

Pedro E. Santacruz

ASSISTANT PROFESSOR · ELECTRICAL ENGINEERING · SAN JOSE STATE UNIVERSITY

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Education

Rice University

Houston, Texas

PH.D., ELECTRICAL ENGINEERING

May 2013

- Thesis Title: “Beyond Interference Avoidance: Distributed Sub-network Scheduling in Wireless Networks with Local Views”
- Advisor: Ashutosh Sabharwal

The University of Texas at El Paso

El Paso, Texas

M.S., ELECTRICAL ENGINEERING

July 2006

- Thesis Title: “Analysis on the Effects of Nonlinear Amplification on Turbo Coding”
- Advisor: Bryan E. Usevitch

The University of Texas at El Paso

El Paso, Texas

B.S., ELECTRICAL ENGINEERING

May 2004

- *Summa Cum Laude*

Academic Interests

- Wireless networks · Mobile Networks · Internet of Things · Distributed algorithms · Wireless Communications · Graph theory · Information theory · Computer Networking

Experience

San Jose State University

San Jose, California

ASSISTANT PROFESSOR, ELECTRICAL ENGINEERING

August 2015 - Present

- **Current Position**

The University of Texas at Austin

Austin, Texas

POSTDOCTORAL FELLOW

September 2013 - July 2015

- Conducted research on the Pharos testbed, a mobile computing testbed that allows the validation and experimentation of wireless communication protocols including network coding, routing, and distributed coordination.
- Experiments and results provide a system-wide understanding of implementation challenges and present a more realistic set of assumptions that guide improved design and development of wireless algorithms and protocols.
- Co-advised by Christine Julien and Sriram Vishwanath

The University of Texas at Austin

Austin, Texas

LECTURER

August 2014 - December 2014

- Full responsibility for teaching *EE 360C Algorithms*, an upper level course that covers advanced problem solving methods, algorithm design principles, complexity analysis, and the study of common algorithmic classes and their applications.
- Enrollment: 70 students
- Responsibilities included lectures, office hours, and preparation of quizzes and exams for evaluation and assessment.

Rice University

Houston, Texas

RESEARCH ASSISTANT

August 2006 - September 2013

- Analyzed the performance of wireless networks with local knowledge by studying the effect of incomplete and asymmetric information about channel states and network topology.
- Produced analytical tools and methods that lead to scalable solutions to manage interference in large networks.
- Developed fully distributed algorithms using graph theoretical tools to leverage available local information and improve the performance of current and next generation networks such as cellular, sensor, ad-hoc, and device-to-device networks.

- Conducted weekly review session for ELEC 241 (Fundamentals of Electrical Engineering) course at Rice University.
- Objectives included clarifying key concepts and reinforcing material learned in class.

The Aerospace Corporation

El Segundo, California

MEMBER OF TECHNICAL STAFF

Summer 2004, Summer 2005

- Analyzed the effects of nonlinear amplification on turbo coding gain utilizing an actual space-qualified traveling wave tube.
- Prepared and performed simulations and experiments on a software-defined radio platform to compute the bit error rate (BER) of a satellite communication system.
- Created user-friendly tools to efficiently create link budget analyses.

Publications

- Yee, A. and **Santacruz, P.E.**, "Analysis and Evaluation of the Hop Expansion Routing Algorithm (HERA) for Delay-Tolerant Networks," accepted to *Proc. IEEE Wireless Communications and Networking Conference*, Barcelona, Spain, April 2018.
- **Santacruz, P.E.**, Aggarwal, V., and Sabharwal, A., "Leveraging Physical Layer Capabilities: Distributed Scheduling in Interference Networks with Local Views," *IEEE/ACM Transactions on Networking*, November 2014.
- Kalbarczyk, T., Walker, B., Julien, C., Hennessy, A., **Santacruz, P.E.**, Michel, J., and Alford, A. "The Breadcrumb Router: Bundle Trajectory Tracking and Geographic Source Routing in DTN", in *Proceedings of the 6th Extreme Conference on Communication and Computing (ExtremeCom)*, August 2014.
- **Santacruz, P.E.**, "Beyond Interference Avoidance: Distributed Sub-Network Scheduling in Wireless Networks with Local Views," Ph.D. Thesis, Rice University, May 2013.
- **Santacruz, P.E.**, Aggarwal, V., and Sabharwal, A., "Beyond Interference Avoidance: Distributed Sub-Network Scheduling in Wireless Networks with Local Views," *IEEE International Conference on Computer Communications INFOCOM*, Turin, Italy, April 2013.
- **Santacruz, P.E.** and Sabharwal, A., "Statistical resource decoupling in random access interference channel," *2010 44th Annual Conference on Information Sciences and Systems (CISS)*, 17-19 March 2010.
- **Santacruz, P.E.** "Analysis on the Effects of Nonlinear Amplification on Turbo Coding," Master's Thesis, July 2006.
- Grayver, E. and **Santacruz, P.E.**, "Effect of nonlinear amplification on turbo coding gain," *IEEE Aerospace Conference*, 2006.

Student Supervision**MASTER'S THESES**

- "Authentication and Encryption of Aerial Robotics Communication," Maojie Han, Spring 2017
- "Enhancing Scalability and Performance in Software-Defined Networks: An OpenDaylight (ODL) Case Study," Priyanka Neelakrishnan, Summer 2016 (*Nominated for SJSU Outstanding Thesis of the Year Award*)

MASTER'S PROJECTS

SP 2018 Network Security for Virtual Machine in Cloud Computing · Delay Mitigation on V2V Communications · Automation of Data Centers Workflows · Super Controller-Based Dynamic Load Balancing

FA 2017 Localization Techniques for the Internet of Things · Mountain Bike Video Telemetry System

SP 2017 Cloud Security Management Portal for AWS Cloud · Mobile Application for Parking System · Parking Management System Using IoT · Location-Based Content Delivery and Logging · DDOS Detection and Mitigation in SDN Context · Location-Based Two-Step Verification · IoT-Based Security System for Differently-Abled People

FA 2016 Video Application Aware Packet Routing

SP 2016 Simulation of Network in GNS3 for Monitoring and Management · Dynamic Cost Function Unit for QoS Routing using OpenFlow · Utilizing IoT Sensor Networks to Monitor and Optimize Agricultural Systems · Traffic Modeling and Generation for Commercial and Residential areas · Dynamic Path Optimization in Software Defined Networks · vFirewall Provisioning using OpenStack

SENIOR PROJECTS

SP 2018 Routing of Sensor Networks Using Bluetooth Low Energy · Portable Connected Helmet Display

FA 2017 City Solutions: Pothole Detector · Navigation for Blind People, SNIPE System · Boar Detection System · Touch-Free Vitals Measurement Device

Grants & Proposals

Implementation of Distributed and Centralized Routing Algorithms

Arista Networks

PRINCIPAL INVESTIGATOR

Oct. 2015

- Total Grant Amount: \$100,000, My Share: \$30,000 + Equipment
- Project Completed December 2017

Protocol Feature Identification and Removal

Navy

PRINCIPAL INVESTIGATOR

Submitted Jan. 2018

- Total Grant Amount: \$200,000, My Share: \$85,000
- Project developed in collaboration with LeWiz Communication, Inc.

Vertically Integrated Pipeline for Student Research Continuity

SJSU College of Engineering

PROJECT LEAD

Submitted Jan. 2018

- Total Grant Amount: \$96,000, My Share: \$32,000

Bursting the Bubble: Integrating STEM and the Liberal Arts for First-year Science and Engineering Students at San José State University

National Science Foundation

ENGINEERING CURRICULUM DEVELOPMENT TEAM

Submitted Jan. 2018

- Total Grant Amount: \$2,000,000

Building Capacity: Increasing the Cultural and Experiential Capital of Latino Transfer Students in STEM

National Science Foundation

CO-PRINCIPAL INVESTIGATOR

To be submitted Mar. 2018

- Total Grant Amount: \$1,500,000

Teaching

SAN JOSE STATE UNIVERSITY

- **EE286** Mobile and Wireless Networking (Newly Developed Course) *FA 2017 - SP 2018*
- **EE112** Introduction to Signal Processing *SP 2016 - SP 2018*
- **EE289** Special Topics in Networking - Mobile and Wireless Networking *FA 2015 - SP 2017*
- **EE281** Internetworking *FA 2015*

THE UNIVERSITY OF TEXAS AT AUSTIN

- **EE360C** Algorithms *FA 2014*

Posters & Talks

- “Beyond Interference Avoidance: Distributed Sub-network Scheduling in Wireless Networks with Local Views,” *Invited Talk*, The University of Texas at Austin, Austin, TX, 2013.
- “Random Access Systems with Local Views,” *Richard Tapia Celebration of Diversity in Computing Conference*, Doctoral Consortium Presentation, San Francisco, CA, 2011.
- “Distributed Maximal Independent Graph Scheduling with Local Views,” *IEEE School of Information Theory*, Poster, University of Texas, 2011.
- “Throughput Performance in Random Access Systems with Local View,” *IEEE School of Information Theory*, Poster, University of Southern California, 2010.
- “Medium Access Protocol Analysis and Design: An Error-event Approach,” *IEEE School of Information Theory*, Poster, Northwestern University, 2009.
- “Rate Analysis of Multiuser Random Access Protocols as Codes,” *Rice Affiliates Conference*, Poster, Rice University, 2008.

Service

SAN JOSE STATE UNIVERSITY

Present	Strategic Planning Task Force Member	Provost, University
Present	Chicanx/Latinx Student Success Center Faculty Mentor	University
Present	STEM Dinners for Student Success Co-Organizer	University
Present	Society of Latino Engineers and Scientists Faculty Advisor	University
Present	Assessment Committee Member	College of Eng.
Present	Cisco Laboratory Coordinator	EE Department
Present	Networking Area Committee Chair	EE Department
Present	Undergraduate Committee Member	EE Department
SP 2017	ABET Student Outcome Committee Champion	EE Department
SP 2017	Graduate Committee Member	EE Department

Honors and Awards

2018	Faculty Award for Excellence in Teaching College of Engineering, SJSU
2015-2017	Principal Investigator Arista Networks funded research project
2006-2007	AGEP Fellow Rice University
2005-2006	Fellowship Recipient NSF Bridge to the Doctorate
2004	Fellowship Recipient The National GEM Consortium
2004	Student Marshall UTEP, College of Engineering
2003-2005	NSF Scholar National Science Foundation
2001-2003	NACME Scholar National Action Council for Minorities in Engineering

Organizations

2017-Now	Society of Latino Engineers and Scientists, SOLES Faculty Advisor
2001-Now	Institute of Electrical and Electronics Engineers, IEEE Member
2002-Now	Tau Beta Pi Member
2002-Now	Eta Kappa Nu Member
2002-2007	Society of Hispanic Professional Engineers, SHPE Member
2002-Now	Mexican-American Engineers and Scientists, MAES Member
2010-2012	NASA Motivating Undergraduates in Science and Technology Project Mentor
2010-2013	Rice University Honor Council Ombuds and Member
2006-2013	Rice-Houston Alliances for Graduate Education and the Professoriate Participant