Alessio **Balsini**

PhD Fellow: Emerging Digital Technologies - Embedded Systems / MSc: Embedded Computing Systems

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Birth date: *9/11/1988* · Gender: *Male* · Nationality: *Italian*

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"Measure what is measurable, and make measurable what is not so" - Galileo Galilei

Alessio is completing his last year of Ph.D. in real-time embedded systems at Scuola Superiore Sant'Anna with an internship at Arm, where he collaborated with Google to the improvement of the Android operating system for low-power and low-latency multimedia applications. At the same time, he manages and takes part in the development process, especially regarding low-level programming and electronics design, of the predictive maintenance division of the startup Wriggle Solution in the role of vice-president. Besides Alessio's technical background, his interests include the whole product life-cycle, from the IP management to the design and development both as a leader and a programmer and finally to the sales and customer relationship management.

Current Positions

Scuola Superiore Sant'Anna *Pisa, Italy*
International PhD Fellow in Emerging Digital Technologies - Embedded Systems *10/2015 - 9/2018 (Expected)*

Improvement of the **Linux kernel scheduler** and **resource management**, **synchronization** and **communication** mechanisms.
Study and implementation of a framework to support the development of **real-time** applications for **heterogeneous computing architectures**.

Wriggle Solutions *Pisa, Italy*
Vice-President *12/2015 - PRESENT*

Design and **development** of embedded platforms for real-time signal processing. **Management** of the predictive maintenance division. Writing and inspection of **IP** and **NDA** documents and **proposals** and **deliverables** for products. **Customers** relationship management.

Experience

Arm *Cambridge, United Kingdom*
Software Engineering Intern *10/2017 - 04/2018 (Expected)*

Extension of the **Android** audio pipeline internals to use the `SCHED_DEADLINE` scheduling class on a custom Android Linux kernel.
Outcome: **audio latency reduced from** $26.67\,ms$ **to** $2.67\,ms$ for dynamic workload audio streams and 40% **power consumption reduction** for high-performance low-latency audio applications, compared to the use of `SCHED_RT` with `WALT` on HiKey 960.

Scuola Superiore Sant'Anna, the JUNIPER European project *Pisa, Italy*
Computer Engineer - Research Fellow *07/2015 - 09/2015*

Investigation on the misbehaviour of **self-suspending tasks** in the Constant Bandwidth Server real-time scheduling algorithm.
Outcome: extension of `SCHED_DEADLINE` scheduling class of the Linux kernel to provide real-time guarantees when managing self-suspending tasks.

E-Team Squadra Corse (Racing Team), University of Pisa *Pisa, Italy*
Embedded Systems and Firmware Engineer - Information Technology Engineer - Team Member *10/2014 - 06/2015*

Design, development and prototyping of boards and firmware for data acquisition from vehicle prototype sensors.
Outcome: produced the telemetry system (board, protocol and firmware) for the racing vehicle.

Fermilab *Batavia, Illinois, USA*
Computer Engineering Intern *08/2014 - 10/2014*

Study of the Fermilab **distributed computing** architecture: GlideinWMS, HTCondor, Fermicloud.
Outcome: extension of the internal **cloud architecture** API to transparently outsource the workload to the internal grid, Amazon Web Services, Google Cloud, or Microsoft Azure.

Patent

2 Dec 2015 **System for monitoring the condition of tyres**, A. G. Nasrabadi, A. Balsini, A. Biondi, D. Calvaresi *102015000079497*

Publications

Under Review - Energy-Efficient Low-latency Audio on Android, A. Balsini, T. Cucinotta L. Abeni, J. Fernandes, P. Burk, P. Bellasi, M. Rasmussen, *Journal*, *9 Jul 2018*

The Journal of Systems and Software (JSS)

Under Review - Virtual Network Functions as Real-Time Containers, L. Abeni, A. Balsini, T. Cucinotta, M. Marinoni, C. Vitucci, *Verona, Italy*, *27 Nov 2018*

IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN 2018)

Under Review - FREDSim: A Simulation Environment for Heterogeneous Platforms with FPGA, A. Balsini, T. Cucinotta, M. Marinoni, *Poitiers, France*, *12 Oct 2018*

Real-Time Networks and Systems (RTNS 2018)

Under Review - Modeling and simulation of power consumption for real-time embedded heterogeneous architectures, A. Balsini, L. Pannocchi, T. Cucinotta, *Torino, Italy*, *4 Oct 2018*

The Embedded Operating System Workshop (EWiLi 2018)

Under Review - Container-Based Real-Time Scheduling in the Linux Kernel, L. Abeni, A. Balsini, T. Cucinotta, *Torino, Italy*, *4 Oct 2018*

The Embedded Operating System Workshop (EWiLi 2018)

Virtual Network Functions as Real-Time Containers in Private Clouds, T Cucinotta, L Abeni, M Marinoni, A Balsini, C Vitucci, *San Francisco, CA, USA*, *7 Jul 2018*

IEEE International Conference on Cloud Computing (IEEE CLOUD 2018)

A Linux-based Support for Developing Real-Time Applications on Heterogeneous Platforms with Dynamic FPGA Reconfiguration, M. Pagani, A. Balsini, A. Biondi, M. Marinoni, G. Buttazzo, *Munich, Germany*, *6 Sep 2017*

30th IEEE International System-on-Chip Conference (IEEE SOCC 2017)

Logical Execution Time Implementation and Memory Optimization Issues in AUTOSAR applications for Multicores, A. Biondi, P. Pazzaglia, A. Balsini, M. Di Natale, *Dubrovnik, Croatia*, *27 Jun 2017*

International Workshop on Analysis Tools and Methodologies for Embedded and Real-time Systems (WATERS 2017)

Generation of Simulink monitors for Control Applications from formal Requirements, A. Balsini, M. Di Natale, M. Celia, V. Tsachouridis, *Toulouse, France*, *14 Jun 2017*

IEEE International Symposium on Industrial Embedded Systems (SIES 2017)

A Framework for Supporting Real-Time Applications on Dynamic Reconfigurable FPGAs, A. Biondi, A. Balsini, M. Pagani, E. Rossi, M. Marinoni, G. Buttazzo, *Porto, Portugal*, *29 Nov 2016*

IEEE Real-Time Systems Symposium (RTSS 2016)

Towards Real-Time Operating Systems for Heterogeneous Reconfigurable Platforms, M. Pagani, M. Marinoni, A. Biondi, A. Balsini, G. Buttazzo, *Toulouse, France*, *26 May 2016*

Operating Systems Platforms for Embedded Real-Time applications (OSPERT 2016)

FMTV 2016: Where is the Actual Challenge?, A. Balsini, A. Melani, P. Buonocunto, M. Di Natale, *Toulouse, France*, *26 May 2016*

International Workshop on Analysis Tools and Methodologies for Embedded and Real-time Systems (WATERS 2016)

A Framework based on Real-Time OS and Multi-Agents for intelligent autonomous robot competitions, D. Calvaresi, P. Sernani, M. Marinoni, A. Claudi, A. Balsini, A. F. Dragoni, G. Buttazzo, *Krakow, Poland*, *20 Mar 2016*

IEEE International Symposium on Industrial Embedded Systems (SIES 2016)

Resource Reservation for Real-Time Self-Suspending Tasks: Theory and Practice, A. Biondi, A. Balsini, M. Marinoni, *Lille, France*, *24 Jul 2015*

International Conference on Real-Time Networks and Systems (RTNS 2015)

Education

Scuola Superiore Sant'Anna, University of Pisa   *Pisa, Italy*

Master's Degree in Embedded Computing Systems (110/110 Summa cum Laude)   *2012/2013 - 2014/2015*

Thesis: *Novel Resource Management Mechanisms for Real-Time Scheduling in the Linux Kernel*

University of Pisa   *Pisa, Italy*

Bachelor's Degree in Computer Engineering (104/110)   *2008/2009 - 2011/2012*

Thesis: *From the WSN synchronization to the re-engineering of a Bluetooth driver: an experience on the TinyOS operating system development with Shimmer devices*

Certifications

Project Management Fundamentals, Arm, *Cambridge, UK*, *01/2018*
Fundamentals of good project management, following the principle of providing just enough process for people to come together to get the job done. Case study approach and many project definition and planning exercises woven throughout.

Management Foundations, Lynda.com, *Cambridge, UK*, *01/2018*
Styles of management, hiring and onboarding, addressing performance problems, resolving conflicts, and managing time, budgets, and performance goals. Handling transitioning from a peer to a manager, managing multiple generations, and letting employees go.

Operations Management Foundations, Lynda.com, *Cambridge, UK*, *01/2018*
Introduction to operations management, including inventory forecasting and management, purchasing decisions, managing waiting lines, quality control, and business processes.

EIT Digital Summer School Cyber-Physical Systems, EIT Digital, KTH Royal Institute of Technology, *Stockholm, Sweden*, *06/2015 - 07/2015*
Design, analysis and deployment of CPS. Business coaching.

VxWorks 7 and Workbench Essentials, WindRiver Education Services, *Live remote lessons*, *05/2015 - 05/2015*
VxWorks 7 operating system behavior. Real-time systems programming and management through VxWorks and its workbench.

Honors, Awards, Achievements

Academy

2014	**Top 2 Master Course Students**,	Scuola Superiore Sant'Anna	*Pisa, Italy*
07/2010	**2nd Team Qualification - Cracca al Tesoro**,	Wardriving, WiFi hacking, penetration testing	*Orvieto, Italy*
02/2007	**Province Classification - XXI Physics Olympics**,	AIF, Associazione per l'Insegnamento della Fisica	*Pisa, Italy*
01/2006	**Regional Classification - Informatics Olympics**,	Istituto Tecnico Commerciale Statale G. Peano	*Florence, Italy*
2006	**91st National Team Qualification**,	International Stock Exchange Contest	*Volterra, Pisa, Italy*

Professional

2015	**National Professional Information Engineering License**,	University of Pisa	*Pisa, Italy*

Affiliation

2016	**Member**,	Rotaract Club	*Volterra, Italy*

Wriggle Solutions - SMART Tyre

2017	**2nd Qualification**,	Lee Kuan Yew, Global Business Plan competition	*Singapore*
2016	**Winner**,	Premio Marzotto, UniCredit Start Lab	*Rome, Italy*
2016	**Winner**,	Lions Club International, District 108 Toscana, Startup Award	*Empoli, Italy*
2016	**Best ICT idea**,	GSVC 2016	*Milan, Italy*
2015	**Winner**,	EGO Ericsson	*Rome, Italy*
2015	**Finalist**,	Premio Nazionale per l'Innovazione	*Cosenza, Italy*
2015	**3rd Qualification**,	START Cup Toscana	*Florence, Italy*

Skills

Languages

Italian   **Mother Thongue**. Understanding: Excellent, Speaking: Excellent, Writing: Excellent
English   Understanding: Good, Speaking: Good, Writing: Good

Technical and Professional

OS	Linux, Windows, FreeBSD
Programming	C/C++, Assembly X86_32/64, Assembly ARM, LaTeX, Matlab, Python, Java, Sh/Bash, SQL, VHDL, Verilog
Environments 1	Qt Framework, GNU tools for programming/debugging/profiling, Git, CMake, Valgrind, Android
Environments 2	Matlab, Simulink, Vivado, Quartus II, Active-HDL, LTSpice, SolidWorks, Keil, CooCox, Atollic TrueSTUDIO, TI Code Composer Studio, XVR Developer Studio

Miscellaneous and Hobbies

Driving License   A (motorbike), B (car)

Technical/Manual   Driving Cars, Motorbikes and Engineering Machineries, Soldering, Prototyping

Artistic   Piano, Keyboards and Synthesizers, Drawing

Sport   Motorcycle, Volley, Windsurf, Basket

23/07/2018