

## CAREER OBJECTIVE

To pursue applied research in the field of signal processing and wireless communication to bring out innovation in ubiquitous connectivity

## ACADEMIC DETAILS

Year	Degree/Exam	Institute	GPA/Marks (%)
2010	B.Tech in Electrical Engineering	Indian Institute of Technology, Delhi	8.96/10 (DR # 3)
2006	CBSE, Class XII	Modi Public School	88 % (PCM)
2004	CBSE, Class X	D.A.V. Public School	94 %

## SCHOLASTIC ACHIEVEMENTS

- Secured **Department Rank 3** among 45 B.Tech students in Electrical Engineering in IIT Delhi.
- Awarded the **Best B.Tech Project Award** by Director, IITD for best bachelor thesis project in 2010.
- Won **Yahoo HackU Award, 2009** organized by Yahoo R&D and judged by Rasmus Lerdorf (Creator of PHP)
- Awarded **IITD Semester merit Award** 4 times in 8 Semesters for outstanding academic achievements.
- Awarded **Summer Undergraduate Research Award, 2008 (SURA)** by Industrial R&D Center, IIT Delhi.
- Secured an **All India Rank of 272 among 400,000 students** in IIT Joint Entrance Examination, 2006.
- Selected (among 31 others across India) to be a part of **International Physics Olympiad** Training Camp, 2006.
- Awarded Certificate of merit for being among top 1% of 29585 students in National Physics Olympiad, 2006.

## STARTUP EXPERIENCE

**Co-Founder & Chief Technology Officer (C.T.O) (Yantr Electronic Systems Pvt. Ltd, New Delhi, India)**

### Astiva SDR – General Purpose SDR platform

#### Project Lead

Sept, 2011 – Present

- Ideated the development of custom SDR platform especially tailored for TV whitespace applications.
- Evaluated existing SDR platforms like USRP2, SFF SDR (Lyrtech) and WARP board as TV whitespace testbeds.
- Leading the design team to develop flexible SDR architecture comprising separate RF, IF and baseband boards.
- Awaiting initial seed funding through Technopreneurship Promotion Program (TePP) project fund by DSIR, GOI.

### Wireless Broadband over TV whitespace in India

#### Project Manager

March 2011 – July 2011

- Conducted technical and market feasibility of using TV whitespace spectrum for broadband internet access in rural and semi-urban India in collaboration with Bharti Airtel.
- Studied RF propagation in TV bands, Link Budget to obtain cell edge data rate and cell area and possible PHY and MAC layer air interface (IEEE 802.22), and technical feasibility of opportunistic Spectrum Access (OSA)
- Developed business models for last mile rural broadband and urban backhaul for hotspots using TV whitespace.

### Intelligent Notice Board (iNB)

#### Project Lead

Aug 2010 – Dec 2010

- Designed Intelligent Notice Board System (iNB) to replace paper based conventional notice boards in campuses.
- Design and development of the system on TI's Leopard Board using GStreamer Media framework to disseminate multimedia content using Ethernet.
- Lead 6-member student team for the implementation and pilot operations of the system in IIT-Delhi.
- Conducted market survey of digital signage and outdoor advertisement Industry as a prospective business opportunity in India.

## INDUSTRIAL EXPERIENCE (1.5 YEARS)

### Auditory Brainstem Response Screening System (Stanford India Bio-Design Center, AIIMS, New Delhi)

#### Algorithm & development Consultant

May 2011 – Present

- Developed newborn hearing screening device based on automated auditory brainstem response (ABR) detection.
- Devised novel algorithm for detecting low (100 nV) ABR signal in presence of 30 dB high EEG and EM noise.
- Developed a standalone prototype of the system on TI's DSP with stimulus generation, data acquisition, signal processing and data storage firmware for conducting clinical studies on adults.
- The standalone prototype was a prime attraction in India Medtech summit, 2011 and resulted in one India patent.

## **Pedestrian Navigation System R & D (CSR plc, Noida)**

*Engineering Consultant*

**Dec 2010 – April, 2010**

- Developed and implemented an Extended Kalman Filter (EKF) based system error estimator for a pedestrian navigation system.
- Conducted benchmarking and performance evaluation of existing navigation algorithms to highlight scope of improvements.
- Incorporated pedestrian biomechanical constraints in EKF to reduce system error to below 1% for 100 m long walking cases.

## **MEMS INS - R & D (Centre for Applied Research in Electronics, IIT Delhi)**

*Research Associate*

**Aug 2010 – Nov 2010**

- Error analysis and stochastic modeling of MEMS INS sensors for performance improvement of attitude and trajectory calculation
- Assessed and modeled the stochastic error present in MEMS accelerometer, gyroscope and compass using Gauss Markov (GM), Autoregressive (AR) and ARMA models.
- Developed optimal Kalman filter based on AR and ARMA analysis of sensor data to adaptively filter out colored sensor noise

## **GPS Application (Texas Instruments India Pvt. Ltd, Bangalore)**

*Engineering Trainee*

**May 2009 – July 2009**

- Developed an application to gauge performance of GPS receivers during field trials without reference data.
- Improvised the idea of using Google Maps data as reference to generate error statistics.
- Conceptualized and implemented the application from scratch to a stage where it is used across all TI centers.

## **ACADEMIC PROJECTS**

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### **Navigation System using Inertial Sensors and GPS**

*Advisor: Prof. Arun Kumar (CARE, IITD), Prof. Manish Sharma (CARE, IITD)*

**Aug 2009 – May 2010**

- Developed Pedestrian Navigation System (PNS) using in-mobile MEMS Accelerometer, Gyroscope and compass sensors with **CSR SiRF** for smart phones to track position, orientation and context (walking, running, stationary etc) of users in indoors.
- Developed an in-field sensor calibration algorithms, Kalman filter based optimal sensor fusion algorithm to calculate attitude and heading, and step-detection and step-length estimation algorithm to determine trajectory of pedestrian with below 3% accuracy.
- Received the **Best B.Tech Project Award** by Director, IITD and the work formed integral part of CSR's upcoming product.

### **Knowledge Management in Academia: A case Study - IIT Delhi**

*Advisor: Prof. Poomima Singh (Humanities Department, IITD)*

**Aug 2009 – May 2010**

- Research into the scope and need of Knowledge Management in academia (IIT Delhi) and developed a student centric knowledge management model by studying constituents of transferable knowledge and psychological barriers to knowledge sharing.
- Presented the work in **Knowledge Management International Conference (KMICe), 2010** and published it in **American Journal of Economics and Business Administration (AJEBA)**.

### **Design and Implementation of Parallel Image Processor on FPGA**

*Advisor: Dr. Anshul Kumar (Computer Science and Engineering, IITD)*

**Jan, 2009 – April, 2009**

- Designed novel parallel processor architecture to accelerate image processing tasks for real time embedded applications.
- Implemented image change detection algorithm on an array of four **Microblaze** processors on Virtex IV Kit.
- Devised mechanisms for inter-processor communication and shared memory architecture for efficient sharing and flow of data.

### **Evolutionary Algorithm for FPGA based Design using Genetic programming and VHDL**

*Advisor: Dr. Santanu Chaudhury, (Electrical Engineering Department, IITD)*

**May 2008 – July 2008**

- Developed an automated approach to digital hardware design by applying Genetic Programming on VHDL using GP Kernel.
- Automatically evolved circuits like multipliers and GCD processors using mutations and crossover operations.
- Awarded **Summer Undergraduate Research Award (SURA) by Industrial R&D Center, IITD** for the outstanding research.

## **RELEVANT COURSES**

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- **Electrical Engineering:** Signals & Systems, Digital Signal Processing, Analog and Digital Communications, Digital Electronics, Embedded Systems, Control Engineering, Computer Architecture, Electromagnetic Waves
- **Computer Engineering:** Introduction to Computer Science, Data Structure, Computer Networks, Operating

- Systems,
- **Mathematics and Economics:** Probability and Stochastic Processes, Introduction to Linear Algebra and Matrix, Microeconomics and Macroeconomics

## TECHNICAL SKILLS

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**Language:** C/C++, Perl, Java, MATLAB, VHDL (FPGA), Assembly Language, Shell Scripts  
**Hardware Platform:** C5515 DSP, DM355/365 DaVinci, Xilinx Virtex II Pro, Virtex IV Video Starter  
**Operating Systems Platforms:** Linux, Embedded Linux, Android OS, GStreamer  
**Web Development:** HTML, CSS, JavaScript, PHP, Drupal and Wordpress CMS, and AJAX

## OTHER ACTIVITIES

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### Co-Founder and KM - Coordinator, Technocracy-IITD

- Envisioned and started a student body to promote and coordinate research and development among undergrad students in IIT-D.
- Represented a 70 member Technocracy Team in **Senate, IITD** to lay down its activities and roadmap to achieve its milestones.
- Led a 15 member Knowledge Management Team for creating an internally accessible KM centric project database, Technopedia™ (*a technical campus wiki*) and web interest groups in collaboration with computer services center (CSC, IITD).

### Chairman, IEEE- IITD Student Chapter

- Rejuvenated IEEE IITD student body by ensuring representation from different years to create a pyramidal structure.
- Led a 5 member team to organize various workshops and competitive events like Showin120Seconds.
- Collaborated with other student branch of IEEE Delhi section for a region level GINI Initiative.

### Technology Workshops

- Conducted 2 workshops in **Drupal and Web Development** in IIT Delhi under Technocracy workshop series. .
- Organized and conducted two workshops in **MATLAB** and one in **Robotics** as an Ideas2ignite initiate.

## PATENTS AND PUBLICATIONS

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- **A system and apparatus for Auditory Evoked Potential (AEP) data acquisition for hearing screening** (2011 India Patent)
- Mayank Kumar and Anuraag Gupta, “**Knowledge Management in Academia – An engineering institute’s case study**”, KMICe 2010 submitted to American Journal of Economics and Business Administration (AJEBA) 2011.
- White paper on “**Broadband connectivity to Rural masses using TV bands in India**”, Yantr Electronic Systems Pvt. Ltd.

## REFERENCES

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### Dr. Manish Sharma

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## OTHER INTERESTS

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Blogging (<http://mayank.ideas2ignite.com/blog>), Web Hacking, Saint Kabir’s and Vivekanand’s Philosophy,