# Mohee Datta Gupta

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## Education

**Class 12** 2018
South Point High School Kolkata, India
- Percentage: 93.8%

**BTech. + MS in Electronics and Communications Engineering** 2023
International Institute of Information Technology, Hyderabad Hyderabad, India
- CGPA: 8.28

## Publications

1. **Gupta, Mohee Datta**, Rishabh B. Mishra, Ivin Kuriakose, and Aftab M. Hussain. "Determination of thermal and mechanical properties of SU-8 using electrothermal actuators." MRS Advances (2022): 1-5.
2. **Gupta, Mohee Datta**, Lakshmanan L., Anis Fatema, and Aftab M. Hussain. "Flexible Writing Pad based on a Piezoresistive Thin Film Sensor Matrix" IEEE APSCON (2023). *(in review)*
3. Surya Teja Manupati, Sridhar M., **Gupta, Mohee Datta**, and Deepak Gangadharan. "Reducing Data Freshness under Deferred Preemption Scheduling" ASP-DAC (2023). *(in review)*

## Research Interests

Flexible Electronics | IoT | Embedded Software | Machine Learning | Image Processing

## Research and Work Experience

***Centre for VLSI and Embedded Systems Technology*** | **Student Researcher** May '20 - Present
Advisor: Dr. Aftab M. Hussain IIIT Hyderabad
- Currently working on fabrication and characterisation of flexible writing pressure sensor based writing pad. We are able to achieve good SNR even under a bending stress.
- Worked on SU-8 based electrothermal actuators. Did FEA simulations to compare with experimental results previously obtained. Was able to study and characterize SU-8 as a hyperelastic material.

***Computer Systems Group*** | **Research Assistant** Jan '22 - July '22
Advisor: Dr. Deepak Gangadharan IIIT Hyderabad
- We proposed an algorithm that uses theory from deferred preemption scheduling to control the response time of a task by changing the length of final non-preemptive region of each task, which in turn affects end-to-end data freshness. We demonstrated how reduced end-to-end data freshness was obtained for task chains of different lengths in a uni-processor running a rate-monotonic scheduler.

***Texas Instruments*** | **Embedded Software Development Engineering Intern** May '22 - Aug '22
Manager: Prem Kumar Vadapalli | Senior Software Development Engineering Manager Bangalore
- Worked with the USB-PD Type C firmware team. Developed an application on top of their existing architecture to send a cryptographically signed(SHA-256) 176kB FW patch to 4 PD Controllers from an EC host using I2C.
- Implemented a state machine from scratch to handle all possible cases and client requests.

***Silicon Labs*** | **Application Engineering Intern** May '21 - Aug '21
Manager: Ventakesh Narsimhan | Senior Director, Engineering Remote
- Worked with the Wireless Team. 1st Person in SiLabs India team to work with CP2130 board and develop an application to bypass the need of an host MCU to communicate with their RS9116 module. Used SPI for host to target communication.

***Jadavpur University*** | **Research Intern** May '19 - Aug '19
Advisor: Dr. Sheli Sinha Chaudhuri | HOD Electronics and Telecommunication Engineering Kolkata
- Explored various **digital image processing** tools and techniques using **MATLAB** and built a naive face detection software.

## SKILLS

**Programming**: C/C++, Python, Verilog

**Software Tools**: COMSOL Multiphysics, Xilinx Vivado, Cadence, Multisim, NGSPICE, Autodesk FUSION 360

**Fabrication Skills**: Spin-coating, Laser cutting, 3D printing, PCB fabrication

**Misc.**: Machine Learning, Image Processing, OpenCL, MySQL, Apache Cassandra, Git, Arduino development, Assembly Language x86-64, Linux

## ACHIEVEMENTS

- Received **IIIT-H Dean's Merit List Award** for being in top 20% of class for Monsoon'20, and Spring'21 semesters.
- Winner of **Hackathon**(Megathon 21) sponsored by Qualcomm (prize money: Rs 75k). We designed a solution that detects unique individuals and identifies whether he/she is wearing a mask, and for how long.
- Listed in **top 0.5% in India JEE Main 2018** and **top 2% in JEE Advanced 2018 (IIT-JEE)**

## TEACHING ASSISTANCE

**Flexible Electronics** Spring '22
Faculty : Dr. Aftab M.Hussain IIIT Hyderabad

- TA for 20 Masters and Undergraduate Research Students. Responsible for guiding through course projects and experiments, helping with evaluating students, etc.

**Digital Systems and Microcontrollers** Fall '22, Spring '21
Faculty : Dr. Aftab M.Hussain and Dr. Harikumar Kandath IIIT Hyderabad

- TA for over 250+ first year undergraduate students; responsible for conducting lab sessions, tutorial classes, preparing coursework,etc .

**Design For Testability** Fall '21
Faculty : Ganesh Bhutekar IIIT Hyderabad

- TA for 50+ Masters and Undergraduate Research Students. Responsible for taking classes, preparing coursework, preparing question papers, and grading of students.

## COURSE PROJECTS

**Time Frame Expansion using Extended D-Algorithm** Spring '20
Guide: Ganesh Bhutekar IIIT Hyderabad

- Converts sequential **circuits to weighted graphs** and using **extended D-Algorithm** checks for **stuck-at-faults** at all the testable fault sites. Returns a test vector after checking upto 4 time-frames.

**Differential input single ended output OTA** Fall '21
Guide: Dr. Abhishek Shrivastava and Dr. Zia Abbas IIIT Hyderabad

- Simulated a differential input single-ended output operational trans-conductance amplifier with the lowest possible power consumption for the given design specifications using **NGSPICE** using TSMC 180 nm technology.

**2-staged Pipelined Processor based on MIPS ISA** Spring '20
Guide: Dr. Suresh Purini IIIT Hyderabad

- Realized a 2-staged pipelined MIPS processor in **Verilog**, consisting of Fetch, Decode and Execute blocks with one branch delay slot. It could handle 27 types of instructions (I-type, J-type, R-type) like ADD, SUB, MULT, ADDI, SUBI, LW, SW, SLL, SLTU, BEQ, JUMP, and others.

**Audio Amplifier using MOSFETs** Spring '20
Guide: Dr. Zia Abbas and Dr. Madhava Krishna IIIT Hyderabad

- Implemented a fully functional audio amplifier using MOSFETs on a breadboard. It consisted of a pre-amplifier stage, gain stages that account for a gain of 500, power amplifier stage, and buffers wherever required and could drive a 5W speaker (10 ohms resistor).
- The design was first simulated in **Multisim** and later implemented using hardware components.

**FPGA Accelerated K-NN with Bubble Sort** Monsoon '21
Guide: Dr. Suresh Purini IIIT Hyderabad

- Accelerated host code for K-NN by using AWS EC2 F1 instance FPGA. Wrote OpenCL code to achieve high parallelisation.
- Used pragmas, roofline analysis, and other techniques to get **130x** acceleration over CPU performance.

**Sentiment Analysis on Movie Reviews** Spring '21
Guide: Dr. Vineet Gandhi IIIT Hyderabad

- Using IMDb dataset to classify a given review as positive or negative. For feature extraction used TF-IDF, GloVE, Word2Vec, Bag of Words, etc. For classification we used Logistic Regression, SVM, Decision Tree, CNN and LSTM. **Highest Accuracy: 93.67%**.

**Time Varying Prediction** Monsoon '20
Guide: Dr. Ravi Kiran IIIT Hyderabad

- Used **Python** libraries like **OpenCV** to make a series of textures emulating weathering and de-weathering processes of a textured input image to **predict what the given texture might have looked like in the past and may look like in the future.**

**Dream 11** Spring '21
Guide: Dr. Lini Thompson IIIT Hyderabad

- Built a scoreboard similar to the Dream11 app. Using distributed database **Apache Cassandra** for data storage. The user-requests distributed between multiple nodes are created using **Java RMI**. Can handle upto 10 million concurrent updates.

**Wikipedia Search Engine** Fall '21
Guide: Dr. Vasudev Verma IIIT Hyderabad

- A **distributed search engine** for a large corpus (45GB) of Wikipedia pages, performing case folding, tokenization and stemming to generate an index for the corpus for fast multi-word information retrieval.

## COURSES

**Electronics and Communication**: Digital Systems and Microcontrollers, Signals and Systems, Digital VLSI Design, Analog Electronic Circuits, Network Analysis, Digital Signal Processing, Communication and controls in IoT, Flexible Electronics, Analog IC Design, Principles of Semiconductor Devices, Communication Theory, Intro to Processor Architecture, Electronics Workshop, FPGA based Accelerator Design

**Computer Science**: C Programming, Data Structures and Algorithms, Digital Image Processing,Statistical Methods in AI, Distributed Systems, OS and Algorithms, Intro to NLP, Computer Vision

**Mathematics**: Finite Element Method, Probability and Random Processes, Linear Algebra, Differential Equations