Ph.D. Academic Career Paths and Job Search

Dilma da Silva, Texas A&M University
Daniel A. Jiménez, Texas A&M University

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About Dilma

NOW

TEXAS A&M UNIVERSITY

7.5 years in different roles:
"only" Professor (since 9/1/20)
  (interim director of the TAMU Cybersecurity Center 2/21 to 8/21)
Professor and part-time Associate Dean (2019-2020)
Department Head and Professor (2014-2019)

BEFORE

Qualcomm
Principal Engineer & Manager
Qualcomm Research
2 years

IBM Research
Researcher; Manager
IBM T.J. Watson Research Center
12 years

USP UNIVERSIDADE DE SÃO PAULO
Assistant Professor
University of São Paulo, Brazil
1996-2000

EDUCATION

GT
PhD
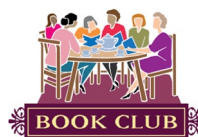*Georgia Tech*

USP UNIVERSIDADE DE SÃO PAULO
BS, MS in Computer Science
University of São Paulo, Brazil

CURRENT ROLE

Research Areas: Distributed Systems, Data Science, Cybersecurity, CS education
Multidisciplinary efforts: Food Safety, Energy Systems, Transportation, Personalized Education

FUN

BOOK CLUB

Daniel A. Jiménez

- Education
  - BS/MS Computer Science, UT San Antonio 1992/1994
  - Ph.D. Computer Sciences, UT Austin 2002
- Jobs
  - Instructor/Research UT Health Science Center San Antonio
  - Assistant/Associate Professor, Rutgers
  - Associate/Full/Department Chair, UT San Antonio
  - **Professor, Texas A&M University**
  - 3 sabbatical leaves at research institutions in Spain (UPC & BSC)
  - Consult with industry
- Research
  - Computer architecture: front-end microarchitecture, cache management
  - Invented perceptron branch predictor currently in your PC or phone
  - IEEE Fellow, Bob Rau award for branch prediction
  - Very diverse group of Ph.D. graduates
- Personal
  - Dual citizen USA/México
  - Born and raised in Texas
  - Married with one daughter

Take Home Messages

- What will your job application look like?

- What will your tenure package or career progress look like?

- What kind of person will you become?

Take Home Messages
(it has worked for many of us)

- **Enjoy** … your work and colleagues

- **Prioritize** … you can't do everything

- "**No**"… learn how to "say" it.

- **Mentorship** … take it and give it

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Tenure Track Positions

- **Research** – advance and disseminate scholarship
  - Train new researchers
  - Attract funding ("sponsored projects")

- **Teaching**
  - Educate the next generation (classroom and beyond)
  - Mentor students

- **Service** / Administration
  - Departmental
  - School/College
  - University
  - Professional (societies, editorial, diversity, policy)

Types of College/Universities*

	Type	Highest Degree Program	Emphasis	Important
R1-R3	Research Universities	Doctoral	Research	Teaching, Service
M1-M3	Colleges / Universities	Masters	Teaching	Research, Service
Undergraduate	Selective Liberal Arts Colleges	Bachelors	Teaching, Scholarship	Service, Research
	Baccalaureate / Associates	Bachelors	Teaching, Service	Research

* Roughly the Carnegie classifications

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Typical Time Management

- **Tenure-track at Research (R1) Institution**
  - 60% - 80% Research
  - 10% - 35% Teaching
  - 5% - 10% Service
- **M.S / B.S. Institution (or teaching faculty at R1)**
  - 50% - 80% Teaching
  - 10% - 30% Professional Development
  - 10% - 20% Service

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Faculty-level Academic Positions

- **Professorial Ranks**
    - Assistant Professor – often untenured
    - Associate Professor – often tenured
    - Full Professor
    - Distinguished/Chaired/Endowed Professor
- **Instructor** – teaching & service
    - Professor of the Practice
- **Lecturer** – teaching
- **Postdoc** – research

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Remaining Topics

- **Tenure-track positions (Jiménez)**

- Teaching positions (Da Silva)

- Postdoctoral positions (Da Silva)

- Research scientists (Da Silva)

- Faculty search (Jiménez)

R1 Expectations: Timing

- **During last year(s) of dissertation**
  - Apply for Assistant Professor jobs (or Postdocs)
- **Tenure-track clock for Assistant Professor**
  - Typically as two contracts (3 year then 4 year)
  - Year 3: Reappointment for second contract
  - Year 5: (Optional) Tenure Tour
  - Year 6: Submit tenure package
  - Year 7: Promotion to Associate — or go make more money
- **Promotion to Full** (Year 11-17)

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R1 Expectations: Research

- **Publications**
  - Journal, conferences, workshops
  - Top-tier venues and peer-review
- **Funding**
  - Support research group and your summer salary
  - Peer-reviewed, basic vs applied, grant vs industry
- **People**
  - Doctoral graduates (and their professional success)

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Daniel A. Jiménez

Department of Computer Science and Engineering, Texas A&M University
Verified email at acm.org - Homepage

computer architecture   compilers   machine learning

| TITLE	CITED BY	YEAR
Dynamic branch prediction with perceptrons DA Jiménez, C Lin High-Performance Computer Architecture, 2001. HPCA. The Seventh …	546	2001
Sampling dead block prediction for last-level caches SM Khan, Y Tian, DA Jiménez Microarchitecture (MICRO), 2010 43rd Annual IEEE/ACM International Symposium …	239	2010
Neural methods for dynamic branch prediction DA Jiménez, C Lin ACM Transactions on Computer Systems (TOCS) 20 (4), 369-397	239	2002
The impact of delay on the design of branch predictors DA Jiménez, SW Keckler, C Lin Proceedings of the 33rd annual ACM/IEEE international symposium on …	198	2000
Fast path-based neural branch prediction DA Jiménez Microarchitecture, 2003. MICRO-36. Proceedings. 36th Annual IEEE/ACM …	196	2003
Dynamically weighted ensemble neural networks for classification D Jiménez Neural Networks Proceedings, 1998. IEEE World Congress on Computational …	173	1998
Adaptive placement and migration policy for an STT-RAM-based hybrid cache Z Wang, DA Jiménez, C Xu, G Sun, Y Xie 2014 IEEE 20th International Symposium on High Performance Computer …	136	2014
Piecewise linear branch prediction DA Jiménez 32nd International Symposium on Computer Architecture (ISCA'05), 382-393	128	2005
Using dead blocks as a virtual victim cache SM Khan, DA Jiménez, D Burger, B Falsafi Proceedings of the 19th international conference on Parallel architectures …	101	2010

Cited by
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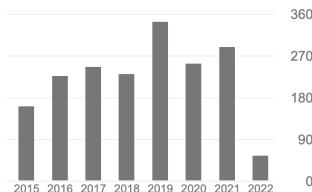
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Co-authors
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Samira Khan University of Virginia	›
Zhe Wang Texas A&M, Intel Labs	›
Calvin Lin Professor of Computer Science, …	›
Paul V. Gratz Department of Electrical and Co…	›

R1 Expectations: Research

- **Reputation** and **Impact** — **professionally necessary**
  - Letter writers and international reputation
  - Citations, h-index, Google Scholar
  - Recognition as awards and invited talks
  - Conference/journal/society organization
- **Other — often personally fulfilling**
  - Outreach, mentoring, undergrad research
  - Patents and open source

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R1 Expectations: Teaching

- **Teaching load**
  - Typically 2-3 courses/year
  - Mix of undergrad and grad courses
  - Teaching assistants for grading, office hours, and overall course management help
- **Promotion and tenure**
  - Quality research essential
  - Great teaching useful
- Teaching is your chance to impress great students!

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R1 Expectations: Service

- **Committees (Internal)**
  - Department — admissions, curriculum, faculty search, …
  - School — executive committee, safety, …
  - University — faculty senate, university resources, …
- **Professional (External)**
  - Program committees, conference org., journal editing
  - Funding panels
  - Professional societies: ACM, IEEE, CRA, AAAS and their TCs
  - From those who have more, more is expected
- Be selective! Avoid flaking!
- Choose important roles where you can engage

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Gaining the Necessary Skills

- **Graduate school is your apprenticeship!**

- **Research**

  - Learn from your advisor and other mentors

  - Develop your style (organizing ideas, executing projects)

  - Publish in the top conferences! https://csrankings.org/

- **Teaching**

  - Experience is very helpful, Preparation is essential

  - Documentation: ensure accountability at all levels

- **Service**

  - Develop Support networks and Student organizations

  - Working on department committees

  - Volunteering at conferences

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What Is It Like?

- Challenges
  - All 3 can be infinite time sinks; avoid spending too much time on each one
  - Networking: be comfortable engaging with new people. Academic is a community
  - Pressure from career and deadlines (papers, grant proposals, etc.)
- Rewards
  - Intellectual freedom – be your own boss (but meet expectations)
  - Create your own culture: lead grad and ugrad students
  - Global community – colleagues and friends around the world
  - Variety and flexibility of work
- Try to balance work and life (that's a whole other talk)

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Remaining Topics

- Tenure-track positions (Jiménez)

- **Teaching positions (Da Silva)**

- Postdoctoral positions (Da Silva)

- Research scientists (Da Silva)

- Faculty search (Jiménez)

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Academic Teaching Positions

- Teaching-oriented institutions
  - Tenure-track emphasizes teaching at all levels (Asst./Assoc./Full)
- Teaching track at research institution
  - Many different types/titles
  - Few with tenure, most on contracts
  - Lecture, Senior Lecturer
  - Teaching Professor
    - Professor of the Practice, Clinical Professor, Lecturers with Security of Employment

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Teaching Positions: Expectations

- **Teaching load**
  - 2-4 classes per semester
  - Teach out of your specific area
    - Intro programming sequence, non-majors
    - Expect busy office hours
- **Service**
  - Attend faculty meetings (dept. and university)
  - Curriculum/Advising committees
  - Serve on campus committees (technology, etc.)

It can be an impactful, successful, happy career

Teaching Positions at Research Institutions

- Fewer institutional resources (time, space, equipment)

  - No graduate research assistants, typically

- May not be able to serve on doctoral thesis committees

- Get undergraduates involved in research (Research Experiences for Undergraduates)

  - CRA DREU and CRA CREU mentorship programs

  - REU through NSF

  - Local programs at undergraduate institutions

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Teaching Positions: Getting the Job

- **Teaching focus** needs to be clear in application materials

- **Document relevant experience** related to teaching

    - "Customer satisfaction surveys" (aka, course evaluations)

    - Opportunities: Teaching Assistant, Center for Teaching programs, Instructor of Record for a course

- **Experience** for grad students teaching intro/non-major courses

- **Your expertise** must match your teaching focus

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Teaching Positions:
Possible Challenges

- **Perception** of less prestigious than research faculty
  - Typically, lower salary and greater flexibility
- **Intense focus on students**, their education, and their inspiration
  - Building "the machine for large courses" (100-1000 students)
- **Working environment**
  - Small department at small school (~5 profs)
  - Small group in a large research department
  - Large lecture staff in a large department
- **Staying engaged in research**
  - Infrastructure, resources, grant administration

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Teaching Positions: Rewards

- **Fulfillment of teaching** is inspiring for both you and students
  - Close relationship with undergrads
  - More focus on being great at one thing
- **Culture and Impact**
  - Be a member of the larger university culture
  - Chance for leadership and influence on campus
- **Fit with beliefs and lifestyle**
  - Teaching may be your gift (share it with others!)
  - Typically, less travel
  - Flexible schedule for families

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What is a Post-Doc?

- Training opportunity whereby a person can deepen his or her expertise and/or research skills for a few years, en route to a permanent position

- Typically funded either by a fellowship awarded directly to the Post-Doc or by the institution/group at which they will spend a limited time

http://cra.org/postdocs/workingpaper.php

Some Post-Doc Motivations

- Timing: Graduate "off season", Two-body issues, Difficult job year

- Improve job opportunities: Strengthen research, Work in a highly regarded institution

- Learn new area, field

- Work with a specific expert: additional mentoring

- Experience different type of university

What is a GOOD Post-Doc?

- Used to expand experience

  - Entering a new research discipline

  - Gaining a distinctly different perspective on the scholar's current research base

- Specific & relevant intellectual growth

  - Working with a particular mentor or on a particular project

- Two years in duration

http://cra.org/postdocs/

GOOD Post-Doc Position Offers

- Mentoring & guidance that directly supports professional development

    - not simply serve as a contract researcher

- Significant opportunities to explore independent research topics

    - in addition to supporting existing research efforts of the mentor's group

    - manage operational aspects of a project under the supervision of the mentor

- Enhance the breadth of their research exploring new fields or new perspectives (not simply refine material from PhD)

http://cra.org/postdocs/

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Expectations

- Variable, some combination of:
  - Teaching, Research, Supervising, Mentoring, Organizing
- The ratio will depend on your own long-term goals, and the position
- Should get clear understanding BEFORE accepting job

Challenges

- Low pay (compared to faculty, industry)

- Role in the university

    - Not a student, but not faculty

    - Depending on school, can feel isolated

- May not have independence

    - working on PI's grant

- If you have family, can be difficult to move for a temporary position

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Research Scientist

- No tenure
  - "Soft money" – grant writing!
- Less requirements (service, teaching)
  - Can focus on research
- Dependent on PI
  - Hired to get things done for grant
  - Not independent
  - **Need a good advocate, well-funded lab**
- Possibly easier work/life balance

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Job Search in ~2 Years?
What to do Now?

- Publish great work!!

- Go to conferences, meet researchers in your area

- Figure out research and/or teaching focused

  - Teaching– attend a SIGCSE conference, try to teach a course, think about teaching initiatives and philosophy

- Attend mentoring workshops

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Mentoring Workshops

- CMD-IT Academic Career Workshop
  - https://cmd-it.harmonyapp.com/programs/current/acw
- CRA-WP Early Career Mentoring Workshop
  - https://cra.org/cra-wp/early-career-mentoringworkshops/
- CRA Career Mentoring Workshop
  - https://cra.org/events/2022-cra-career-mentoring-workshop/

Some Numbers (YMMV)

- Applications out of graduate school:
    - Dilma: 1 faculty position, 0 research labs (very atypical)
    - Daniel: 24 faculty apps, 10 interviews, 1 research lab (2002), 6 offers
    - Daniel's student (tenure track) ~50 faculty apps, 6 interviews (2022), 2 or 3 informal offers (so far)
    - Daniel's student (teaching) ~10 apps, 6 interviews, 3 offers (2022)
- Informal heuristic (maybe outdated):
    - 25-30 applications
    - -> 4 interview invitations
    - -> 1 job offer

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What's in an Application?

- Pages of online forms — Takes longer than you think!
- Cover letter (lightly personalized)
- CV
- Research and teaching statements
- 3-5 references
  - Established people who can write knowledgeable letters
- Diversity often separate statement, sometimes mentioned in teaching / cover letter
- Due dates Nov – Jan, often not firm

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Phone/On-Site Interviews

- Sometimes Zoom/phone interview first – 1 hour typically with search committee
- Onsite (maybe Zoom): 1,1.5, or 2 days
  - Mostly 30 min slots throughout the day
  - Faculty 1 on 1, dept chair, dean, students
  - Job talk (sometimes demo lecture for a teaching school)
  - 3+ meals
  - Very packed schedule: breakfast through late dinner
  - Don't do more than 3 in any 2 week period

Research Talk

- Usually 45-55 minute slot
- Prepare for lots of interruptions
  - Plan to make shorter on the fly
  - Don't go over time
- Goal: Accessible to non-specialists but also deep technical content (this is hard)
  - Don't: excessive background (need some)
  - Do: provide framework for research agenda

One-on-one Meetings: Questions you will be asked

- Why do you want to be in academia?
- Tell me about your research/teaching (current, agenda)
    - Something not in your job talk
    - Something in your field you aren't working on
- Who here do you expect to collaborate with?
- Where do you expect to get funding?
- What lower-level classes can you teach?
- Where else are you interviewing? (This may be illegal)
- Are you married or have children? (This is definitely illegal)

One-on-one meetings: Questions *you* should ask

- How many faculty? Teaching load?
- How much (if any) TA support?
- What is the quality of grad students?
  - How recruited? Success after graduation?
- What is the support for new faculty:
  - mentoring, help with grants, teaching priority and relief, etc.?
- What is the review process? Tenure rate?
- What about IT, admin, grant-writing support, etc.?
- How collaborative are the faculty members?
- What is it like to live here? Where do faculty live?

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Where to find job listings

- CRA: https://cra.org/ads/

- IEEE: https://jobs.ieee.org/

- ACM: https://jobs.acm.org/

- Chronicle of Higher Education: https://jobs.chronicle.com/

Job Search – Closer to getting out

- Prepare CV and research/teaching statements

- Get these materials reviewed

- Talk to advisor/other faculty about where to apply

- Apply to many places – get advice, use your network
  - Do you like snow? Heat? Low cost of living? Does it matter?

- Prepare/Practice interview talk

- Be assertive

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How to get a Post-Doc

- Can be posted in same places as other academic jobs
- Not always advertised
    - Use Your Network!
    - Give talks as you get closer to graduating
- Remain in your PhD lab
    - Usually for timing reasons only

Resources

- On Academic Life

  - http://blogs.scientificamerican.com/guest-blog/2013/07/21/the-awesomest-7-yearpostdoc- or-how-i-learned-to-stop-worrying-and-love-the-tenure-track-faculty-life/

  - http://dynamicecology.wordpress.com/2014/02/04/you-do-not-need-to-work-80- hours-a-week-to-succeed-in-academia/

- On Post-Docs

  - http://cra.org/resources/bp-view/best_practices_memo_computer_science_postdocs_best_practices

- Tips on doing an academic job search

  - http://matt.might.net/articles/advice-for-academic-job-hunt/

  - http://people.mills.edu/spertus/job-search/job.html

  - https://homes.cs.washington.edu/~mernst/advice/academic-job.html