Gaurav Gupta

Contact Information

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Research Interests

Mathematical modeling of electrical/biological systems, computational biology, computational nuero-science, signal processing, algorithm design

Applications of information theory, communication systems, networks, optimization, detection and estimation

Education

University of California Irvine *2014-2016*
M.S. in Electrical Engineering, CGPA: 3.967

Indian Institute of Technology Kanpur *2009-2013*
B.Tech in Electrical Engineering
GPA: Major 9.8/10.0, Overall 9.0/10.0

Publications

- **Gaurav Gupta** and S.A. Jafar
  Topological Interference Management and Frequency Hopping
  Tech Rep, Dec. 2015.

- **Gaurav Gupta** and A.K. Chaturvedi
  User Selection in MIMO Interfering Broadcast Channels
  IEEE transactions on Communications, vol. 62, no. 5, pp. 1568-1576, Apr. 2014.

- **Gaurav Gupta** and A.K. Chaturvedi
  Conditional Entropy based User Selection for Multiuser MIMO systems
  IEEE Communications Letters, vol. 17, no. 8, pp. 1628-1631, Aug. 2013.

Awards and Distinctions

- **Top scorer** in EECS PhD Preliminary exam 2014-15
- EECS Departmental fellowship award for the year 2014-15
- Finalist for Best Bachelors Thesis Project in Electrical Engineering at IIT Kanpur
- Secured **All India Rank 385** in IIT JEE 2009 from among 400 thousand students
- **Academic Excellence Award** (awarded to top 5%) for academic year 2012-13 at IIT Kanpur
- **Certificate of merit** in Mathematics (awarded to top 0.1% in the country) in AISSE 2007
- **Project of Appreciation** award for railway barrier project done as a part of academic course at IIT Kanpur in Nov-10
- Awarded **Second** Prize in FIFA 2050 robotics event at IIT Kanpurs Annual Technical Festival Techkriti-11
- Secured **All India Rank 384** in AIEEE 2009 from more than 800 thousand students
- Represented School in Science Exhibition and selected as **Most Innovative Design** for **Burglar Alarm** at District level in 2006

Projects

Frequency Hopping in Topological interference networks Prof. Syed A. Jafar

- Studied tactical networks with frequency hopping when only topology information is available at the transmitter

- Developed novel counter examples to show the inseparability of sibling topologies for 2 frequency hopping from sum dof perspective

Interference Channels with partial Channel knowledge Prof. Syed A. Jafar

- Integrated Blind interference alignment (BIA) and partial channel knowledge(CSIT) to achieve upperbound on degrees of freedom
- Designed MIMO-IC scenario where integration of BIA and partial CSIT is optimal

User Selection in MIMO Interfering Broadcast Systems Prof. A.K. Chaturvedi
B-Tech Project 2012-2013

- **Addressed** the problem of user selection in MIMO-IFBC to **improve** the sum rate utilizing multiuser diversity
- Proposed **two low complexity** user selection algorithms achieving sum rate close to the optimal solution
- Simulated the algorithms to obtain sum rate plots and verified **linear** complexity using total flops plot

RFID Assets Tracking System Prof. A.R. Harish
May-Jul'11

- **Innovated the idea** of using **GUIs** to update database and collect data with speed and efficiency
- Proposed idea **reduced** the work load to collect data from **hours to few minutes**
- Developed **Matlab** codes to fetch, process and feed the data from Receiver to **MySQL** server
- **Designed** application for remotely accessing data from server and **proposed idea** of representing coordinates and tag type in form of graphical images for read/unread positions
- The project was sponsored by the **Boeing International**

Smith Simulator (Self Project) Feb'12

- Developed Smith Simulator from scratch as a **learning and teaching resource** for solving Smith chart [**link**]
- Added **16 types of analysis** features to solve and demonstrate transmission lines stub problem
- Embedded numerous **CAD** like features to create and modify constant absolute reflection coefficient, r and x loci
- Inbuilt **database** system and **read-write protocols** to manage undo-redo operations

Term Paper on Turbo decoder Oct-Nov'12

- Figured out a new way **'minimum contributing parent'** which reduced the run-time of Viterbi decoder by more than **10 times** on Matlab
- Simulated BER performance of BCJR decoder with bit-wise MAP decoding

Dynamic Signal Filtering tool (Self Project) Jun-Jul'11

- Developed Signal filtering tool on **Matlab** which upon signal input displays real-time changes in output on varying filter
- It allows user to interactively apply **different types** of filters on signal and vary their higher and lower cut-off frequencies with a simple mouse drag in a user friendly **Graphical User Interface**
- Accessory functions like **sound player, cursors** with the facility of peak and valley detection
- **Digital FIR filters** and **FFT** algorithms were employed for this purpose [**link**]

Professional Experience

Synopsys India Pvt. Ltd, Bangalore, India

R&D Engineer 2013 - 2014

Worked on the development of communication and signal processing blocks for SMC library on Matlab and Simulink. The blocks upon use of SMC tool gets converted to RTL for FGPA's

Mobile Communications Lab, IIT Kanpur

Summer researcher May-Aug′12

Carried out research work on user selection in Multiuser MIMO Broadcast channels and developed an algorithm with best performance in terms of sum-rate and complexity as compared to all existing work

RELEVANT COURSES Information Theory, Wireless Communication Theory, Convex Optimization, Linear Optimization, Detection and Estimation, Applied Stochastic Processes, Applied Game Theory, Bayesian Statistics, Control System Analysis, Communication Systems, Coding Theory, Microelectronics I, Principles of Communication, Speech Signal Processing, Linear Algebra, Digital Signal Processing, Fundamentals of Computing, Signals and Systems, Real and Complex Analysis, Differential Equations, Probability and Statistics

COMPUTER SKILLS

- Languages: C, C++, LaTeX, HTML
- Softwares: Matlab, Microcap, Simulink, Mentor Graphics
- Operating Systems: Linux, Windows.

POSITIONS OF RESPONSIBILITY

TA for EECS-55

– An engineering probability course for undergraduates at UC Irvine

Student Guide, Counseling Service 2010-11

– Mentored 5 new students and helped them to acclimatize to the campus as a part of counseling service team
– Contributed in smooth conduction of Orientation Program 2010-11

Secretary, Professional Shows Antaragni 2010 (Inter-Collegiate Cultural Festival of IIT Kanpur)