

# HENRIQUE AWOYAMA KLEIN

Computer Engineer



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## SUMMARY

Software Developer with 9+ years of experience in embedded systems development.  
Acted as technical leader for an agile team.  
Recent experience as a Product Owner.

## EMPLOYMENT HISTORY

2022 – Present

### Embedded C++ Tech Lead

DBServer - AEL Sistemas S/A

- (1) Designer and main developer of a pre-allocated file system to be certified in Development Assurance Level A (DAL-A) of the DO-254 Aircraft Safety guidelines. Implementation of a system compatible with a known file system type for easier testing and developing.

*Technologies:* Embedded C++ 03, VxWorks, Linux CLI.

*Achievement highlights:*

- Design of the file system based on an existent standard, allowing it to be backward compatible. By using a known standard, most of the common file system requirements were already foreseen in its architecture and existent tools could be used to check the implementation as well as verify the backward compatibility. The solution was well received by both management and the stakeholders as it would decrease the complexity of a formatting tool implementation and reduce the risks of designing a custom file system from scratch.
- Development of polymorphic file system interfaces. The interfaces of the system were implemented using virtual methods not only to enable different storage media, but also different libraries. The Aircraft Safety guidelines are very strict on library usage due to the need of certification under its rules, so common libraries are not always allowed. The implementation was made in a way only local libraries or C and C++ 03 built-in mechanisms were used. By using abstract classes, the algorithm could be tested using standard libraries and any device such as a pen drive or even an image file. These features were of great value to the team, not only on this project, but also as a reference of a good practice.

- (2) Developer of Ethernet and File System abstraction layers on a multicore embedded product. The product required both Ethernet and File System access layers to be controlled by a server, while providing these capabilities to other applications running on different cores. The architecture was designed as to provide libraries to clients that would use Inter Process Communication to the servers.

*Technologies:* Embedded C++ 03, VxWorks, POSIX Socket API, POSIX File System API.

*Achievement highlights:*

- Introduced the use of code formatting tool to the team. This helped the verification of the coding rules when developing, since the formatter would follow the parameters configured. This paved the way for a more unified coding style, making the code easier to maintain.

- (3) Stand-in Product Owner of the Ethernet and File System abstraction layers projects. Attended meetings with stakeholders, explaining solution design and architecture, as well as negotiating deliverables and deadlines.

*Technologies:* SCRUM, Agile.

- (1) Sole maintainer and developer of the PertoScan A6, a general document scanner with the main focus on bank checks.

*Technologies:* Embedded Linux, C language for mainly developing kernel drivers for low level functions such as USB Device and Analog to Digital conversion and processing.

- (2) Developer and maintainer of the PertoPrinter QR Code, a thermal receipt printer. Implemented the firmware as well as a user-friendly application to run on Windows systems using C++11 and QT, in order to provide a remote firmware update tool for field technicians.

*Technologies:* Embedded C language, C++11, QT.

*Achievement highlights:*

- Use of dynamic memory allocation on microcontrolled systems, which led to better usage of memory overall, as well as a paradigm shift in terms of memory organization for the firmware developing team. This also made possible the development of the QR Code module, which was vital in the thermal printer market at the time.
- First user-friendly software designed using QT and C++ to be internally distributed. This represented a big change in the firmware engineering sector, seeing that all previous software were developed by third parties or the API development team.

- (3) Developer of the ink staining module in ATMs, an automated system which decides when to paint bills according to security rules. Implemented CAN bus communication with peripheral boards, designing reusable C code in the process. Implemented low consumption security modules and embedded logging system for diagnosis purposes. Developed a user-friendly multi-threaded software to gather and parse the embedded logs, printing in human-readable format.

*Technologies:* Embedded C language, C++11, QT, CAN Bus.

*Achievement highlights:*

- Implementation of components using weak linkage and function pointers to enable reuse in different architectures. This form of modularization became a standard practice amidst the firmware development team.
- The ink staining module with CAN Bus was integrated in most of the ATMs due to its ability to detect violation attempts and invalidate banknotes.

- (4) Sole developer of the Perto Check Scanner, a check scanner peripheral integrated on ATMs. Implemented FreeRTOS based firmware modeling all architecture with multiple tasks and software timers. Began developing in C++14 and C++17 for embedded systems, using object-oriented programming and interfacing new C++ code with legacy C code. Developed utilities for testing and demonstration using QT and C++14. Created installation tools with drivers and dependencies needed for the application and peripheral. Created a self-managed GitLab instance to facilitate development.

*Technologies:* Embedded C and C++17, FreeRTOS, QT, C++14.

*Achievement highlights:*

- Pioneered the use of object-oriented programming on embedded systems on the company. The use of classes and polymorphism were a breakthrough in firmware development and since then were adopted by the most senior developers on the team.
- First developer to build an easy-to-use installer with signed drivers containing everything needed to run the peripheral and demonstrate it.
- Creator and maintainer of a self-managed GitLab server. Implemented the migration of the SVN repositories to it, as well as projects of other co-workers.

2012 – 2013

**VHDL Designer - Subcontracted**

LaPSI - Image and Signal Processing Laboratory

- (1) VHDL programmer of the image deblocking filter for interlaced video for the H.264 standard. Implemented pixel interpolation based on neighboring values to smooth frames with lossy compression. Had experience using FPGA and timing simulations to validate solutions.

*Technologies:* VHDL, FPGA, Xilinx ISE, Modelsim.

**EDUCATION**

2007 – 2012

**Computer Engineer Bachelor's Degree**

UFRGS - Federal University of Rio Grande do Sul

Graduated with focus on network courses.

Main courses: Computer Networks, Network Protocols, Network Management, Operational Systems, Digital Systems (VHDL designing).

Bachelor Thesis: Support for intra-frame prediction in interlaced video on the H.264 standard for the Brazilian Digital Television System.