DMITRII GUSEV

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TECHNICAL SKILLS:

Programming: C, C++, Python, MATLAB, Assembly

Frameworks & Tools: ROS/ROS2, RViz, Moveit2, OpenCV, Pants, Make, CMake, GCC, GDB, Git, GitHub, Isaac Sim, DeepStream

Firmware Development: Object-Oriented Programming (OOP), Test-Driven Development (TDD), Agile, Event & Interrupt Handling

Platforms: FreeRTOS, Linux (Debian & Red Hat), Docker & Podman, Kubernetes, QEMU & KVM (+VFIO), ARM, AVR, Xtensa

Hardware: NVIDIA Jetson, ESP32, STM32, JTAG, SWD, OpenOCD, SPI, I2C, UART, Modbus, Wi-Fi, Bluetooth LE, PCIe, EtherCAT, CAN

Electrical & Lab Equipment: Altium, LTSpice, Soldering, Multimeter, Oscilloscope, Logic Analyzer

WORK EXPERIENCE:

IndustrialNext   **Robotics Integration Engineer**   **September 2022 – Present**

- Introduced a load-cell controlled by the ESP32 u-controller allowing to achieve sub-mm precision of the robot hand task
- Programmed FreeRTOS-based C firmware for the ESP32 to send load-cell data via CAN bus to the upstream system
- Architected and engineered IEC61131 compliant digital IO module PCB using ESP32 and multiple MAX14906 via SPI daisy-chain
- Collaborated closely with electrical team on the bring-up of a custom Jetson board: power sequencing and Image Signal Processor
- Upgraded company's C++ camera software stack with the dual imager GStreamer pipeline support
- Designed multiple automated robotic solutions in Python and C++ for the pick-and-place operations using ROS2
- Developed motion planning for the robot hand applications using MoveIt2 and C++ for the time critical application
- Achieved the desired cycle time using STOMP algorithm and trajectory optimization via Curvature Corrected Moving Average
- Provided production critical bugfixes for ROS2 Foxy in C++ and ROS2 Python state-machine library
- Implemented driver written in Python for the Advantech industrial IO and PWM control over Modbus-TCP
- Led the implementation of the robot digital twin written in C++ and coordinated development with machine learning team
- Contributed to the company's core software IP implementing multithreaded code for data processing and error handling
- Executed multimillion-dollar deployment of the CV/ML application at Dell laptop assembly line using Kubernetes
- Collaborated with stakeholders and clients across Asia and the US responding to changing business and technical conditions

Tesla   **Manufacturing Controls Software Engineer**   **September 2021 – September 2022**

- Designed controls software (Structured Text) for the 4680-battery terminal installation machines at GigaTexas
- Demonstrated AGILE methodologies and best practices for software engineering team, actively participated in design reviews
- Architected and led the implementation of the laser marking systems for the 4680-battery manufacturing lines at GigaTexas
- Conceptualized and developed internal tools in Python automating PLC code maintenance saving 20+ hrs./engineer/month
- Established research targeting evaluation of the TwinCAT/BSD and SOEM driver to replace Windows-based controls
- Introduced MATLAB-based tool for one-click torque calibration of the Beckhoff VFD drives installed on the factory line
- Commissioned equipment for the 4680-battery lines achieving desired performance within strict deadlines
- Recruited and mentored software engineering interns at the battery cell manufacturing team fostering their professional growth

Tesla   **Manufacturing Controls Engineer Intern**   **September 2020 – December 2020**

- Validated newly developed internal Beckhoff PLC programming methodology and programmed a battery sorting machine

Tesla   **Embedded Robotics Engineer Intern**   **January 2019 – August 2019**

- Designed a PCB with ESP32 and CAN (MCP2515) for the addressable safety light control and programmed FreeRTOS C firmware
- Developed C++ ROS nodes for the Tesla AGV platform: line sensing, safety lights and fleet management integration
- Introduced a bugfix for the C++ firmware of the Model 3 FPD Link III to HDMI board touch screen to USB-HID behavior
- Programmed firmware in C of the STM32-based power distribution board used on Tesla AGV platform
- Implemented QR code detection using OpenCV and Python at Fremont Factory and reduced storage conveyor downtime by 50%
- Established a new computer vision process at the factory allowing to save up to $5000 per incoming delivery truck
- Prototyped autonomous traffic light system for the human-to-AGV interaction at Gigafactory1 using Python and Raspberry Pi
- Coordinated third-party vendors on the implementation of the truck yard tracking using Zigbee-based hardware

Resume showcases only relevant work experience. Full portfolio and references are available upon request.

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Dynamic Attractions   *Controls Software Engineer Intern*   *September 2018 – December 2018*
- Implemented magnetic line tracking system for the prototype rollercoaster using STM32 microcontroller and RoboteQ sensor
- Programmed C firmware for the ADC sensor reading and sending data to the upstream PLC via RS-232
- Programmed updates for the various PLC ladder logic programs for the Siemens S7-based systems

Electra Meccanica   *Embedded Vehicle Engineer Intern*   *April 2018 – September 2018*
- Designed FMVSS108 certification test jig using Arduino Mega2560 implementing relay control and SD card logging
- Developed a vehicle harness test jig using Arduino Mega2560 allowing to increase OEE of the vehicle manufacturing line
- Performed >30 hours of dyno testing and optimized the BMS firmware behavior resulting in up to 10% NEDC range increase
- Created STM32-based board to read State of Charge via CAN bus and display it on analog fuel gauge using I2C potentiometer

PERSONAL ENGINEERING PROJECTS:

Open-Source AR Headset   *Project Lead*   *May 2024 – Present*
- Architected software based on micro-services approach and various Linux APIs as well as baseline electrical architecture
- Designed Python SDK for the stereo vision (OpenCV), IMU, framebuffer (NumPy), IPC (ZeroMQ) and hand tracking (TensorFlow)
- Coordinated a team of 3 software engineers to design and validate new software features
- Produced two AR headsets based on Orange Pi and Nvidia Jetson using off-the-shelf components and 3D-printer

Lego Motor Controller Board   *Embedded Engineer*   *2022*
- Architected DIY alternative remote-control board for the Lego Power Functions motors using ESP32 u-controller
- Designed a 4-layer PCB with ESP32, DRV8833 drivers, CP2104 UART bridge, MCP23017 I2C IO expander and a battery balancer
- Developed firmware in C to control motors using Bluetooth HID input utilizing both dual-core and sleep functionality of the ESP32

Asteroids Game   *Embedded Engineer*   *2021*
- Built Atari Asteroids game clone using TI TM4C123GXL, Nokia 5110 LCD screen, MCP2221A UART bridge and analog joystick
- Programmed efficient firmware in C using open source libopencm3 low-level toolkit utilizing ADC and UART peripherals

Autonomous Mobile Robot   *Embedded Robotics Engineer*   *August 2019 – August 2021*
- Architected entire electrical system for the Capstone Autonomous Mobile Robot project targeting modularity and scalability
- Designed multiple PCBs in Altium: BLDC Motor Driver, Safety Watchdog Controller, Li+ Balancer and Power Delivery Controller
- Engineered circuits for 10/100 Ethernet PHYs, USB-OTG, current and voltage monitoring via ADC and power rail sequencing
- Developed FreeRTOS-based firmware for every ESP32-based PCB and implemented ROS Serial communication via UART

Hacked Nvidia vBIOS   *Hacker*   *2021*
- Analyzed vBIOS binary code using HxD software and introduced custom hexadecimal entries based on the conducted research
- Reversed engineered vBIOS SPI circuit on the Nvidia GK104-based PCB and manually re-flashed vBIOS using CH341 board
- Hacked Tesla K10 as dual Quadro K5000 and enabled 3D graphics APIs along with NVENC when running under Linux KVM

Custom 8051 Board   *Electrical Engineer*   *2019*
- Coordinated with university professor and architected 8051-based PCB to be used for the MSE352 course at the SFU
- Implemented ATmega328p for ISP flashing of the AT89S52 u-controller and achieved 70% reduction of the board price
- Wrote Assembly code for 8051 and validated entire course material currently used to teach microcontroller programming

EDUCATION:

Simon Fraser University   *2021*

Bachelor of Applied Science. Mechatronic Systems Engineering. Dean's Honour Roll (2021).
Team "Phantom": SFU Formula SAE Electric – Lead Battery Pack Engineer (2016 - 2019)

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