

# Shubham Kumar

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## PROFESSIONAL SUMMARY

B.Tech Electrical Engineering student at IIT Jodhpur specializing in **hardware-software co-design, embedded systems, and performance optimization**. Experienced in VLSI design, FPGA programming, real-time embedded systems, and systems-level programming with strong foundations in computer architecture and parallel computing.

## EDUCATION

2022 - 2026 **B.Tech in Electrical Engineering at IIT Jodhpur** (CGPA: 7.68/10.0)

## TECHNICAL SKILLS

|                                   |                                                                                                |
|-----------------------------------|------------------------------------------------------------------------------------------------|
| <b>Systems &amp; Hardware</b>     | Embedded Systems (STM32, Arduino, FPGA), Verilog, Computer Architecture, ARM/x86/MIPS Assembly |
| <b>Programming Languages</b>      | C++, C, Python, Java, Rust, SQL                                                                |
| <b>Parallel &amp; Performance</b> | OpenMP, MPI, CUDA (learning), Hardware Acceleration, Optimization                              |
| <b>EDA &amp; Circuit Tools</b>    | Cadence Virtuoso, LTspice, Vivado, Simulink, MATLAB                                            |
| <b>Software Development</b>       | Git, Flutter, Firebase, Django, REST APIs                                                      |
| <b>ML Frameworks</b>              | TensorFlow, OpenCV, Scikit-learn, Pandas, NumPy (familiarity)                                  |

## EXPERIENCE

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| <b>Inter-IIT Tech Meet 12.0</b><br><i>Quantum Computing Project</i><br><i>Team Rank: Top 10% among 23 IITs</i>                                                                                                                                                                                                                                                                                                                                                                                                  | Dec 2023<br>IIT Madras, Chennai<br><a href="#">GitHub Link</a> |
| <ul style="list-style-type: none"><li>- Developed a Streamlit interface for rescheduling 20+ flights using D-Wave's hybrid quantum solvers.</li><li>- Optimized rerouting efficiency with &lt; 10% deviation from classical baselines under real-time constraints.</li><li>- Integrated backend quantum solver with dynamic UI handling 15+ parameters, improving airline usability.</li><li>- Presented live demo to Mphasis and IIT panel, securing top 10% rank among 23+ participating IIT teams.</li></ul> |                                                                |

## TECHNICAL PROJECTS

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| <b>CUDA-Accelerated Image Processing Toolkit</b><br><i>GPU Computing, Performance Optimization</i>                                                                                                                                                                                                                                                                                                                                                                 | [In Development]                                      |
| <ul style="list-style-type: none"><li>- Building parallel GPU-accelerated image filters (Gaussian blur, edge detection, brightness adjustment) using CUDA C++</li><li>- Implementing performance comparison framework measuring CPU vs GPU execution times with speedup analysis for various image sizes</li><li>- Optimizing CUDA kernel configurations (block/grid dimensions) and memory transfers for maximum throughput</li></ul>                             |                                                       |
| <b>Multifunctional Digital Clock</b><br><i>PYNQ-Z2 FPGA, Verilog — Digital Design, HDL</i>                                                                                                                                                                                                                                                                                                                                                                         | <a href="#">GitHub</a> — <a href="#">YouTube Demo</a> |
| <ul style="list-style-type: none"><li>- Designed and implemented complete digital system in Verilog with 4 operational modes: clock, timer, stopwatch, and alarm functionality</li><li>- Achieved precise timing control with <math>\pm 1</math>-second accuracy through careful clock division and synchronization logic</li><li>- Optimized display multiplexing: drove four seven-segment displays using single output port to minimize I/O pin usage</li></ul> |                                                       |
| <b>Real-Time Analog Signal Visualizer</b><br><i>STM32F429 Discovery Board — Embedded Systems, Real-Time Programming</i>                                                                                                                                                                                                                                                                                                                                            |                                                       |
| <ul style="list-style-type: none"><li>- Developed a full-featured digital oscilloscope on ARM Cortex-M4 with custom LCD driver and touchscreen interface.</li><li>- Implemented real-time ADC sampling, signal processing, and waveform visualization with adjustable timebase (1-500 ms) and gain control.</li><li>- Integrated ADC, LCD(LTDC/DMA2D), I2C touchscreen &amp; UART modules to achieve low-latency system performance.</li></ul>                     |                                                       |

## RELEVANT COURSEWORK

|                                 |                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------|
| <b>Core Systems</b>             | Data Structures & Algorithms, Computer Architecture, Embedded Systems, Digital Design |
| <b>Hardware Design</b>          | VLSI Design, Analog Electronics, Semiconductor Devices, Control Systems               |
| <b>Mathematics &amp; Theory</b> | Linear Algebra, Probability & Statistics                                              |
| <b>ML/AI (Exposure)</b>         | Pattern Recognition & Machine Learning, Computer Vision, Artificial Intelligence      |

## LEADERSHIP & EXTRACURRICULARS

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|--------------------|--------------------------------------------------------------------------------------------------|
| Aug 2023 - Present | <b>Class Representative</b> — Electrical Engineering Batch 2026, IIT Jodhpur                     |
| -                  | <b>Core Member</b> — DevUp Labs (Open Source Organization), IIT Jodhpur                          |
| -                  | <b>Core Member</b> — RAID (AI/ML/DL Club), IIT Jodhpur                                           |
| -                  | <b>Assistant Head</b> — Prometeo'24 & Varchas'23 (College Technical & Sports Fests), IIT Jodhpur |