Benjamin MacFarlane Kuter

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WORK EXPERIENCE

Firmware Engineer *January 2022 – Present*

P & E Microcomputer Systems Inc., Watertown, MA

- Designed and implemented Wi-Fi interface for flagship product
- Improved existing test suites & internal tool sets for increased productivity and reliability
- Refactored flagship product code for new generation of MCU & RTOS
- Developed flash algorithms for a variety of ARM targets (ST, NXP, etc)

Research Technician & Database Manager *2017 – 2020*

Priscilla Brastianos Lab, Massachusetts General Hospital, Boston, MA

EDUCATION

Master's Degree in Computer Engineering with a focus in Cybersecurity *2020 – 2022*

Boston University, College of Engineering, Boston, MA

Bachelor of Arts in Neuroscience with a focus in Biology *2013 – 2017*

Macalester College, St. Paul, MN

PROJECTS

IMXRT 1062 Development | C, ARM, FreeRTOS

- Implemented core peripherals for an NXP IMXRT1062, including encryption, flash programming, PWM, GPIO, secure boot, networking, file storage, and more.

Production PCBA Enclosure | FDM Printing, Fusion360 CAD, Slicing

- In charge of designing enclosure for latest generation hardware in Fusion360 and manufacturing in-house through FDM technology.
- Designed philosophy includes minimal post-processing, low rejection rate, and easy assembly.

Smart Agricultural System | C, ARM, FDM Printing, EDA, FreeRTOS

- Designed an automated agricultural system for indoor and vertical farming.
- Built on ESP32-C3/6/P4 with custom pumps, enclosure, and circuit.
- Modular design based around networked grow-pods to a local server for expandability.

Pocket MIDI Transcriber | C, ESP-IDF, Altium PCB & EDA

- ESP32-C3 based device that allows users to play any key/scale combination by just playing "natural notes on MIDI keyboard.
- Utilized rotary encoder & TFT LCD for user input with UART logging.
- High performance with no noticeable latency during conversion calculation.
- Custom PCBA design.

Rocket Propulsion Testing | Teensy 4.1, Arduino, Actuators & Sensors, I2C

- Worked with Boston University's Rocket Propulsion Group on their next generation of rocket testing & launch equipment
- Utilized an ARM M7 to remotely control servos & actuators for fuel injection and ignition

RFID Scanner | C Device Drivers, BeagleBone, Linux, Sensors, I/O

- Assistive device for vision-impaired populations
- Created data structure for user-defined messages paired to RFID tags
- Utilized legacy & modern C device drivers

Pocket Cryptography Stack | C, RTOS, Cryptography, FRDM K64F

- Led team through designing & implementing low-resource cryptography system

- Contained a full hashing, signing, encoding, decoding, verification stack
- Built on ARM Cortex-M4 with mbedtls

Linux Driver Development | C, ARM, BusyBox, QEMU

- Designed character device driver to initiate kernel timers & display messages
- Implemented user space & kernel space interactions
- Prototyped designs with QEMU

4-Stage 32-bit Pipelined CPU | Verilog, Vivado, Computer Architecture

- Created basic CPU modeling using behavioral Verilog
- Experimented with ISA to support 7 ALU pipelined operations

Additional Skills*:* Arduino (Teensy 3.6 & 4.1)*,* Assembly, Debugging, Linker Scripts, Fusion360, Unix, Computer assembly, FDM 3D Printing, Electronics & Circuits Theory, Through-hole Soldering, Sketchup, Microsoft Excel, Adobe Suite

RESEARCH EXPERIENCE

Priscilla Brastianos Lab – Conducted & optimized single-cell sequencing of cerebrospinal fluid from metastatic brain cancer patients using a novel technique developed with collaborators at the Massachusetts Institute of Technology.

Macalester College – Developed & conducted a self-run study on the effects of electric fields on neuronal properties in crawfish that was later presented at a national conference (*Society for Neuroscience 2016).*

Biju Parekkadan Lab – Prototyped devices to treat patient-derived blood with stem cell growth factors.

Publications

Prakadan SM, Alvarez-Breckenridge CA, Markson SC,…**Kuter BM**,…Brastianos PK. *Multicellular responses to PD-1 blockade within the tumor microenvironment of leptomeningeal metastases.* Nature Medicine. 2019. [Submitted]

Shih DJH, Nayyar N, Bihun I,…**Kuter BM**,…Brastianos PK. *Genomic characterization of human brain metastases identifies novel drivers of metastatic lung adenocarcinoma*. Nature Genetics. 2020.

Ippen FM, Grosch JK, Subramanian M, **Kuter BM**,…Brastianos PK. *Targeting the PI3K/Akt/mTOR-pathway with the pan-Akt inhibitor GDC-0068 in PIK3CA-mutant breast cancer brain metastases*. Neuro Oncol. 2019 Jun 7. doi: 10.1093/neuonc/noz105.

Ippen FM, Alvarez-Breckenridge CA, **Kuter BM**,…Brastianos PK. *The dual PI3K/mTOR-pathway inhibitor GDC-0084 achieves antitumor activity in PIK3CA -mutant breast cancer brain metastases*. Clinical Cancer Research. 2019 Feb. doi: 10.1158/1078-0432.CCR-18-3049.

Nayyar N, White MD, Gill CM,...**Kuter BM**,…Brastianos PK. *MYD88 L265P mutation and CDKN2A loss are early mutational events in primary central nervous system diffuse large B-cell lymphomas.* Blood Adv. 2019 Feb. doi: 10.1182/bloodadvances.2018027672.

Ippen FM, Alvarez-Breckenridge CA, **Kuter BM**,…Brastianos PK. *CSIG-29T, the dual PI3K/mTOR-pathway inhibitor GDC-0084 achieves antitumor activity in breast cancer brain metastases in vitro and in vivo*. Neuro Oncol. 2018 Nov. doi: 10.1093/neuonc/noy148.195.

Strickland M, Bertalan M, **Kuter BM**,…Brastianos PK. *CMET-15, Whole exome sequencing of brain metastases from colorectal primary cancers reveals clinically actionable mutations.* Neuro Oncol. 2018 Nov. doi: 10.1093/neuonc/noy148.227.

Juratli TA, McCabe D, Nayyar N,...**Kuter BM**,…Brastianos PK. DMD genomic deletions characterize a subset of progressive/higher-grade meningiomas with poor outcome. Acta Neuropathol. 2018 Nov. doi: 10.1007/s00401-018-1899-7.

AWARDS

Engineering Graduate Scholarship – Boston University *January 2020 – May 2022*
The Center for Engineering in Medicine (CEM) Internship (*Hematology*) *June 2016 – August 2016*