

Harsh Dubey

411 Berry Chase Way, Cary, NC 27519

had7143@gmail.com

(605) 592-6747

EDUCATION

South Dakota State University

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Bachelor of Science: Electrical Engineering

TECHNICAL SKILLS

- Skilled in embedded system and control system design using Microprocessors, Microcontrollers, Programmable Ladder Logic (PLC), Human Machine Interface (HMI), and Field Programmable Gated Array (FPGA).
- Skilled in Industrial Internet of Things (IIoT) system design using various frontend and backend tools.
- Experienced in working with PIC microchip controllers, Arm Cortex processors, Arduino Uno, Arduino Mega, Altera's DE-10 FPGA, and Altera's Cyclone-2 FPGA.
- Skilled in developing firmware in C, Embedded C, C++, JavaScript, ARM assembly and Microchip-PIC assembly.
- Experienced in working with communication protocols such as I2C, SPI, UART, RS-232, RS-485, USB, Wi-Fi, https, MQTT, Meter-Bus, LoRaWAN and RPMA.
- Skilled in frontend/user Interface development using HTML, CSS, JavaScript, InfluxDB and Grafana.
- Skilled in backend development for IoT systems using Nodejs, Node-RED, Google Firebase and Influx DB.
- Skilled in writing Verilog, writing test benches using Model Sim, and working with other Quartus tools.
- Experienced in working with NIOS 2 processor and other onboard devices on DE-10 and Cyclone-2.
- Skilled in printed circuit board (PCB) design using Eagle and testing it using oscilloscope, and multimeter.

WORK EXPERIENCE AND SENIOR DESIGN PROJECTS

Firmware Engineer – Wireless Networks

Trilliant Networks, Inc. | Cary, NC | **July 2021- July 2022 & Feb 2023 - present.**

Supported, upgraded, and tested firmware for various products in their RPMA and Mesh network, including streetlight controllers (SLCs) and meter interfacing units (MIUs). I worked closely with customers to provide support and design IoT solutions and demos for them. Some of my specific responsibilities included:

- Debugging firmware written in C/C++ for Trilliant's SLCs, which required working with an ARM processor and M-BED RTOS. I also added new features to the firmware and created testing applications.
- Leading product development for Trilliant's water MIUs, which involved testing firmware/hardware, testing the network, creating unit tests, and assisting the software team with driver development.
- Creating dashboards, remote control software, and testing applications using Node-RED, JavaScript, Influx DB, Prometheus, Oracle DB, MySQL DB, Nginx, and Grafana.
- Configuring and setting up Linux servers to host various services and applications.

Firmware Engineer – Wireless Networks

Amazon.com, Inc. | Cupertino, CA | **July 2022- Feb 2023**

As a wireless firmware engineer at Amazon, designed and implemented wireless sensor networks, developed low-level firmware and communication protocols, and led the development of multiple IoT devices while ensuring high-quality testing and secure communication. Some of my specific responsibilities included:

- Designed and implemented wireless sensor networks using 805.15.4 protocol and Contiki-NG operating system, utilizing knowledge of Zigbee and LoRa protocols.
- Developed low-level firmware for wireless sensor network devices in C, including drivers for I2C, SPI, and GPIO, and implemented power management algorithms for ultra-low power consumption.
- Designed and implemented advanced network communication protocols for wireless sensor networks, such as COAP and lwM2m, to optimize data transmission and reduce network overhead.
- Developed an ADC data validation library that collected samples for 120 seconds and calculated the median of the samples to ensure high-quality data from wireless sensor networks, using advanced statistical analysis techniques.

Electrical Engineer - Embedded Systems IoT

South Dakota State University, Agricultural and Biosystems Engineering | Brookings, SD | **Jan 2020 – May 2020 & Dec 2020 – July 2021**

Designed a LoRaWan-enabled remote monitoring system for a swine facility that allowed users to monitor the status of feeders, fans, and heaters through a webpage. My system architecture included LoRaWan sensor nodes connected to a LoRaWan gateway, through which data was sent to Google Firebase and displayed on a webpage. In this project, I:

- Designed and engineered a non-invasive, easy-to-use LoRaWAN-enabled sensor node using Arduino Uno, Arduino Mega, and a LoRaWAN shield for long-distance data transmission.
- Created a C# interface that receives data serially from an Arduino and sends it to the database.
- Designed the backend of the website using Google Firebase.
- Developed the frontend of the website using HTML, CSS, and JavaScript.
- Configured the network gateway using The Things Network.

Electrical Engineer – PLC & HMI Firmware

Banner Engineering | Aberdeen, SD | **May 2019- August 2019**

Designed a PCB fixture to hold and stabilize PCBs while they were being soldered, and automated six industrial ovens by creating a timer system to avoid errors associated with manual time tracking. I also designed electrical control panels and updated existing designs. Some of my specific responsibilities included:

- Designing the PCB fixture using the CLICK PLC, a Banner safety controller, relays, and a Banner touch photo-electric sensor.
- Designing the oven timer system to accept and record heating time and update employees once the devices are heated. This required using the CLICK PLC, CMORE HMI, an indicator light, and a photo-electric sensor.
- Designing neat and easy-to-fix control panels for the ovens and conveyor belts in the Banner production facility.

Senior Design Project – Electrical Engineering Research

South Dakota State University, Math and Computer Science | Brookings, SD | **August 2018- May 2019**

Developed a gaming system that is reactive to the player's brain status. The gaming system's internal logic will trigger different game events while measuring player's brain response using the Electroencephalography signals (EEG) headset. And later build the player's profile that will be used to train a machine learning model.

- Researched and created an emotion model that can be used to classify player's brain responses from the EEG signal acquired from the Open BCI EEG headset.
- Collaborated on creating a 2D space shooter game with 3-levels (easy, medium, and hard) using Unity game engine.
- Collaborated on creating a machine learning model using Keras and TensorFlow.

Senior Design Project – Embedded System Design

Daktronics Inc. | South Dakota State University, Electrical Engineering | Brookings, SD | **August 2019 – May 2020**

Designed a configuration dongle to fetch and reconfigure Daktronics' display controller's network settings without the use of any form of network. The dongle communicates using USB 2.0 and can change the network mode, hostname, IPv4 address, netmask, and gateway of the display controller. In this project, I:

- Designed the dongle using an ATSAMD21 Arm Cortex processor and developed its firmware using Arduino IDE and embedded C. I also interfaced the processor with an OLED display and tactile pushbuttons to create an easy-to-use user interface.
- Wrote a .NET C# application to act as a driver for the dongle, allowing the display controller to recognize and initiate communication with it. The application was also coded to send the current system network settings to the dongle and update them as commanded.
- Designed a PCB board to house the processor, display, and pushbuttons.

ADDITIONAL INFORMATION

GitHub: <https://github.com/hdubey-debug?tab=repositories>