

Francesco Bronzino

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EDUCATION

Rutgers University Ph.D. in Electrical and Computer Engineering (GPA 3.9/4) Thesis title: "Named-Object Based Services in the Future Internet Architecture" Advisor: Prof. Dipankar Raychaudhuri	2012 - 2016
Università degli Studi di Torino Laurea and Laurea Magistrale in Computer Science Advisors: Prof. Marco Grangetto, Prof. Matteo Sereno	2006 - 2012

RESEARCH TOPICS

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.

Privacy oriented network systems. Performance analysis and design of network systems that preserve user privacy, *e.g.*, multi-party relay architectures.

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

École Normale Supérieure de Lyon Maître de conférences (Associate Professor). Computer Science department and LIP	2022 - Now
Université Savoie Mont Blanc Maître de conférences (Associate Professor). IAE Annecy and LISTIC	2020 - 2022
Nokia Bell Labs France Research Scientist. AAAID Lab.	2018 - 2020
Inria, Paris, MiMove Research Group Post-Doctoral Research Fellow. Mentor: Dr. Renata Cruz Teixeira.	2016 - 2018
WINLAB, Rutgers University, ECE Department Graduate Research Assistant. Advisor: Prof. Dipankar Raychaudhuri.	2012 - 2016
Ericsson Research Research Intern. Mentors: Icaro Da Silva, Gunnar Mildh.	Fall 2015
FuturWei Technologies (Huawei Research Labs) Research Intern. Mentor: Cedric Westphal.	Summer 2014
NRL, University of California, Los Angeles, CS Department Visiting Research Assistant. Advisor: Prof. Giovanni Pau	2011 - 2012

ADVISING

Ph.D. Students

- Saloua Naama 2021 - Current
"New network systems mechanisms to support Massive Machine Learning". With Prof. Salamatian (USMB).
- Youssouph Faye 2022 - Current
"Distributed Edge Cloud Architecture for Executing AI-Based Applications". With Prof. Salamatian (USMB).
- Johann Hugon 2022 - Current
"Modeling Modern Network Traffic for Automated Machine Learning in Network Systems". With Prof. Busson (U Lyon).
- Razanne Abu-Aisheh 2020 - Current
"Context-Aware Information Gathering and Processing Towards Supporting Autonomous Systems in Industry 4.0 Scenarios". With Dr. Thomas Watteyne (Inria) and Dr. Myriana Rifai (Nokia Bell Labs).

Interns

- Malo Jaffré, Gaetan Nodet, Duncan Bordin, Hakim Ouhida, Setareh Nouri, Ayoub Ben Ameer.

TEACHING

École Normale Supérieure de Lyon

2022 - Now

- Networks
- Network measurements
- Performance Evaluation
- Architectures and Operating Systems

IAE, Université Savoie Mont Blanc

2020 - 2022

- Intro to programming
- Machine learning
- Computer networks
- Operating systems

WINLAB, Rutgers University, ECE Department

2013 - 2016

- 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.

FUNDING AS PRINCIPAL INVESTIGATOR

FIL INTERFERE: Stressing Systems Security Through On-the-fly Network Traffic Generation

Project studying the generation of real-time network traffic to create auditing tools for stressing systems and their security. **10k€, 2021-2025**

ANR-NSF MINT: Modeling Modern Network Traffic: From Data Representation to Automated Machine Learning

Project studying new methods to represent and model traffic for machine learning driven network management and inference. **188k€, 2021-2025**

ANR PARFAIT: Planning and Learning for AI-Edge Computing

Project studying distributed allocation schemes based on Markov decision processes and Reinforcement Learning for edge computing infrastructures tailored for AI-intensive processing tasks. **135k€, 2021-2025**

Industrial contract with CELESTE

Project studying how to automatically extract network configurations satisfying client constraints using machine learning solutions that learn from past configurations rules and apply them to future cases. **Half a PhD thesis funding, 84k€, 2021-2024**

AAP USMB: Decentralized Live Video Analytics at the Network Edge

Project studying how to integrate mobile video sources into the video analytics processing infrastructure using heterogeneous compute resources at the edge of the network. **3k€, 2022**

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

Traffic Refinery: Cost-Aware Data Representation for Machine Learning on Network Traffic

F. Bronzino*, P. Schmitt*, S. Ayoubi, H. Kim, R. Teixeira, N. Feamster (*Co-First Authors). In the Proceedings of the ACM on Measurement and Analysis of Computing Systems (POMACS) and at ACM Sigmetrics 2022, Mumbai, India, June 6-10, 2022.

Coordinating a Swarm of Micro-Robots under Lossy Communication

R. Abu-Aisheh, F. Bronzino, M. Rifai, L. Salaun, T. Watteyne. In the Proceedings of the 2nd ACM International

Workshop on Nanoscale Computing, Communication, and Applications (ACM NanoCoCoA 2021), co-located with ACM SenSys 2021, November 17, 2021

Decentralized Modular Architecture for Live Video Analytics at the Edge

S. Rachuri, F. Bronzino, S. Jain. In the Proceedings of the 3rd Workshop on Hot Topics in Video Analytics and Intelligent Edges (HotEdgeVideo 21), co-located with ACM MobiCom 2021, February 04, 2022.

The Case for Admission Control of Mobile Cameras Into the Live Video Analytics Pipeline

F. Faticanti, F. Bronzino, F. De Pellegrini. In the Proceedings of the 3rd Workshop on Hot Topics in Video Analytics and Intelligent Edges (HotEdgeVideo 21), co-located with ACM MobiCom 2021, February 04, 2022.

Application-Aware End-to-End Virtualization Using a Named-Object Based Network Architecture

F. Bronzino, S. Maheshwari, I. Seskar, D. Raychaudhuri. In the Proceedings of the 33 Edition of the International Teletraffic Congress (ITC 33).

(POSTER) Impact of Connectivity Degradation on Networked Robotic Swarm Cooperation

R. Abu-Aisheh , M. Rifai, F. Bronzino, T. Watteyne. In Proceedings of the International Conference on Distributed Computing in Sensor Systems (DCOSS 2021), virtual conference.

Mapping the Digital Divide: Before, During, and After COVID-19

F. Bronzino, N. Feamster, S. Liu, J. Saxon, P. Schmitt. In Proceedings of the Research Conference on Communications, Information and Internet Policy (TPRC48), virtual conference.

Characterizing Service Provider Response to the COVID-19 Pandemic in the United States.

S. Liu, P. Schmitt, F. Bronzino, N. Feamster. In Proceedings of the Passive and Active Measurement (PAM) Conference 2021, virtual conference.

Mapping the Digital Divide: Before, During, and After COVID-19.

F. Bronzino, N. Feamster, S. Liu, J. Saxon, P. Schmitt. In Proceedings of the Research Conference on Communications, Information and Internet Policy (TPRC48), 2021

Interconnection Changes in the United States.

F. Bronzino, E. Cully, N. Feamster, S. Liu, J. Livingood, P. Schmitt. IAB COVID-19 Workshop

On the Deployability of Augmented Reality Using Embedded Edge Devices.

A. Ben Ameur, A. Araldo, F. Bronzino. In the Proceedings of the 2021 IEEE Consumer Communications and Networking Conference (CCNC), Las Vegas, NV, USA, January 9-12, 2021.

NOVN: A Named-Object Based Virtual Network Architecture to Support Advanced Mobile Edge Computing Services.

F. Bronzino, S. Maheshwari, D. Raychaudhuri, I. Seskar. Elsevier Pervasive and Mobile Computing Journal 69 (2020) 101261.

Atlas: Exploration and Mapping with a Sparse Swarm of Networked IoT Robots.

R. Abu-Aisheh, F. Bronzino, M. Rifai, B. Kilberg, K. Pister, T. Watteyne. In the Proceedings of the 2nd International Workshop on Wireless Sensors and Drones in Internet of Things (Wi-DroIT) 2020, Marina Del Rey, CA, USA, June 15-17, 2020.

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

Understanding Model Drift in a Large Cellular Network.

S. Liu, F. Bronzino, P. Schmitt, N. Feamster, R. Borges, H. Garcia Crespo, B. Ward.
Technical report in arXiv preprint. 2021.

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

Traffic Refinery

A novel system that enables the joint evaluation of both machine learning performance and systems-level costs of different representations of network traffic. <https://traffic-refinery.github.io/>

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

- ACM Sigmetrics 2023: TPC Member
- IEEE Infocom 2023: TPC Member
- Elsevier Computer Communications: Associate Editor
- IEEE MedComNet 2022: TPC Member
- IEEE Smartcomp 2022: TPC Member
- IEEE Infocom 2022: TPC Member
- IEEE MedComNet 2021: TPC Member
- ACM GoodIT 2021: TPC Member
- ITC 33: TPC Member
- IEEE Smartcomp 2021: TPC Member
- IEEE Infocom 2021: TPC Member
- 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

Nick Feamster, Professor, Chicago University, feamster@uchicago.edu

Ivan Seskar, Associate Director, WINLAB, Rutgers University, seskar@winlab.rutgers.edu

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