Hrishikesh Karande

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PROFILE

- **Digital Design and Embedded Systems Engineer** with 2+ years of experience across firmware development, FPGA-based design, and hardware–software co-integration.
- Skilled in **Embedded C, C++, Python, and Verilog/SystemVerilog** for both embedded software and digital hardware design.
- Experienced in **RTL design, FPGA prototyping (Xilinx Zybo Z7-7020), AXI4 interfaces, and synthesis flows** alongside **device driver development** and industrial communication protocols (I2C, SPI, UART, CAN, Ethernet). Proficient with **STM32, ARM Cortex MCUs, RISC-V**, and FPGA design tools (**Vivado, Vitis**). Strong debugging expertise using oscilloscopes, JTAG, and logic analyzers.
- Open to opportunities in **Firmware Development, Digital Design, Verification, and Physical Design (Synthesis)** while leveraging extensive **firmware knowledge** to deliver reliable, real-time embedded and FPGA-based solutions.

PROFESSIONAL EXPERIENCE

Embedded Software Engineer Intern 12/2024 – 03/2025
Infineon Technologies AG Münich, Germany
- Developed and tested **firmware automation tools** in C and Python for embedded processors, improving system integration efficiency.
- Worked on **RISC-V based firmware**, software modeling, and **device-level code generation**.
- Collaborated with engineers on **embedded firmware verification and debugging** using **CMake, JTAG debuggers, and oscilloscopes**.
- Contributed to **control-flow parser implementations** for embedded code generation.

Research & Operations Engineer 07/2023 – 03/2024
eLab - Uni Siegen Siegen, Germany
- Designed and programmed **firmware for microcontrollers (Raspberry Pi, ESP32, Arduino, STM32)** in **C/C++**.
- Developed and tested **device drivers for sensor integration** (temperature, pressure, motion sensors).
- Debugged hardware using **oscilloscopes, function generators, and digital multimeters**.
- Conducted training on **embedded protocols (I2C, SPI, UART)** and **PCB design** using Eagle, KiCad, and Altium.

Software Engineer 12/2020 – 07/2022
Birlasoft Pune, India
- Automated software testing using **Selenium Java**, improving efficiency across 750+ test cases.
- Worked with **CI/CD pipelines, Git, Jenkins**, and collaborative code reviews, ensuring robust release cycles.
- Gained professional exposure to **software development lifecycle (Agile + Waterfall)**.

SKILLS

Programming Languages:
Embedded C, C++, Python, Rust

Microcontrollers:
STM32, ARM Cortex, RISC-V, ESP32, Arduino, Raspberry Pi

Protocols:
I2C, SPI, UART, CAN

RTOS:
FreeRTOS

IDEs:
Keil, IAR, Eclipse, Vivado, Vitis, VS Code, MicroChip Studio, STM Cube IDE

PCB & Hardware:
Altium, Eagle, KiCad, Soldering (SMD/THT)

HDLs
Verilog, SystemVerilog (behavioral & RTL modeling)

FPGAs
Xilinx Zynq (Zybo Z7-7020), AXI4-Lite integration

FPGA Tools
Vivado, Vitis, EDA-Playground

Design Flow
RTL coding, testbench creation, simulation, synthesis

Debugging Tools:
Oscilloscopes, JTAG, Logic Analyzers, Multimeters

PUBLICATIONS

Raising the Bar(Ometer): Identifying a User's Stair and Lift Usage Through Wearable Sensor Data Analysis 02/2025
Springer
- Developed a machine learning-based system using wearable sensor data to classify stair and elevator usage with **87.61% accuracy**.
- Collected and analyzed data from 20 participants, leveraging **inertial and pressure sensors** to enhance real-time activity detection.
- Investigated sensor impact on model performance, demonstrating the potential for **health and lifestyle insights** using wearable technology.

PROJECTS

EMULATION OF RERAM MODEL ON FPGA
Academic - Uni Siegen - Master Thesis
- Designed, implemented, and emulated a **Resistive Random Access Memory (ReRAM) model** on the **Xilinx Zybo Z7-7020 FPGA**.
- Developed a **behavioral SystemVerilog model** of a ReRAM cell, incorporating **LRS/HRS states, write delays, and endurance limits**.
- Scaled the design into a **ReRAM core array**, integrated with an **AXI4-Lite interface** for communication with the ARM processing system.
- Deployed design on FPGA and evaluated the Model.

SMARTWATCH BASED HUMAN ACTIVITY RECOGNITION
Academic - Uni Siegen - Masters level
- Designed a study and recorded a multimodal dataset to perform Human Activity Recognition.
- Designed and implemented a **data pipeline** to process and classify large amounts of sensor data, utilizing **Python**, **Pandas**, **NumPy, Imblearn, Scikit-learn** for preprocessing and feature extraction.
- **Collaborated with data scientists** to refine machine learning models based on real-time data, ensuring smooth integration between hardware sensors and data analytics pipelines.
- Conducted **data quality checks** and maintained reliable data storage systems for ongoing data collection, ensuring scalability in handling increased sensor data.
- Utilized **version control systems (Git)** to manage code versions and collaborative contributions from other developers in the project.

AUTOWRITER - A WRITING MACHINE FOR THE DISABLED
Academic - Pune University - Bachelors level
- Designed, built and pitched- 'AUTOWRITER' a product which helps the differently abled to write on a paper with a pen/pencil using voice commands.
- Built an end-to-end system using the microcontroller from **Texas Instruments' BeagleBone Black** to control a self designed **XY Plotter** with speech input.
- Led my team to the Semi Finals of **Texas Instruments - India Innovation Challenge and Design Contest 2016** held in New Delhi.

- Ranked among **top 36 from a total of 2500+ teams.**

LUMINOSENSE - NON INTRUSIVE LOAD MONITORING
Academic - Pune University - Bachelors level
- Built an **Energy Monitoring Solution** for commercial buildings. Carried out aggregated current and voltage wave-forms measurement at a single point.
- Built a **full scale system by designing and manufacturing** the **PCB** incorporated with sensors like current and voltage transformers.
- Used a **deep learning algorithm (SparseNILM)** for pattern recognition. Thus, the energy consumption of individual appliances was predicted and recommendations were given by the system.

XY PLOTTER
Academic - Pune University - Bachelors level
- Designed and implemented a **precision XY Plotter using stepper motors and Arduino** for high-accuracy plotting applications. Integrated **CNC-based firmware** to ensure stable motor control.
- Integrated Arduino with a CNC platform for carrying out plotter operations.
- Tested the project under multiple conditions.
- Build a stable system from previous rigorous prototypes.

EDUCATION

Masters of Science 2022 – present
University of Siegen Siegen, Germany
- Field of study: **Computer Science with Embedded Systems**
- Worked on multiple Embedded Systems projects using technologies like **MEMS, IMUs, CAN, I2C, SPI.**
- Actively improving German language proficiency, currently at German **B1** level, targeting **B2 by 2025** to enhance professional communication.

Bachelor of Engineering 2015 – 2020
Savitribai Phule Pune University Pune, India
- Field of study: **Electronics and Telecommunication**
- Received great appreciation for excellence in several National Level Innovation Challenges, Hackathons, and Design Contests.
- Strong foundation in **electronics hardware**, **circuit design**, and **safety-critical systems** development.

ACHIEVEMENTS

FINALIST Bangalore, India
ACCENTURE INNOVATION CHALLENGE
- Ranked among the **top 14 from a total of 13000+ teams**. Led my team to the finals of Accenture Innovation Challenge 2018 held in Bangalore.

SEMIFINALIST Delhi, India
TEXAS INSTRUMENTS IICDC
- Led my team to the Semi-Finals of Texas Instruments - India Innovation Challenge and Design Contest 2016 held in New Delhi. **Ranked among the top 36 from a total of 2500+ teams.**

LANGUAGES

Englisch ● ● ● ● ●
7.5 IELTS

Deutsch ● ● ● ● ○
B1