Puranjay Datta
Electrical Engineering
Indian Institute of Technology Bombay

19D070048
Dual Degree (B.Tech. + M.Tech.)
Gender: Male
DOB: 12/14/2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	HSC	Ratanbai Walbai Junior College of Science	2019	93.08%
Matriculation	ICSE	Smt. Sulochanadevi Singhania School	2017	97.00%

Pursuing **Minor degree** in the Department of **Computer Science and Engineering** **[Present]**

SCHOLASTIC ACHIEVEMENTS

- Secured **Department Rank 7** in the batch of 80 students(Electrical Engineering Dual Degree). **(2021)**
- Secured **All India Rank 460** in **IIT JEE-Advanced** out of 245,000 candidates. **(2019)**
- Achieved **All India Rank 300** in **JEE Mains** out of 1.14 million candidates. **(2019)**
- Secured **All India Rank 132** in Kishor Vaigyanic Protsahan Yojana (KVPY) and awarded fellowship **(2018)**
- Awarded Certificate of Merit for being among the **Statewise top 1%** in the **NSEC**. **(2019)**
- Received **Lala Kailashpat Singhania Merit Scholarship** for General proficiency and highest GPA in 9^{th} std. **(2017)**
- Awarded Bronze Medal for being among the **Statewise top 0.75%** in **Dr.Homibhabha Balvaidnyanik Spardha**. **(2016)**

RESEARCH PROJECT

Summer Undergraduate Research Programme(SURP) [June-July 2021]

Radar Signal Processing *Guide : Prof Vikram M Gadre,Shrikant Sharma*

- Studied Research Paper pertaining to estimation of **micro and body-doppler frequency** in Radar signals.
- Read about micro-doppler effect induced by micro-motion dynamics of rotating objects.
- Used **delay,doppler focussing** approach for estimation of body doppler of **FRI Signals.**
- Implemented **annihilation filter on matlab** to segregate body doppler frequency using delay focussing.
- Researched about how **bessel function(of first kind)** decomposition of signals involving micro-doppler would help in estimation of **side band frequency** ,hence the micro-doppler frequency.
- Tried and tested various methods of solving non linear equations like **non-linear least square heuristic approach,root music,doppler focussing and annihilation filter .**

ACADEMIC PROJECTS

Bank Queue Simulator on 8051 microprocessor [April-May 2021]

Course Project | EE-337 Microprocessors Laboratory *Guide :Prof Saravanan Vijayakumaran,Rajbabu Velmurugan*

- Simulated the behavior of a queue in a bank with 4 counters labeled A, B, C, D and the actions of the bank customers and tellers using key presses on a keyboard connected to **Pt-51 using UART in embedded C.**
- Used the switches on Pt51 to detect a toggle and lcd 16x2 to display the state of the counters.
- Used **serial communication** to communicate between the keyboard and Pt51 at a **9600 baud rate.**
- Implemented the key press of token using **Timer , serial interrupt(RI and TI flag) and lcd commands.**

Tone-synthesizer using Krypton Board [April 2021]

EE-214 Digital Circuits Laboratory *Guide : Prof. Maryam Shojaei Baghini*

- Generated musical octave using krypton board,speaker,transistor and a potentiometer for adjusting the volume.
- Used behavioural style to model FSM in VHDL for the various notes.
- Analyzed the Gate level and RTL simulation in Quartus to check the correctness of the program.
- Created a state transition table to visualize the sequence of states and a 4Hz clock using clock divider from the 50 MHz master clock on krypton board.

Graph Theory [May-July 2020]

Summer of Science(SOS) *Maths and Physics Club,IIT Bombay*

- Created a detailed report of various algorithms used in domain of computer science to deal with aspect of graphs, path and shortest route finding algorithms.
- Analysed the time complexity of algorithms like **DFS(Depth First Search), BFS(Breadth First Search), Djikstra, Bellman Ford, Floyd Warshall, Kruskal's Minimum Spanning Tree** .
- Reviewed various blogs on **Longest increasing Subsequence** problem which dealt with Range Query using **Fenwick Tree** and **DAC(directed acyclic graphs)**.

Web Development [July-Aug 2020]

Learner's Space *IIT Bombay*

- Learnt about Front-end theory like **HTML, CSS, bootstrap, github and basics of javascript**.
- Deployed a full fledged Website using the **github** server .
- Incorporated a **responsive table,navigation-bar,carousel,hover animation** and **feedback form**.

Machine Learning [April-June 2020]

Summer of Code(SOC) *Web and Coding Club(WnCC),IIT Bombay*

- Implemented a salary prediction model using **flask**, **linear regression** and deployed it using **Heroku**.
- Read about gradient descent,binary classification,confusion matrix,precision-recall, **random-forest classifier**.
- Analysed variations in house pricing-**MNIST dataset** using **Train-Test split** method.

16 bit Arithmetic and Logical Unit [Dec 2020]

Course Project | EE-224 Digital Circuit Design *Guide : Prof Virendra Singh*

- Synthesized **VHDL code** for **16 bit ALU**, capable of carrying out 4 operation: **Addition, Subtraction, Bitwise-NAND, Bitwise-XOR**, along with Carry and Zero flag for two input signals
- Implemented **Brent Kung** fast adder, to **increase** the **speed** of addition to **O(log n)**
- Generated **digital waveform** of the output of **RTL simulation** in **Quartus** for a coded **testbench**

DC Power Supply [Aug-Nov 2019]

Course Project | EE-113 Introduction to Electrical Engineering Practice *Guide : Prof B.G Fernandes*

- Soldered a **full wave brige rectifier** on a perforated board with a **capacitive filter and zener regulator**.
- Analysed the voltage using a Digital Multimeter and waveform using a **CRO(Cathode Ray Oscilloscope)**.
- Assembled a +12V ,-12V Regulator using zener diode and a +5v regulator using **LM 7805 IC**.

Digital Counter for Object counting [Aug-Nov 2019]

Guide:Prof B.G Fernandes,EE113 *IIT Bombay*

- Interfaced **LT-542** Common-Anode seven segment display to **7447A BCD to-seven-segment decoder**.
- Analysed the function table of 7447 decoder with respect to all the inputs and outputs.
- Studied **TTL decade counter** which consists of Master-Slave JK flip-flops and configured it as divide-by-2,5 counter.
- Used the output of **74C04** gate as the clock for **7490 BCD counter** and generated a manual clock using a miniature Push-button Switch and an inverter such that we get one pulse going from +0 to 5V for every press of the switch.
- **Interfaced LED-IR detector** pair(Object sensor) to 7490,7447A and **7 segment display** for object sensing.

TECHNICAL SKILLS

- **Programming Languages:** C++,Embedded C, Python, Julia,Matlab,VHDL,Assembly Language,MIPS
- **Developement:** HTML, CSS, Javascript, Bootstrap
- **Others:** Quartus, AutoCAD(2D), GNURadio, matplotlib, numpy, LaTeX

KEY COURSES UNDERTAKEN

***: To be completed by December '21**

- **Electrical Engineering:** Communication Systems - I*,EM Waves*,Analog Circuits, Digital Systems, Probability and Random Processes,Signal Processing,Electronic Devices & Circuits,Microprocessors
- **Computer Science:** Data Structures and Algorithms,Logic for Computer Science,Computer Programming and Utilization, Design and Analysis of Algorithms*
- **Maths:** Calculus, Linear Algebra, Partial Differential Equations, Complex Analysis

EXTRA-CURRICULARS

Sports	Completed one year long course in **National Sports Organisation in Table Tennis.** Finished 4^{th} in **intra department chess championship** held on **Lichess Arena** Was part of **Hostel 5 chess team** who finished **second in Inter-Hostel competition**.
Competitions	Engineered manually controlled bot capable of negotiating different kinds of obstacles in its path in stipulated amount of time**(XLR8 Competition)** . Secured 67^{th} rank in Hackerearth Programming Challenge and a **rank of 91** in codechef Long challenge. Represented my school at the **Aqua Regia Science Quiz** Competition .