# Arna Ghosh

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## ACADEMIC QUALIFICATIONS

| Year | Degree/Certificate | Institution | CGPA /% |
|---|---|---|---|
| 2013-2017 | Bachelor of Technology [Honors] in Electrical Engineering | Indian Institute of Technology (I.I.T) Kharagpur, India | 9.39/10 (Dept Rank:2) |
| 2012 | Intermediate Education *(Mathematics, Physics and Chemistry)* (Central Board of Secondary Education) | Delhi Public School, Bokaro Steel City | 97.2% |
| 2010 | Secondary Education (Central Board of Secondary Education) | Delhi Public School, Bokaro Steel City | CGPA : 10/10 |

## ACADEMIC ACHIEVEMENTS

- O.P. Jindal Scholarship for the year 2014-2015.
- Jagdish Bose National Science Talent Search(JBNSTS) scholar – 2013 batch
- Cleared IIT-JEE(Mains) 2013,secured an All India Rank of 68,with a 99.9 percentile.
- Cleared IIT-JEE(Advanced) 2013,secured an All India Rank of 829,with a 99.35 percentile.
- Cleared WBJEE(West Bengal JEE) 2013, secured a rank of 11.
- Qualified National Standard Examination in Physics-2012, ranked in top 5 in state
- Qualified National Standard Examination in Astronomy-2012, ranked in top 4 in state
- Kishore Vigyan Protsahan Yojana(KVPY) scholar for the years 2011-2013.
- Qualified Regional Maths Olympiad 2011, ranked 1st in state.
- Achieved 1st rank in National Science Olympiad(NSO) ,2011-12 .
- Achieved 3rd rank in National Science Talent Search Exam(NSTSE) ,2011-12.

## RESEARCH EXPERIENCE

***Research Assistant (Summer Intern)***

"Slide-Scanning Microscopy on a Smart Phone by High-Frame-Rate Video Capture"

***University of British Columbia, Kelowna, British Columbia, Canada*** **May '15 – July '15**

Supervisor: Dr. Kenneth Chau, Associate Professor(M)

- Developed the image processing module to extract microscopic images from video, sharpen and remove dirt.
- Developed a preliminary IOS app to take image at high frame rate using OpenCV, an open-source image processing library and modified it in the process.
- Assisted in building the SolidWorks model of the device and built the prototype to test functionality.
- Co-authored a research paper submitted presently for review.

***Currently undergoing Projects***

***1. Perception Team Member***

*"Autonomous Ground Vehicle Research Group"*

***Department of Mining Engineering, IIT Kharagpur, India*** ***Mar '14 – Present***

Supervisor: Prof. Debashish Chakravarty, Associate Professor, Department of Mining Engineering, IIT Kharagpur

- Developed the image processing module to detect obstacles based on color, lane detection and construct a world map by fusing data from camera and LIDAR.
- Was part of the presentation team that qualified for the prototype round of Mahindra Rise Prize-Driverless Car Challenge .
- The team qualified 2 out of 3 rounds of Auto-navigation challenge at Intelligent Ground Vehicle Challenge 2015 held at Oakland University in Rochester, Michigan. The team stood 20th out of 42 teams at the design challenge presentation at the same competition.

***2. Image Processing Team Member***

*"Indic View"*

***Department of Computer Science and Engineering, IIT Kharagpur, India*** ***Oct '14 – Present***

Supervisor: Prof. Pawan Goyal, Assistant Professor, Department of Computer Science and Engineering, IIT Kharagpur

- The project is funded by **Google** under the **Google-IIT Pilot program** and will soon be evaluated for further proceedings.
- Developed the algorithm to detect words from scanned image of a document written in an Indian language.
- Implemented the binarisation algorithm to threshold the scanned images and thus segregate into text and background.

## Publications

Lab on a Chip, published by Royal Society of Chemistry

Co-authored a paper on "**Slide-Scanning Microscopy on a Smart Phone by High-Frame-Rate Video Capture**", presently being reviewed for modifications and awaiting publication.

## Relevant Courses/Labs

| Completed | Courses that will be completed this year |
|---|---|
| Electrical Machines* | Digital Electronics* |
| Algorithms – I * | Image Processing |
| Measurement and Electronic Instruments* | Power Electronics* |
| Analog Electronics* | Control Systems Engineering* |
| German | Product Development |
| Introduction to Manufacturing Processes Lab | Computational Neuroscience |
| Environmental Science | |
| Science of Living System | |
| Introduction to Wireless Technology | |
| Signals and Networks * | |
| Physics -2 | |
| Chemistry* | |

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| | |
|---|---|
| Mechanics | |
| Introduction to Electronics* | |
| Physics-1* | |
| Programming and data structures* | |
| Electrical Technology* | |
| Engineering drawing and graphics* | |
| Mathematics-1,2 | |

*** indicates both Theory and Lab Courses**

## Lab Experiences

**DEVELOPMENT OF SLIDE-SCANNING MICROSCOPY ON A SMART PHONE**

1.Used Newport controllers to control the motion stages and move the slide. 2. Worked on Arduino and Beaglebone to implement controls strategies and simulation on MATLAB and LabView to interface the controllers to the computer. 3. Used image processing techniques in OpenCV.

**MEASUREMENT AND ELECTRONIC INSTRUMENTS LAB**

D.C. Potentiometer, Kelvin's double bridge, d'Arsonval Galvanometer, Measurement of L, C and frequency using A.C. bridges, Testing of Energymeter.Electronic voltmeter, A/D and D/A converters, F/V and V/F converters, Linear Capacitance meter, Instrumentation amplifier, strain gage bridge and amplifier, Data acquisition system.

**ELECTRICAL MACHINES LAB**

1. No load, Short circuit and Load test on a single phase transformer.2. Study of various three phase transformer connections and measurement of third harmonic voltage.3. Hopkinsons test on d.c. shunt machines.4. O.C.C and load characteristic of a d.c shunt generator.5. No load, blocked rotor and load test on a three phase induction motor.6. No load, blocked rotor and load test on a single phase induction motor.7. Open circuit, short circuit and ZPF tests of alternator and estimation of regulation by various methods.8. Synchronisation and V-curves of a synchronous motor.At the end it is recommended, that each student has to appear in LAB TEST individually.Further to the above, If time permits, suitable number of experiments may be chosen from the following list.10. Fields test on d.c series motors.11. Sumpners test on transformers.12. Speed control of 3-phase induction motor using variable voltage, variable frequency sinusoidal source.13. Study of starters for d.c and a.c motors.Operation of induction machine as an isolated generator- estimation of suitable capacitance for self excitation.

**ANALOG ELECTRONICS LAB**

1. D.C. characterization and finding parameters of transistors (BJT and MOST)2. Design of simple amplifiers (common emitter and common source)3. Characterization of Simple and Cascode Current Mirror circuits (BJT and MOST)4. Design of Common collector amplifier5. Design of differential amplifier with resistive load (BJT) and active load (MOST)6. Design of R-C and L-C oscillators (phase shift/Colpitt/Hartley)7. Design of a second order active filter (low pass/high pass)8. Design of tuned amplifier

**SIGNALS AND NETWORKS LAB**

1. Experimental verification of Maximum Power Transfer Theorem and Reciprocity Theorem 2. Transient response and frequency response of series R-L-C circuit. (i) Determination of âZâ,âYâ, and âABCDâ parameters of linear two port network (ii) Determination the driving point impedance of one port network by frequency response method 3. Study of active low pass and high pass filters : measurement of frequency response â attenuation and phase characteristics of Butterworth and Sallen Key filters 4. Characteristics of a closed loop amplifier : closed loop gain of the amplifier with feedback 5. Study of non-linear circuit : rectifier diode and zener diode circuits in series parallel combination Determination of Fourier series coefficients of a periodic signal

**INTRODUCTION TO ELECTRONICS LAB**

1.Familiarization with electronic components and usage of multimeter 2 Familiarization with oscilloscope, signal generator and further usage of multimeters 3.Frequency-response and square-wave testing of R-C, C-R and R-L networks 4.Voltage Rectifiers 5.Studies on Common-Emitter amplifiers 6.Studies on analog circuits using OP-AMP 7.Studies on logic gates

**PROGRAMMING AND DATA STRUCTURES LAB**

1. Familiarization of a computer and the environment and execution of sample programs 2. Expression evaluation 3. Conditionals and branching 4. Iteration 5. Functions 6. Recursion 7. Arrays 8. Structures 9. Linked lists 10. Data structures

**INTRODUCTION TO MANUFACTURING PROCESSES LAB**

Machining: 1.Introducing to various machine tools and demonstration on machining 2.Making a steel pin as per drawing by machining in centre lathe 3.External screw thread by single point chasing in lathe 4.Making a cast iron Vee block by shaping 5.Making a regular polygon prism (MS) by milling 6.Making a gauge as per drawing 7.Study of machining in machining in machining centre (CNC) and Electro discharge machining (EDM) Foundry Practice: 8.Orientation, demonstration and practice on metal casting 9.Practicing sand moulding using split and uneven parting line pattern 10.Practice on CO2 moulding and machine moulding 11.Mechanised sand preparation and melting practice

Welding Practice: 1.Practice on Oxy-acetylene gas welding and manual metal arc welding (running bead) 2.Practice on oxy-acetylene gas cutting and arc welding for butt welding 3.Introduction and demonstration on submerged arc welding and plasma spray coating

Metal Forming:Demonstration of deep drawing process.

## SOFTWARE AND CODING SKILLS

- **Programming Languages**: C,C++,Java,Python
- **SDK**: OpenCV(C and C++),ROS,numpy(Python)
- **Web Developement**: HTML,XML,CSS(Basics),MySQL(database)
- **Operating Systems**: Microsoft Windows, Linux(Ubuntu)
- **Software Tool:** MATLAB, Octave, Arduino, Atmel Studio, Microsoft Office, LTSpice IV
- **IDE**: Netbeans,Visual Studio(2010 and 2012),Eclipse
- **Design and Editing**: Google Sketchup 8, Audacity(Sound editing)

## POSITION OF RESPONSIBILITY

| Organization / Tenure | Key Achievements |
|---|---|
| Vice-Captain,Bengali Elocution and Dramatics, RadhaKrishnan Hall of Residence, IIT Kharagpur 2015-16 | Expected to manage a team of 50 members simultaneously managing a budget of 10,000 INR.<br>Conducted intensive dramatics and public speaking workshops for sophomores. |
| Director, Public Relations, IIT-Kharagpur Model United Nations Spring Fest , 2013-14. | • Successful in increasing footfall by 60% from previous edition.<br>• In the course, succesfully managed accomodation and needs of 100 participants. |

## EXTRA ACADEMIC ACTIVITIES / ACHIEVEMENTS

| | |
|---|---|
| **Technology** | • Won **Best Freshers' award** in **Geoaware**(Image processing event) in Kshitij-2014<br>• Secured **1st position** at Tata Consultancy Services IOT-based Hackathon at Kshitij-2015 |
| **Sports** | • Representing hall in Inter-Hall Hockey team 2016<br>• Representing hall in Open-IIT Table Tennis team 2015 |
| **Social and Cultural** | • Won **2nd prize** in Open-IIT **Bengali Elocution** 2014.<br>• Part of **Gold winning** Inter-hall **Hindi** and **English** dramatics team- General Championships, 2014-2015<br>• Awarded the **Best All-rounder Fresher award** at Radhakrishnan Hall of Residence, IIT-Kharagpur for the academic year 2014-2015. |

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