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SUMMARY

As a Senior Software Engineer at HID Global, I lead the development of a ground-up, secure, embedded Linux operating system for a new line of biometric sensors that provide identification and authentication. With 16 years experience developing high-tech commercial products, I have expertise in building custom embedded Linux systems, system security, board bring-up, device drivers, networked applications, communication protocols, algorithms, continuous integration, and code optimization.

I am driven by the challenge and opportunity to work with highly skilled teams of scientists, engineers, and product managers to build cutting edge, high security, products and solutions for a variety of industries. I have a proven track record of delivering innovative and robust solutions that meet customers' needs and expectations, while adhering to the highest standards of quality and performance. I am passionate about learning new technologies and developing a deep and rigorous understanding of them, resulting in novel and enduring solutions.

AREAS OF EXPERTISE

• Leadership/Soft Skills: Cross-Disciplinary Team Work, Technical Documentation, Intellectual Curiosity, Adaptability and Flexibility, Critical Thinking, Complex Problem Solving, Strategic Planning, Long Term Vision and Planning, Product Management, Requirements Analysis, System Architecture, Detail Oriented.

• Technical/Hard Skills: C, C++, Edge Computing, C#, MATLAB, Bash, Perl, MySQL, SQLite, gdb, JTAG, gcc, cmake, cross toolchains, Linux, RTOS, embedded Linux, u-boot, device trees, device drivers, BSP, secure boot, high assurance boot, dm-verity, sysinit, busybox, Linux Gadgets, V4L2, WSL2, VirtualBox, Gentoo, LFS, Ubuntu, Yocto, git, github, subversion, openssl, ssh, JX-F22 camera, UART, RS-232, GPIO, I2S, I2C, CAN, Sockets, TCP, UDP, Jenkins, Agile, Jira, Confluence, Visual Studio, Atmel Studio, Arm, Arm TrustZone, Trusted Execution Environment, OPTEE, NXP CAAM/SNVS security, fuses, anti-tamper, NXP I.MX SoM, AVR32, MPC5200, AT32UC3C, Apache, AJAX, css, html, JSON, Continuous Integration, DevOps, DNS, Bind, TLS, iptables, sed, awk, Active Directory, Samba, DFS, CIFS.

EDUCATION

• Master's of Science in Computer Science, University of New Mexico (4.0/4.0 GPA)
• Bachelor's of Science in Physics, Gettysburg College (3.9/4.0 GPA)

HID Global, Senior Software Engineer, Jun 2019 - Oct 2023

• Principal architect of the embedded Linux OS for a new line of globally marketed biometric sensors, expanding the existing product line from simple streaming sensors to secure, edge computing, end-points with greater host compatibility and performance.
• Lead initial risk reduction efforts, in collaboration with EEs, via rapid BSP development, board bring-up, and testing all critical hardware elements including eMMC, RAM, PHY, V4L2 imaging sensor, watchdog, tamper, USB, and hardware security.
• Lead development of the bootloader, implementing device trees, defconfigs, boot commands, secure update scripts, and boot counters stored on battery-backed GPRs within a globally static u-boot environment.
• Lead development of the Linux kernel, implementing device trees, defconfigs, on-board camera driver, USB bulk transfer gadget, OPTEE secure execution environment, sysinit, and system scripts.
• Lead system security requirements definition, implementing crypto blobs, zeroizable and OTP master keys, tamper and secure storage features, secure boot, on-chip security, and extended chain of trust.
• Architected a scalable Yocto build system to reproduce end-to-end builds supporting multiple simultaneous: hosts/Yocto versions, hardware targets, board revisions, and rootfs use cases, all designed for continuous integration with upstream open-source and local application software.
• Designed and implemented a secure OS update process incorporating both high assurance boot, dual boot, dual OS behaviors, and with catastrophic recovery options.

• Worked with software and global manufacturing teams to design and debug the manufacturing bootstrap flow.
• Developed the product's camera driver within the V4L2 framework, associated user libraries, and test applications. Developed various control and test applications, and numerous system scripts.

TruTouch Technologies, Inc., Director of Software Development, Mar 2013 - Nov 2018

• Principal architect for the embedded Linux OS, software, algorithms, and hardware interfaces.
• Worked with electrical and optical engineers to redesign the platform targeting a solid-state, bare metal, implementation, reducing size, complexity, and cost, while increasing ruggedness for integration into automobiles in collaboration with the NHTSA driver alcohol detection system for safety research program.
• Developed bare-metal software running on two ARM AT32UC3C SoCs for command and control over new solid state devices in development for integration in automotive applications, along with internal and external communication protocols and data transfer.
• Developed and standardized communication protocols over RS-232, CAN, and GPIO lines, connecting various system components, for both development and production use.
• Developed data collection software to integrate with new solid state devices.
• Worked with 3rd party developers to update older generation instruments with a connected cloud infrastructure for enterprise deployment, integration with time management systems, and networked reporting features.
• Added investigative support to instrumentation for measuring hydration state.

VeraLight, Inc., Research Scientist & Scientific Programmer, Jun 2011 - Jan 2013

• Worked with data scientists and engineers to define requirements for a large scale computing cluster used to build models and analyze data for novel biomedical instrumentation used to measure diabetes progression.
• Improved computing cluster performance by an order of magnitude by implementing intermediate, generalized, caching, across a suite of algorithms.
• Built out and improved the computing cluster including node management, network performance, data storage, and MySQL database performance.
• Optimized and standardized user friendly front-ends to the computing cluster, including AJAX based web front-end for monitoring and controlling the cluster.
• Designed and implemented the back-end server that managed the system and associated data.

TruTouch Technologies, Inc., Senior Software Engineer, Jul 2005 - May 2011

• Principal architect for the embedded Linux RTOS and related software for the world’s first non-invasive alcohol monitor winning TIME magazine's Best Inventions of 2006.
• Improved core interferometer algorithm performance by an order of magnitude by reducing the computational complexity of the primary spline interpolation algorithm from O(N^2) to O(N) for our specific use case. This enabled a massive reduction in the hardware requirements, power consumption, system design, and allowed for real-time interferogram processing on a modest MPC5200 RISC processor.
• Investigated the viability of using a Linux/RTAI operating system for real-time interferometer control and processing using the aforementioned interpolation efficiency improvements.
• Developed a custom LFS build system supporting running Linux/RTAI on an MPC5200.
• Responsible for initial board bring-up supporting eMMC, networking, I2S, RS-232, JTAG.
• Architected the OS, interprocess comm, sysinit, system update, supporting three generations of instruments.
• Managed all DevOps, revision control, processes, integration with manufacturing, testing, and software dev.
• Developed a stateful system health monitor with self assessment.
• Developed a suite of windows applications to control and collect clinical data for all instrument generations.
• Designed, implemented, and managed a hybrid Linux/Windows Domain and intranet.

Publications

• T. Ridder, B. Ver Steeg, B. Laaksonen, W. Radigan, "Robust Calibration Transfer in Noninvasive Ethanol Measurements, Part II: Modification of Instrument Measurements by Incorporation of Expert Knowledge (MIMIK)," Applied Spectroscopy, 68, 865-878 (2014).

• T. Ridder, E. Hull, B. Ver Steeg, B. Laaksonen, "Comparison of spectroscopically measured finger and forearm tissue ethanol concentration to blood and breath ethanol measurements," Journal of Journal of Biomedical Optics, 16(2), (2011).
• T. Ridder, B. Ver Steeg, B. Laaksonen, "Comparison of spectroscopically measured tissue alcohol concentration to blood and breath alcohol measurements," Journal of Journal of Biomedical Optics, 14(5), (2009).
• A. Krishnamurthi, D. Terndrup, M. Pinsonneault, K. Sellgren, J. Stauffer, R. Schild, D. Backman, K. Beisser, D. Dahari, A. Dasgupta, J. Hagelgans, M. Seeds, R. Anand, B. Laaksonen, L. Marschall, T. Ramseyer, "New Rotation Periods in the Pleiades: Interpreting Activity Indicators," The Astrophysical Journal, 493, pp. 914-925, (1998).
• S. Allain, J. Bouvier, C. Prosser, L. Marschall, B. Laaksonen, "Rotational periods and starspot activity of young solar-type dwarfs in the open cluster IC4665," Astronomy and Astrophysics, 305, pp. 498-506, (1996).
• G. Burks, P. Clark, B. Laaksonen, "Astronomy in Cyberspace, an Experiment: the Online Journal of Astronomy Education," American Astronomical Society Meeting, 187, #05.01, (1995).
• M. Richmond, R. Treffers, A. Filippenko, S. van Dyk, Y. Paik, C. Peng, L. Marschall, B. Laaksonen, B. Macintosh, I. McLean, "UBVRI Photometry of the Type Ia SN 1994D in NGC 4526," The Astrophysical Journal, 109(5), pp. 2121-33, (1995).
• C. Prosser, M. Shetrone, A. Dasgupta, D. Backman, B. Laaksonen, S. Baker, L. Marschall, B. Whitney, K. Kuijken, J. Stauffer, "Rotation Periods of Open-Cluster Stars. III.," Publications of the Astronomical Society of the Pacific, 107(709), pp. 211-18, (1995).
• B. Laaksonen, W. Romanishin, L. Marschall, "BVRI Photometry of supernovae 1993G, 1994D, 1994I, 1994M, 1994S, and 1994Q," American Astronomical Society Meeting, 185, #79.13, (1995).
• C. Prosser, M. Shetrone, E. Marilli, S. Catalano, S. Williams, D. Backman, B. Laaksonen, V. Adige, L. Marschall, J. Stauffer, "Rotation Periods of Open-Cluster Stars. II.," Publications of the Astronomical Society of the Pacific, 105(694), pp. 1407-14, (1993).

Intellectual Property

• Trent Ridder, Ben Ver Steeg, Mike Mills, Bentley Laaksonen, Bill Kardeen, "Methods and Apparatuses for Improved Breath Alcohol Testing," U.S. Patent Application 13/008,000.
• Trent Ridder, Ben Ver Steeg, Mike Mills, Bentley Laaksonen, "System for Noninvasive Determination of Alcohol in Tissue," WO/2010/085716, PCT/US2010/021898.
• Trent Ridder, Ben Ver Steeg, James McNally, John Maynard, Russell Abbink, Mike Mills, Bentley Laaksonen, "System for Noninvasive Determination of Analytes in Tissue," U.S. Patent Application 2010-0010325.