

# Nikhil Nayyar

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## Skills

Proficiency with: C++, C | Experience with: Python | Experimenting with: Rust

Software: (*Tooling*) bash, git, Docker, JIRA, Ozone (*Libraries*) FreeRTOS, TinyUSB, ASF3/4, Harmony, TIVWARE

Hardware: ARM Cortex M4, TI TM4C, Microchip SAMD21/51, Microchip ATtiny, JLink, Saleae

Embedded: (*Protocols*) USB (CDC-ACM, DFU), I2C, UART (*Design*) Bootloader, NVM Driver, USB Driver

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## Work Experience

### Bevi (dba Hydration Labs)

Charlestown, MA

Firmware Engineer

May 2023-Present

- Led development for firmware in low-cost water chiller. Delivered ~15k lines of code on an ambitious 1-year timeline. Defined features and epics in conjunction with program management to provide deliverables on time.
- Developed and maintained firmware for flagship Standup 2.0 Smart Water Dispenser. Completed first major firmware release in 1 years time, currently deployed to 8,000 field units. Designed and implemented novel Board Reconnect feature.
- Championed engineering best practices by refactoring Makefile builds for various boards, Dockerizing the build environment for Standup V1, and implementing an initial unit test framework with GTest and GMock.

### Starry Internet

Boston, MA

Software Engineer in Test

September 2022 – Jan 2023

- Developed in Python to automate iperf3 testing of WiFi Access Point / Base Station network performance.
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## Project Experience

### Low Cost Chiller (Bevi)

- Developed FreeRTOS-based application to run controls for components of chiller (pumps, valves, etc); handle commands from tablet UI; read, parse, convert various sensor inputs; and pass sensor data upstream to UI.
- Designed and implemented novel architecture whereby chiller controls react autonomously to sensor input data.
- Designed and implemented CDC USB Driver using TinyUSB that handles COBS-encoded, custom protocol.
- Designed and implemented ADC Chain using SAMD event system, external interrupts, timers, and DMA.
- Adapted existing bootloader to use TinyUSB DFU driver, and abstracted design to allow portability to different MCU's.

### Board Reconnects (Bevi)

- Implemented feature whereby MCU's on 3 different boards take autonomous reset actions to re-establish USB comms.
- Designed precise 'asymmetric information' algorithm to synchronize actions and timing when no comms are present.
- Designed and implemented NVM Driver (EEPROM & Flash) with CRC error checking for critical safety of algorithm.

### Feasibility of Passive Bistatic Radar (PBR) for Glacial Tomography (Senior Thesis)

- Developed mathematical model using electromagnetic equations, FCC guidelines on EM power limits, and material properties of glacial ice to investigate potential use of ambient, atmospheric EM waves for mapping glacial interiors.
- Analyzed model in MATLAB to estimate idealized signal-to-noise ratios associated with three potential illuminators of opportunity and reviewed findings in a written, 60-page thesis.

## Personal Projects

- Built Pomodoro Timer using C and TM4C123G development board.
  - Implemented driver library in C for use of 16x2 LCD display by TM4C123G development board.
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## Education

The Pennsylvania State University

2016-2020

BS with Honors in Electrical Engineering | BA in English

GPA: 3.94 / 4.00