Curt Henrichs

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Embedded System Engineer

Analytical and tech-savvy professional with substantial experience in embedded system engineering, software development, project management, human-robot interaction, electronics design, QA, and manufacturing operations. Skilled in FPGA / SoC firmware development and maintenance. Competent in bare-metal and RTOS embedded C programming, architected multiple firmware libraries, and knowledgeable in multiple programming languages/frameworks. Broad knowledge of development, production, testing, and maintenance of embedded systems to mitigate potential issues, provide system-level support, and collaborate with cross-functional teams. Adept at troubleshooting technical issues, reviewing code, technical documents, and schematics as well as implementing technical human-robot research projects. Outstanding ability to gather and translate complex user requirements into practical and cost-effective hardware/software solutions.

Areas of Expertise

- Embedded Systems
- Firmware Maintenance
- Software Engineering
- Web Development
- Collaborative Robotics (Cobots)
- FPGAs, SoCs, & Microcontrollers
- Linux Operating System
- Real-time Operating Systems (RTOS)
- Research & Development
- Robot Operating System (ROS)
- Programming Languages
- Problem Resolution

Technical Proficiencies:

C/C++ | Arduino | Atmel/Microchip | Xilinx Vitis/Vivado | Linux | Python | Git | Robotics | ROS (Robot Operating System) | React Angular | Java | Node.js | MATLAB | VHDL | Verilog | Assembly | MongoDB | Git | JavaScript | Embedded C | FreeRTOS

Professional Experience

Integrated Dynamic Electron Solutions, Inc. Pleasanton, CA **2021 - Present**
Senior Embedded System Engineer (2022 – Present)
Oversee existing hardware/firmware shipped to customers and collaborate with coworkers at parent company JEOL Ltd. Assist in hiring and onboarding process for manufacturing and software engineers. Provide documentation, training, and support on electronics manufacturing processes, with attention to improving QA. Aided in standardizing packing procedures and training logistics specialists on IDES latest processes. In addition, continued duties of firmware engineer role.

- Improved employees' skills by delivering training on manufacturing engineering, electronics engineering, and testing.
- Transitioned Xilinx codebase to support Zynq z7020 and Ultrascale+ variants in addition to existing z7030 SoC.
- Selected electronic components for next generation of and developed the firmware to support these changes.
- Extensive focus on testing of existing and new firmware / software projects.
- Developed new user interface product from requirements analysis through PCBA layout, firmware development, USB driver implementation, and integration into existing software product system.

Firmware Engineer 2021 - 2022
Created voltage control firmware for flagship Movie-Mode product (MM-DTEM) based on Xilinx Zynq z7030 SoC. Led hardware bring-ups and assisted in R&D embedded tasks. Maintained and extended existing firmware. Engaged in formulating Nvidia Jetson Xaiver system images with AverMedia for production of IDES Acuity Edge platform. Worked on user-facing software in Python that interfaces with various hardware products. Developed R&D and production EDM, Relativity, and numerous electronic components. Wrote extensive engineering and manufacturing documentation for electronic subsystems. Carried out manufacturing tasks for electronic systems in IDES products.

- Expanded current C/C++ firmware for Atmel/Microchip and Xilinx embedded systems.
- Supported ECAD development tasks and PCBA / component procurement.

University of Wisconsin - Madison, Madison, WI **2019 – 2021**
Graduate Research Assistant ~ People and Robots Lab, Computer Sciences
Brought up and documented following devices: Universal Robots UR3e, Microsoft Hololens 1 & 2. Collaborated with several colleagues outside of the lab (in Human Factors and Optimization) to examine the effectiveness of cobot by analyzing a variety of manual work activities. Participated in different lab infrastructure/processes and maintained centralized robot description and configuration repository for lab.

- Tested and revised Robotiq gripper ROS drivers for colleagues under paper deadline.
- Designed collaborative robot (cobot) authoring and training interfaces (Author, CoFrame) using web technologies; React / Angular with ROS backend.
- Investigated interactions with cobots for both attention management (pRAD) and task interdependence.
- Used grounded theory analysis on participant interviews to generate design suggestions for future implementations.

Dedicated Computing, Waukesha, WI **2016 – 2018**
R&D Software Engineering Intern

Engaged in development of embedded C/C++ firmware. Prototyped server subsystems, including Matrix Storage, OLED Node Display, and Fan Controller. Leveraged Python to link embedded devices into the server control software.

- Devised internal hardware testing infrastructure (Thermal Chamber) using NodeJS, Python, and MongoDB.
- Facilitated product life-cycle documentation for design, implementation, and testing.

Education & Credentials

M.S. in Computer Science ~ Emphasis: HCI / HRI
University of Wisconsin - Madison, Madison, WI 2021 GPA: 3.6 / 4.0
Coursework: High-Performance Computing | Adv. Computer Architecture | Human-Computer Interaction Wearables | User Modeling | Data Visualization | Artificial Intelligence | Machine Learning | Computer Vision

B.S. in Computer Engineering ~ Emphasis: Embedded Systems
Milwaukee School of Engineering, Milwaukee, WI 2018 GPA: 3.9 / 4.0
Coursework: Business / Management | Entrepreneurship | Ethics for Mgmt. and Eng. | Embedded Systems | Computer Architecture | Digital / Analog Circuits | Control Systems | Digital Signal Processing | Computer Networking | Software Development | Operating Systems | Data Structures | Computer Vision | Neural Networks | Computer Graphics

Key Projects

Multi-Purpose Control Knob ~ USB User Interface Peripheral for Microscopy
- Designed and implemented a USB connected user interface peripheral from requirements to first article.
- Custom vender class driver to manage image streaming to embedded OLED displays and animation table control.

Synchrony / MM-DTEM ~ Xilinx SOC Firmware Development
- Wrote SCPI voltage instrument control service; controls high-voltage deflector drivers.
- Switched to FreeRTOS and utilized second core as an onboard application-specific accelerator.
- Implemented AXI DMA improving transfer from DDR to BRAM by 10x for DPG application.
- Designed unified firmware across hardware variants.

EDM / Relativity Systems ~ Atmel / Microchip Firmware Development
- Selected microcontrollers, ethernet controllers, and I2C components for upgraded revisions of existing products.
- Developed and maintained firmware solutions with minimal rework risk for electronics components.
- Extensive documentation and project management using Atlassian Confluence / Jira.
- Maintained Python drivers for IDES hardware products.

CoFrame ~ Cobot Training Environment
- Created custom domain language for cobot behavior that elicits student's learning goals.
- Designed React web application with ROS backend and a PyBullet simulation.
- Investigated Microsoft Hololens as Alternative XR interface.

Automated Thermal Chamber Testing ~ *Several Test & Measurement Subsystems:*
- Unit-Under-Test state scraper captures CPU and GPU configuration/sensor values with NodeJS.
- Thermal Chamber control server, written in NodeJS, issues low-level TCP byte commands to hardware.
- Thermocouple monitor service running on NI cRIO.

Matrix Storage ~ Server Backplane Controller
- Created controller firmware with Atmel embedded C as well as connected firmware to Python application.
- Integrated PSU and fan control plus environmental sensing for Linux main node on the system bus.

Additional projects shared upon request.