Curriculum Vitae of
Michael B. Parks, PE, CEM
Full-Stack Product Development Engineer | Industrial Artist | Maker | Ethical Hacker
Veteran | Small Business Owner | Technical Writer | Coach | Decent Human Being

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I am a Navy veteran and a pioneering multidisciplinary engineer with an entrepreneurial bent who specializes in blending old-school craftsmanship with modern digital tools to design, engineer, and fabricate bespoke objects (functional and artistic) for my clients. I can tackle just about everything, including mechanical, electrical, electronic, and software/firmware development. My 25 years of experiences as a military officer, small business owner, and maker have led me to my current job as a **creative manufacturing engineer.**

In short, I blend the maker spirit with engineering discipline to turn my client's ideas into tangible, functional objects. Quickly and within budget. I work with my clients throughout the entire development lifecycle, including research & development, conceptual design, rapid prototype, detailed engineering, custom fabrication, low-volume manufacturing, and laboratory & real-world testing. I am proud to have served customers across North America, Europe, Asia, and Africa. Fortune 500 corporations, academic institutions, museums, small businesses, non-profits, startups, and solo entrepreneurs have sought my unique insights and expertise. I was formally trained in embedded electronics engineering, with a focus on Building Automation Systems (BAS), Environmental Monitoring Systems (EMS), Industrial Control Systems (ICS), and the Internet of Things (IoT).

As a leader, I know when to lead and when to get out of the way.

As a polymath, I possess both practical hands-on skills and a penchant for pioneering thinking and experimentation. I also take limited commissions for projects involving photography, writing (technical and fiction), mixed-media art, woodworking, metalworking, and the design/printing of 3D printable and laser-cut objects. I also have a penchant for technical communications in multiple formats, including written, visual presentation, audio, and video. Lastly, I provide career coaching for those in STEM fields and technical leadership positions.

Education:
- U.S. Merchant Marine Academy. Logistics and Intermodal Transportation Major
- University of Maryland, Baltimore County. Bachelor of Science (Cum Laude) in Computer Engineering
- Johns Hopkins University. Master of Science (With Honors) in Systems Engineering

Professional Career:
- **1999-2009**: Sailor, **United States Navy**. Culminating as an active-duty **Naval Officer**.
  - Military Sealift Command (MSC), USNA KISKA (T-AE 35)
  - Naval Facilities Engineering Command (NAVFAC), Production Officer, NAS Key West, FL
  - Naval Air Systems Command (NAVAIR), Environmental Officer (AIR-1.6) and Staff Civil Engineer (AIR-7.10), NAS Patuxent River, MD

- **2009-Present**: **Naval Air Systems Command** (NAVAIR). Currently an NHIV-0801 **Engineer**.
  - NAWCAD, AD-5.3 Weapon Server Common Environment (WSCE), Systems Engineer
  - NAVAIR PEO(A), PMA-205 Top Gun Integrated Training Facility (NAWDC), Systems Engineer
  - NAVAIR HQ, Strategic Planning and Analysis Department, Systems Engineer

- **2012-Present**: **Green Shoe Garage**. Multidisciplinary **Product Design Engineer**.
  - Prototype design, engineering, and fabrication, particularly on embedded electronics products.
  - Conduct cyber and physical security assessments with a focus on the Internet of Things (IoT), Industrial Control Systems (ICS), and Building Automation Systems (BAS).
  - Producer of technically focused digital content and training (blogs, articles, podcasts, videos)
  - Career coaching for those with technical management and engineering executive positions.

- **2022-Present**: **Polymath Design Studio**.Photographer, Craftsman, & Mixed Media **Industrial Artist**.
  - Creating bespoke woodworking, metalworking, and 3D printed objects (artistic and functional) according to client specifications.
  - Innovative photographer with a penchant for serving clients with discerning tastes.

Skill Tree Highlights:
- **Design and Implement Advanced Processes**: Develop innovative manufacturing workflows using tools such as 3D printers, CNC mills, and laser cutters.
- **CAD and CAM Proficiency**: Skilled in tools like Fusion 360 to bridge traditional and modern generative design/parametric manufacturing methods.
- **Integrate Traditional and Modern Techniques**: Combine artisanal woodworking and metalworking methods with digital fabrication tools to create unique, high-quality products that honor craftsmanship while embracing modern efficiency.
- **Prototype and Optimize Designs**: Build and refine prototypes and production-ready products that merge traditional craftsmanship with advanced technology, emphasizing both functionality and aesthetic appeal.
- **Electronics and Smart Integration**: Design and integrate electronics, such as circuit boards and sensors, into traditional and modern products using tools like KiCAD for PCB design alongside microcontrollers (e.g., Arduino, Raspberry Pi).
- **Programming Knowledge**: Familiarity with programming languages such as C, C++, Python/Micropython, Rust, Go, HTML/CSS/Javascript, and VHDL/Verilog to automate processes, enhance workflows, and develop IoT-enabled products.
- **Cybersecurity Expertise**: Understanding of cybersecurity principles to secure IoT-enabled products.
- **Traditional Woodworking Techniques**: Expertise in joinery methods, carving, and finishing to create durable and visually appealing wooden products.

- **Metalworking Expertise**: Proficiency in welding, machining, forging, and sheet metal forming, as well as finishing techniques like polishing and powder coating.
- **Material Science Expertise**: Comprehensive knowledge of woods and metals to optimize designs and processes.
- **Project Leadership**: Manage projects that combine traditional crafting methods, advanced manufacturing, rapid prototyping, and small-batch production.
- **Technical Writing**: Strong ability to document technical processes, produce user manuals, create assembly instructions, and write reports.

Technical Project Experiences:
- Wrote a minimalist netcat and port scanner in the Go programming language.
- Set up numerous WordPress-based websites and hardened them against cyberattacks using Cloudflare solutions.
- Provisioning and managing large-scale IoT networks on various IoT cloud platforms, including Azure, AWS, Google Cloud Platform (GCP), and Medium One.
- Created numerous machine learning (ML) algorithms using the Edge Impulse tool suite. Trained, tested, and deployed multiple convolution neural networks (CNN) to identify keywords in audio samples, object recognition in static photos, and machine operation status based on accelerometer data.
- Knowledgeable of the full OSI stack and associated protocols and standards for embedded development from I2C/SPI/JTAG/UART for onboard interconnect communications to JSON/MQTT/REST/WebSockets for edge-to-cloud communications.
- Experienced in developing custom applications using industrial protocols and standards such as CANbus, Modbus, BACnet, RS485, and RS422.
- Implemented IoT device security leveraging TLS/SSL public-key certificates based on X.509 cryptography for secure communications between IoT edge devices and IoT cloud services.
- Use Docker containers and virtual machines to manage secure computing environments for clients.
- Build out and maintain wired and wireless networks (PAN/LAN/WAN/Mesh) in both IT and OT spaces. Configured routers, switches, wireless APs, and WLAN controllers. Familiar with setting up VPNs, segmented networks, and securing OT/IoT devices, including edge devices and Internet gateways, and use of a variety of protocols, including WiFi, BLE, GSM, ZigBee, LoRa, LTE Cat-M, NB-IoT, and Sigfox.
- Rewired and updated residential and light commercial electrical wiring and troubleshot electrical distribution failures. Upgraded legacy outlets to GFCI/AFCI outlets in older buildings with wiring lacking proper grounds. Replaced failed and added new circuit breakers to breakers.
- Established, operated, and maintained Command and Control (C2) infrastructure for the Hak5 suite of pentesting products using Amazon Web Services and No-IP services. Provisioned devices onto the network and oversaw their deployment, operation, maintenance, and decommissioning,
- Capable of performing vulnerability assessment, penetration tests, and red team engagements to assess and document an organization's security posture concerning cyber, physical, and social engineering attacks. I am trained in various reverse engineering and cybersecurity tactics, techniques, and procedures related to Industrial Control Systems (ICS).
- Adept at implementing side-channel attacks (electron starving, clocking hazards) to bypass security mechanisms in embedded systems to exfiltrate encryption keys.
- A seasoned technical writer who can create, edit, and present technical findings in various formats, including white papers, executive summaries, and in-person and virtual presentations.

Management and Leadership Experiences:
- Managed a $20-million/year public works budget and supervised over 100 civilian and military personnel. Responsibilities included utility and energy analysis, resource budgeting, establishing key

performance metrics, administering environmental and safety programs, management of base support vehicle and equipment program, space allocation planning, union negotiations, long-term capital maintenance planning, and developing statements of work.

- Responsible for a $300-million integrated project list to repair hurricane-damaged facilities at NAS Key West. Led an interdisciplinary rapid damage assessment team tasked with thoroughly documenting all damage to facilities and infrastructure and providing cost and schedule estimates for repair projects.
- Chief Architect conceptual design for major information technology systems, including the Department of the Navy Airfield Safety Waiver web-based tool.
- Supported the divestiture of excess government real property through detailed analysis of facility condition assessments and repair project proposals. Led to the sale of excess real property (Plant Replacement Value ~$1B) to private industry to help encourage private economic growth.
- Established Innovation Cell to identify and analyze potential disrupting infrastructure and facility planning technologies. Spearheaded 3D modeling and laser scanning initiative of RDT&E aircraft hangars to help improve operations analysis and future planning.
- Hand-selected for long-term rotational engineering and program management assignment supporting the Integrated Battlespace Simulation and Test Department, Manned Flight Simulator. Helped support PMA 205 Common Simulation Products Integrated Product Team.
- Delivered over 300 major system improvements to NAVAIR's facilities and safety operations using a web-based tool. Oversaw the delivery of over 25 analytics apps (6 of which are recognized as Command Key Performance Indicators), covering safety and facility topics ranging from inspections, waiver approvals, and mishaps to space allocation, project execution, and material conditions. Reduced the time to complete requirements analysis of new tools by nearly 50% by integrating teams and implementing Human-Centered Design (HCD), Agile, Lean, Kanban, and SCRUM methodologies, replacing older, waterfall, and functionally "silo-ed" methods.

Software Tools Experience:
- **Security and Reverse Engineering:** Wireshark, Fiddler, Metasploit, Aircrack-NG, Bettercap, OWASP ZAP, BeEF, BurpSuite, Ghidra, KillerBee, Wifite, Trufflehog, Social Engineering Toolkit, Gobuster, SAINT, Firmwalker, Princeton IoT Inspector, Expliot Hardware Auditor, Shodan.io, Maltego, John the Ripper, Social Engineering Toolkit, CyberChef, SQLmap, Hashcat, Kismet, Nessus, SNORT, binwalk, Binary Ninja, IO Ninja, nmap, netcat, scapy, wpscan, responder, impacket, inSSIDer, Hak5 C2, and GNUradio. Use security-oriented operating systems like Kali, Parrot, and the Control Things Platform.
- **Media Production:** Adobe Photoshop, Illustrator, Premiere Pro, After Effects, Audacity, Inkscape, Autodesk Sketchbook, Procreate, and Affinity Designer.
- **Electronics Design and Test**: Simulators such as TINA, LTspice, Partsim, and MPLAB Mindi. Schematic and PCB Layout using EagleCAD, KiCAD, Fritzing, Flux.ai, and Altium Designer
- **3D Design:** Fusion 360, OnShape, and SketchUp
- **Software Development**: Visual Studio Code, Eclipse, Atom, PyCharm, Atmel Studio, TI Code Composer Studio, Arduino IDE, Thunkable (iOS and Android apps), MIT Android App Inventor, SquareLine Embedded GUI, MPLAB X IDE, Mu, Postman, MQTT.fx, and HTTP Toolkit. Used tools like GitHub, debuggers, and linters to develop high-quality software rapidly. Familiar with ladder logic programming for industrial applications.
- **Data Visualization Tools:** Qlik, Tableau
- Mathematical/Scientific Computational Environments: MATLAV, GNU Octave, Scilab, Julia.
- **Embedded-oriented Development Frameworks**: Zerynth and Kivy
- **Programming Languages:** C, C++, Python, MicroPython, JavaScript, PHP, Rust, GoLang, R.
- **Office and Project Management Tools**: Microsoft Office, Atlassian Suite including Jira, Google Workspace, Microsoft Project, Primavera, Monday, Shortcut, Slack, Zoom, Microsoft Teams, Zoho Suite, Notion, Parts Box.

Hardware Tools Experience:
- **Desktop Manufacturing Equipment**: Use various manufacturing tools for prototyping and low-volume production runs. Tools include 3D printers, 3D scanners, CNC milling machines, laser cutters, embroidery machines, vinyl cutters, PCB milling machines, and PCB reflow ovens.
- **Woodworking**: Table saw, compound miter saw, bandsaw, drill press, belt sander, scroll saw, circular saw, drills, impact driver, impact wrench, rotary tools, lathes, milling machines
- **Metalworking**: Stick welder, spot welder, flux core arc welder, plasma cutter, waterjet cutter, grinder, milling machines
- **CAM Software**: X-Carve Easel, Fusion 360, Glowforge App, Fire Control, Prusa Slicer, Pronterface, Cricut Design Space, Silhouette Studio, Bantam Tools (OMC).
- **Electronics Test Equipment**: DMM, oscilloscopes, logic analyzers, signal generator, BusPirate, I2C driver, GreatFET, Black Magic Probe, JTAGulator, Analog Discovery 2, Binho, HackRF One, RF Explorer, LoStik, and Tigard.
- **Pentesting Tools**: Rubber Ducky, Wifi Pineapple, Screen Crab, LAN Turtle, Key Croc, Plunder Bug, O.MG cables, Shark Jack, Packet Squirrel, Bash Bunny, Kali Linux-based Raspberry Pi, Hak5 C2 Suite, Expliot Nano, Bus Auditor, Zigbee Auditor, PROXMARK3 KIT (RDV4.01), and ChipWhisperer.
- **Physical Security Tools**: Under Door Tool, thumb door turner, bump keys, locksmithing tools.
- **Microcontroller and FPGA Platforms**: AVR, PIC, MSP430/432, RISC-V, and ARM-based embedded systems. MKR VIDOR FPGA. Various Programmable Logic Controller (PLC) vendors.

Qualifications:
- Licensed Professional Engineer in Maryland (License #33857)
- Certified Energy Manager (CEM, License #22589)
- TRUST-certified Drone Pilot
- DAWIA Level 3 engineering certified and member of the Defense Acquisition Corps
- Graduate of NAVAIR Executive Leadership Development Program
- 2017 Mouser Technical Writer Top 10

Technical Training:
- ICS Active Defense and Incident Response (SANS ICS515)
- Hacker Tools, Techniques, Exploits, and Incident Handling (SANS SEC504)
- ICS/SCADA Security Essentials (SANS ICS410)
- Certified Ethical Hacker
- TryHackMe badges earned: Burp'ed, cat linux.txt, Webbed, World Wide Web, Network Nerd.
- Global Industrial Cyber Security Professional (GICSP), attempting certification in the next 12 months.

Business Management Training:
- Financial and Contract Management (Johns Hopkins)
- Project Planning and Control (Johns Hopkins)
- Software Engineering Management (Johns Hopkins)
- Shaping Smart Business Arrangements (Defense Acquisition University)
- Principles of Contract Pricing (Defense Acquisition University)
- Business Decisions for Contracting (Defense Acquisition University)
- Legal Consideration in Contracting (Defense Acquisition University)
- Improving Project Communications (Defense Acquisition University)
- Earned Value Management (Defense Acquisition University)
- Engineering Change Proposals for Engineers (Defense Acquisition University)
- Six Sigma: Concepts and Processes (Defense Acquisition University)
- System Sustainment Management (Defense Acquisition University)

Random
- Host of the Gears of Resistance Substack/YouTube/Twitch channel
- Co-Founder of Mountain Maryland Makers (M3)
- Writer at large for a variety of trade publications (Mouser, Molex, EECatalog, Make Magazine)
- Licensed amateur radio operator (Extra Class license, N1HNP)
- Member of the National Eagle Scout Association
- Member of the Tau Beta Pi Engineering Honor Society
- Dad to an awesome daughter

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"Wherefore the mere practical architect is not able to assign sufficient reasons for the forms he adopts; and the theoretic architect also fails, grasping the shadow instead of the substance. He who is theoretic as well as practical is therefore doubly armed; able not only to prove the propriety of his design but equally so to carry it into execution."

-Vitruvius