

DAVID DEGROOTE

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Embedded Software | *Embedded Hardware* | *Full Stack Engineer*

Embedded Software: satellite flight software and instrumentation control software **Cloud Computing & Full Stack:** high speed scalable data collection systems **Digital Hardware Design:** high speed parallel data processing for video & graphics displays

TECHNICAL SKILLS

Platforms & Processors Linux, VxWorks, VRTX, MPX, iOS, macOS, Windows, many microprocessors, bit-sliced processors, smart cards, custom kernels

Tools & AWS C, JavaScript, Node.js, PHP, Java, Python, Assembly, SQL, HTML, CSS, VHDL, Verilog, LabView, Joomla, WebStorm, Eclipse, Xcode, EC2, DynamoDB, RDS, Lambda, CloudFormation, API Gateway, CloudFront, S3, VPC, SQS

Hardware & Drivers Xilinx FPGA, Cypress CPLD, TI Digital Micromirror Device (DMD), Analog Devices DSP, Hardware Device Interfacing, Serial Protocols, Parallel Interfaces, PCB Layout

EXPERIENCE HIGHLIGHTS

Principal Software Engineer *Astrobotic Technology* — Pittsburgh, PA 2019 – Present
Developing flight software for commercial lunar landers under NASA's Commercial Lunar Payload Services (CLPS) program.

- Developed flight code for the Peregrine lunar lander, the first US Moon landing attempt in over 50 years (launched January 2024).
- Developing flight code for the Griffin lunar lander, contracted to deliver Astrolab's FLIP rover to the Moon's south pole (targeting launch July 2026).

Principal Embedded Systems Engineer *Symmetric Designs* — State College, PA 1998 – Present
Full stack engineering primarily using Amazon Web Services (AWS). Founded in 1998 for independent product development; became a full-time consulting business in 2006. Developed scalable data collection and processing systems, calendar management tools, iOS applications, and website tools.

- Developed a cloud-based voting system for Boldstream.tv to accurately capture millions of votes per second.
- Created a scalable data collection system for Oberon's IC Sentinel environmental monitor, with backend DynamoDB database for low latency graphic display of large data sets.
- Patented live components, a tool enabling non-programmers to display interactive math equations on websites (patent rights sold in 2006).
- Developed online calendar tools including Stellar Calendar Assistant, a service to synchronize and filter calendars; Calendar Filter, an iOS application; gCalMarkup, a Joomla! extension to filter and display calendars; and Days Until, a website displaying worldwide events and assorted calendars including Hebrew, Islamic, and Chinese.

Principal Engineer *Cinea / Dolby* — Reston, VA 2000 – 2006
Developed image processing hardware for Cinea's movie piracy prevention systems.

- Developed FPGAs to convert real time video into a pulse width modulated binary image sequence for Texas Instruments Digital Micromirror Devices (DMD) and to generate the control signals for the DMDs.
- Reverse engineered commercial projectors to modify DMD control sequences to inject piracy prevention signals.
- Developed a secure encryption key generation application for Cinea's digital movie distribution system, and a DVD serialization system used by DVD manufacturers to generate data for a BCA laser cutter.

ADDITIONAL EXPERIENCE

Principal Software Engineer *Orbital Sciences Corporation (Northrop Grumman) — Dulles, VA*

Developed flight software for three successful satellite systems. Responsible for system design, command and telemetry databases, interface definition and enforcement between spacecraft subsystems and ground stations, fault detection and correction software, multi-satellite configuration, and hardware interface drivers. (VxWorks, VRTX & MPX)

- Core flight software development team member for the Orbcomm global satellite communication network.
- Lead software engineer for APEX, the company's first satellite (Air Force experimental). Supported US Air Force on-orbit operations as technical advisor.
- Team member for Seastar (OrbView 2) earth observation satellite.

Senior Engineer *HRB Systems / Raytheon — State College, PA*

Architected and developed digital hardware and embedded software for signal analysis equipment.

- Designed and authored all firmware, drivers, and custom multitasking kernel for the RTSA radar signal analyzer. Firmware controlled all analysis hardware and front panel display and controls.
- Developed a high-speed graphics processor faster than any available single-chip processor for the Outreach signal processing workstation, including all hardware and related software (microcode, driver, windowing package to draw vectors, shapes & fonts).
- Performed entry, layout, routing, and simulation of two gate arrays to transfer data via fiber optic cable.

EDUCATION

Bachelor of Science in Electrical Engineering — Pennsylvania State University, Centre County, Pennsylvania

PATENTS

Visual Copyright Protection — 7,218,754 | 6,950,532

Live Component System — 7,076,763 | 8,504,988

Environmental Monitoring — 9,311,807 | 9,280,884 | 9,729,945

PERSONAL INTERESTS

Marathons, triathlons, skiing, scuba-diving, yoga, home-automation, science-fiction.