

Emil M George

Software Design Engineer

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SUMMARY

Software engineer with 6+ years of experience in designing and developing software for different clients. Exposed to diverse technical areas/projects such as real time firmware, bootloaders, bluetooth, machine learning, desktop applications etc. Open to learning and working with new languages/frameworks/tools.

WORK HISTORY

Senior Embedded Software Engineer -- Digital Core Technologies Pvt. Ltd

Kochi, India | July 2017 – January 2024 (6.5 years)

SKILLS AND KNOWLEDGE

- **Software Design:** Designing and building robust, modular, maintainable software systems. Experienced in developing embedded software (baremetal / RTOS / Linux) as well as GUI applications.
- Good **analytical thinking** and problem solving skills.
- **Programming Languages:** Fluent in C, comfortable with Modern C++, Python. Some exposure to C#, Javascript / NodeJS, Rust.
- **Microcontroller Firmware:** Experience in developing FreeRTOS-based firmware. Familiar with NXP, STM32, Nordic SDKs/dev tools.
- **Bootloader:** Familiarity in working with U-Boot source – ARMv8 multi-core bootup, ensuring cache coherency. familiarity with U-Boot's Mass Storage, FatFS drivers.
- **Yocto:** Experience in working with Yocto - Adding machines, layers and recipes, patching recipes etc.
- **Interfaces and Protocols:** Experience with I2C, SPI, UART (TTL / RS485) interfaces. Familiarity with interfacing Modbus devices, MQTT for cloud comm. / IoT, etc.
- **Bluetooth:** Experience in developing Bluetooth devices using Nordic nRF52, TI CC26xx processors.
- **Linux Kernel:** Familiarity in working with kernel source code, modifying kernel drivers, device tree etc.
- **DSA:** Knowledge of basic data structures and algorithms.
- **Machine Learning:** Familiarity in training object detection models, inference on Nvidia GPU. Basic understanding of YOLO object detection network.
- **Software Dev Tools:** Experience in using language servers, debuggers, memory analysers.
- **Hardware:** Reading and understanding circuit schematics. Using Logic analyser for debugging.
- **Design and Documentation:** Experience with documentation using UML diagrams (PlantUML / drawIO etc.).
- **SCM:** Proficient in version control using Git, Familiar with code review on Gerrit, Gitlab, Github.
- **Teamwork:** Experience in working and communicating within cross-functional teams of members from software, hardware, QA backgrounds.

PROFESSIONAL PROJECTS

Multicore USB Encryption Application in U-Boot

Design and development of a device firmware that performs multi-core encryption of files on a USB drive. The device consists of a Xilinx ZynqMP board with a modified U-Boot firmware.

- Added multi core boot-up to U-Boot using PSCI, stack setup in Assembly. Verified cache coherency across cores. Implemented baremetal atomics and mutexes using LL/SC assembly instructions.
- Modified the U-Boot USB Mass Storage driver to flush USB drive caches (SCSI Sync Cache command).
- Gained familiarity of U-Boot codebase, ELF executable format and loading.
- Led two trainees in the design and development of the firmware.

Energy Management IoT Device

Development of an IoT device used for electrical energy monitoring+control, as well as its ecosystem of supported sensors (Modbus, Bluetooth etc.).

- Design and development of a Cortex M0+ (NXP KE15Z) microcontroller firmware in FreeRTOS that reads values from a dozen I2C/SPI sensor ICs, controls electrical loads, captures electrical signature etc.
- Development of a linux application in C that accumulates, processes and sends data from various sources to a cloud application in JSON over MQTT format. Also used a local SQLite database for persistence of data in case of network / power failure.
- Interfacing Modbus RTU devices from C application.
- Added driver support in NXP i.MX6 kernel for controlling an RS485 transceiver in half-duplex mode.
- Developed BLE firmware for a battery-operated temp/humidity/light sensor device. Optimised power usage to run on a coin cell battery.
- Wrote library to parse raw BLE mesh packets, decrypt and extract contained values.
- Mentored juniors in various development tasks.

IR Imaging Sensor Module

Development of an 80x64 px IR imaging module software on a custom STM32 board with additional features.

- Designed and developed FreeRTOS firmware for reading frames from a SPI thermal image sensor, processing them and transferring them via STM's USB CDC-ACM stack to the host.
- Supported the customer regarding various queries, feature changes.
- Developed python script to aid analysis of pixel temperature data, plot images, calibrate offsets etc.

Object Detection in Far IR Thermal Camera Images

Exploration of object detection in far-IR thermal images using neural networks.

- Explored hardware acceleration of neural networks in Embedded Devices - Google Coral, Nvidia Jetson Nano, Microchip VectorBlox.
- Implemented object detection using YOLO on thermal images.

Aircraft Transponder Wireless Test Interface

Development of a wireless configuration interface for an existing transponder.

- Ported a C# WPF desktop application to Android/iOS using Xamarin. Also added various features.
- Developed a Lua firmware on ESP8266 to add WiFi interface for a transponder using its serial interface.

EDUCATION

Cochin University of Science And Technology (CUSAT)

B. Tech - Electronics and Communication Engineering | Kochi, India | 2013 – 2017

(College: Toc H Institute of Science and Technology)

Kendriya Vidyalaya

High School - Computer Science, Math | Kochi, India | 2012

CERTIFICATIONS

Object Oriented Programming using C++

NIIT Limited - July 2009

Certificate in Developing Applications Using Core JAVA

NIIT Limited - July 2009