



Alessandro Carrega

Adjunct professor

✉ 2641157@studenti.unige.it

☎ +39 348 74 85 497

Education and training

2013

Ph.D. in Green Networking

Techniques for Optimal Exploitation of Green Networking Capabilities for Future Internet Devices

University of Genoa - Genoa - IT

2007

Master's Degree in Computer Engineering

Advanced Techniques for Propositional Satisfiability - Advanced Techniques for Proposit

University of Genoa - Genoa - IT

2005

Bechelor's Degree .in Computer Engineeering

Experimental Validation of classification methodologies for multi-frequency SAR images and polarimetric - 110/110 cum laude

University of Genoa - Genoa - IT

Academic experience

2016 - ONGOING

Post-doctoral Fellow

CNIT - Genoa - IT

Visiting Ph.D. Scholar at Portland State University OR USA under the supervisor of Prof. Suresh Singh. Took part to the activities of many national and European projects (e.g. H2020 ARCADIA - arcadia-framework.eu and INPUT - input-project.eu FP7 IP ECONET - econet-project.eu PRIN EFFICIENT - tnt-lab.unige.it/efficient FIRB GreenNet - tnt-lab.unige.it/greennet and FIWARE --- fiware.org). Collaboration with many industries such as TIM (tim.com) BROADCOM (boardcom.com) NOKIA (nokia.com) ERICSSON (ericsson.com) HUAWEI (huawei.com) etc. and industrial fora like GESI (gesi.org). Author of papers in international journals book chapters and international conference proceedings. Reviewer for many different journals and conferences.

2013 - 2016

Post-doctoral fellow

Unige - Genoa - IT

Visiting Ph.D. Scholar at Portland State University OR USA under the supervisor of Prof. Suresh Singh. Took part to the activities of many national and European projects (e.g. H2020 ARCADIA - arcadia-framework.eu and INPUT - input-project.eu FP7 IP ECONET - econet-project.eu PRIN EFFICIENT - tnt-lab.unige.it/efficient FIRB GreenNet - tnt-lab.unige.it/greennet and FIWARE --- fiware.org). Collaboration with many industries such as TIM (tim.com) BROADCOM (boardcom.com) NOKIA (nokia.com) ERICSSON (ericsson.com) HUAWEI (huawei.com) etc. and industrial fora like GESI (gesi.org). Author of papers in international journals book chapters and international conference proceedings. Reviewer for many different journals and conferences.

Work experience

2008 - 2009

Consultant

Ernst Young - Milan - IT

CRM Salesforce.com platform for BTicino S.p.A. SAP platform for Vodafone and Intesa Sanpaolo bank.

2005

Internship

German Aerospace Center (DLR) - Oberpfaffenhofen Munich - DE

Study and development of image classification algorithm for SAR images. Experimental validation of developed image classification algorithm for multifrequency and polarimetric SAR images. Draft of Bachelor Thesis Experimental Validation of Classification Methodologies for Multifrequency and Polarimetric SAR Images.

2002

Worker

Burger King Corporation - Serravalle Scrivia Alessandria - IT

Unloading services responsible cooking meat and sandwich preparation.

2000

Worker

Michelin S.p.A. - Spinetta Marengo Alessandria - IT

Talc tires responsible. Cleaning and checking tires employee.

Language skills

Italian

Mother tongue

English

Proficient

Preliminary

English Test (PET) -

Level B1

Teaching activity

Assistan Teacher for **Fundamentals of Computer Science, year 2017/2018** (Fondamenti di Informatica, a.a. 2017/18) for the **Degree in Nautical Engineering and Yacht Design**

(Corso di Laurea in Ingegneria Nautica e Yacht Design) at the University of Genoa, Italy (La Spezia university campus).

Research interests

Topics

The main research topic addressed by the TNT Lab is in the field of the *Future Internet* and related technologies. In this respect, the latest specific research efforts undertaken by the TNT Lab regard: Energy-efficiency in ICT, Green Networking, Smart Grid, Software Defined Networks (SDN), Distributed Router Architectures, Multi-core Linux SW Routers, Monitoring, Traffic and Network Models, Planning and Control Mechanisms, Network processors and custom smart boards; Continuous and cross-ambient communications, Ad hoc Networks, Vehicular Traffic Estimation through Mobile Networks, Mobility Management.

Initiatives and Projects

The TNT Lab is the center of a number of research initiatives and projects funded by national and international industries and industrial fora (GeSI), standardization bodies (ITU-T, ETSI), the European Commission, and the Italian government. The TNT Lab research heads are principal investigators in many of these research projects (among the most recent ones we can cite the EU FP7 ECONET Integrated Project, of which Prof. R. Bolla is the coordinator and principal investigator, the national "PRIN" project EFFICIENT, coordinated by Prof. F. Davoli, and the GreenNet FIRB-young researchers project, coordinated by Dr. R. Bruschi).

Approach

The general research approach aims at covering the complete cycle of the research and innovation process: the staff activities start from measurement campaigns on real network infrastructures of device prototypes, go through the design of theoretical models and optimization mechanisms, and arrive to the realization of in-house prototypes. To this purpose, the laboratory is equipped with professional instrumentation (among others, 3 router testers, 10 SW routers, Broadcom and Intel network processor evaluation boards, remote watt-meters, high precision multimeters and DAQs, OpenFlow switches, etc.).

Grants

2015 - 2018

ARCADIA (A Novel Reconfigurable By Design Highly Distributed Applications Development Paradigm Over Programmable Infrastructure)

European Commission - GR

Horizon H2020 - Principal investigator

The inability of Highly-Distributed-Application-Developers to foresee the changes as well as the heterogeneity on the underlying infrastructure impose a great challenge. The design and development of novel software paradigms that facilitate application developers taking advantage of the emerging programmability of the underlying infrastructure are crucial making the development of Reconfigurable-by-Design applications a necessity. In parallel, it is crucial to design solutions that are scalable, support high performance, resilient-to-failure and take into account the conditions of their runtime environment. Towards this direction, the ARCADIA project aims to design and validate a Novel Reconfigurable-By-Design Highly Distributed Applications Development Paradigm over Programmable Infrastructure.

The ARCADIA framework relies on the development of an extensible Context Model which will be used by developers directly at the source-code level. Proper Context-Model will be assisted and validated by IDE-plugins (for many IDEs) in order to re-assure that the generated executable files contain meaningful semantics. According to ARCADIA's vision, the generated executables should be on-boarded by a Smart Controller which will undertake the tasks of translating annotations to the optimal infrastructural configuration. Such a controller will enforce an optimal configuration to the registered programmable resources and will pro-actively adjust the configuration plan based on the Infrastructural State and the Application State. The Context-Model and the aforementioned ARCADIA toolset will be complemented by a Development Methodology that will assure that developed Highly Distributed Applications are Reconfigurable-By-Design. The framework is planned to be validated and evaluated on three use cases that will be deployed over testbeds that host heterogeneous programmable infrastructure.

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2015 - 2018

INPUT (In-Network Programmability for next-generation personal cloUd service support)

European Commission - IT

Horizon H2020 - Principal investigator

The INPUT Project aims to contribute to the evolution of the Internet "brain" beyond current limitations due to obsolete IP network paradigms, by moving cloud services much closer to end-users and smart-devices. This

evolution will be accomplished by introducing intelligence and flexibility (“in-network” programmability) into network edge devices, and by enabling them to host cloud applications (Service_Apps) capable of cooperating with and of offloading corresponding applications residing in the users’ smart objects (User_Apps) and in data centers (DC_Apps), to realize innovative personal cloud services. The conceptual approach of the INPUT Project, including the Service_Apps operating at the edge network level, is shown in the figure below.

The presence of such Service_Apps will allow user requests to be manipulated before crossing the network and arriving at data centers in ways that enhance performance. Such manipulations can include pre-processing, decomposition and proxying. Moreover, the Service_Apps will take advantage of a vertical integration in the network environment, where applications can benefit from network-cognitive capabilities to intercept traffic or to directly deal with network setup configurations and parameters. The integration of Service_Apps at the network edge level is a fundamental aspect, since this level is the one where the Telecom Operator terminates the user network access, and a direct trusting/control on user accounts and services is performed. Therefore, this level is the best candidate to host personal Service_Apps and to provide novel network-integrated capabilities to the cloud environment in a secure and trusted fashion. To achieve this purpose, the INPUT Project will also focus on the evolution of network devices acting at this level beyond the latest state-of-the-art Software-Defined Networking (SDN) and Network Function Virtualization (NFV) technologies, and on how to interface them with the *in-network* programmability. This approach will reduce the reaction times of cloud applications, by exploiting the ability to directly access network primitives, and by providing improved scalability in the interactions of the network with users and datacenters.

2010 - 2013

ECONET (low Energy Consumption NETWORKS)

European Commission - IT

Framework Programme 7 (FP7) addressing the Strategic Objective ICT-2009.1.1 The Network of the Future - Principal investigator

ECONET (low Energy Consumption NETWORKS) project is a 3-year IP project (running from October 2010 to September 2013) co-funded by the European Commission under the Framework Programme 7 (FP7), addressing the Strategic Objective ICT-2009.1.1 “The Network of the Future”.

The ECONET project aims at studying and exploiting dynamic adaptive technologies (based on standby and performance scaling capabilities) for wired network devices that allow saving energy when a device (or part of it) is not used.

The project will be devoted to re-thinking and re-designing wired network equipment and infrastructures towards more energy-sustainable and eco-friendly technologies and perspectives.

Enabling the reduction of energy requirements of wired network equipment by 50%

As the **Future Internet** is taking shape, it is therefore recognized that,

among other basic concepts and key aspects, **energy efficiency** should pervade the network infrastructure as a whole to such extent as to become part of the network design criteria and to carry across multiple networking domains for the achievement of a general target. There are two main motivations that drive the quest for *green* networking: environmental one, related to the reduction of wastes and impact on CO2 emissions, and the economic one, stemming from the need of operators to reduce the cost of keeping the network up and running at the desired service level, while counterbalancing the ever-increasing cost of energy.

The overall idea is to introduce novel green network-specific paradigms and concepts enabling the reduction of energy requirements of wired network equipment by 50% in the short to mid-term (and by 80% in the long run). To this end, the main challenge will be to design, develop and test novel technologies, integrated control criteria and mechanisms for network equipment enabling energy saving by **adapting network capacities and resources to current traffic loads and user requirements, while ensuring end-to-end Quality of Service.**