



**Harsh Saiprasad Deshpande**  
**Electrical Engineering**  
**Indian Institute of Technology Bombay**  
**Specialization: Microelectronics**

**16D070011**  
**UG Third Year (Dual Degree)**  
**Male**  
**DOB: 05/09/1998**

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2019	0.00
Intermediate/+2	HSC	Thakur Vidya Mandir High School and Junior College	2016	94.00
Matriculation	ICSE	Thakur International School	2014	96.83

## SCHOLASTIC ACHIEVEMENTS

- Ranked **3rd** in Electrical Engineering Dual Degree Department amongst a total of 69 students (2018)
- Pursuing a **Minor in Computer Science** with a minor CPI of 10.00 (2018)
- Awarded **AP** grade for excellent performance in **Electronic Devices Lab** (rank 1 out of 139 students) (2017)
- Secured **All India Rank 474** in **IIT JEE-Advanced Examination** among 150,000 candidates (2016)
- Bagged **All India Rank 458** in **JEE Mains** among 1.3 million candidates (2016)
- Bestowed with the prestigious **KVPY Fellowship** by DST, Govt. of India with **All India Rank 106** (2016)
- Awarded **Certificate of Merit** for being placed in the **Top 1 percent** students amongst 44,032 candidates at national level in NSEP conducted by IAPT (2016)
- Recipient of **National Talent Search Examination(NTSE)** Fellowship by NCERT, Govt of India (2014)
- Awarded **Silver Medal** in **Dr. Homi Bhabha Bal Vaidnyanik Science Talent Search Competition** and **MOM Junior Science Olympiad** organized by Maharashtra Olympiad Movement (2014)
- Bagged **11th rank** in Mathematics Olympiad conducted by IIT Bombay (2013)

## INTERNSHIPS

### Parametric Time Dependent Entropy of EEG

(May 2018 - July 2018)

Prof. Anastasios Bezerianos | Cognitive Engineering, SINAPSE

National University of Singapore

- Developed and implemented algorithms in Python to calculate and analyze four distinct **Parametric Time-Dependent Entropies (TDE)** of an EEG (Electroencephalogram) signal
- Designed an algorithm using Time-Dependent Entropy to perform **real-time mental fatigue monitoring**
- Applied Support Vector Machine(SVM) to classify **Cognitive Fatigue** and **Mental Workload** achieving **75%** and **82%** classification accuracy respectively
- Developed a **Graphical User Interface** in Qt framework for projection of the aforementioned results

## PROJECTS

### Mars Rover Project

(October 2017 - Present)

(Part of a team which represented India at the international finals of University Rover Challenge(Utah, USA) in 2018 and bagged 31st position out of 95 participating teams worldwide)

- Responsible for integration of a Battery Management System with **Active Cell Balancing**
- Conceptualised onboard sensor fusing of GPS and IMU via **Kalman Filter** for robust localization of the rover
- Obtained hands-on experience on implementation of **IK code for robotic arm control**, a **BMS enabled battery** and codes to operate DC motors via **H-bridge motor driver**

### Semiconductor Device Parameter Extraction

(November 2017- March 2018)

Prof. M. B. Patil | Electrical Engineering Department

IIT Bombay

- Conducted a literary survey of variation in values of parameters of the **SPICE model of a bipolar junction transistor BC547** affect its device characteristics and how they can be tweaked to obtain desirable features
- Developed an iterative method based on **Particle Swarm Optimization** to **determine parameters of the transistor** from device characteristics accurately and in a **short convergence time**

### Touchless Gesture Recognition

(March 2018 - May 2018)

Prof. Siddharth Tallur | Course Project

IIT Bombay

- Bestowed with **Best Project Award** among 70+ projects
- Designed and implemented a Touch-less gesture Audio **volume controller**, **Motion tracker** (using an LED matrix) and a Gesture **pattern lock** using **Infrared Emitters and Sensors**
- Used **Altera Quartus** to code in **VHDL** and **Krypton CPLD** board to implement digital logic.

## Autonomous Bipedal Robot with Object Tracking

Institute Technical Summer Project

(May 2017 - June 2017)

Students Technical Activities Body, IIT Bombay

- Designed a **Bipedal robot** to mimic the **human walk** and capable of recognizing & following objects
- Implemented Control Protocol using **RaspberryPi 3** and designed an algorithm to recognise spherical objects
- Incorporated servo motors to provide the bot with **two degrees of freedom** to mimic the human walk
- Used RaspberryPi camera along with **OpenCV 3.2** library to process video input and track the object

## Fastest Finger First Indicator (FFFI)

Prof. M.B.Patil | Course Project

(March 2017 - April 2017)

IIT Bombay

- Designed a **Quiz Buzzer** through an electronic circuit that determines as to which of the four contestants pressed the button first, locking the entries of the other three members
- Framed the logic to use the input from IC 7475 to produce **latch-disabling signal** using circuitry comprising of dual 4-input NAND gates of IC 7420
- Used **coupling logic** to display corresponding number on the 7-segment display (using IC 7447 )

## Reaction Game

Prof Madhav P Desai | Course Project

(March 2018 - April 2018)

IIT Bombay

- Designed a game (on the Krypton FPGA board) which displayed the accumulated reaction time of a person to a **randomly blinking LED**, which blinked a fixed number of times.
- Generated RTL and Gate Level simulations using Altera Quartus software and implemented the design in the **Krypton CLPD card** programmed using JTAG to perform the digital logic
- Used various concepts of registers, flip-flops, finite-state machines, etc in **structural VHDL** coding and also generated a **pseudo-random number** for the LED to blink after a random time
- Interfaced the design with the LCD controller to display the final time on the LCD pane

## Cryptography and RSA Encryption-Decryption

Guide: Prof. Bernard L. Menezes | Course Project

October 2017 - November 2017

IIT Bombay

- Developed a **BigInteger** class to perform arithmetic and modular exponentiation operations on large numbers
- Designed an algorithm to compute the **modular inverse** and solve the **discrete logarithm** problem
- Implemented an algorithm to generate public-private key pair in **RSA encryption-decryption**

## TECHNICAL SKILLS

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<b>Programming</b>	C++, C, Python, Java, Arduino
<b>Web Development</b>	HTML, CSS, JavaScript, PHP
<b>Software packages</b>	MATLAB, Gnuplot, Git, AutoCAD, SolidWorks, Ngspice, L <sup>A</sup> T <sub>E</sub> X

## POSITIONS OF RESPONSIBILITY

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### Hostel Web and Computer Secretary

Hostel 5

(August 2017 - May 2018)

IIT Bombay

- Administered and updated the Hostel Website with respect to hostel events, activities, festivals and mess
- Responsible for maintaining and updating hostel computer systems and networks
- Administered the hostel LAN and address network related issues faced by hostel inmates

## COURSES UNDERTAKEN

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<b>Core Courses</b>	Microprocessors*, EM waves*, Communication Systems*, Control Systems**, Digital Signal Processing **, Microelectronics, Electronic Devices and Circuits, Signals and Systems, Analog Circuits, Digital Systems, Electrical Machines and Power Electronics
<b>CS and Maths</b>	Introduction to Machine Learning *, Data Structures and Algorithms, Computer Networks, Calculus, Complex Analysis, Probability and Random Processes *
<b>Others</b>	Quantum Physics and Application, Moral and Political Philosophy , Psychology

\*to be completed by November 2018

\*\*to be completed by April 2019

## EXTRACURRICULARS

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- Volunteered for the Green Campus initiative of National Service Scheme(NSS),IIT Bombay (2016)
- Bagged 2nd place at Vigyasa, an Inter-College general knowledge quiz (2015)
- Cleared Elementary Drawing Examination organised by the Government of Maharashtra (2010)
- Maharashtra State Champion in Abacus Mental Arithmetic Exam organised by UCMAS (2008)