Ema Dimitrova

ema_dimitrova@brown.edu | (401)-527-1043 | Based in Providence, RI

EDUCATION

BROWN UNIVERSITY **Aug 2023 - May 2027 (Exp.)**
Bachelor of Science (B.Sc.) in Computer Engineering Providence, USA

- *Course focus*:Linear System Analysis, Digital Electronics Systems Design, Real-time Embedded Software, Computer systems
- *Academics:* GPA: 3.80/4.0; Davis United World College Scholar, selected from global cohort (50% tuition covered)
- *Teaching Assistant*: Course Developer UTA for *Introduction to Engineering*; UTA for *Ordinary Differential Equations*
- *Clubs*: Particle Physics Journal Club (Active Member), Women in Engineering (Active Member), Climbing (Active member)

UNITED WORLD COLLEGES (UWC) **Aug 2021 - May 2023**
International Baccalaureate Diploma Programme (IB), 10% grade globally Bosnia & Herzegovina

- *Academics*: GPA 40/45 (Top 10% of students globally)

EXTRACURRICULAR PROJECTS & LEADERSHIP

Sorting Claw – Computer Vision–Controlled Robotics Project

- Built a color-sorting robotic claw utilizing **Raspberry Pi and Arduino**, achieving a **97% object sorting accuracy** rate during rigorous testing and exceeding initial project goals.
- Applied **OpenCV**-based computer vision to classify colored coins, coordinating signals between the Raspberry Pi and servos.
- Calculated load, torque, and mechanical constraints to select servo motors and structural components, achieving stable motion and precise placement into color-designated bins.
- Integrated **embedded hardware and software,** including **servo control firmware** and **Pi-to-Arduino communication**, to ensure smooth operation and system reliability.

Smart Heating Mug — Bare-Metal Embedded Systems Project

- Engineered a **bare-metal heating regulation system** employing **PWM, timer interrupts and watchdog timers** alongside a rotary encoder interface; resulting in responsive and reliable temperature control and **stability within 0.2°C.**
- Implemented **interrupt-driven firmware logic and watchdog timers** to ensure continuous operation and fault-tolerant behavior.
- Designed a **custom PCB** integrating the microcontroller, heating interface, and peripheral connections, supporting **real-time operation** and embedded system scalability.
- **Tested and validated** system performance through **iterative firmware-hardware integration,** improving response accuracy.

Smart Compost Bin – Hackathon at Brown Winner (out of 70+ teams)

- **Led a team of 4 engineers** to design and prototype an automated embedded sensor system tracking compost contributions, communicating and coordinating tasks and ensuring a working demo built from scratch in **under 24 hours.**
- Applied core **circuit design** and embedded systems principles to **integrate sensors, a 4×4 keypad, and an LCD with Arduino** hardware, delivering a **fully functional prototype**.
- Demonstrated resilience and strong communication by working continuously through the 24-hour hackathon to align team deliverables and ensure successful completion.

PROFESSIONAL EXPERIENCE

BROWN UNIVERSITY| Research under Prof. Srinath Sridhar **Jun 2025 – Present**
PCB Design Researcher, BRICS Project Providence, RI

- Collaborated with faculty and peers on camera **hardware prototyping** for the Brown Interaction Capture System (BRICS), supporting the capture of 4D spatial data.
- **Evaluated electronic components**, assessing electrical ratings, size, and system compatibility, enabling assembly of 40 successful prototypes for camera hardware in the BRICS project.
- Developed and assembled **40+ PCBs**, **integrating Wi-Fi modules and ESP microcontrollers** for wireless control and **real-time data transmission** in embedded systems.

CERN & BROWN UNIVERSITY| Research under Prof. Matt LeBlanc **Jan 2025 – Sep 2025**
Research Assistant, Particle Physics Providence, RI

- Built a Julia reimplementation of the SoftKiller algorithm (FastJet) to confirm published results and expand the Julia repository with new methods, achieving **~50% faster runtime than C++ and contributing to CERN's repository.**
- Designed, set up and implemented a **benchmarking algorithm** to assess performance across 100-trial averages on Brown CMS Tier-3 cluster, validating reproducible results at high pileup (noise) levels ($\mu = 1000$).
- Presented findings in person at international physics workshop BOOST 2025 to 100+ peers and physics experts.

TECHNICAL SKILLS

Programming: Python, C/C++, Julia, Java
Embedded/Hardware: Arduino, microcontrollers, sensors, oscilloscopes, circuit design, soldering
Tools & CAD: Git, KiCad, LTspice, MATLAB, LaTeX, Fusion360
FPGA/HDL: Verilog, Quartus Prime, FSMs, simulation & timing analysis