Atul Bansal

Major in Electronics and Electrical Communication Engineering
Minor in Computer Science
Micro-Specialization in Embedded Wireless Systems

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Education

- **B. Tech + M. Tech; CGPA: 9.54; Rank 3** — Kharagpur, India
  Indian Institute of Technology — *Jul 2014 – Present*
- **Senior Secondary Examination XII(CBSE); 95.2%** — Ranchi, India
  Jawahar Vidya Mandir, Shyamali — *Jun 2012 – May 2014*
- **Class X(CBSE); CGPA: 10.00** — Ranchi, India
  Surendranath Centenary School — *Apr 2010 – Apr 2012*

Internships and Projects

- **Relative Localization using Bluetooth Low Energy signals** — Edmonton, Canada
  University of Alberta; Guide: Professor Ioanis Nikolaidis — *May 2018 - Jul 2018*
  - Designed a framework with dynamically moving Bluetooth Low Energy based sensor nodes, which used Advertising packets to transmit information and localize themselves by communicating with one another.
  - Used Received Signal Strength Information(RSSI) as a substitute for measuring distance between 2 sensor nodes.
  - Developed an algorithm for each sensor node, which prevents the execution of critical sections and occurrence of race conditions while concurrently scanning and transmitting its packets.
  - Mastered working with Nordic Semiconductors nRF5 SDK deployed on a nRF52 chip in a PCA10040 board.
- **WiFi Assisted Autonomous Driving** — Pittsburgh, USA
  Carnegie Mellon University; Guide: Professor Swarun Kumar — *May 2017 - Jul 2017*
  - Identified the location of static objects using the angle of arrival of Wi-Fi signals reflected from them.
  - Developed a working prototype with a static transmitting antenna and an antenna stuck on the Roomba robot which can localize the antenna and move towards it in real time. Demo Video
  - Performed experiments to establish relationship between the drift in polarization and the object material.
  - Designed a system to tackle an imminent issue in Computer Vision based autonomous vehicles: detecting objects in the blind-spot of the driver.
- **Brain Connectivity variation with IQ using MEG signals** — Kharagpur, India
  Indian Institute of Technology; Guide: Professor Goutam Saha — *Jul 2017 - Apr 2018*
  - Studied the brain connectivity variation of children 3-4 years of age with cognitive ability using MEG signals.
  - Modelled the brain networks as a graph by using correlation measures between the MEG signals as the weights and found their relationship with the IQ information, obtained from the standardized K-ABC test.
  - Employed both Statistical and Machine Learning methods such as Feature Selection with Linear SVM kernel to get a maximum of 73% accuracy.
- **Lung Nodule Detection** — Kharagpur, India
  Indian Institute of Technology; Guide: Professor Sudipto Mukhopadhyay — *Dec 2016 - Dec 2017*
  - Developed an efficient algorithm for detection of nodules with reduction in the number of false positives per scan.
  - Implemented the segmentation and nodule detection algorithms on a dataset provided by the LIDC.
  - Obtained an accuracy of 91% in detecting lung nodules with ground truth values provided by 5 radiologists.
- **Identifying Blood Fluctuations and Patterns using PPG signals** — Kharagpur, India
  National Digital Library, Ministry of Human Resource and Development, Govt. of India — *May 2016 - Jul 2016*
  - Processed the Photoplethysmogram(PPG) signals which measured the blood flow of the arteries present in the fingertips of variuos subjects.
  - Measured the pulse rate and oxygen content variation from the data after preprocessing of the PPG signals.
  - Detected common envelopes among the PPG signals, by comparing the FFT and Spectrograph of signals.

- **Fiducial Markers Localization** Madras, India
  Indian Institute of Technology; Gold Medal (6th Annual Inter-IIT Tech Meet) *January 2018*
  - Successfully localized fiducial markers in a series of DICOM images using just Image Processing algorithms only.
  - Converted DICOM images into a Point Cloud using PCL library followed by thresholding to separate the fiducials.
  - Employed Statistical Outlier Removal algorithm to remove noise effectively and Iterative Closest Point algorithm (used in Robotics for 3-D localization) to localize the fiducials.
  - Automating the task of localization greatly reduce the time and manual work to perform neuro-registration, where images of same subject using 2 different imaging systems can be correlated by using fiducials.

- **Term Projects | Indian Institute of Technology** Kharagpur, India
  Topics: Machine Learning, Image Processing, Analog and Digital Circuits
  - **Image Registration:** Stitched 2 partially overlapping images together by registration, projective warping and color blending and formed one complete image, in the Image Processing course.
  - **Brain Control Interfacing:** Estimated the mental workload of brain using features extracted from EEG signals and obtained an accuracy of 71% with a Neural network classifier, in the Machine Learning course.
  - **16 point FFT calculation:** Developed the architecture of calculating 16 point FFT using digital circuits by simulating them in Verilog, in the Digital Electronic Circuits course.
  - **Analog Tx-Rx using PSPICE:** Designed an analog circuit for Energy Efficient Data Communication to achieve an efficiency 2.85 nJ/bit, in the Analog Electronics Circuits course.
  - **Capacitance calculation:** Calculated the capacitance of a parallel-plate capacitor analytically using MATLAB to observe fringing effects, in the Network Theory course.

Skills

- MATLAB
- PHP
- Cadence
- Python
- Nordic SDK
- Assembly Programming
- Visual Studio(OpenCV)
- Verilog
- Embedded C
- Spice Schematics
- R
- Javascript
- C
- C++
- HTML
- CSS

Scholastic Achievements

- Joint Entrance Examination Advanced 2014: Secured 99.4 percentile (All India Rank 1200)
- Joint Entrance Examination Mains 2014: Secured 99.87 percentile (All India Rank 1818)
- Qualified Special Class Railway Apprentice Examination 2014 by Union Public Service Commission, India
- Kishore Vaigyanik Protsahan Yojna 2013-14 scholar awarded by Dept. of Science and Technology, Govt. of India
- National Standard Examination in Physics 2014 by Indian Association of Physics Teachers: Secured 99 percentile

Relevant Course Work

- Embedded Systems Design
- MIMO Communications
- Signals & Systems
- Matrix Algebra
- Algorithms
- Communication Signal Processing & Algorithms
- Information Theory & Coding Techniques
- Introduction to Wireless Communications
- Computer Communication & Networking
- Probability & Stochastic Processes
- Computational Neuroscience
- Control System Engineering
- Digital Signal Processing
- Analog Communication
- Digital Communication

Positions of Responsibility

- **Sub-Head, Tech Team** Kharagpur, India
  Spring Fest 2016 - Annual Socio-Cultural Festival, Indian Institute of Technology *Jul 2015 - Mar 2016*
  - Developed the mobile version of the main website of Spring Fest 2016 using a new Javascript API called IONIC.
  - Created an online maze game Labyrinth, which witnessed a participation of over 1000 participants.