

Francesco Bronzino

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EXPERTISE SUMMARY

Wide research experience working on networking systems with focus on network management, measurement, and network edge technologies. Deep understanding of systems with practical approach to advanced technology research gained through extensive experience in converting research projects into experimental realizations. Strong leadership experience gained participating in multi-institute projects and coordinating activities in academic and industrial research laboratories.

EDUCATION

Rutgers University 2012 - 2016

Ph.D. in Electrical and Computer Engineering (GPA 3.9/4)

Specialization in computer networks with focus on future mobile and Internet architectures

Thesis title: "Named-Object Based Services in the Future Internet Architecture"

Advisor: Prof. Dipankar Raychaudhuri

Università degli Studi di Torino 2006 - 2012

Laurea (GPA 26.8/30) and Laurea Magistrale in Computer Science (GPA 29.6/30, Summa cum laude)

Specialization in networks and distributed systems

Advisors: Prof. Marco Grangetto, Prof. Matteo Sereno

MAIN RESEARCH PROJECTS

Data driven network management. Design of systems and data driven models to advance the operationalization of machine learning for network management tasks.

Edge assisted network services. Design and analysis of solutions to support the distributed execution of network based services, e.g. video analytics, on heterogeneous edge computing resources.

Mobile Internet architectures. Design of name based networking solutions aimed at the deployment and support of advanced services in future Internet and mobile network architectures.

EXPERIENCE

Nokia Bell Labs France, AMI Group 2018 - Current

Research Scientist. AAAID Lab.

Edge assisted ML Driven Multi-Agent Systems:

- Development of a distributed processing architecture for live video analytics for mobile cameras.
- Design of mechanisms to process information from heterogeneous sources available in industrial settings for ML driven autonomous machines control.
- Design of ML based algorithms to automatically detect fields containing personally identifiable information within unstructured logs produced by network equipment.

Inria, Paris, MiMove Research Group 2016 - 2018

Post-Doctoral Research Fellow. Mentor: Dr. Renata Cruz Teixeira

Service Quality Diagnosis & Enhancement:

- Design and implementation of a system for passive network traffic monitoring and analysis to support a range of prediction and inference problems.
- Design of methods to infer video quality in real-time from encrypted traffic.
- Design of techniques to diagnose root causes of video streaming quality impairments for DASH based video streaming services.

WINLAB, Rutgers University, ECE Department 2012 - 2016

Graduate Research Assistant. Advisor: Prof. Dipankar Raychaudhuri

Future Internet Architectures & Information Centric Networks:

- Design and implementation of a new network service API for the MobilityFirst future Internet architecture that provides full access to new network basic service abstractions.
- Design of the Virtual Network based Application Specific Routing technique with the goal of enhancing mobile services through edge cloud computing.

- Design and evaluation of MFTP, a clean-slate transport layer protocol for the MobilityFirst future Internet architecture based on the concept of named objects.
- Development of a satellite-based CDN network with in-network content caching support built on top of the MobilityFirst future Internet architecture protocol stack.
- Prototyping of the MobilityFirst network protocol stack for Linux and Android devices. Deployment and maintenance of the full network prototype in real world testbeds (ORBIT and GENI) for evaluation under different network scenarios.

Network Virtualization & Service Enhancement:

- Design of a Name-Based Virtual Networking (NOVN) architecture for end-to-end virtualization and service enhancement. Development of a working prototype using Click modular router.
- Design of an SDN based framework for network-assisted dynamic spectrum access towards service enhancement in emerging 5G Radio Access Network scenarios. Development of a working prototype using OpenFlow and OpenAirInterface based software components.

Ericsson Research

Fall 2015

Research Intern. Mentors: Icaro Da Silva, Gunnar Mildh

LTE eNB Sharing of Resources Through Virtualization: Design of an API and abstraction layer towards service enhancement through LTE Base Station slicing. Development of a working prototype using OpenAirInterface based software LTE eNB.

FuturWei Technologies (Huawei Research Labs)

Summer 2014

Research Intern. Mentor: Cedric Westphal

Adaptive Dynamic Streaming over HTTP: Design of an in-network caching system aimed at improving quality of experience for wireless attached video clients and development of an OpenFlow-SDN based pre-fetching system for video streaming in Information Centric Networks.

NRL, University of California, Los Angeles, CS Department

2011 - 2012

Visiting Research Assistant. Advisor: Prof. Giovanni Pau

Future Internet Content Delivery Networks: Design and development of an hybrid CDN/P2P solution for Content Delivery Networks for the FP7 funded project COntent Aware Search retrieval and sTreaming (COAST).

TEACHING

Nokia Bell Labs France, AMI Group

2019 - Current

- Advising one Ph.D. student (Razanne Abu-Aisheh) on the thesis "La Sensibilisation au Contexte de la Collecte et l'Analyse des Données en Faveur des Systèmes Autonomes dans l'Industrie 4.0" ("Context-Aware Information Gathering and Processing Towards Supporting Autonomous Systems in Industry 4.0 Scenarios").

Inria, Paris, MiMove Research Group

2016 - 2018

- Mentoring of 2 PhD and 4 Master students towards completion of thesis and research activities.

WINLAB, Rutgers University, ECE Department

2013 - 2016

- Mentored PhD, Master and Undergraduate students towards completion of thesis and research activities.
- Rutgers ECE 544: Designed and graded the software project for the course Communication Networks II.
- Rutgers ECE 127: Instructed course laboratories for the course Introduction to Computers for Engineers.

AWARDS

- 2016/2017 recipient of the "ECE Graduate Program Academic Achievement Award" from the ECE department at Rutgers University.
- Recipient of two best paper awards.

PRESS

- "The Truth About Faster Internet: It's Not Worth It". The Wall Street Journal, Aug 21st 2019 front page print and online editions.
- "SES and Rutgers University test satellite content delivery network for streaming, OTT, and 5G". SES Blog.
- "WINLAB develops infrastructure for potential new internet", The Daily Targum, Nov 2nd 2016

CONFERENCE AND JOURNAL PAPERS

Inferring Streaming Video Quality from Encrypted Traffic: Practical Models and Deployment Experience.

F. Bronzino, P. Schmitt, S. Ayoubi, G. Martins, R. Teixeira, N. Feamster.

In the Proceedings of the ACM on Measurement and Analysis of Computing Systems (POMACS) and at ACM Sigmetrics 2020, Boston, USA, June 8-12, 2020.

Service Traceroute: Tracing Paths of Application Flows.

I. Morandi, F. Bronzino, R. Teixeira, S. Sundaresan.

In Proceedings of the Passive and Active Measurement (PAM) Conference 2019, Puerto Varas, Chile, March 27-29, 2019.

NOVN: Named-Object Based Virtual Network Architecture.

F. Bronzino, S. Maheshwari, D. Raychaudhuri, I. Seskar.

In Proceedings of the 20th International Conference on Distributed Computing and Networking, Bangalore, India, January 4-7 2019.

Scalability and Performance Evaluation of Edge Cloud Systems for Latency Constrained Applications.

S. Maheshwari, D. Raychaudhuri, I. Seskar, F. Bronzino.

In Proceedings of the ACM/IEEE Symposium on Edge Computing 2018 (SEC '18), Bellvue, WA, October 25-27, 2018.

Enhancing Transparency: Internet Video Quality Inference from Network Traffic.

P. Schmitt, F. Bronzino, R. Teixeira, T. Chattopadhyay, N. Feamster. In Proceedings of the Research Conference on Communications, Information and Internet Policy (TPRC46), Washington DC, USA, September 21-22, 2018.

nepi-ng: an Efficient Experiment Control Tool in R2lab.

T. Parmentelat, M. Mahfoudi, T. Turletti, F. Bronzino, W. Dabbous.

In Proceedings of The 12th ACM International Workshop on Wireless Network Testbeds, Experimental evaluation & Characterization (ACM WINTECH 2018), New Delhi, India, November 2, 2018.

The Named-Object Abstraction for Realizing Advanced Mobility Services in the Future Internet.

F. Bronzino, S. Mukherjee and D. Raychaudhuri.

To appear in Proceedings of the ACM Workshop on Mobility in the Evolving Internet Architecture (MobiArch) 2017, Los Angeles, CA, USA, August, 2017.

An Agile Resource Management Framework for 5G.

O. Bulakci, D. M. Gutierrez-Estevez, M. Ericson, A. Prasad, E. Pateromichelakis, G. Calochira, J. Belschner, P. Arnold, F. Sanchez Moya, A. M. Ibrahim, F. Bronzino, H. Celik and G. Fodor.

To appear in Proceedings of IEEE Conference on Standards for Communications & Networking, 18-21 September 2017, Helsinki, Finland

Evaluating 5G Multihoming Services in the MobilityFirst Future Internet Architecture.

[Best Paper Award]

P. Karimi, M. Sherman, F. Bronzino, I. Seskar, D. Raychaudhuri and A. Gosain.

In Proceedings of the 2nd International Workshop on Research Advancements in Future Networking Technologies (RAFNET 2017), June 4-7, 2017, Sidney, Australia.

Achieving Scalable Push Multicast Services Using Global Name Resolution.

S. Mukherjee, F. Bronzino, J. Chen and D. Raychaudhuri.

In Proceedings of IEEE GLOBECOM 2016, Washington, DC (USA), 4-8 December 2016.

Demonstrating Context-Aware Services in the MobilityFirst Future Internet Architecture.

F. Bronzino, D. Raychaudhuri and I. Seskar.

In Proceedings of the First International Conference in Networking Science & Practice, ITC 28, Wurzburg (Germany), 12-16 September 2016.

vMCN: Virtual Mobile Cloud Network for Realizing Scalable, Real-time Cyber Physical Systems.

K. Nakauchi, F. Bronzino, Y. Shoji, I. Seskar and D. Raychaudhuri.

In Proceedings of the Workshop on Distributed Cloud Computing (DCC) 2016, Chicago (USA), July 25, 2016.

Enabling Advanced Network Services in the Future Internet Using Named Object Identifiers and Global Name Resolution. S. Mukherjee, P. Karimi, F. Bronzino and D. Raychaudhuri.
CTRQ 2017, April 26, 2017, Venice, Italy.

Abstractions and Solutions to Support Smart-Objects in the Future Internet. F. Bronzino and D. Raychaudhuri.
In Proceedings of the 2nd Workshop on Experiences with Design and Implementation of Smart Objects October 3, 2016, New York, USA.

Exploiting Network Awareness to Enhance DASH Over Wireless.
F. Bronzino, D. Stojadinovic, C. Westphal and D. Raychaudhuri.
In Proceedings of the 13th IEEE Consumer Communications & Networking Conference (CCNC) January 2016, Las Vegas, NE.

MFTP: A Clean-Slate Transport Protocol for the Information Centric MobilityFirst Network.
K. Su, F. Bronzino, K. K. Ramakrishnan, and D. Raychaudhuri.
In Proceedings of 2nd ACM Conference on Information-Centric Networking (ICN 2015), September 2015, San Francisco.

Experiences with Testbed Evaluation of the MobilityFirst Future Internet Architecture..
F. Bronzino, D. Raychaudhuri and I. Seskar.
In Proceedings of 2015 European Conference on Networks and Communications (EuCNC). IEEE, 2015.

Congestion-Aware Edge Caching for Adaptive Video Streaming in Information-Centric Networks.
Y. Yu, F. Bronzino, R. Fan, C. Westphal and M. Gerla.
In Proceedings of the 12th IEEE Consumer Communications & Networking Conference (CCNC) January 2015, Las Vegas, NE.

In-Network Compute Extensions for Rate-Adaptive Content Delivery in Mobile Networks.
F. Bronzino, C. Han, Y. Chen, K. Nagaraja, X. Yang, I. Seskar and D. Raychaudhuri.
International Workshop on Computer and Networking Experimental Research using Testbeds (CNERT), October 2014

Network Service Abstractions for a Mobility-Centric Future Internet Architecture.
[Best Paper Award]
F. Bronzino, K. Nagaraja, I. Seskar, and D. Raychaudhuri.
In Proceedings of 8th ACM Workshop on Mobility in the Evolving Internet Architecture (MobiArch) 2013, Miami, FL, October, 2013.

An Adaptive Hybrid CDN/P2P Solution for Content Delivery Networks.
F. Bronzino, R. Gaeta, M. Grangetto, and G. Pau.
In Visual Communications and Image Processing (VCIP), 2012 IEEE, pages 1-6. IEEE, 2012.

THESIS

Named-Object Based Services in the Future Internet Architecture.
F. Bronzino.
Rutgers University Ph.D. Thesis. 2016

TECHNICAL REPORTS, DEMOS, POSTERS & TUTORIALS

Lightweight, General Inference of Streaming Video Quality from Encrypted Traffic.
F. Bronzino, P. Schmitt, S. Ayoubi, N. Feamster, R. Teixeira, S. Wasserman, S. Sundaresan.
Technical report in arXiv preprint. 2019.

Understanding and Improving video QoE – a Last-Mile Perspective
Poster introducing a novel lightweight system running at the home gateway that analyzes traffic generated by

DASH on-demand and live video streams.
Poster at ACM Internet Measurement Conference (IMC) 2017, November 2017.

Public Safety Focus: Connected Vehicles Assisting First Responders

Demo aimed at demonstrating the deployment of contextual services in the MobilityFirst FIA showcasing a geo-casting based alert service integrated together with innovative technologies.
Plenary talk and Demonstration at the 22nd GENI Engineering Conference (GEC-22), March 2015.

Cloud Services Enhancements Through Application Specific Routing in MobilityFirst FIA

Demo showcasing how to exploit name based network virtualization techniques implemented on top of the MobilityFirst FIA to enhance the performance of replicated cloud services.
Poster and Demonstration at the 22nd GENI Engineering Conference (GEC-22), March 2015.

Introduction to the MobilityFirst FIA Protocol Suite

Tutorial that presented a series of exercises intended as an introduction to experimentation with the MobilityFirst FIA project code base.
Tutorial at the 21st GENI Engineering Conference (GEC-21), October 2014.

In-Network Compute Layer in MobilityFirst Future Internet Architecture FIA

Development of computing layer extensions integrated in the MobilityFirst FIA Click router prototype aimed at enhancing performance of DASH video streaming.
Poster and Demonstration at the 20th GENI Engineering Conference (GEC-20), July 2014.

Context Services in MobilityFirst FIA

Development of a context based Android messaging application that exploits MobilityFirst FIA name based API to provide geo-location based communication services.
Plenary talk and Demonstration at the 18th GENI Engineering Conference (GEC-18), October 2013.

Multi-Homing Support in MobilityFirst FIA

Development of in-network based multihoming delivery techniques to support multi-homed mobile devices.
Poster and Demonstration at the 17th GENI Engineering Conference (GEC-17), July 2013.

MobilityFirst Network API use in Mobile Applications

Development of the MobilityFirst FIA protocol stack and API on Android devices used to access replicated services through anycasting primitives.
Poster and Demonstration at the 16th GENI Engineering Conference (GEC-16), March 2013.

TOOLS

Network Microscope

A novel system for passive network traffic monitoring and analysis to support a range of network prediction and inference problems.
<https://netmicroscope.com>

Video Ground Truth Collection

A Chrome extension to collect browsing history and all necessary information to identify video quality metrics for a video streaming session.
https://github.com/inria-muse/video_collection

Service Traceroute

Development of a tool that allows the discovery of individual application flows paths by passively issuing traceroute probes that pretend to be part of the application flow.
<https://github.com/inria-muse/service-traceroute>

MobilityFirst FIA Protocol Suite

The MobilityFirst FIA prototype including the network protocol stack for Linux and Android devices, a Click router based Virtual Network framework and more.
<https://mobilityfirst.orbit-lab.org>

An Adaptive Hybrid CDN/P2P Solution for Content Delivery Networks

Development of a Python based prototype implementing both CDN and P2P systems and evaluated through a deployment on Amazon EC2 and PlanetLab's testbed.

<https://bitbucket.org/wontoniii/coastkad/>

PROFESSIONAL SERVICE

- IEEE Infocom 2020: TPC Member
- FRUGALTHINGS 2020 Workshop at ACM MobiCom: TPC Member
- IEEE SMARTCOMP 2020: WIP and Demo Chair
- IEEE Infocom 2019: TPC Member
- IEEE VTC2018-Fall: TPC Member
- NEAT 2018 Workshop at ACM SIGCOMM: TPC Member
- CCNC 2018: Publicity Chair
- MMSys 2018 Special Session on Human-centric Internet and Multimedia Systems: TPC Member
- MobiMWareHN 2017 Workshop at ACM MobiHoc: TPC Member and Publicity Chair
- MobiCom 2016: Registration Chair
- CCNC 2017: Publicity Chair
- S3 Workshop at MobiCom 2016: TPC Member
- CCNC 2016: Publicity Chair
- MobiSys 2015: Web Chair

REFERENCES

Dipankar Raychaudhuri, Distinguished Professor, Rutgers University, ray@winlab.rutgers.edu

Renata Cruz Teixeira, Senior Researcher, Inria, Paris, France, renata.teixeira@inria.fr

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Giovanni Pau, Professor, Università degli Studi di Bologna, giovanni.pau@unibo.it