Antonio Franques

(217) 766-0317 / franques.antonio@gmail.com / afranques.com

Education

- **University of Illinois at Urbana-Champaign** — Urbana, IL
  Ph.D. in Computer Science — *Aug. 2021*
  - **Advisor**: Prof. Josep Torrellas
  - **Thesis**: *"On-Chip Wireless Manycore Architectures"*
- **University of Illinois at Urbana-Champaign** — Urbana, IL
  M.S. in Computer Science — *Dec. 2019*
  - **Thesis**: *"Fuzzy-Token: An Adaptive MAC Protocol for Wireless-Enabled Manycores"*
  - **Relevant coursework**: Parallel Computer Architectures; Operating Systems Design; Machine Learning for Signal Processing; Designing Applications for Extreme Scale Systems (MPI+OpenMP)
- **Polytechnic University of Valencia** — Valencia, Spain
  B.S. in Telecommunications Engineering – Class Rank: 2nd — *Jun. 2015*
  - **Senior thesis**: *"Numerical Methods for Nonlinear Modeling"*. Grade: 10/10 with Honors
  - **Exchange program**: Norwegian University of Science and Technology (NTNU). Fall 2014

Publications

- **A. Franques**, A. Kokolis, S. Abadal, V. Fernando, S. Misailovic, J. Torrellas. *"WiDir: A Wireless-Enabled Directory Cache Coherence Protocol"*. International Symposium on High-Performance Computer Architecture **(HPCA)**, 2021.
- **A. Franques**, S. Abadal, H. Hassanieh, J. Torrellas. *"Fuzzy-Token: An Adaptive MAC Protocol for Wireless-Enabled Manycores"*. Design, Automation & Test in Europe Conference **(DATE)**, 2021.
- S. Jog, Z. Liu, **A. Franques**, V. Fernando, S. Abadal, J. Torrellas, H. Hassanieh. *"One Protocol to Rule Them All: Deep Reinforcement Learning Aided MAC for Wireless Network-on-Chips"*. Symposium on Networked Systems Design and Implementation **(NSDI)**, 2021.
- V. Fernando, **A. Franques**, S. Abadal, S. Misailovic, J. Torrellas. *"Replica: A Wireless Manycore for Communication-Intensive and Approximate Data"*. International Conference on Architectural Support for Programming Languages and Operating Systems **(ASPLOS)**, 2019.
- X. Timoneda, S. Abadal, **A. Franques**, J. Zhou, D. Manessis, J. Torrellas, A. Cabellos-Aparicio, E. Alarcon. *"Engineer the Channel and Adapt to it: Enabling Wireless Intra-Chip Communication"*. **IEEE Transactions on Communications**, 68(5) 3247-3258, 2020. *Impact Factor: 6.72 (Sep. 2020)*
- S. Abadal, A. Marruedo, **A. Franques**, H. Taghvaee, A. Cabellos-Aparicio, J. Zhou, J. Torrellas, E. Alarcón. *"Opportunistic Beamforming in Wireless Network-on-Chip"*. International Symposium on Circuits and Systems **(ISCAS)**, 2019.
- X. Timoneda, S. Abadal, A. Cabellos-Aparicio, D. Manessis, J. Zhou, **A. Franques**, J. Torrellas, E. Alarcon. *"Millimeter-Wave Propagation within a Computer Chip Package"*. International Symposium on Circuits and Systems **(ISCAS)**, 2018.
- A. Cordero, **A. Franques**, J.R. Torregrosa. *"Chaos and Convergence of a Family Generalizing Homeier's Method with Damping Parameters"*. Nonlinear Dynamics, 85(3) 1939-1954, 2016. *Impact Factor: 4.86 (Sep. 2020)*
- A. Cordero, **A. Franques**, J.R. Torregrosa. *"Multidimensional Homeier's Generalized Class and Its Application to Planar 1D Bratu Problem"*. SeMA Journal, 70(1) 1-10, 2015.
- A. Cordero, **A. Franques**, J.R. Torregrosa. *"Numerical Solution of Turbulence Problems by Solving Burgers' Equation"*. Algorithms, 8(6) 224-233, 2015.
- A. Cordero, L. Feng, **A. Franques**, J.R. Torregrosa. *"Stability of a Fourth-Order Family of Iterative Methods for Solving Nonlinear Problems"*. International Conference on Engineering Computational Technology **(ECT)**, 2014.

Industry & Research Experience

- **NVIDIA Corporation** — Santa Clara, CA
  Senior Architect — *Sep. 2023 – present*
  - GPU and SoC modelling
- **Apple Inc.** — Cupertino, CA
  SoC Performance Architect — *Aug. 2021 – Sep. 2023*
  - Performance modeling and analysis of Apple's on-chip interconnect for various SoCs
- **AMD Research** — Bellevue, WA and Austin, TX
  Co-Op Engineer – Software Development — *Sep. 2018 – May 2019*
  - **Mentor**: John Wilkes, **Manager:** Andrew Kegel
  - **Project**: PathForward program to accelerate critical computing technologies for the nation's first exascale supercomputers. *Project funded by the U.S. Department of Energy – Exascale Computing Project.*
  - Developed and benchmarked driver and library software to evaluate the capabilities and performance of prototype interconnects for exascale computing
  - Co-authored a U.S. patent for hybrid interconnect technologies
- **I-ACOMA Group** — University of Illinois at Urbana-Champaign, Urbana, IL
  Graduate Research Assistant — *Aug. 2015 – Aug. 2021*
  - **Advisor**: Prof. Josep Torrellas
  - **Project**: XPS: FULL: Breaking the Scalability Wall of Shared Memory through Fast On-Chip Wireless Communication. *Grant Awarded by the U.S. NSF (#1629431): $880,000*
  - Worked on HW-SW co-designs for novel scalable shared-memory chip multiprocessors, leveraging on-chip wireless communication to reduce the cost of core-to-core communication in parallel computing.
  - Developed new cache coherence protocol (*WiDir*) and medium access control protocol (*Fuzzy-Token*) for these chips, which dynamically adapt to different computational and communication patterns
  - Evaluated performance using Gem5+SST+Multi2Sim, and energy consumption with McPAT+Cacti
- **DAMRES Numerical Analysis Lab** — Polytechnic University of Valencia, Valencia, Spain
  Undergraduate Research Assistant — *Sep. 2013 – Jul. 2015*
  - **Advisors**: Prof. Juan Ramon Torregrosa, and Prof. Alicia Cordero
  - **Area**: Computational Mathematics
  - Designed new set of highly efficient and stable iterative methods for solving nonlinear equations and systems. Applied and analyzed these methods using Matlab to Bratu's problem and Burgers' equation (used in Physics)
  - Designed with Mathematica a new way of discretizing Burgers' equation; increased accuracy, reduced cost

Select Class Projects

- **Automatic MAC Protocol Selection in Wireless-Enabled Manycore Chips**: application of machine learning techniques to infer the optimal medium access control protocol per epoch from real-time processor and memory traces. Implemented in Python. Achieved accuracy of 96%. Evaluated performance on Splash-2 and Crono suites
- **N-Body Problem in Akka**: implementation and performance analysis of the Direct Gravitational N-Body problem in Akka; a very popular framework for actor-based concurrency

Select Personal Projects

- **Lazarius**: Android app for helping reduced-vision people move around cities in real time. Used Google Maps API together with Valencia City Council's Open Data for accessibility and public transport.
  Won second prize and Telefonica Award, 2015 Spanish edition of Hack For Good
- **2 Park**: Android app for managing parking spaces on the street in real time. Used Google Maps API and crowdsourced data (gathered both automatically and using a rewards system).
  Won Telefonica Award, 2014 Spanish edition of Hack For Good

Patents

- S. Blagodurov, **A. Franques**, *"Communication Engine for Hybrid Interconnect Technologies"*, U.S. Patent App. No. 16/588,612. Filed: September 30, 2019, on behalf of Advanced Micro Devices **(AMD)**, Inc.

Awards, Honors, and Scholarships

- **Student Research Competition Winner**, ACM SIGCOMM Conference on Posters and Demos, 2020
- **Student Travel Grant**, U.S. National Science Foundation (NSF), 2017-2019
  Awarded to selected students to attend ISCA (2017, 2018), MICRO (2019), and ASPLOS (2019) conferences
- Award for the **Second-Best Academic Record**, Polytechnic University of Valencia, Class of 2015
- **Undergraduate Full Tuition Scholarship**, Spanish Ministry of Education, 2011-2015
  Merit-based scholarship covering full tuition and living expenses for the whole duration of undergraduate studies
- **Undergraduate Senior Thesis Distinction**, Polytechnic University of Valencia, Class of 2015
- **Undergraduate Course Distinction**, Polytechnic University of Valencia, 2011-2015
  Granted to selected students who obtain the maximum qualification in a certain subject. **16-time recipient**
- **Erasmus Programme Grant**, European Commission, 2014
  Grant providing monthly stipend for undergraduate study abroad program
- **Undergraduate Research Fellowship**, Spanish Ministry of Education, 2013-2014
  Merit-based scholarship providing monthly stipend for advanced study in the field of computational mathematics

Invited Talks & Poster Sessions

- *"Millimeter Wave Wireless Network on Chip Using Deep Reinforcement Learning"*
  - Proceedings of the ACM **SIGCOMM** Conference on Posters and Demos, New York, USA, August 2020. ***Student Research Competition Winner*** *(graduate category)*
- *"Challenges and Opportunities of Wireless Network-On-Chip for Manycore Architectures"*
  - Invited Talk #1 at Session I (Emerging NoC Technologies) of the 12th International Workshop on Network on Chip Architecture, held in conjuction with **MICRO**, Columbus, USA, October 2019.

Teaching Experience

- Teaching Assistant - CS 433 Computer System Organization, Fall 2020, University of Illinois at Urbana-Champaign. Instructor: Prof. Sarita Adve. Responsibilities: office hours, class logistics, homeworks, and exams
- Teaching Assistant - CS/ECE 439 Wireless Networks, Fall 2016, University of Illinois at Urbana-Champaign. Instructor: Prof. Robin Kravets. Responsibilities: occasional lecturer, office hours, and class projects supervisor

Service

- Technical Program Committee Member of the International Workshop on Network on Chip Architectures, 2019
- Journal Reviewer, Nano Communication Networks (Elsevier), 2018 – 2021
- Journal Reviewer, Journal of Electrical and Computer Engineering (Hindawi), 2018 – 2021
- President of the Spanish Student Association at the University of Illinois at Urbana-Champaign, 2018 – 2021
- Graduate Student Ambassador & Mentor, University of Illinois at Urbana-Champaign, 2018 – 2021
- Incoming Exchange Students' Mentor, Polytechnic University of Valencia, 2013 – 2014