Josh **Booth**

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WORK EXPERIENCE

Applications/Marketing Engineer | Microchip Technology
CURRENT, FROM JUN 2022 (FT)

- Wrote production-quality embedded C code for customers to use as a reference when creating their own designs.
- Developed various demos on PIC and AVR microcontrollers for new products (see DMX Light Show, The Cold Plate). This included writing and documenting code and test conditions as well as completing design documents and flowcharts for the published demo.
- Created and documented example libraries for abstracted use in collaboration with a local/global team.
- Executed project analysis to synchronize deliverables to management. This included identifying project purposes, documenting key deliverables, code hooks, and team responsibilities as well as updating Airtable with weekly updates.
- Designed PCBs and structural enclosures for the demos.
- Led an analytics initiative that helped improve video retention and click rate for marketing campaigns.

Prototype Consultant | Booth Oil and Gas LLC.
SEP 2016, JUN 2022 (FT/PT)

- Designed and manufactured prototypes for novel business problems (see 3D PEEK Printer, AI-Driven Security System).
- Offered technical expertise for project planning, cost estimation, and feasibility studies.
- Communicated with the client to manage their expectations and incorporate or remove features as their needs changed.

Electrical Engineer | United States Naval Research Laboratory
JUN 2017 - JAN 2022 (FT/PT)

- Detecting and classifying objects in satellite imagery using TFLearn and pachyderm for rapid machine learning model prototyping.
- Recovered RF communications lost to noise by augmenting message-passing algorithms with machine learning.
- Identified promotor sequences in DNA to speed up genome sequence identification (BRNN w/ LSTM cells.)

EMBEDDED DEVELOPMENT PROJECTS

The Cold Plate 🔗 (EMBEDDED C, ANALOG & POWER DESIGN)

A reference design showing the most efficient way to perform common microcontroller tasks on a PIC16 such as temperature measurement, fan control, current monitoring, and UI control; all wrapped up into an engaging demo.


This project demonstrates clean code practices and documentation as well as working within a team.
It has become Microchip's most copied code repository.

DMX Light Show (EMBEDDED C, ANALOG & POWER DESIGN)

A real-time audio processing light show integrating audio filtering, DMX, DMA, PoE, and a hardware-encoded WS2812 driver; each node using a PIC18Q71 MCU. Utilizing the devices' CIPs, nearly no processing occurs on the CPU.


Each tube's audio frequency peak:
63Hz, 160Hz, 400Hz, 1kHz, 2.5kHz, 6kHz, 16kHz
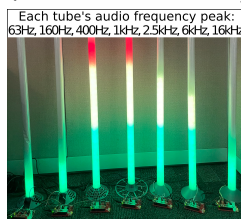
Written C drivers for this project include UART, DMA, DMX, PWM, SPI, CLC, OP-AMP, and ADC configurations.

3D PEEK Printer 🔗 (EMBEDDED C, PYTHON, ANALOG & POWER DESIGN)

Designed and built a large-scale 3D printer capable of printing PEEK for biofuel refinement.

An STM32 MCU running Klipper and a Raspberry Pi running custom Python controlled the printer. Involved in the development was designing the kinematic system, thermal dynamics, and software to safely control its operation while dealing with hazardous temperatures and voltages.

6'
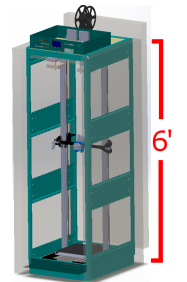
AI-Driven Security System 🔗 (PYTHON, BASH, MACHINE LEARNING)

A solar-powered security system that gives real-time alerts with a classified video anytime a human, vehicle, or large animal is spotted on the property.

person: 100%

Custom python and bash programs handled data transfer throughout the mesh network and into/out of the neural network.

PUBLICATIONS

2023	App. Note 4889: Using Core Independent Peripherals (CIPs) to Implement a Peltier Cooled Metal Plate 🔗
2023	Embedded.com - Reducing BOM cost in embedded systems using advanced MCU peripherals 🔗
2018	Machine Learning in Radio Frequency Communications 🔗
2017	Prediction of Bacterial Promoter Sequences using Machine Learning 🔗

EDUCATION

B.S. in Computer Engineering; Mathematics minor
SUMMA CUM LAUDE; 3.98 GPA; CMPE 322/120 SI; CLASS OF 2022
Shippensburg University of Pennsylvania

CORE COMPETANCIES

- **Technical:** C, Python, Linux, Marlin, Bash, Embedded Development, C++, Digital Circuit Design, CAD Design, Robotics
- **Software:** Git, Sourcetree, Fusion 360, KiCAD, Eagle, MPLAB X, XC8