Curriculum Vitae

Srivatsan Sridhar

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EDUCATION

Stanford University *ongoing*
Master of Science (MS) and Doctor of Philosophy (PhD) in Electrical Engineering
Indian Institute of Technology Bombay, Mumbai *Aug 2019*
Bachelor of Technology (B.Tech) with Honours in Electrical Engineering
Minor degree in Computer Science and Engineering
Cumulative Performance Index (CPI) : 9.85/10.0

ACADEMIC AWARDS AND HONOURS

- Received the **President of India gold medal** for ranking first among 900+ students *['19]*
- Received **AP (Advanced Performer) grade** in 8 courses (top 1-10 among 250 students) *['15-'17]*
- Awarded **INSPIRE scholarship** for science for placing in top 1% of Maharashtra State Board *['15]*
- Secured **All India Rank 50** (1.3 M candidates) in JEE Main, **All India Rank 137** (150 K candidates) in JEE Advanced (Joint Entrance Examination for engineering) *['15]*
- Ranked in **top 1%** in **National Standard Examination in Physics** (NSEP) *['14-'15]*
- Received the Kishore Vaigyanik Protsahan Yojana (KVPY) **fellowship** by Indian Institute of Science (IISc) with an **All India Rank of 57** out of 579 selected students *['13]*
- Awarded **silver medal** in Dr.Homi Bhabha Young Scientist Competition *['11-'12]*

RESEARCH EXPERIENCE

1. **Secure Multiparty Computation** *[Jul'18 - Aug'19]*
   B. Tech. Project - Indian Institute of Technology Bombay
   Guides: Prof. Sibiraj Pillai (Indian Institute of Technology Bombay),
   Prof. Manoj M. Prabhakaran (Indian Institute of Technology Bombay),
   Prof. Vinod M. Prabhakaran (Tata Institute of Fundamental Research, Mumbai)
   - Studied communication and randomness lower bounds for secure computation
   - Analysed the role of private randomness in protocols for three-party secure computation
   - Proved the optimality of a protocol for secure computation of 2-bit AND
   - Linked secure multiparty computation with other problems such as distribution design
2. **RF Fingerprinting Authentication for Bluetooth Receivers** *[May - Jul'18]*
   Summer Internship - Microsystems Technology Lab
   Guide: Prof. Anantha P. Chandrakasan (Massachusetts Institute of Technology)
   - Worked on security for ultra low-power bluetooth wake-up receivers
   - Authentication to prevent battery drainage attacks by rogue transmitters
   - Used **RF Fingerprinting** to authenticate the transmitter based on its bluetooth signal
   - Designed a feature extractor for the bluetooth signals using **wavelet analysis** and PCA
   - Implemented a **neural network** classifier to identify the transmitter from the features
   - Optimized the neural network by quantization for a **low power implementation**
   - Achieved **90% accuracy** in classifying the transmitter from the bluetooth signal
1. **Onset Detection Methods for Piano Music** *[May'17 - Feb'18]*
   Digital Audio Processing Lab
   Guide : Prof. Preeti Rao (Indian Institute of Technology)
   - Presented a **novel feature extraction method** for piano note onset detection
   - Proposed a **multi-band analysis** and **energy-based weighting** of the short-time spectrum
   - Devised **adaptive thresholding** and **grouping** methods to reduce false positives
   - Achieved **95% successful note onset detection** for monophonic piano music
   - Applied major concepts of digital signal processing, including short time Fourier Transform, spectral flux and psycho-acoustic perception of music

PUBLICATIONS

1. Sibi Raj B Pillai, Manoj M Prabhakaran, Vinod M Prabhakaran and **Srivatsan Sridhar**[1] *[Dec '19]*
   "Optimality of a Protocol by Feige-Kilian-Naor for Three-Party Secure Computation"
   20th International Conference on Cryptology in India (INDOCRYPT), Hyderabad, India.
2. K. Subramani, **S. Sridhar** *(equal contribution)*, Rohit M. A., and P. Rao *[Feb '18]*
   "Energy-Weighted Multi-Band Novelty Functions for Onset Detection in Piano Music"
   Proc. of National Communications Conference, Hyderabad, India.

MAJOR PROJECTS

1. **Voice Conversion** *[Apr'18]*
   Course Project : Machine Learning
   - Studied in detail, existing architectures for converting speech from one voice to another
   - Implemented neural networks for speech to phoneme and phoneme to speech conversion
   - Contributed majorly in **MFCC feature extraction** and **Griffin-Lim method** for speech reconstruction from short-time magnitude spectrum
   - Experimented and compared results using **LSTMs, GRUs and multitask learning**.
2. **Digitally Programmable Analog Computer** *[Jan - Apr'18]*
   Course Project : Electronic Design Lab
   - Designed an analog computer to **solve linear dynamical systems** for real-time simulations
   - Equipped it with on-chip power management, and microcontroller for programmability
   - Fabricated the circuit on a PCB, simulated upto 5^{th} order coupled linear differential equations
   - Applied concepts of **linear algebra**, used Eagle extensively for **circuit design**
3. **Pipelined Reduced Instruction Set Computer** *[Nov'17]*
   Course Project : Microprocessors
   - Designed a working **6-stage pipelined processor** from scratch, implemented it on VHDL
   - Simulated the processor using **Quartus** and tested it on **FPGA hardware**
4. **Automated Turret** *[May - Jun'16]*
   Institute Technical Summer Project, Robotics Club
   - Created a system to detect a target in the surroundings and shoot it correctly using a toy gun
   - Worked with Image processing using **OpenCV, Arduino** and **Servo motors**
   - Achieved an accuracy of 85% head-on shots and 100% shots upto 3cm around the target centre for target distances of upto 1.5m
   - *Presented at the 'Tech n RnD Expo' among the best projects from IIT Bombay*
5. **Palliative Care** *[Dec'15]*
   Tata Centre, IIT Bombay
   - Designed and created a circuit to electronically control the dosage of intravenous painkillers
   - Linked it to a GSM module to transmit the dosage details to a monitoring nurse
   - Worked with **Arduino, ATMega, GSM module** and **stepper motors**
   - Intended to be applied as a low cost syringe pump for regulated delivery of painkillers to patients outside the hospital, under the monitoring of a nurse in the hospital

SKILLS

- **Languages :** English (professional proficiency), Hindi, Tamil (native)
- **Programming :** C++, Java, Python, Tensorflow, VHDL, 8085 assembly language
- **Software :** MATLAB, Scilab, GNURadio, Eagle, Quartus
- **Hardware :** Arduino, ATMega, 8085 microprocessor, analog circuits

TEACHING EXPERIENCE

1. **Teaching Assistant for Quantum Physics** - *Prof. S. Umasankar* *[Jul - Nov'16]*
2. **Teaching Assistant for Linear Algebra -** *Prof. A. Ranjan* *[Jan - Feb'17]*
   - Selected for a TA team of 20. Each TA to teach a class of 45 first year undergraduates
   - Conducted weekly tutorials to clear concepts and discuss solutions to problems

1 I am the primary author. Author list is in alphabetical order

COURSES UNDERTAKEN

Electrical Engineering courses:
Electronic Devices (with lab)
Analog Circuits (with lab)
Digital Systems (with lab)
Microprocessors (with lab)
Electronic Design Lab
EM Waves
Control Systems (with lab)
Probability and Random Processes
Signals and Systems
Communication Systems (with lab)
Digital Signal Processing

Graduate level courses:
Image Processing
Speech Processing
Computer Vision
Number Theory and Cryptography
Information Theory and Coding
Network Information Theory

Mathematics Courses:
Calculus
Linear Algebra
Differential Equations
Complex Analysis
Partial Differential Equations
Data Analysis and Interpretation
Optimization Techniques

Computer Science courses:
Computer Networks
Data Structures and Algorithms
Operating Systems
Machine Learning
Network Security and Cryptography
Advanced Computer Architecture

Other courses:
Quantum Physics
Biology and Bio-engineering
Physical Chemistry
Organic and Inorganic Chemistry
Engineering Drawing
Economics
Environmental Studies
Study of Language

LEADERSHIP EXPERIENCE

1. **Classical and Folk Arts Secretary** *['17 - '18]*
   Institute Cultural Council, IIT Bombay
   - **Led a team of 4** conveners for the promotion of Indian classical and folk arts
   - Managed a **budget of 0.5 million INR** for purchase of inventory, inviting professional artists and conducting concerts, workshops and other events
   - Organised **professional concerts** and performances by students of the institute.
   - Initiated regular classes and introduced new unexplored Indian art forms
2. **Coordinator** *['16]*
   Mood Indigo - Asia's largest college cultural festival
   - Worked with a team of 50 volunteers to organize concerts with a footfall of 20,000
   - Ideated and executed Asia's largest band competition Livewire
3. **School Head Boy** *['12 - '13]*
   Hiranandani Foundation School, Thane
   - Coordinated a student council of 29 members to organise intra-school activities
4. **President of Interact Club** *['11-'12]*
   Youth Wing of Rotary Club of Hiranandani Estate, Thane
   - Led a team of 20 students to organize social welfare activities for the underprivileged sections
   - Organized fundraiser for education of poor children, visit to an old age home, tree plantation drive

EXTRA CURRICULAR ACTIVITIES

1. **Music**
   - **15 years of experience** in Carnatic (south Indian) classical vocal and violin *['04 - Present]*
   - Won **2nd place** in Goonj, inter-hostel music competition of IITB *['16]*
   - Awarded merit in Grade 1 Plectrum Guitar by **Trinity College of London** *[Jan'12]*
   - Performed at Naadha Vaibhavam, a **Guiness World Record event** of 5700 Carnatic singers on one stage, organised by the Art of Living *[Jan'11]*
2. **Social Service** – *National Service Scheme*
   - Volunteered for the **Educational Outreach** Programme *['15 - '16]*
   - Completed **80 hours** of teaching underprivileged students at NGOs in Powai, Mumbai
3. **Yoga**
   - Received formal training in Yoga from the Art of Living Foundation
   - Awarded gold certificate for performing 108 Suryanamaskars on World Health Day *[Apr'12]*
4. **Runner Up** at the Thane city finale of **HDFC Life Spell bee 2012** *['12]*