EDOARDO CITTADINI

Computer engineer

in Edoardo Cittadini

TOPICS

Programming | FPGA
Object tracking | MCU
Neural networks | AI
Embedded systems
Autonomous vehicles

LANGUAGES

Italian: Native

English: B1

INFO

First name: Edoardo
Last name: Cittadini

Current position: PhD student at the Scuola Superiore Sant'Anna since 2021

PhD Course on Emerging Digital Technologies

ABOUT ME

I started my experience in the informatics world in 2014 at the University of Cagliari where I had my bachelor's degree in computer science. Since the beginning of the final bachelor's degree year, in particular, when I decided what topic to address for my thesis, I realized that there was a growing passion for electronics driven by the curiosity to know how exactly a computer works. At the time I was also very interested in machine learning and AI applied to real-time systems, so the decision was to develop a custom flight controller for a drone that was used to perform face detection on crowds. This passion grew over time and led me to Pisa where I was able to better investigate and improve in a natural way the path that I decided to start by joining the master in Embedded Computing Systems, progressively moving from IT specialties towards increasingly engineering skills. I am now a PhD student and I currently work on real-time tracking and control of embedded systems at Retis lab in Scuola Superiore Sant'Anna.

EDUCATION

Master of Engineering - Embedded Computing Systems | University of Pisa and Scuola Superiore Sant'Anna

📅 10 2018 – 02 2021   📍 Pisa, Italy

- **Thesis**: Real time visual tracking of objects with variable appearance
- **Final score**: 110/110 cum laude
- **Supervisor**: Giorgio Buttazzo
- **Graduation date**: 19/02/2021

Bachelor in Computer science | University of Cagliari

📅 10 2014 – 07 2018   📍 Cagliari, Italy

- **Thesis**: An Arduino drone for real-time face detection
- **Final score**: 101/110
- **Supervisor**: Diego Reforgiato Recupero
- **Graduation date**: 20/07/2018

PROFESSIONAL EXPERIENCE

Winner of a scholarship - Support for autonomous driving vehicles | Scuola Superiore Sant'Anna

📅 01/05/2021 – 01/10/2021 📍 Pisa, Italy

- **Topic**: Development of real-time systems using hypervisors on heterogeneous hybrid platforms with FPGAs (ZCU102 Ultrascale + and Ultra96 Ultrascale +). The Clare hypervisor allows you to have both Linux and RTOS subsystems running on the same machine, making their management safe through virtualization and allowing the exchange of data between trusted communication channels. FreeRTOS 10 was used for wave forms generation, critical tasks execution (low latency and high predictability), and to generate all commands to drive actuators or read sensors. Linux is used for higher-level applications, like neural networks execution for real-time tracking, and to interface complex sensors such lidars and cameras using OpenCV library (C++/python).

TEACHING ACTIVITIES

Project rocket - Embedded software design and sensor fusion | Liceo scientifico A. Pacinotti

📅 10 2021 – 04 2022 📍 Cagliari, Italy

- 20 hours of lessons
- **Topic**: The basic concepts of optimal control, state estimation, sensor fusion/filtering. In the first part of the class filtering systems were explained, in particular IIR and FIR filters. In the second part of the class sensor fusion techniques, like complementary filter, were presented in order to improve system measurements reliability. The last part of the class was a gentle introduction to linear Kalman filter and full state estimation for TVC control including matrix formulation of system state space and practical implementation.

Project rocket - Digital control systems and PCB design | Liceo scientifico A. Pacinotti

📅 05 2021 – 08 2021 📍 Cagliari, Italy

- 12 hours of lessons
- **Topic**: Understand how to control dynamic systems using an embedded computer. The class was divided into the following milestones: Programming microcontrollers for real-time embedded applications, designing PCBs, designing using CAD the physical system, simulating TVC control in python by implementing a mathematical model of the system, and finally applying the controller on a real 3D printed rocket.

Seminar on embedded microcontroller programming | University of Cagliari

📅 11/05/2018 📍 Cagliari, Italy

- 3 hours of lessons
- **Topic**: Explanation of the main differences in programming embedded devices compared to standard desktop computers. Explanation with examples of the main communication protocols (I_2C, SPI, UART, etc ...) and how to write drivers using interrupts and DMA. Final practical demonstration through the programming of a basic flight controller.

PRESENTATION AT CONFERENCES

IWES 2021 - Italian Workshop on Embedded Systems | University La Sapienza

📅 09/12/2021 – 10/12/2021   📍 Roma, Italy

- **Title**: Supporting AI-Powered Cyber-Physical Systems on Heterogeneous Platforms

THIRD MISSION ACTIVITIES

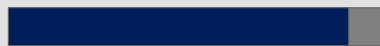8^a festa della robotica | Teatro dei coraggiosi (virtual event)

📅 20/01/2022   📍 Pomarance (PI), Italy

- **Topic**: Depth sensors theory and practical demonstrations.
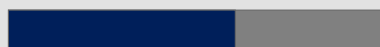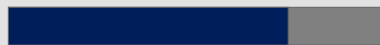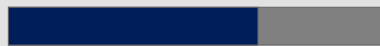
PROGRAMMING SKILLS

C/C++

Python

Java

$C\#$

Javascript

VHDL

Rust

OPERATING SYSTEMS

Linux
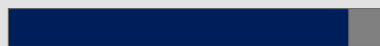
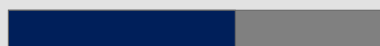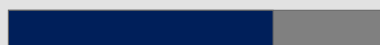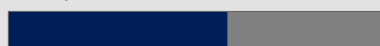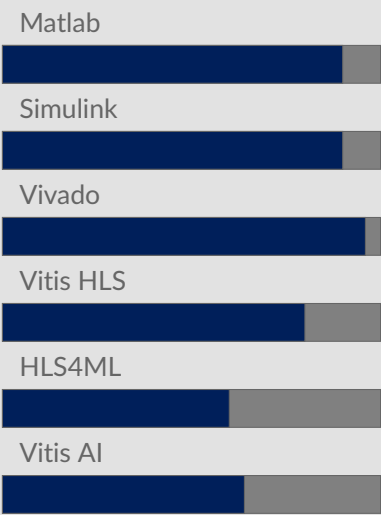Mac OS/OS-X

Windows

freeRTOS

Erika

Contiki

TinyOS

DEVELOPEMENT TOOLS

Matlab

Simulink

Vivado

Vitis HLS

HLS4ML

Vitis AI

AI FRAMEWORKS

Keras

Tensorflow

PyTorch