ADIL GUPTA

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EDUCATION

Indian Institute of Technology, Bombay *July 2016 - Present*
B.Tech in Electrical Engineering Overall GPA: 8.97/10
Senior Undergraduate

RESEARCH INTERESTS

My major research interests lie in signal processing and communication systems with emphasis on speech and acoustic signal processing, audio and music technology, natural language processing and application of deep learning in these fields

EXPERIENCE

Audio Technology Department, Sony May 2019 - July 2019
Guide: Kyosuke Matsumoto-san *Tokyo, Japan*

- Researched and developed **very low latency speech enhancement** methods using **deep learning**
- Researched new methods to **model musical noise** and reduce implementation time of proposed method
- Extended the proposed method to applications using **microphone arrays**, developed a deep learning based **beamforming** algorithm to be used in combination with proposed real time speech enhancement network
- Proposed a method to identify optimal locations of microphones on the device under consideration
- Description is high level, exact devices and figures are not mentioned to honor the non-disclosure agreement

Data Science Department, Balbix May 2018 - July 2018
Guide: Dr. Pavan Ramkumar *San Jose, California*

- Developed a probabilistic method to get impacts of breach in network through its individual devices by combining traffic observations and prior device information such as role, category, applications running, etc.
- Designed and implemented a **Probabilistic Graphical Model** for obtaining **device impacts** using **Pyro**, a scalable deep probabilistic programming library **open sourced by Uber**
- Extended the method to calculate **confidence levels** of impacts based on amount of data recorded for each device modeled using **fully Bayesian inference** with cutting edge deep learning framework

PROJECTS

Speech Enhancement for Automatic Reading Assessment July 2019 - Present
Prof. Preeti Rao *Thesis*

- Researching on **speech enhancement** algorithms for improvement in children's oral reading assessment
- The enhanced recordings are to be automatically rated for reading fluency using **ASR** and **prosody detection**
- Focused on developing deep learning based methods that **preserve the speech characteristics** like pitch which are usually distorted by conventional enhancement methods and are crucial for prosody assessment task

Secure Voice Communication System March 2019 - April 2019
Prof. Vikram M. Gadre *Digital Signal Processing*

- Conceived a secure low-resource voice communication system for narrowband military applications
- Achieved **85% speech compression** using methods like Linear Predictive Coding and pitch detection
- Performed encryption using chaotic signal obtained by solving Rssler discrete-time hyper chaotic system
- Selected among the **top 5** projects out of **35+ teams** in TI-DSP seminar, supported by the MHRD

High Speed Polymer Optical Fiber Link January 2019 - April 2019
Prof. Kumar Appaiah *Electronics Design Lab*

- Built a cost-efficient laser-based optical fiber communication link delivering data speeds of about **50 Mbps** for **100m Polymer Optical Fiber (POF) link** with potential use in FTTH (Fiber to the Home) networks
- Designed 3D-printed connectors using Solidworks for efficient coupling of laser, POF link and photodiode
- Implemented in three stages (achieved speeds up to **1.5/12.5/50 Mbps**), designed PCBs at each step for noise minimisation and examined the problems faced in designing circuits operating at such high frequencies

Processor Design September 2018 - November 2018
Prof. Virendra Singh *Microprocessors*

- Designed and implemented **16-Bit, 6-Stage Pipelined RISC** processor with **8-registers** based on Turing-Complete ISA in **VHDL**; successfully tested the implementation on **Cyclone IV FPGA Board**
- Optimized performance of the processor through **data & control hazard mitigation**, **result forwarding**

Google Landmark Recognition Challenge January 2018 - April 2018
Prof. Preethi Jyothi *Foundations of Machine Learning*

- Explored the problem of recognizing correct landmark in dataset of test images from label set of **15,000+**
- Implemented **15 layer** Convolutional Neural Network using **TensorFlow**; trained it on **Google Cloud**

Encrypted Audio Transmission Using Chaotic Circuits April 2018
Prof. Siddarth Tallur *Analog Circuits*

- Built and analyzed a **chaotic circuit** for **encrypting audio signals**, and built a corresponding chaotic decryption circuit to **extract the transmitted audio signal** with minimal distortion
- Recorded audio using **microphone** and **encrypted** it with noise created by **chaotic oscillator**
- Simulated the **3rd order chaotic oscillators** in **Ngspice** and implemented it using TL 7802 Opamps

Reaction Game On CPLD Board April 2018
Prof. Madhav P. Desai *Digital Circuits*

- Designed a game using **VHDL** to measure **reaction time**, having application in **clinical diagnostics**
- Conceptualised an **RTL machine** to display response time to an LED glowing at random instants on LCD
- Implemented the specification of the game on **Krypton CPLD** Board (**Altera MAX V** architecture) using **Quartus Prime** Software and verified the design by conducting simulations on **ModelSim**

Automatic Toll Collection System May 2017

- Created **Arduino programme** to communicate with **RFID sensors** on road to automate toll collection
- Developed **monitoring system** for capturing sensor data & maintaining collection systems using **Pyserial**

Crypto Package using RSA Algorithms October 2016
Prof. Bernard Menzes *Computer Programming*

- Designed a **cryptopackage** based on **RSA algorithms** using **C++**
- Executed **Pohlig-Hellman** and **Baby Step Giant Step algorithm** to compute **discrete logarithm**
- Programmed an RSA cryptosystem for **RSA key generation, RSA encryption and decryption**

TEACHING EXPERIENCE

MA105 - Calculus July 2018 - November 2018
Teaching Assistant *IIT Bombay*

- Entrusted with conducting weekly tutorial session for **50 students** to help them with the concepts of **calculus**
- Helped the professors in **conducting examinations** and evaluating the answer scripts

RELEVANT COURSES

- **Electrical engineering** - Speech Processing, Signals & Systems, Digital Signal Processing, Communication Systems, Digital Communications, Microprocessors, Control Systems, Network Theory
- **Mathematics** - Multivariable Calculus, Linear Algebra, Differential Equations, Complex Analysis
- **Computer Science and Data Analysis** - Medical Image Computing, Data Analysis and Interpretation, Probability and Random Processes, Foundations of Machine Learning, Network Security and Cryptography, Advanced concentration inequalities

SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 116** out of 2,00,000 applicants in JEE Advanced 2016
- Placed in the **99.60th percentile** in JEE Mains 2016 out of 12,00,000 candidates
- Among **Top 1%** at state level in National Standard Examination in Physics(**NSEP**)
- Within **Top 1%** at state level in National Standard Examination in Chemistry(**NSEC**)
- Selected for the Kishore Vaigyanik Protsahan Yojana Award 15 (1000 out of 20000 applicants)

TECHNICAL STRENGTHS

Computer Languages	C/C++, Python, Julia, VHDL, HTML, CSS, MATLAB
Software & Tools	Git, Docker, Quartus, AutoCAD, Solidworks, Arduino, NGSpice
Machine Learning	Tensorflow, PyTorch, NumPy, OpenCV, Pyro, Pandas, Anaconda

EXTRA-CIRRUCULAR

Strategic Decision Modelling Course

- Completed course Behavioural Insights to Strategic Decision Modelling at **London School of Economics**
- Learned about decision making in fields like marketing, strategic planning, resource allocation & investment

Volunteer at National Service Scheme

- Successfully completed **80+ hours** of community service as part of **NSS, Green Campus**
- Made videos in **regional Indian Languages** to promote the use of medicinal plants
- Carried out a tree census along the **1.6 km** long main road and recorded a total of 200 trees of **40 species**

Miscellaneous

- Certified as **stage 1 sky diver** by iFLY indoor sky diving, Basingstoke and learnt the sport of **wakeboarding**
- Won **Fourth position all over India** in green I competition held at Hyderabad international Convention Centre organized by the Confederation of Indian Industrys Young Indians
- Successfully completed a fast track course on **mock parliament** held at IT festival, DPS RK Puram

REFERENCES

Preeti Rao
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Kyosuke Matsumoto
Research Engineer
Audio Technology Department, Sony
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Kumar Appaiah
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Pavan Ramkumar
Research Engineer
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