# Romolo Marotta

*Curriculum Vitæ for publishing*

## Personal Information

✉ *marotta@diag.uniroma1.it*

First Name Romolo

Last Name Marotta

Nationality Italian

## Education

November 2016 – February 2020 **Ph.D. in Computer Engineering**, *Sapienza*, University of Rome, Italy, Courses held in English.
THESIS TITLE: **Innovative Concurrent Data Structures and Synchronization Supports in Multi-core Platforms.**
ADVISOR: **Francesco Quaglia.**

January 2013 – January 2016 **Master's Degree cum laude in Engineering in Computer Science**, *Sapienza*, University of Rome, Italy, Courses held in English, GPA: 29.14/30, Mark: *110/110 cum laude*.
THESIS TITLE: **A Lock-Free O(1) Priority Queue For Pending Event Set Management.**
ADVISOR: **Francesco Quaglia.**

September 2008 – December 2012 **Bachelor's Degree in Engineering in Computer Science**, *Sapienza*, University of Rome, Italy, Taught in Italian, GPA: 26.88/30, Mark: *110/110* .
THESIS TITLE: **Input-Sensitive Profiling on I/O Flows and Multi-Threading.**
ADVISOR: **Camil Demetrescu.**

## Work Experience

January 2020 – Present **Researcher.** *Università degli Studi dell'Aquila*.
Instrumentation of models and code of railway systems for the management of controlled simulations.

October 2017 – Present **Co-founder.** *Lockless S.r.l.*
University Start Up of Sapienza and Tor Vergata Universities of Rome, Italy.

September 2016 – December 2017 **Researcher.** *Fondazione CRUI*.
Assessment of the National Telematic Criminal Trial System.

## Awards and Honors

2016 **Best Paper Award**, *20th IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications.* Award for the paper "A Lock-Free O(1) Event Pool and its Application to Share-Everything PDES Platforms".

## Funding and Scholarships

July 2018 **HiPEAC ACACES Grant cover**
AMOUNT:**1000€**, ORGANIZATION: **HiPEAC**, European Network on High Performance and Embedded Architecture and Compilation.

November 2017 **Excellent Ph.D. Student Grant**
AMOUNT:**1000€**, ORGANIZATION: **DIAG**, University of Rome "La Sapienza".

April 2017 **Research Starter Grant**
AMOUNT:**1000€**, ORGANIZATION: University of Rome "La Sapienza"
PROJECT TITLE: **Adaptive Coordination Algorithms in Multi-core Platforms.**
PROJECT EVALUATION: Innovation: 7/7; Quality and feasibility: 6.5/7.

January 2017 **ACM SIGSIM Travel Grant**
AMOUNT:**1000$**, ORGANIZATION: ACM SIGSIM

October 2016 **Ph.D. Scholarship**
ORGANIZATION: University of Rome "La Sapienza".

## Reviewing Activities and Services

2020 Present **ACM TOMACS**. Transactions on Modeling and Computer Simulation. Information Director.

2019 **IEEE Access**. The Multidisciplinary Open Access Journal. Reviewer.

March 2018 **PADS 2018**. 2018 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation. Artifact evaluator.

March 2017 **RC 2017**. 9th Conference on Reversible Computation. Subreviewer.

September 2016 **NCA 2016**. 15th IEEE International Symposium on Network Computing and Applications. Subreviewer.

## Memberships and Societies

April 2019 Present **IEEE**, *Institute of Electrical and Electronics Engineers.* Member.

March 2017 Present **ACM**, *Association for Computing Machinery.* Member.

## Projects

November 2018 present **libmutlock**, *Mutable lock library*, Open Source Software.
Libmutlock (https://github.com/HPDCS/libmutlock) provides implementations of locking primitives combining both passive and active waiting phases to maximize critical-section usage and reduce waste of clock cycles. The work has led to one contribution, currently under revision in the *CCPE* journal.

November 2017 present **NBBS**, *Non-blocking Buddy System*, Open Source Software.
USE (https://github.com/HPDCS/NBBS) is a non-blocking implementation of a buddy system allocator for multi-core machine. My major contribution has been providing the algorithm design and implementation and protocols, and formally proving its correctness and progress guarantees. The work has led to two publications in the *IEEE Cluster 2018* and *IEEE/ACM CCGrid 2019* conferences.

April 2016 present **USE**, *Ultimate Share-Everything Simulator*, Open Source Software.
USE (https://github.com/HPDCS/USE) is a Parallel Discrete Event Simulation engine optimized for multi-core shared-memory platforms. It exploits fine-grained synchronization to ensure scalability in platforms with high core counts and resorts to speculative execution by implementing a custom Time-Warp protocol optimized for shared-memory. My major contribution has been the design of custom data structures and protocols for high scalability. The work has led to three publications in the *IEEE/ACM DS-RT'17*, *ACM SIGSIM PADS'18* and *WSC'18* conferences.

December 2015 – present: **NBCQ**, *Non-Blocking Calendar Queues*, Open Source Software.
NBCQ (https://github.com/HPDCS/NBCQ) provides priority queue implementations that jointly ensures non-blocking and constant time access. My major contribution has been the design and implementation of such data structures, proving their correctness and progress guarantees, and their integration in the open source simulation environment RAMSES (https://github.com/HPDCS/RAMSES). The work has led to three publications in the *ACM/ICTS SIMUTools'16*, *IEEE/ACM DS-RT'16* and *ACM SIGSIM PADS'17* conferences.

June 2012 – February 2014: **Aprof**, *An input-sensitive performance profiler*, Open Source Software.
Aprof (https://github.com/ercoppa/aprof/wiki) is a Valgrind tool that allows developers to identify asymptotic inefficiencies hidden in the code. My major contribution has been the design and implementation of a strategy to extend the operability of Aprof to programs with multi-threading and I/O from devices. The work has led to a publication in the *IEEE/ACM CGO'14* conference.

## Teaching Activities

September 2019 – present: **Teaching Assistant** (Tutoring) Course: *Algorithm Engineering*.
DICII, University of Rome "Tor Vergata", Rome, Italy.

2017 – present: **Teaching Assistant** (Tutoring) Course: *Capacity Planning*.
DIAG, University of Rome "La Sapienza", Rome, Italy.

2017 – present: **Teaching Assistant** (Lectures about *Concurrent Programming*). Course: *Data Center and High Performance Computing*.
DIAG, University of Rome "La Sapienza", Rome, Italy.

## Seminars

May 2019: *NBBS: A Non-blocking Buddy System for Multi-core Machines*. CCGrid'19, Larnaca, Cyprus.

October 2017: *Towards a Fully Non-blocking Share-everything PDES Platform*. DS-RT'17, Rome, Italy.

May 2017: *A Conflict-Resilient Lock-Free Calendar Queue for Scalable Share-Everything PDES Platforms*. PADS'17, Singapore.

March 2017: *An overview on solid-state-drives architectures and enterprise solutions*. DIAG, La Sapienza, Rome, Italy.

August 2016: *A Non-Blocking Priority Queue for the Pending Event Set*. SIMUTools'16, Prague, Czech Republic.

## Research Interests

Concurrent programming: Concurrent algorithms and data structures, self-adaptive synchronization algorithms, optimistic synchronization

Simulation: Parallel Discrete Event Simulation platforms

## Research Activities

My research is mainly focused on concurrent algorithms and follows three main paths: 1) designing efficient, scalable and general purpose data structures; 2) designing synchronization protocols (e.g. spin locks and semaphores) able to adapt their behavior according to the workload (e.g. concurrency profile and access pattern); 3) implementing and integrating the abovementioned solutions in real-world HPC scenarios, in particular parallel discrete event simulation platforms.

## Languages

Italian: Mother tongue.

English: Independent.

## About Me

I am a determined person with a strong capability in problem solving. I always look for originality and innovation in every field I work in, starting from computer engineering to music composition. I get fit with gym activity and playing five-a-side football. I train my mind with riddles, wood brain teasers and point & click games. I like to spend my spare time building guitar effects and simple home automation projects.

## Exams taken during academic courses

| PH.D. | |
|---|---|
| **NAME** | **MARK** |
| MACHINE LEARNING | qualified |
| SYSTEMS AND ENTERPRISE SECURITY | qualified |

| MASTER | |
|---|---|
| **NAME** | **MARK** |
| CAPACITY PLANNING | 30/30 |
| THEORETICAL COMPUTER SCIENCE | 30 cum laude/30 |
| DATA MINING | 30/30 |
| DISTRIBUTED SOFTWARE PLATFORMS | 28/30 |
| COMPUTER GRAPHICS | 30 cum laude/30 |
| OPERATING SYSTEMS II | 30/30 |
| ARTIFICIAL INTELLIGENCE I | 30/30 |
| NETWORK TRAFFIC ENGINEERING | 30/30 |
| DISTRIBUTED SYSTEMS | 26/30 |
| COMPUTER AND NETWORK SECURITY | 30/30 |
| DATA MANAGEMENT | 24/30 |
| WIRELESS NETWORK SYSTEMS | 30/30 |
| SEMINARS IN ARCHITECTURES AND DISTRIBUTED SYSTEMS | qualified |
| ELECTIVE IN ARCHITECTURES AND DISTRIBUTED SYSTEMS | 30 cum laude/30 |

| BACHELOR | |
|---|---|
| **NAME** | **MARK** |
| ANALISI MATEMATICA I | 27/30 |
| GEOMETRIA | 26/30 |
| FONDAMENTI DI INFORMATICA I | 30 cum laude/30 |
| ANALISI MATEMATICA II | 26/30 |
| FONDAMENTI DI INFORMATICA II | 28/30 |
| CALCOLATORI ELETTRONICI | 25/30 |
| FISICA | 30/30 |
| PROGETTAZIONE DEL SOFTWARE | 30/30 |
| FONDAMENTI DI AUTOMATICA | 25/30 |
| INGEGNERIA DEGLI ALGORITMI | 30 cum laude/30 |
| TELECOMUNICAZIONI | 25/30 |
| ELETTROTECNICA | 27/30 |
| LINGUAGGI PER IL WEB | 29/30 |
| BASI DI DATI | 25/30 |
| RETI DI CALCOLATORI | 25/30 |
| SISTEMI OPERATIVI | 30 cum laude/30 |
| IDONIETÀ INGLESE | qualified |
| CALCOLO DELLE PROBABILITÀ E STATISTICA | 28/30 |
| RICERCA OPERATIVA | 29/30 |
| COMPLEMENTI DI FISICA | 30 cum laude/30 |
| ECONOMIA E ORGANIZZAZIONE AZIENDALE | 21/30 |
| ELETTRONICA | 26/30 |

## Publications

2019 Romolo Marotta, Mauro Ianni, Andrea Scarselli, Alessandro Pellegrini and Francesco Quaglia, **NBBS: A Non-blocking Buddy System for Multi-core Machines**, *2019 19th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGRID), Larnaca, Cyprus, 2019*.

2018 Romolo Marotta, Mauro Ianni, Andrea Scarselli, Alessandro Pellegrini and Francesco Quaglia, **A Non-blocking Buddy System for Scalable Memory Allocation on Multi-core Machines**, *[Poster abstract] IEEE Cluster 2018, Belfast, United Kingdom, 2018*.

2018 Mauro Ianni, Romolo Marotta, Alessandro Pellegrini and Francesco Quaglia, **Optimizing simulation on shared-memory platforms: the smart cities case**, *[Invited paper] 2018 Winter Simulation Conference (WSC), WSC 2018*.

2018 Mauro Ianni, Romolo Marotta, Alessandro Pellegrini and Francesco Quaglia, **The Ultimate Share-Everything PDES System**, *2018 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation, PADS 2018*.

2017 Mauro Ianni, Romolo Marotta, Alessandro Pellegrini and Francesco Quaglia, **A Non-blocking Global Virtual Time Algorithm with Logarithmic Number of Memory Operations**, *21th IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications, DS-RT'17*, 2017, **(Candidate for Best Paper Award)**.

2017 Mauro Ianni, Romolo Marotta, Alessandro Pellegrini and Francesco Quaglia, **Towards a Fully Non-blocking Share-everything PDES Platform**, *21th IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications, DS-RT'17*, 2017.

2017 Romolo Marotta, Mauro Ianni, Alessandro Pellegrini and Francesco Quaglia, **A Conflict-Resilient Lock-Free Calendar Queue for Scalable Share-Everything PDES Platforms**, *2017 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation, PADS 2017*, 2017.

2016 Romolo Marotta, Mauro Ianni, Alessandro Pellegrini and Francesco Quaglia, **A Lock-Free O(1) Event Pool and its Application to Share-Everything PDES Platforms**, *20th IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications, DS-RT'16*, 2016, **(Candidate for and winner of Best Paper Award)**.

2016 Romolo Marotta, Mauro Ianni, Alessandro Pellegrini and Francesco Quaglia, **A Non-Blocking Priority Queue for the Pending Event Set**, *9th ACM ICST Conference of Simulation Tools and Techniques, SIMUTools'16*, 2016.

2014 Emilio Coppa, Camil Demetrescu, Irene Finocchi, and Romolo Marotta. **Estimating the Empirical Cost Function of Routines with Dynamic Workloads**. *12th IEEE/ACM International Symposium on Code Generation and Optimization, CGO'14*, 2014.

## Articles Under Review

### Minor Revision

2019 Romolo Marotta, Davide Tiriticco, Pierangelo Di Sanzo, Alessandro Pellegrini, Bruno Ciciani and Francesco Quaglia. **Mutable Locks: Combining the Best of Spin and Sleep Locks.** Submitted to *Concurrency and Computation: Practice and Experience (CCPE).*

### Submitted

2020 Romolo Marotta, Mauro Ianni, Alessandro Pellegrini and Francesco Quaglia. **An Adaptive Conflict-Resilient Linearizable Lock-Free O(1) Priority Queue.** Submitted to *Journal of Computer and System Sciences (JCSS).*

2020 Romolo Marotta, Mauro Ianni, Alessandro Pellegrini and Francesco Quaglia. **A Non-Blocking Buddy System for Multi-core Machines.** Submitted to *IEEE Transactions on Parallel and Distributed Systems (TPDS).*