Dimple Kochar | **16D070010**
Electrical Engineering | **Dual Degree (B.Tech. + M.Tech.)**
Indian Institute of Technology, Bombay | **Gender: Female**
Specialization: Microelectronics and VLSI | **DOB: 01-02-1999**

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2021	
Intermediate	HSC	Pace Junior Science College	2016	94.30%
Matriculation	SSC	Saraswati Vidyalaya High School	2014	96.00%

SCHOLASTIC ACHIEVEMENTS

- Completed a **Minor** Degree in **Computer Science and Engineering** *[2017-19]*
- Conferred the Desai-Sethi Scholarship, awarded to the **top 5** girls admitted to IIT Bombay *[2017-19]*
- Stood **first** in Maharashtra among girls in **JEE Mains** (AIR **102**) and **JEE Advanced** (AIR **295**) *[2016]*

RESEARCH EXPERIENCE

- **Dipole-Exchange Spin Waves in Ferromagnetic Films** - *Spintronics* *[May '19 - Jul '19]*
  Advisor: Prof. Gerrit Bauer, Kavli Institute of Nanoscience, Applied Physics *TU Delft, Netherlands*
  - ◇ Calculated the **wave function**, the **magnetization** and **dipolar field** profiles for various modes of spin waves by using appropriate boundary conditions and checked them for the property of **chirality**
  - ◇ Solved **Landau–Lifshitz** and **Maxwells'** equations to obtain the **dispersion** relation for a given film
  - ◇ Obtained **isofrequency** curves and analytically solved for magnetization of Damon-Eshbach mode
- **Failure Time Estimation of SRAM due to RTN** - *Circuits & CAD* *[Jan '19 - Present]*
  Advisor: Prof. Animesh Kumar, Electrical Engineering Department *IIT Bombay*
  - ◇ Acquired **time to failure** distribution of a stored bit in an **SRAM** cell due to **single trap** Random Telegraph Noise (RTN) model by composition of **Monte-Carlo** simulations & circuit-level abstraction
  - ◇ Showcased results of this procedure on **45 nm** technology at various supply voltages using Cadence
  - ◇ Demonstrated that the time to failure distribution worsens due to **process variations**
- **Modelling of MOS Device Reliability** - *Device Physics* *[May '18 - Present]*
  Advisor: Prof. Souvik Mahapatra, Electrical Engineering Department *IIT Bombay*
  - ◇ Designed a cell based **oxide percolation** model which creates bulk & interface traps with different rates
  - ◇ Procured time to failure distribution & analysed the relation of its Weibull slope with oxide thickness
  - ◇ Utilized **WKB** tunneling to model **SILC** measurements of differently processed **dual oxide** wafers
  - ◇ Extracted **bulk trap** densities in wafers & used a **Reaction-Diffusion** (RD) framework to model them
  - ◇ Modelling the traps generated from **PBTI** stress using the double interface H/H_2 RD model

KEY COURSE PROJECTS

- **4×4 Butler Matrix Circuit** - *Microwave Integrated Circuits* *[Sep '19 - Nov '19]*
  Guide: Prof. Jayanta Mukherjee, Electrical Engineering Department
  - ◇ Constructed the circuit with **90°** **hybrids** and **phase delay** lines for operation at frequency **5.4 GHz**
  - ◇ Fabricated on FR4 substrate using microstrip transmission lines to obtain **equal power division**
- **Layout and Back-extracted 16 bit Brent Kung Adder** - *VLSI Design* *[Sep '19 - Nov '19]*
  Guide: Prof. Dinesh Sharma, Electrical Engineering Department
  - ◇ Designed the schematic & layout passing **DRC** & **LVS**, and did **PEX** of each module of adder
  - ◇ Combined the modules & conducted **post layout** simulation tests to get accurate adder functionality
- **Power Amplifier Design** - *Solid State Microwave Devices* *[Jan '19 - Apr '19]*
  Guide: Prof. Jayanta Mukherjee, Electrical Engineering Department
  - ◇ Fabricated a power amplifier of gain **2.5 dB** at **520 MHz** with S_{11} & S_{12} values of -18 dB & -35 dB
  - ◇ Designed **matching networks** for the amplifier IC AFIC901N with microstrip transmission lines
- **Stop Noise Pollution from Honking** - *Electronic Design* *[Jan '19 - Apr '19]*
  Guide: Prof. Pramod Murali, Electrical Engineering Department
  - ◇ Built a device to **count** a specific vehicle's honks amid noise by an amplitude-frequency threshold circuit
  - ◇ Transmitted this data to a server **wirelessly** and provided for detection if the device is tampered with

- **Pipelined RISC Microprocessor** - *Microprocessors* *[Jul '18 - Nov '18]*
  Guide: Prof. Virendra Singh, Electrical Engineering Department
  - ◇ Devised IITB-RISC, an **8**-register, **16-bit** system with standard **6 stage pipelines** capable of executing **15** instructions and equipped it with control flow, data forwarding & **hazard mitigation**
  - ◇ Programmed the design in **VHDL**, synthesized in Altera Quartus and tested it on **DE0-Nano FPGA**
- **Music Genre Identification** - *Machine Learning* *[Feb '18 - May '18]*
  Guide: Prof. Preethi Jyothi, Computer Science and Engineering Department
  - ◇ Implemented various Machine Learning algorithms like **Neural Networks**, **Principal Component Analysis** and **Random Forests**, and used **Bayesian Optimization** for hyperparameter tuning
  - ◇ Achieved an accuracy of **56%** and an F1 score of **50.65%** using the Random Forest algorithm
- **Other Projects:**
  - ◇ Created a **heart monitor** to predict the risk of myocardial infarction using digital signal processing on ECG & stood among the **top 5** teams in the **Make in India** presentation organised for TEQIP-III
  - ◇ Designed a **16-bit** multicycle **processor** with **15** instructions in VHDL, optimized the architecture for performance using **point-to-point communication** infrastructure & tested it on DE0-Nano FPGA
  - ◇ Implemented a **touchless gesture** detecting audio controller, motion tracker (using an LED matrix) & pattern lock using infrared emitters & sensors, & won the award for **best project** from among **70** teams

TECHNICAL SKILLS

- **Software:** Cadence, Advanced Design System, TCAD Sentaurus, Bluespec, SPICE, Altera Quartus, Code Composer Studio, Modelsim, GNURadio, AutoCAD, SolidWorks, MATLAB, Scilab, Octave, Origin
- **Programming Languages:** C, C++, Python, Julia, VHDL, HTML, Assembly, Aa

TEACHING ASSISTANT

- Probability and Random Processes - *Department of Electrical Engineering* *[Aug '20 - Present]*
- Differential Equations - *Department of Mathematics* *[Mar '18 - Apr '18]*
- Quantum Physics and Applications - *Department of Physics* *[Jul '17 - Nov '17]*

POSITIONS OF RESPONSIBILITY

- **Academic Mentor** - *Electrical Engineering, IIT Bombay* *[Apr '19 - Present]*
  Department Academic Mentorship Programme
  - ◇ Selected through extensive **peer reviews** & interviews, to help academically weak & ARP students improve, & identify **problems** of the student populace & bring to the notice of the **concerned authorities**
  - ◇ Responsible for mentoring **11** students and playing a key role in their overall development
- **Editor** - *Insight, IIT Bombay* *[Apr '18 - Mar '19]*
  Official Student Print Media Body of IIT Bombay
  - ◇ Recipient of the **Institute Journalism Special Mention Award** for outstanding contribution to the field
  - ◇ Part of the **22** member team responsible for managing Insight's online presence & newsletter, circulated to **10,000+** students and **650+** faculty members with an online readership of over **0.4 million**
  - ◇ Led the **Univ Series** by collecting testimonials from IITB alumni doing their graduate degree abroad
  - ◇ Interviewed **professors** for the **Know Your Professor** series to enhance student-faculty interaction
- **Convenor** - *IIT Bombay Broadcasting Channel* *[Apr '17 - Mar '18]*
  Official Student Multimedia Journalistic Body of IIT Bombay
  - ◇ Covered interviews, social drives, protests, interactive sessions and major events across the institute
  - ◇ Part of the scripting, shooting and editing teams of **Honest Intern**, a video which went **viral** over social media and garnered a Facebook reach of over **0.25 million** and **86,000+** views on YouTube

EXTRACURRICULAR ACTIVITIES

- ◇ Awarded **Hostel Cultural Colour** in '18 for exceptional contribution to **film-making** in the institute
- ◇ Aided in setting up **self-defence** workshops for **women** as a part of social initiative of Techfest '17
- ◇ Assisted in **Sanitary Health and Education (SHE)** campaign in '17 to promote women's sanitary health through a network of distribution of **2,00,000+** sanitary pads through a route covering **37** remote villages
- ◇ Conceptualized and conducted the **Mood Indigo Treasure Hunt** '17 which attracted **1000+** participants
- ◇ Member of the **fine arts** team of 'Ranbhoomi', the **winner** at Performing Arts Festival, 2017
- ◇ Part of the **13** member Institute Women's **Volleyball** Team for the **Inter-IIT** camp, 2016