Walter Gallego Gomez

M.Sc. in Computer Engineering

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Research interests

Embedded systems and their deployment in the real word has always captured my attention. This in conjunction with new emerging technologies for computational speed up, like neuromorphic architectures, and their integration with traditional ones like CPUs, GPUs and FPGAs is a topic I would love to investigate. Application wise, I am interested in bioinformatics because of the impacts it can have on medical research, and the challenges it posses due to the large amounts of noisy data that needs to be analyzed, requiring high computational power and the use of innovative disciplines, such as machine learning.

Research experience

Polytechnic University of Turin *Turin, Italy*

Research assistant *Dec. 2021 - Today*

I am conducting research on bioinformatics algorithms and technologies, and on heterogeneous computing. I am currently working on three different topics:

- **RNA structural alignment.** Improvement of the C++ program LaRA2 for pairwise RNA structural alignment, by reducing the required time and memory footprint, especially for long sequences. The final objective is to use LaRA2 in conjunction with other tools to perform multiple structural sequence alignment and folding of COVID sequences, in a reasonable time.
- **Somatic structural variations (SVs) discovery.** Development of a pipeline for the discovery of somatic mutations in ONT long read samples, coming from an oncology case study. The dataset contains paired samples of healthy and cancerous cells. The basic idea is to discover SVs in both samples (using tools as CuteSV), to then identify the somatic SVs by subtracting the germline mutations from the SVs in the cancerous sample. The parsing and subtraction of SVs is being developed in Python.
- **Benchmarking of Intel's Lava framework.** Benchmarking of the recently released Lava framework by Intel, for heterogeneous computing including neuromorphic hardware (like Intel's Loihi and Loihi2 chips). The benchmark is being developed primarily in Python (as Lava is written in Python as well), and takes some inspiration from MPI benchmarks.

Teaching and supervising experience

Polytechnic University of Turin *Turin, Italy*

Teaching assistant *Jul. 2022 - Today*

I am currently assisting professor Gianvito Urgese with the course "System-on-chip architecture". My responsabilities are:

- Four lectures related to the usage of the Renode and Platformio frameworks for the development of embedded software.
- Definition of final project proposals regarding the use of SoC solutions (STMicroelectronics, NVIDIA, Xilinx) for edge computing.
- Technical support to students during the development of their projects, and evaluation of their results.

Additionally I am co-supervisor in the master thesis "Development of a synchronized acquisition system based on a BLE-sensor network for real time IoT applications".

Professional experience

Teoresi S.p.A | Marelli S.p.A *Turin, Italy*

Embedded Software Developer *Oct. 2018 - Dec. 2021*

I worked on-site at Marelli (as a consultant from Teoresi) in the automotive infotainment project TBM2, and its evolution TBM20H. The main activities I carried out were:

- Embedded software design and development.
- Code debugging and maintenance.
- Front desk analysis.
- General engineering support.
- Mediation with clients and providers.

During this job I gained experience in:

- C++ and C development in an embedded Linux environment.
- Linux OS and Bash scripting.
- Source code management in large projects with Git.
- Yocto cross-compilation tools.
- Wireless modules for embedded systems (Modem and SIM).
- The Legato framework for embedded systems.
- Automotive ecosystem (CAN network, AVB audio interface, DLT logging and debugging, emergency call standards).
- Atlassian suite for collaboration in large projects (JIRA, Stash, Confluence).
- Software requirements and architecture (Rational DOORs, Enterprise architect).

Education

Polytechnic University of Turin *Turin, Italy*

M.Sc. in Computer Engineering *Sep. 2015 - Jul. 2018*

- **Pathway:** Embedded systems.
- **Grade:** 110 / 110 cum laude.
- **Thesis title:** A Secure Password Wallet based on the SEcube framework.
- **Thesis summary:** It is very common nowadays to rely on software applications such as web browsers for the management and storage of personal passwords. In my work I presented and alternative hardware solution based on the SEcube™ (Secure Environment cube) framework, which consist of an open source security-oriented hardware platform and a set of open source software libraries. The developed application, named SEcubeWallet, was written in C/C++ and Qt. It manages passwords using secureSQlite, one of the SEcube™ libraries, which wraps the functionalities of the SQlite standard to create secured databases. The passwords are encrypted using a personal SEcube™ device (which looks like a regular USB pendrive), and can only be decrypted if the device is connected to the PC and the user authenticates using a master password. As the cryptographic operations are performed by the device, not by the host PC, the passwords can be accessed in any computer where an appropriate version of Qt is installed and the device is connected. The application is cross-platform and the GUI is easily configurable. The user can easily create, delete, open, and modify password wallets. Additionally, the application can suggest strong Passwords and Passphrases and verify the entropy of the ones provided by the user.

University of Antioquia *Medellin, Colombia*

B.E. in Electronic Engineering *Mar. 2010 - Aug. 2015*

- **Pathway:** Digital systems.
- **Grade:** 4.5 / 5.
- **Achievements:** Honor Student in the 1st, 2nd and 4th semesters.

Skills

Embedded SW development	C++: Advanced
	C: Advanced
Application SW development	Python: Advanced
	C++: Advanced
OS and scripting	Linux / Bash: Advanced
	Windows / cmd: Intermediate
GUI development	Qt: Intermediate
Hardware modeling	VHDL: Intermediate
Writing	Latex: Intermediate
	MS Office: Intermediate
Languages	Spanish: Native
	English: Fluent
	Italian: Fluent

References

Gianvito Urgese	Assistant Professor at the Polytechnic University of Turin.
	gianvito.urgese@polito.it
Iman Amirtaheri	Founder and software developer at Tripense.
	imanamirtaheri@gmail.com
Carlos H. Mendoza Cardenas	Graduate student and research assistant at the University of Delaware.
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