – Feb 2018
Mentor: Prof. Preeti Rao (IIT Bombay)

- Presented a novel feature extraction method for piano note onset detection
- Achieved 95% successful note onset detection for monophonic piano music

Publications

1. **Impact of Lossy Compression of Nanopore Raw Signal Data on Basecall and Consensus Accuracy**
   Shubham Chandak, Kedar Tatwawadi, **Srivatsan Sridhar**, Tsachy Weissman
   Bioinformatics, Dec 2020
2. **Lower Bounds and a Near-Optimal Shrinkage Estimator for Least Squares using Random Projections**
   Srivatsan Sridhar, Mert Pilanci, Ayfer Özgür
   IEEE Journal on Selected Areas in Information Theory (JSAIT) - Estimation and Inference, Nov 2020
3. **Optimality of a Protocol by Feige-Kilian-Naor for Three-Party Secure Computation**
   Sibi Raj B. Pillai, Manoj Prabhakaran, Vinod M. Prabhakaran, **Srivatsan Sridhar***
   20th International Conference on Cryptology in India, Hyderabad, India, Dec 2019
4. **Energy-Weighted Multi-Band Novelty Functions for Onset Detection in Piano Music**
   Krishna Subramani*, **Srivatsan Sridhar***, Rohit M. A., and Preeti Rao
   Proc. of National Communications Conference 2018, Hyderabad, India.

Preprints

1. **Securing Proof-of-Stake Nakamoto Consensus Under Bandwidth Constraint**
   Joachim Neu*, **Srivatsan Sridhar***, Lei Yang*, David Tse, Mohammad Alizadeh

Other Projects

Sampling Arbitrary Latent Variable Distributions in an Autoencoder Oct – Dec 2019
Course Project : Deep Generative Models (Stanford University)
- Proposed an architecture combining autoencoders with flow networks and adversarial learning
- Demonstrated improved sample quality and smaller Frechet distance scores

Digitally Programmable Analog Computer Jan – Apr 2018
Course Project : Electronic Design Lab (IIT Bombay)
- Designed an analog computer to solve linear dynamical systems in real-time
- Fabricated a prototype used for hardware-in-loop simulations in the power electronics lab

Teaching Experience

Course Assistant – Internet-Scale Consensus in the Blockchain Era Jan – Mar 2021
Instructor : Prof. David Tse (Stanford University)

Course Assistant – Statistical Signal Processing Sep – Dec 2020 and 2021
Instructor : Prof. David Tse (Stanford University)

Teaching Assistant – Linear Algebra Jan – Feb 2017
Instructor : Prof. A. Ranjan (IIT Bombay)

Teaching Assistant – Quantum Physics Jul – Nov 2016
Instructor : Prof. S. Umasankar (IIT Bombay)

Skills

Programming: Python, C++, Java, Tensorflow, Pytorch, VHDL, 8085 assembly
Software: MATLAB, Scilab, GNURadio, Eagle, Quartus
Hardware: Arduino, ATMega, 8085 microprocessor, analog circuits

Relevant Coursework

Graduate-level EE courses: Information Theory, Convex Optimization, Cryptography, Scaling Blockchains, Image Processing, Speech Processing, Computer Vision
CS courses: Data Structures and Algorithms, Machine Learning, Deep Generative Models, Computer Networks, Network Security and Cryptography, Advanced Computer Architecture

Extracurriculars

Music: 18 years of experience in Carnatic (south Indian) classical vocal and violin music 2004 – present
National Service Scheme: 80 hours of teaching underprivileged students in Mumbai 2015 – 2016

*first author(s) with equal contribution