Curriculum Vitaé

PERSONAL INFORMATION

Anurag Agrawal
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RESEARCH INTERESTS

- Information Theory
- Wireless Communications
- Security (Physical Layer)

EDUCATION

Institution	Educational Qualification	Academic Record
IIT Bombay	3rd Year Bachelor of Technology	CGPA: 9.19/10
IIT Bombay	2nd Year Bachelor of Technology	CGPA: 9.51/10
IIT Bombay	1st Year Bachelor of Technology	CGPA: 9.61/10

MATHEMATICS AND PHYSICS

- A list of all the Mathematics and Physics courses I have done in the past, along with their grades, can be seen below:

Course name	Year of study	Grade obtained
Convex analysis	2nd Year B.Tech	10/10
Differential Equations II	2nd Year B.Tech	10/10
Linear Algebra	1st Year B.Tech	10/10
Differential Equations	1st Year B.Tech	10/10
Modern Physics	1st Year B.Tech	10/10
Calculus	1st Year B.Tech	9/10
Secondary School Mathematics	12th Grade	96/100
High School Mathematics	10th Grade	97/100

AWARDS AND HONORS

- **MITACS Globalink Scholarship** (May 2010): awarded to 2 students from Electrical Engineering and 4 students from the institute for summer internship at University of Toronto
- **CBSE Merit Scholarship:** for being among **top 0.05%** (from among 0.5 million participants) in All India Engineering Entrance Examination
- **National Talent Search Examination (NTSE) Scholarship:** for being among **top 0.4%** (from among 0.15 million participants) in NTSE
- **State Science Olympiad Scholarship:** for ranking among **top 1%** students in the state of Madhya Pradesh (M.P.), India, in 2003
- **Oxford Junior College G.K. competition shield:** for **ranking 1st** in the district of Ujjain, M.P., in 2002

PUBLICATIONS

Journal

- Anurag Agrawal, Zouheir Rezki, Ashish Khisti and Mohamed-Slim Alouini**, "Non-Coherent Capacity of Secret-Key Agreement with Public Discussion,"** Submitted to IEEE Transactions on Information

Forensics and Security, Special Issue on Using the Physical Layer for Securing the Next Generation of Communication Systems, Sept. 2010. Available online: http://www.ee.iitb.ac.in/student/~anurag_agwl07/Paper.pdf

Conference

- Anurag Agrawal, Zouheir Rezki, Ashish Khisti and Mohamed-Slim Alouini**, "Non-Coherent Capacity of Secret-Key Agreement with Public Discussion,"** IEEE ICC 2011, Workshop on Physical Layer Security, Accepted for Publication, Jan. 2011

In Preparation

- Anurag Agrawal, Sibi Raj Bhaskaran Pillai, **"An Upper Bound on Non Coherent Secret-Key Capacity,"** A part of my Senior Undergraduate Thesis, Stage-1 B.Tech Project, Dec. 2010
- Anurag Agrawal, Sibi Raj Bhaskaran Pillai, **"A Coding Scheme for Discrete Memoryless Channels with Feedback and Quantization at the Receiver,"** A part of my Senior Undergraduate Thesis, Stage-2 B.Tech Project

RESEARCH EXPERIENCE

Stage-1 B.Tech Project, Electrical Engineering, IIT Bombay (Ongoing)
"Capacity Analysis of Wireless Channels" Guide: Prof. Sibi Raj Bhaskaran Pillai

- The project involves a study of select topics in Information Theory with current emphasis on the capacity analysis of DMCs with feedback and Secret-Key Agreement.

Summer Internship – University of Toronto, Toronto, Canada (May - July 10)
"Information Theoretic Secret-Key Agreement" Guide: Prof. Ashish Khisti

- Proved that the secret-key capacity is bounded in the SNR for a non coherent MIMOME channel
- Established the achievability of the secret-key capacity and proved that the capacity achieving input distribution is discrete
- The proof was the first ever complete proof that established the bound on the secret-key capacity

Summer Internship – Wilcom Technologies, Antenna Lab, IIT Bombay (May - June 09)
"Radar Recorder" Guide: Prof. Girish Kumar

- Designed the microcontroller circuitry for the Radar Recorder in a team of two
- Proposed a model to measure the speed of any vehicle passing by the device and to give its direction

Undergraduate Research Award (Mar - May 09)
"Asterisk" Guide: Prof. Uday B. Desai

- Integrated a cell phone to 'Asterisk' a PBX, by writing a channel driver for a low cost GSM phone
- By integrating a cell phone the cost was brought down by having an IP PBX with an outgoing facility

TEACHING EXPERIENCE

Teaching Assistant, Help Sessions (Aug - Nov 10)
"Undergraduate First Year Course – Data Analysis and Interpretation" Guide: Prof. Siuli Mukhopadhyay

- Conducted help sessions for a class of 45 academically weak students to solve assignment problems
- Analysed their mid-semester performance and prepared tutorials to tackle the problems faced

Student Partner, Cognizance - Technical Festival, IIT Roorkee (Aug 08 - Mar 09)
"Robotics and C Programming" Guide: Prof. Girish Kumar

- Lectured and trained 1st year IITB students with basics of C programming and designing of Robots
- Led a contingent to participate in 4 Robotics and Programming competitions held at IIT Roorkee

Volunteer, Educational Outreach, National Service Scheme (Aug 07- Mar 08)
"Secondary School Physics and Mathematics" Guide: Prof. K. Narayanan

- Taught and coached school students by conducting over 30 lectures at the Campus school, IIT Bombay

- Developed strategies to solve the problems faced by underprivileged students that came to Campus School with their class 9th and 10th Physics and Mathematics

KEY TECHNICAL PROJECTS

Course Project, Advanced Computing for Electrical Engineers (Aug – Nov 10)
"Rabin Cryptosystem" Guide: Prof. Sachin Patkar, Prof. S. Vijayakumaran

- Implemented the Encryption and the Decryption process of the Rabin Cryptosystem in C++
- Devised a disambiguation scheme to eliminate the inherent problem of multiple decryption outputs associated with the decryption process of the Rabin Cryptosystem

Nexus, Techfest 2009 – 10, Technical Festival, IIT Bombay (May - Oct 09)
"Thesus, A Swarm Robot" Guide: Prof. Girish Kumar

- Designed a robot using a CC2500 RF transceiver and ATMEGA32 microcontroller, that transversed a 5x5 maze to reach a destination taking checkpoints and avoiding danger-points
- Programmed the microcontroller in C++ and used WinAVR as a software development tool

Techfest 2008 – 09, Technical Festival, IIT Bombay (Oct 08 – Jan 09)
"Micromouse, An Autonomous Robot" Guide: Prof. Girish Kumar

- Designed and developed the Micromouse, an autonomous self contained machine designed to get to the centre of a maze in the shortest possible time
- Developed microcontroller Application board, stepper motors circuitry and an IR sensors array and programmed the machine in C++ and used 'Eagle' to design the Application board

Digital Circuits Lab Project (Feb - Apr 09)
"Digital frequency cum phase meter" Guide: Prof. Sachin Patkar

- Designed and developed a meter which measured the frequency of any kind of wave up to 1MHz
- The project got special appreciation and was preserved as a 'model project' for the upcoming batches

Course Project, Computer Programming and Utilization (Sep - Nov 07)
"Arkanoid" Guide: Prof. S. Sudarshan

- Developed a game using EZWindows aimed at scoring points by breaking a set of bricks using a glider
- The game comprised of 3 levels with varying levels of difficulties and different implementation logics

NON ACADEMIC WORK EXPERIENCE

Institute Student Coordinator, National Service Scheme (NSS), IIT Bombay (Apr 09 – Mar 10)

- Planned and executed meditation campaigns, cloth collection campaigns and blood donation campaigns at the institute level to guide 185 freshmen with their weekly NSS activities

Special Academic Task Force (SATF), IIT Bombay (May 10 - present)

- Part of a **22 member SATF** aimed to create a new registration interface and to conduct Maths and C++ help sessions

TECHNICAL ACHIEVEMENTS

- **Thesus**
  - Stood 2nd and 4th in the two final rounds at CommQUEST Nexus a competition organized by Techfest, with an overall ranking of **4th among 250 teams** which registered for the competition
  - Found the shortest path with a recorded time of **51.5 seconds** and ranked the 5th fastest team to complete the task
- **Micromouse**
  - Stood **15th** (among 225 teams) in the country in the national Micromouse competition at Techfest 2008