Sulav Lal Shrestha

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Skills Summary

- **Programming**: C, C++, Python, Bash, Design Patterns, Object Oriented Programming, Distributed Computing
- **Tools & Framworks**: GMock/GTest, Git, BlueZ, Docker, gRPC, American Fuzzy Logic (AFL), KLEE
- **Embedded Systems**: Microcontroller Programming, Embedded Linux, FreeRTOS, Azure RTOS, NetX network stack, lightweight Internet Protocol (lwIP) network stack (TCP/IP, DHCP, SNTP, Ethernet/IP), Hardware Interfaces (I2C, UART, SPI, CAN)

Experience

- **Molex - Advanced Technology Team** — Waterloo, Canada
  Research Student, Embedded Software Developer — *Sep 2022 - Apr 2023*
  - **Ethernet/IP Prototype**: Developed Ethernet/IP application on Beaglebone Black (Cortex-A8) and LaunchPad AM243x (Cortex-R5) for two RTOSes - FreeRTOS and Azure RTOS using lightweight IP (lwIP) network stack. Utilized FreeRTOS compatibility layer in Azure RTOS.
  - Optimized and determined the maximum number of Exclusive Owner (EO) connections supported by the chosen platform without violating the jitter requirements of <10% of Requested Packet Interval (RPI).
- **Yatri Design Studio Pvt Ltd** — Kathmandu, Nepal
  Embedded Software Developer — *Jul 2019 - Mar 2021*
  - **Vehicle Dashboard**: Developed vehicle dashboard prototype based on Raspberry Pi 4 for an electric bike. Implemented the user interface using HTML-CSS-JavaScript and Python. Developed Bluetooth Low Energy application based on BlueZ and basic vehicle positioning based on Mapbox. Created Linux SystemD services and communicated with other services using DBUS. Integrated peripherals and sensors with I2C, SPI, CAN, interfaces.
  - Completed the dashboard prototype (minimum viable product) development within 4 months of joining the team, leading to successful product demo and startup fundraiser event.
  - Identified automotive-grade components for vehicle dashboard which are deployed in Electric Bike - Project One, resulting in a 15-20% increase in the quality of the dashboard.
- **Harman International** — Bangalore, India
  Associate Software Developer — *Sep 2017 - Jul 2019*
  - **Vehicle Infotainment System**: Implemented Audio Presentation Layer using C++ and Franca Interface Definition Language for an Embedded Linux based OS (built using Yocto Build System) in a vehicle infotainment system. Debugged code using GMock/GTest and Bash Scripting for testing.
  - Resolved 90% of domain-specific bugs leading to successful delivery of the product on schedule.
  - Automated tests, saving two hours of testing done twice every week.

Education

- **University of Waterloo** — Waterloo, Canada
  Master of Applied Science - Electrical and Computer Engineering; GPA: 95.6% — *May 2021 - August 2023*

  Relevant Courses: Software Testing, Quality Assurance and Maintenance • Software Reliability Engineering • Data and Knowledge Modelling and Analysis • Distributed Systems • Computer Network Security • Embedded Software • Operating Systems • Real-Time Operating Systems

Projects

- **Microcontroller firmware - Research Student, Real-Time Embedded Systems Lab, UWaterloo**: Implemented Azure RTOS (ThreadX, NetX Duo) based firmware for collecting sampled analog data and publishing to Azure Edge using MQTT for storage and analysis. Used SNTP for time synchronization. Developed a bootloader to support firmware updates using HTTPS server. (Sep 2021 - Aug 2022)
- **Nano-Satellite Firmware - Undergraduate Final Year Project, Nitte Meenakshi Institute of Technology**: Implemented nano-satellite firmware related to Attitude Determination and Control System (ADCS) on STM32F4-Discovery microcontroller using FreeRTOS. Implemented ADCS algorithm using CMSIS DSP library to accelerate matrix multiplication. Integrated magnetometer and GPS sensors. (May 2016 - May 2017)

Publications

- **Conference Paper - Metasploit for Cyber-Physical Security Testing with Real-Time Constraints**: 4th International Conference on Science of Cyber Security, Matsue Japan. Tech: C, Ruby, Metasploit, Linux, Controller Area Network (CAN) (Sep 2022) *Link*
- **Conference Paper - A Strategic Methodology for 2D Map Building In Indoor Environment**: 2015 1st International Conference on Next Generation Computing Technologies (NGCT). Tech: MBed LPC1768 microcontroller, C (Sep 2015) *Link*