

Name Surname

Electronics Engineer

address

city

📞 phone number

✉ email

A life devoted to knowledge

My passion for discovery started at very young age, disassembling every device at hand to understand how and why stuff works. Electronics do fascinate me the most, from the black magic of analog to the extreme versatility of programmable devices, which has been the main driver for my programming skills. Over the last decade, I fully embraced a UNIX-like lifestyle and its efficient, elegant mindset. Experimenting with system administration led inevitably to a growing interest in cybersecurity, gradually expanding from system hardening to privacy matters and lately into embedded systems hacking. My master thesis project prompted the final shift from mere enthusiasm to an actual, intriguing profession.

Education

Jul 20th 2021 **MSc in Advanced Automotive Electronic Engineering**, *University of Bologna*, cum laude

Thesis on digital forensics applied to car infotainment systems, supervised by Prof. Mirco Marchetti and Ten. Col. Corrado Federici, head of Internet Investigations at Raggruppamento Operativo Speciale, Arma dei Carabinieri. A MediaNav multimedia system, commonly found on vehicles manufactured by Renault and Dacia, has been examined both at the hardware and the software level to gain access to the data stored within. The obtained disk image has been analyzed to extract valuable evidence such as geographical positions, timestamps, contact lists and unique bluetooth identifiers of the user.

Mar 15th 2017 **BSc in Automation Engineering**, *University of Bologna*, 100/110

Thesis on tailoring Simulink's automatic code generation to custom embedded systems, supervised by Prof. Claudio Rossi, Ing. Alessio Pilati and Ing. Marco Bertoldi. The work consisted in a custom *support package* to integrate LEMAD Laboratory's hardware into Simulink, while a series of scripts hijack the original code generation sequence. This enables the TIME project to model the vehicle and implement its control system in a straightforward way and drop the resulting code directly onto its proprietary real-time kernel.

Jun 27th 2012 **High School Diploma**, *Liceo Scientifico Tecnologico "redacted"*, redacted, 100/100

- Handcrafted, obstacle-avoiding robot presented at final examination, featuring a PIC microcontroller, ultrasonic sensing, soldering, welding, metalwork, woodwork, epoxy casting.
- Ranked 58 nation-wide at *Olimpiadi Italiane di Informatica 2010*, Sirmione.
- GUI engine design in Java for a major school project, under SVN version control.

Research

Sep 16th 2021 **Research Associate**, *University of Modena and Reggio Emilia*

to Research conducted under grant "Automotive Cybersecurity and Digital Forensics", supervised by Prof. Mirco Marchetti.

- Sep 15th 2023
- The main activity for the first year stems from previous work on automotive infotainment systems while preparing my master thesis. An NTG 5 unit from a recent Mercedes car has been forensically analyzed to assess the amount of data stored inside. The initial reverse engineering phase allowed to interpret the navigation history of the vehicle and eventually two years worth of routes could be retrieved. In addition, details on the status of several components have been found in dedicated system logs. This information could be matched with travel records to better pinpoint user interaction with the car. Statistical analysis performed on the decoded data highlights how the habits of the user can be reconstructed with high confidence. These results, their forensic value, and the associated privacy concern have been explained in an academic artifact submitted for review at the "IEEE Transactions on Information Forensics and Security".
 - Focus has shifted on inter-vehicular communications in the following year of the grant. Efforts have been put into assembling the proper framework to achieve successful communication with commercial off-the-shelf devices. Such framework is fully based on open source software and uses software-defined radios as radio frequency frontends. The development of this tool has been essential to kickstart research on the main topic of interest, that is to scrutinize the security and privacy aspects of V2X communications in intelligent transportation systems.

Teaching

2023 **Master thesis co-supervisor**, supervision on physical access techniques

Thesis on the full security analysis of IoT surveillance cameras. Several vulnerabilities have emerged from this work and are in the process of being responsibly disclosed. CVE identifiers have been already assigned.

2023 **Bachelor thesis co-supervisor**, supervision on embedded electronics

Thesis on the development of a model car testbed for automotive cybersecurity attacks and defenses. Supervision provided on topics of embedded electronics hardware design and firmware development.

2022 **Master thesis co-supervisor**

Thesis on the forensic analysis performed on the mass storage of a car infotainment system.

Publications

- 2023 **redacted**, "*redacted*", submitted for review at the "IEEE Transactions on Information Forensics and Security" Forensic analysis of an NTG5 infotainment system. Complete reverse engineering of the navigation database and subsequent recovery of more than two years worth of history.

Work

- Mar 27th 2017 **Technician at Test and Prototype Facility**, *Cefla s.c.*, Imola
to Relevant activities:
Sep 30th 2017
- **ESD hardening** of electronic circuits subject to unexpected strong fields (above 16kV). Thanks to the side effects of the surges, some unrelated yet severe design flaws have been discovered and fixed.
 - **Design and assembly** of the electro-pneumatic system for a static-load testing press (up to 800kg). Despite its simplicity, the circuitry features plug-in remote controls with safety interlocks and fail-safe automatic load regulation.

Certification

- Jun 22nd 2017 **Radiation protection for dental radiology**, *Cefla s.c.*, Imola
Mar 29th 2017 **Occupational safety and health education**, *Cefla s.c.*, Imola
Mar 30th 2017
Jan 19th 2017 **Occupational safety and health education for students**, *University of Bologna*
Feb 4th 2017

Human Languages

Italian	native speaker
Slovak	native speaker
English	C1
Spanish	B1

Tech Languages

C	native coder
C++	beginner
Python	intermediate, grad school
Java	intermediate, high school
SystemVerilog	coursework
Assembly	reverse engineering
LaTeX	intermediate

What's in the box?

- Personality** A dedicated learner, constantly looking for logical links to efficiently compress concepts inside my brain, I refuse blindly remembering them by-heart. Instead of stopping by the first make-do patches, I love to refine further and deliver simply elegant solutions. I am a loyal team mate and past experiences prove the positive, optimistic mood I bring to the team.
- Craft** Tearing apart all kind of objects gave me a good comprehension about the inner workings of many mechanism, improving my dexterity and creativity. I also acquired basic crafting, machining, arc and TIG welding skills from local craftsmen.
- Telecomm** In recent years, I have approached the world of radio communications and software-defined radios (**SDRs**). I am mostly skilled in the use and development of the **GNU Radio** framework, while a bugfix pull request for the **Universal Radio Hacker** suite has been successfully merged upstream.
- Electronics** I am maintaining some vintage Tektronix scopes in good working order (their schematics have a lot to teach, even these days). I do have fair soldering skills for both through-hole and surface-mount circuits.
- Embedded** I stepped into the world of embedded systems by programming some Microchip's **PIC** microcontrollers and moved to Atmel's **AVRs** later on (not just Arduinos). Then, I got into 32-bit **ARM** microcontrollers thanks to a course during my bachelor's degree, where we focused on the **STM32F4** chip series. My future plans will focus on **RISC-V** architecture and **FPGA**, whose description language was introduced during the master degree. Aside from these bare metal devices, I also invest my time on the **Raspberry Pi** as a neat, portable and well-documented Linux platform.
- Software** As an open source enthusiast, at the moment I am thoroughly studying **C++** and **JavaScript**, along with the **Qt** framework and tools such as **CMake** to contribute to some projects. I'm well acquainted with the **Git** code revision tool.
- OS** Regarding operating systems, I am focusing on advanced **Linux** knowledge both as a power user and server administrator, while using **macOS** for development and multimedia creation tasks. I have power user skills on **Windows** too, as it has been the OS of my early days.

- Cybersecurity I am currently working on **UEFI Secure Boot** and measured boot implementations aimed at system hardening. I have plans to switch to the **Coreboot** firmware project in the future. I employ Trusted Platform Modules (TPMs), secure hardware tokens (smart cards) and multi-factor authentication methods to secure my personal devices, servers and networks.
- Music Sound design is a fundamental craft in music production and I really enjoy to tear apart songs into their essential components, to unveil the secret recipes the artist used to give me chills in the first place. I love to play keyboards and synthesizers in my free time and had the chance to play in few bands at high school. I also started playing guitars, mainly to test out custom audio effects.
- Sport When the snow falls, it's finally time to set electronics aside and reconnect with nature, riding down the powder on my snowboard.

Batteries included, plenty of them!