GAUTAM BIDARI

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EDUCATION

Northeastern University, Boston, MA
Master of Science in Embedded Systems, Conc. in IoT   Sep 2023 - Aug 2025
Coursework: IoT, Connected Devices, Embedded Device Drivers, Design Patterns, OOP   GPA: 4.0

Visvesvaraya National Institute of Technology (VNIT), Nagpur, MH, India
Bachelor of Technology in Electronics and Communication Engineering   July 2018 - May 2022
Coursework: Embedded Systems, Operating Systems, Object-Oriented Programming

EXPERIENCE

Northeastern University, Boston, MA
Research Assistant - Cyberspace security and forensics lab (CactiLab)   May 2025 - Present
- Researching **ARM Cortex-M based voltage glitching attacks** using ChipWhisperer Husky
- Exploring how GCC compiler optimization can introduce new glitching attack vectors
- Analyzing ECTF 2025 designs for potential glitching attack vectors

Woods Hole Oceanographic Institute (WHOI), Woods Hole, MA
Embedded Software Engineering Intern   June 2024 - Dec 2024
- Developed **Embedded C firmware** for an **ARM Cortex M4**-based pH sensor, implementing
  sensor (Thermistor, Photodiode, RTC, CTD), LT2499 ADC and pump motor controls
  via **SPI, I2C, UART, RS232**. Restructured code for **MISRA compliance**, ensuring a
  functional and robust embedded system.
- Engineered a **Python GUI** for **BLE** control, facilitating real-time hardware command, data plotting,
  and **automated script execution** for enhanced system usability.
- Designed and iterated **PCBs in KiCAD**, generating BOMs for manufacturing. **Diagnosed and rectified
  critical hardware issues** including LED voltage instability and SD card SPI faults, ensuring stable operation.
- Instituted thorough **Test-Driven Development (TDD)** for all modules. Conducted field deployments
  and lab calibrations, validating system accuracy and robustness.
- Integrated an **embedded scripting engine** with a custom parser, loop execution, and CLI control,
  facilitating advanced, unattended system automation.
- Interfaced with external systems (Bristlemouth, Lowell Deck Box) and documented architecture
  with **UML diagrams, state diagrams** and a user guide.

Northeastern University, Boston, MA
Teaching Assistant - Data Networking (TELE 5330)   Jan 2024 - Apr 2024
- Designed and graded assignments and projects and conducted viva evaluations
- Conducted weekly Networking Lab sessions using **Cisco Packet Tracer** and **Ubuntu Linux**

Deloitte Consulting, India
Java Backend Developer   June 2022 - Aug 2023
- Awarded **Deloitte Applause Award** for end-to-end implementation of core modules supporting
  5+ business use cases (0 critical post-deployment defects)
- Built 20+ **REST** endpoints using **Spring Boot Microservices** with 99.9% uptime SLA.
  Containerized deployment using **Docker** and Google Kubernetes Engine (**GKE**)
- Utilized **Git, Jenkins** and **Jira** for **CI/CD** flows across Dev/QA/Prod and Project Management
  in an **Agile Framework**

Millennium Semiconductors, India
Embedded Software Engineering Intern   June 2021 - Aug 2021
- Successfully prototyped a wearable, low-cost, bluetooth-enabled patient monitoring system
- **Bare metal** development on nRF52840 MCU using Segger Embedded System IDE w/ JTAG
  debugger and protocols like **SPI, I2C, BLE**

TECHNICAL SKILLS

Embedded Systems	nRF52840, ESP32, Arduino Uno/Nano, RPi, SPI, I2C, JTAG, BLE, RTOS, TinyML
Networking Protocols	TCP, UDP, IPv4/v6, 802.11, Thread, OSPF, STP, CoAP, MQTT, LoRA
Programming Languages	C/C++, Rust, Python, Java, SQL, Redis, MATLAB
Cloud Computing	Certified Google Cloud Associate Cloud Engineer (Certificate)
Libraries and Frameworks	Git, Make, CMake, OpenCV, Tensorflow Lite, Numpy, Pandas, Docker
Design Software	KiCad, Solidworks

COMPETITIONS

MITRE E-CTF 2025 (Team NEU1) ([Certificate](#))   Jan 2025 - April 2025
- Designed a secure Satellite Communication System based on MAX78000 (**Arm Cortex-M4**) MCU using **embedded security principles**. Ranked 18th globally out of 120+ teams
- Implemented **end-to-end encryption** using ChaCha20Poly1305 for AEAD and SHA512 HKDF to generate decoder key
- **Attacked 40+ designs** using various hardware and software attacks like replay attacks, power glitching (chip-whisperer) and buffer overflow and captured 20+ flags

Matter-enabled patient monitoring system ([Link](#))   Sep 2024 - Oct 2024
- **Winner** - Silicon Labs Matter Developer Challenge; Featured in SiLabs WorksWith Conference
- Redesigned **Matter over Thread** (IoT connectivity standard) for critical-care environments with 40% lower energy consumption than WiFi through Arduino Nano integration, Thread border routers, and self-healing mesh networks.

PROJECTS

Unsupervised Anomaly detection for Robotic Arm   May 2025 - August 2025
- Implemented **servo based 6 DOF Robotic arm control** using **FreeRTOS** on **ESP32** using **queuing, interrupts and memory management**
- Performed **anomaly detection** using **Rust** on RPi 5 (running custom **Yocto** build) to provide feedback on arm movement and positioning
- Designed **custom communications framework** over WiFi for seamless information flow
- Built cloud dashboard using **ubidots** for health checks and alerts

Embedded Linux Device Driver Development ([Link](#))   Jan 2025 - April 2025
- Designed linux device drivers for sysfs, proc, and ioctl to manipulate RPi 4 **GPIO ports** using **memory mapped IO** and bit manipulation for **PWM control**
- Implemented **Rust** code on RPi 4 to interact with custom GPIO drivers using sysfs, proc and ioctl
- Built custom linux distro using **Yocto and bitbake** to achieve 20% faster operations on embedded devices

Time Series Forecasting ([Link](#))   Jan 2024 - Feb 2024
- Forecasted energy consumption using PJM Energy Dataset and models such as **Exponential Smoothing, Holt-Winters, AR, MA, ARMA, ARIMA, SARIMA** and **XGBoost**
- Compared model performance using metrics such as **MSE, MAE, MASE and R-Squared**

IoT Data Center Climate Monitoring System ([Link](#))   Jan 2024 - April 2024
- Designed an IoT control system system using temperature, humidity, and pressure sensors with **automated HVAC/humidifier controls** via **MQTT**, and optimized sensor data processing on **RPi 4**
- Engineered a cloud-based pipeline (**Ubidots IoT**) aggregating sensor data and triggering alerts
- Applied ML algorithms (**Edge AI**) **for predictive maintenance** to reduce downtime by 30%
- Implemented redis cache to store system performance data

Linux Based Intranet Design   Nov 2023 - Dec 2023
- Configured a **DHCP server** for dynamic allocation of IPv4, and IPv6 addresses in the network
- Created a **DNS** server using **BIND9** to resolve the domain name and IP queries and implemented Master-Slave DNS relationship with zone transfer
- Designed a **firewall** secured Web-server using apache2 as well as a backup server and utilized **crontab** to automate the backup process
- Enhanced security by implementing **IPSec VPN** in tunnel mode between 2 Linux machines.
- Executed **Network File System** for sharing files between server and client

Real Time Audio Synchronization using Audio Fingerprinting Techniques
[Published](#) in IEEE Xplore   Aug 2021 - Feb 2022
- Designed a system that can recognize a song by recording a small snippet of it and automatically synchronize lag-free playback
- Achieved **86% detection accuracy** and **98% synchronization accuracy** using **Digital Signal Processing** techniques like Fast Fourier Transform and Discrete Wavelet Transform

Mask Module for Remote Health Monitoring
[Patent Application](#) Published (Application No: 202221031954)   May 2021 - June 2021
- Designed an ESP32 based **multi-sensor smart module** with BLE capability to track vital signs
- Built **companion android app** to stream data to a dashboard website
- Caregivers can connect to the module from a distance via Bluetooth and prevent direct exposure to patients
- Facilitates contactless patient monitoring and reduces infection risk by upto 50%