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 WebUI using HTML-CSS-JavaScript and Python. Developed Bluez based Bluetooth Low Energy application and Mapbox-based basic vehicle positioning. Created Linux SystemD services and communicated with other services using DBUS. Integrated peripherals and sensors with I2C, SPI, CAN, interfaces.
  - Led and completed the dashboard prototype development for startup fundraiser.
  - Identified automotive-grade components for vehicle dashboard which are deployed in Electric Bike - Project One
- **Harman International** — Bangalore, India
  Associate Software Developer — *Sep 2017 - Jul 2019*
  - **Vehicle Infotainment System**: Implemented Audio Presentation Layer using C++ and Franca Interface Defintion 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 bugs leading to successful delivery of the product on schedule.
  - Automated tests to save two hours of testing that was 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*

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

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*