Aditya Deshmukh

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Education

Program	Institution	%/CGPA	Year of completion
Dual Degree (B.Tech & M.Tech), Electrical Engineering	Indian Institute of Technology Madras, Chennai	**8.68/10**	2017
XII (HSC)	M.E.S. Abasaheb Garware College, Pune	**77.5%**	2012
X (ICSE)	Fravashi Academy, Nashik	**91.3%**	2010

Publications

Online energy efficient packet scheduling with a common deadline

Aditya Deshmukh, Rahul Vaze [Link]

Accepted at 14^{th} International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks (WiOPt-2016), IEEE Control Systems Society, IEEE Information Theory Society and IFIP.

Online energy efficient packet scheduling for a common deadline with and without energy harvesting

Aditya Deshmukh, Rahul Vaze [Preprint]

Accepted for publication in IEEE Journal on Selected Areas in Communications - Series on Green Communications and Networking (IEEE JSAC-SGCN December issue 2016).

Scholastic Achievements

- Secured an **All India Rank 599** in IIT-JEE 2012 among half million applicants
- Selected for **Kishore Vidnyan Protsahan Yojana (KVPY)** Scholarship (2011 SX Stream) by the Department of Science and Technology, Government of India
- Awarded **National Talent Search Examination (NTSE)** Scholarship in 2008 (top 1000 out of 200,000 applicants)
- Qualified for **Indian National Mathematics Olympiad (INMO)** in 2010
- Awarded **Maharashtra Talent Search (MTS)** Scholarship in 2009
- Ranked **16 All-India** in **National Mathematics Talent Contest** in 2007
- **Silver Medal** in Maharashtra Junior Science Olympiad in 2009 (**State rank 9**)

Research Experience

Learning algorithms for search in structured environments **July 2016 - Present**

Dr. Srikrishna Bhashyam, IIT Madras

- Information-theoretic analysis of sequential anomaly detection in structured stochastic scenarios.
- Algorithm design for identification of odd arm in Multi-Armed Bandits by minimization of cumulative regret and fixed confidence simple regret through a Frequentist approach.
- Analysis of Bayesian-inspired Thompson Sampling for the arm identification in Multi-Armed Bandits.

Water-filling Algorithms for Gaussian MAC and Sum-rate bounds for Gaussian MIMO Z Channel **Oct 2015 - Jan 2016**

Dr. Srikrishna Bhashyam, IIT Madras

- Worked on developing iterative algorithms to find optimal covariance matrices for weighted sum-rate maximization in Gaussian Multiple Access Channels. Studied water-filling techniques for Gaussian MAC with Inter-Symbol Interference and general sum-rate maximization in Gaussian MAC.
- Worked on analytically proving a conjecture that a new upper bound is tighter than the established upper bound on the sum-rate of Gaussian MIMO Z channel.

Online Energy Efficient Packet Scheduling **May - Oct 2015**

Dr. Rahul Vaze, TIFR

- Worked on a problem of packet scheduling to minimize the required conventional grid energy for transmitting a fixed number of packets given a common deadline.
- Developed online algorithms with provable competitive ratio logarithmic in the total number of packets in both scenarios: with and without energy harvesting; **first ever online algorithm with provable guarantees under the most general setting**.

Selected Projects

Irregular LDPC codes and Turbo codes **March - May 2016**

Modern Coding Theory Course Project

- Constructed Irregular LDPC codes from first principles by large girth Tanner graphs using Progressive Edge Growth (PEG) and optimized them by EXIT charts.
- Implemented decoders using belief propagation for BEC and BIAWGN channels for LDPC codes.
- Implemented encoder and decoder for 1/3 rate Turbo codes using max-log version of the BCJR decoder.

Huffman Coding and parametric characterization of Binary Channels **April - May 2015**

Information Theory Course Project

- Implemented Huffman encoding and decoding of discrete sources with given probability distributions in MATLAB.
- Developed a geometric method for parametric characterization of all binary memory-less channels having a fixed capacity.

Mathematical modelling of eusocial insect colonies **Nov 2014 - Jan 2015**

Manasi Deshmukh, UCLA

- Developed a model where agents execute work assigned based on adaptive division of labour depending on the intensity of external stimuli and individual thresholds, which are modulated in response to task performance.
- Mathematically modelled and simulated agents physiology and the flow of nutrients based on biological research using jMonkeyEngine 3.0 SDK (Java-based 3D game engine).

Persistence of Vision **July - Dec 2013**

Envisage, Shaastra[1] *2014*

- Based on the optical illusion whereby multiple discrete images blend into a single image in the human mind.
- Designed apparatus consisting of 128 multicolour LEDs & IR sensors controlled by LED driver TLC5951 & Arduino Due.

Industrial Experience

Instant Messaging Android Application **March - July 2014**

Phasorz Technologies, IITM Research Park

- Developed 'DocsApp' – an android based messaging and consulting platform for patients and doctors.
- Worked on the back-end to facilitate server interaction through XMPP & HTTP, and database management by SQLite.
- Designed digital signal filters to process signals acquired through Bluetooth from an ECG device.

Skills and Tools

- Languages: Java, C, Python
- Softwares and Tools: MATLAB, Eclipse IDE, Android SDK, Arduino IDE, AutoCAD, LaTeX
- Operating Systems: Window, Ubuntu

[1] Envisage is a techno-entertainment show in Shaastra, IIT Madras' annual technical festival.

Relevant Coursework

Communication & Signal Processing

- Information Theory
- Network Information Theory*
- Modern Coding Theory
- Advanced Topics in Signal Processing
- Error Control Coding
- Digital Communication Systems
- Analog and Digital Signal Processing
- Information Theory and Inference†

Mathematics & Data Science

- Machine Learning
- Multivariate Data Analysis
- Detection & Estimation Theory
- Probability, Statistics and Stochastic Processes
- Applied Linear Algebra
- Convex Optimization
- Complex Analysis
- Topology†

Other Courses

- Modern Control Theory
- Networks & Systems
- Electromagnetic Fields
- Analog Circuits
- Quantum Physics
- Quantum Computation and Quantum Information*

Positions of Responsibility

Teaching Assistant **July - Nov 2016**

Electrical Department, IIT Madras

- Assisted in collecting course material, evaluated and graded projects, and coordinated course related activities in the course Communication Networks.
- Applied for teaching assistantship for the coming semester Jan-May 2016.

Mobile Operations Coordinator **Oct - Dec 2013**

Saarang[2] 2014

- Developed an android app 'Saarang 2014', which provided online registration facilities and detailed festival itinerary to the attendees of Saarang 2014.
- Developed an android app for on-the-spot registration via scanning the barcode on the festival identity card.

Shows Coordinator **July - Dec 2013**

Envisage, Shaastra 2014

- Part of the 'Persistence of Vision' project team.
- Designed a 'Stringless Guitar' by coupling an android app, that served the purpose of chords, with a bluetooth module, that acted as a frequency selector.

Extra - Curricular Activities

- National Cadet Corps (NCC) : Senior Wing Certificate.
- One of the 8 finalists among 25 participants in Mono-acting competition in LitSoc[3] 2015.
- Participated in various inter hostel technical competitions in TechSoc[3].
- Trained in elementary Tabla, awarded Gandharva Mahavidyalaya Praveshika Pratham.
- Accomplished World's Highest Tandem Skydive from an altitude of 18,000 feet.
- Basketball, Chess, Swimming, Ultimate Frisbee
- Self-taught Harmonica player

*Current courses.

†Next Semester courses.

[2]Saarang is IIT Madras' annual cultural festival.

[3]LitSoc and TechSoc are IIT Madras inter-hostel cultural and technical competitions, respectively.