

# Dr. Supratim Gupta

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## Research Interest:

- Embedded Signal & Image Processing
- Facial Feature tracking from image sequence
- Compressive Measurement of Image Features
- Denoising via Sparse Representation of Images

## Education:

- **Ph. D.:** Electrical Engineering Department, Indian Institute of Technology, Kharagpur, 2013  
Thesis title: **Eye Image-based Algorithms to Estimate Percentage Closure of Eye and Saccadic Ratio for Alertness Detection**
- **M.E.E.:** Electrical Engineering Department, Jadavpur University, Kolkata, 2004, 1<sup>st</sup> Class/78.8%  
Thesis title: **Development of 8051 microcontroller-based PID controller**
- **B.E.E.:** Electrical Engineering Department, Jadavpur University, Kolkata, 2002, 1<sup>st</sup> Class (Hons.)/75.56%

## Work Experience:

- **Assistant Professor**  
*2011- Present; Department of Electrical Engineering, NIT, Rourkela, India*
- **Algorithm Developer, in Project Sponsored by DIT, Ministry of Information Technology, Govt. of India, in the Department of Electrical Engineering, IIT Kharagpur, India**  
*2007-2009; Pl. Prof. A. Routray, in EE dept. IIT Kharagpur.*

### Job Responsibilities:

- [1]. Developing and programming and testing algorithm for image based measurement of drowsiness in human driver.
  - [2]. Designing and developing method of inducing drowsiness drivers.
  - [3]. Developing graphical user interface (GUI) in MATLAB for objective analysis of performance and response against visual and auditory instruction.
  - [4]. Coordinating and arranging progress review steering group meeting.
  - [5]. Report generation for the project work.
- **Teaching Assistant, Department of Electrical Engineering, IIT Kharagpur, India**  
*2006-2009; Instrumentation System Design, Embedded System Design, Measurement Laboratory in EE dept. IIT Kharagpur.*
  - **Technical Consultancy to Electrosoft Consultant, STEP, IIT, Kharagpur**  
*2007-2008; Development of microcontroller based communication device for cerebral palsy patients.*
  - **Teaching Consultancy to SAIL personnel, conducted by Department of Electrical Engineering, IIT, Kharagpur**  
*2008; Image acquisition and processing in MATLAB in a training program*
  - **Teaching Consultancy to NIT, Rourkela**

2010; One day teaching on *8051 Microcontroller Architecture and Programming*.

- **Research & Development Officer, Megatherm Electronics Private Ltd., Saltlake, Kolkata, India**  
*2004 to 2006; R&D, Static Frequency Converter Supervising & Monitoring Section;*

**Job Responsibilities:**

- [1]. Developing program of Microcontroller based Supervising & Monitoring system for Induction furnace. Atmel89s8252 and Pic16f 876 have been used.
- [2]. Testing the program for bug detection and provide solution.
- [3]. Developing program for interfacing microcontroller Based device with computer using Visual Basic language. It includes communication with the device and handling its database.
- [4]. Communicating with consultant from company side.
- [5]. Testing the hardware portion of the embedded system.

## Current Sponsored Projects (Ongoing):

|                         |   |
|-------------------------|---|
| Project Title:          | Reconfigurable Hardware to Detect Drowsy Operator from Eye Image under Spectacles |
| Principal Investigator: | Supratim Gupta  |
| Sponsoring Agency:      | Board of Research in Nuclear Sciences (BRNS), Govt. of India                      |
| Duration:               | Apr. 2016 – Mar. 2019   |

## Courses Offered:

Under Graduate Courses

- EE 209: Network Analysis (Autumn, 2011- Present)
- EE 100: Basic Electrical Engineering (Autumn, 2011-2013)
- EE 356: Digital Signal Processing (Spring, 2012)
- EE 375: Embedded System Laboratory UG (Autumn, 2011- 2013)
- EE 481: Embedded System Laboratory UG (Autumn, 2016)

Post Graduate Courses

- EE 645: Adaptive Signal Processing (Autumn 2014-Present)
- EE 664: Embedded Computing System (Spring, 2012-Present)
- EE 732: System Design using HDL (Spring, 2013-2014)
- EE 674: Embedded System Laboratory PG (Spring, 2012-Present)

## Ph.D. & M. Tech. Thesis Supervision

**Ph.D. (Ongoing)**

| Name                       | Status                       | Title of Thesis  |
|----------------------------|------------------------------|--|
| Mr. Susant Kumar Panigrahi | Joined in 2012-In progress   | Image Denoising in Curvelet Domain   |
| Mr. M.Zefree Lazarus       | Joined in 2013-In progress   | Eye Corner Detection in Presence of Eyelashes & Spectacles                   |
| Ms. Nidhi Panda            | Joined in 2016 – In progress | Parallel Computer Architecture for Ocular Feature Detection under Spectacles |

**M. Tech. (Complete)**

| Name                       | Year of Completion | Title of Thesis  |
|----------------------------|--------------------|--|
| Mr. Susant Kumar Panigrahi | 2012               | Quantitative Evaluation of Image Information Retention by Phases |
| Mr. Vipin Milind Kamble    | 2013               | Analysis of Blind Image Quality Index                            |
| Mr. Sushant S. Sawant      | 2013               | Compressed Image Quality Measurement                             |

|                         |      |  |
|-------------------------|------|--|
| Mr. Ayan Kanti Santra   | 2013 | Denoising Images under Multiplicative Noise  |
| Mr. K. Ram Prabhakar    | 2014 | Phase-Only Image Synthesis using Fast Generalized Fourier Family Transform (FGFT)                        |
| Mr. Sankarasrinivasan S | 2014 | Compressed Measurement of Structural Similarity Index  |
| Mr. Mathew Francis      | 2014 | Face Detection in Curvelet Domain  |
| Mr. Abhishek Maddhesiya | 2014 | Analysis of Anisotropic Blind Image Quality Assessment   |
| Mr. Gajanan S Shirnewar | 2013 | Digital Pulse Width Modulation (DPWM ) Generation Using 8051 for DC DC Buck Converter (As Co-Supervisor) |
| Mr. Sreejith M          | 2014 | Development of an FPGA based Intellectual Property Core  |
| Mr. Sajith Kumar K. K.  | 2014 | Simulation of Human Cardiovascular System  |
| Ms. Dipshikha Narayan   | 2015 | Analysis of Image Compression in Curvelet Domain   |
| Mr. Sanjit Dhali        | 2015 | CORDIC based SSIM Computation in Hardware  |
| Mr. Amit Agrahari       | 2015 | Analysis of Iris Signature   |
| Mr. Suresh Gurjar       | 2015 | Bluetooth Based Data Acquisition System  |
| Ms. Nidhi Panda         | 2016 | Analysis of edge detection technique for hardware realization  |
| Ms. Kiran Patel         | 2016 | Hardware Architecture for Image Denoising using DWT  |
| Ms. Suparna Rooj        | 2016 | Vision based measurement of Arterial Pulse Rate  |
| Ms. Amrita Maity        | 2016 | Matrix Completion for Data Recovery of Faulty PMU  |

## Soft Skills:

- Assembly language programming for 8051 microcontroller
- VHDL programming for signal & image Processing
- Matlab programming for signal and image hardware interface, analysis and processing, computer vision, graphical user interface, deployment of the software as installer package
- C/C++ programming with OpenCv library for Computer Vision applications.
- Visual Basic programming for graphical user interface and database handling.
- Latex for document and presentation slide preparation.

## Awards & Achievements:

- MHRD Govt. of India, Scholarship during Masters in Electrical Engineering and in Ph. D. program.
- Stood fourth in West Bengal Secondary Examination in the district of Murshidabad in 1996.

## Publications:

### Patent:

- *Real-time On Board Driver Drowsiness Monitoring System, published on 16 Nov. 2012, Patent Office, Govt. of India, Appl. No. 660/Kol/2010, Pub. No. 46/2012.*

### Journal:

- **Gupta S.**, Routray A., and Mukherjee A., "A New Method for Edge Extraction in Images using Local Form Factors", in *Int. J. Comput. Application (IJCA)*, vol. 21, no. 2, pp. 15-22, May, 2011.

### Conference:

- Panigrahi S., **Gupta S.**, and Sahu P. K., "Phases Under Gaussian Additive Noise," in *IEEE Proc. Int. Conf. on Communication and Signal Processing (ICCSPP)*, Chennai 2016.

- Panigrahi S., and **Gupta S.**, “Quantitative Evaluation of Image Information Retention by Relative Phase”, in *IEEE Proc. 2<sup>nd</sup> Students’ Conf. on Engineering & System (SCES), 2013*, MNNIT, Allahabad, Apr. 2013. **(Best paper award)**
- **Gupta S.**, and Routray A., “Estimation of Saccadic Ratio from Eye Image Sequences to Detect Human Alertness”, in *IEEE 4th Int. Conf. on Intelligent Human Computer Interaction (IHCI 2012)*, Kharagpur, India, Dec. 2012.
- **Gupta S.**, Dasgupta A., and Routray A., “Analysis of Training Parameters for Classifiers Based on Haar-like Features to Detect Human Faces”, in *Proc. Int. Conf. on Image Information Processing*, Shimla, India, Nov. 2011
- Pradhan T., Routray A., and **Gupta S.**, “Fast and Fixed-Point SVD Algorithm for Face and Eye Tracking”, in *Matrix Information Geometry, Indo-French Seminar*, Feb. 2011.
- **Gupta S.**, Vignesh R., and Routray A., “Form Factor: A New Technique for automated center of pupil detection”, in *1st International Conference on Emerging Trends in Signal Processing and VLSI Design*, Jun. 2010.
- **Gupta S.**, Routray A., and Mukherjee A., “Correlation Filter Based Method for Measurement of Eyelid Movement”, in *2nd Int. Conference on Multimedia and Content Based Information Retrieval*, Bangalore, India, Jul., 2010.
- **Gupta S.**, Kar S., Gupta S., and Routray A., “Fatigue in Human Drivers: A Study Using Ocular, Psychometric, Physiological Signals”, in *IEEE symposium, Techsym*, Kharagpur, India, Apr. 2010.
- Dhar S., Pradhan T., **Gupta S.**, and Routray A., “Implementation of Real Time Visual Attention Monitoring Algorithm of Human Drivers on an Embedded Platform”, in *IEEE symposium, Techsym*, Kharagpur, India, Apr. 2010. **(Best Paper Award)**
- Bagaria A. N., **Gupta S.**, and Routray A., “Detection of Slow Eyelid Closure Using Eigen-eyes”, in *5th Int. Conference on Industrial and Information System*, Jul-Aug. 2010.
- **Gupta S.**, Mukherjee A., Routray A., and Sharma S., “A Comparative Assessment of Background Subtraction Methods for Face Extraction under Variable Illumination”, in *National Conference on Information Science and Security*, Chennai, India, Mar. 2010.
- **Gupta S.**, Kar S., Naik S., Routray A., and Mukherjee A., “Multidimensional Approach for Detection of Human Fatigue”, in *1st Indo-Japan Conference on Science and Technology of Facial Expression Analysis*, CDAC, Kolkata, India, Mar. 2009.

## Professional Association:

- IEEE Member with membership no. 90807388.
- Member IEEE Signal Processing Society