Marcela M. Gomez, PhD

135 N. Bellefield Ave – Pittsburgh, PA 15260

☎ (412) 624 9436 • ✉ mmg62@pitt.edu • marcelamgomez.net

RESEARCH INTERESTS

- Interactions among technology, economics, and policy in resource-sharing systems
  - Systems based on radio-electric spectrum
  - Common-pool Resource (CPR) Systems
- Application of computational modeling methods for the study of emergent behavior in resource-sharing systems
- Emerging Distributed and Decentralized Governance Systems (particularly focused on blockchain)

APPOINTMENTS

Office of the Vice Chancellor for Research, University of Pittsburgh **Pittsburgh, PA**
Research Assistant *Jan 2018–Present*

School of Computing and Information, University of Pittsburgh **Pittsburgh, PA**
Visiting Research Assistant Professor *Sept 2017–Present*

School of Science and Technology, Universidad del Azuay **Cuenca, Ecuador**
Lecturer *March – July 2011*

Alliance Française **Cuenca, Ecuador**
Instructor *March – July 2011*

Research Appointments

Office of the Vice Chancellor for Research, University of Pittsburgh **Pittsburgh, PA**
Research Assistant *Jan 2018 – Present*

As a research assistant in this project, I am focused on the following activities:

- Perform social network analysis of research collaborations across the University of Pittsburgh
- Use data analysis and data visualization techniques to gain insights about the research landscape of the University of Pittsburgh
- Completed a data analysis project for the Innovation Institute of the University of Pittsburgh, which provided detailed information about the inventions registered to date

School of Computing and Information, University of Pittsburgh **Pittsburgh, PA**
Visiting Research Assistant Professor *Sep 2017 – Present*

US National Science Foundation Grant 1642949: "EARS: Collaborative Research: Automated Enforcement in Spectrum Sharing: Technical Challenges and Policy Considerations"

- My role in this grant is to mentor Graduate Student Researchers in the design and development of models for automating enforcement in spectrum sharing environments

CONNECT, Trinity College Dublin
The Science Foundation Ireland Research Centre for Future Networks and Communications **Dublin, Ireland**
Visiting Researcher *Oct. – Dec. 2016*
My activities at CONNECT can be summarized as follows:
- Worked with Professor Linda Doyle on the study of secondary spectrum markets for service-driven networks.
- Developed an agent-based model for capturing the negotiations and interactions among entities in a secondary spectrum market
- Utilized *matching markets* concepts to model negotiations among market participants
- Studied alternatives for implementing service differentiation in the market

School of Information Science, University of Pittsburgh **Pittsburgh, PA**
Graduate Student Researcher *Jan 2015 – Aug 2017*
U.S National Science Foundation Grant 1443978: "Virtualized Wireless Networks and Their Impact on Capacity Markets"
As a Graduate Student Researcher in this project, I contributed by completing the following tasks:
- Studied markets for virtualized spectrum resources
- Explored different spectrum market configurations and the resulting market viability via Agent-based Modeling
- Explored resource allocation alternatives (i.e., spectrum auctions and matching games)
- Analyzed applicable policy and economics frameworks

School of Information Science, University of Pittsburgh **Pittsburgh, PA**
Graduate Student Researcher *Aug 2013 – Dec 2014*
U.S. National Science Foundation Grant 1247546: "Techno-Economic Models of Secondary Spectrum Usage"
My contributions to this NSF grant can be summarized as follows:
- Investigated the limitations of spectrum fungibility
- Modified an existing spectrum trading tool considering fungibility limitations
- Analyzed the impact of lack of fungibility on the viability of spectrum markets
- Developed a spectrum trading tool to study virtualized spectrum as a new commodity to trade
- Studied the changes in the market viability results when including virtualization methods

EDUCATION

University of Pittsburgh **Pittsburgh, PA**
PhD in Information Science with concentration in Telecommunications *Jan 2013–Aug 2017*
Dissertation Title: "Spectrum Markets: from *naked* spectrum to virtualized commodities"
Advisor: Martin B.H. Weiss, PhD
GPA: 3.923/4.0

University of Pittsburgh **Pittsburgh, PA**
MSc in Telecommunications *Aug 2011–Dec 2012*
GPA: 3.906/4.0

Universidad de Buenos Aires **Buenos Aires, Argentina**
Specialization Course *Oct-Dec 2009*
Topic: Telecommunications and Automated Control for Building Automation

Universidad del Azuay **Cuenca, Ecuador**
BSc in Electronics Engineering *Sep 2004–Jul 2009*

HONORS AND AWARDS

Pacific Telecommunications Council
O.S Braunstein Best Student Paper Award *January 2016*
Paper: Wireless Network Virtualization as an enabler of Spectrum Sharing

Telecommunications Policy Research Conference
Participant in the TPRC Graduate Student Consortium *September 2015*
Selected by the Telecommunications Policy Research Conference Graduate Student Consortium board to present and discuss my doctoral research with leaders from Industry and Academia

Fulbright Commission
Fulbright Scholarship *2011–2012*
Granted by the Fulbright Commission for pursuing a Masters Degree in Telecommunications in the United States

Universidad del Azuay
"Honorato Vazquez" Award *2009*
In recognition for obtaining the highest GPA of the class of 2009 in the Electronics Engineering program
Granted by Universidad del Azuay, Cuenca – Ecuador

Universidad del Azuay
Top Scholar Award *2005–2009*
Obtained a full-tuition waiver every semester throughout my undergraduate studies in recognition of outstanding academic performance
Granted by Universidad del Azuay, Cuenca – Ecuador

GRANTS

Grant Proposals, Submitted

Pitt SEED Project **Pittsburgh, PA**
Chancellor's Seed Funding Awards - University of Pittsburgh *March 2019*
Proposal Title: "Analyzing Faculty Collaboration Networks at the Swanson School of Engineering". Grant PI: Gemma Jiang. Grant Co-PIs: Julie Myers-Irwin, Marcela M. Gomez
This grant proposal was submitted on March, 2019 and is currently under review.

Pitt SEED Project **Pittsburgh, PA**
Chancellor's Seed Funding Awards - University of Pittsburgh *March 2018*
Proposal Title: "Institutional Workshop on Governance, Anarchy, and Policy". Research Team: Marcela M. Gomez, Martin B.H. Weiss, Prashant Krishnamurthy, Jennifer Murtazashvili, Ilia Murtazashvili, Jeremy Weber, Sera Linardi, Tymofiy Mylovanov, Mark Roberts
This grant proposal was not funded.

Grants, Doctoral Research

Jan 2015 – Aug 2017: U.S National Science Foundation Grant 1443978: "Collaborative

Research: Wireless Networks and Their Impact on Capacity Markets". Grant PI: Allen MacKenzie (Virginia Tech). Grant Co-PIs: Luiz DaSilva (Virginia Tech), Martin B.H. Weiss (University of Pittsburgh)

Aug 2013 – Dec 2014: U.S. National Science Foundation Grant 1247546: "Techno-Economic Models of Secondary Spectrum Usage". Grant PI: Martin B.H. Weiss (University of Pittsburgh). Grant Co-PIs: Prashant Krishnamurthy, David Tipper (University of Pittsburgh)

PUBLICATIONS

Journal Papers

• Kibilda, Jacek, **Gomez, Marcela M.**, Weiss, M.B.H., and DaSilva, Luiz, "Analytical Modelling of Localized Spectrum Sharing in Mobile Networks," *IEEE Wireless Communications Letters*, *Under Review*

• Bodon, Herminio, Bustamante, Pedro J., **Gomez, Marcela M.**, Krishnamurthy, Prashant, Madison, Michael, Murtazashvili, Ilia, Murtazashvili, Jennifer, Mylovanov, Tymofiy, and Weiss, M.B.H., "Ostrom amongst the Machines: Blockchain as a Knowledge Commons," *Cosmos + Taxis - Studies in Emergent Order and Organization*, *Under Review*. (Authors are listed in alphabetical order)

• **Gomez, Marcela M.**, Chatarjee, Shubhajeet, Abdel-Rahman, Mohammad, MacKenzie, Allen, Weiss, M.B.H., and DaSilva, Luiz, "Market-driven Stochastic Resource Allocation Framework for Wireless Network Virtualization," *IEEE Systems Journal. Forthcoming*

• **Gomez, Marcela M.**, Weiss, Martin B.H., and Krishnamurthy, Prashant "Improving Liquidity in Secondary Spectrum Markets: Virtualizing Spectrum for Fungibility," *IEEE Transactions on Cognitive Communications and Networking.*

• **Gomez, Marcela M.**, and Weiss, Martin B.H. "Wireless Network Virtualization: Opportunities for Spectrum Sharing in the 3.5 GHz Band" *EAI Endorsed Transactions on Wireless Spectrum, 2017*

Conference Papers

• **Gomez, Marcela M.**, Kibilda, Jacek, Weiss, Martin, DaSilva, Luiz, "Assessing the Sharing Potential in the 3.5 GHz band: An Analytical Approach" *Accepted for presentation at the Telecommunications Policy Research Conference*, September 2019

• **Gomez, Marcela M.**, Weiss, Martin, Kim, Seongmin, Krishnamurthy, Prashant, "Technology Adoption in Spectrum Sharing: Estimating the Impact on Incumbents in the 3.5GHz Band" *Accepted for presentation at the Telecommunications Policy Research Conference*, September 2019

• **Gomez, Marcela M.**, Bustamante, Pedro, Weiss, Martin, Madison, Michael, Krishnamurthy, Prashant, Mylovanov, Timofiy, Bodon, Herminio, "Is Blockchain the next step in the Evolution Chain of Brokers?" *Accepted for presentation at the Telecommunications Policy Research Conference*, September 2019

• Bustamante, Pedro, **Gomez, Marcela M.**, Weiss, Martin, Znati, Taieb, Das, Debarun, Rose, Stephanie, "A Collaborative Enforcement Mechanism for Spectrum Sharing Using Blockchain and Smart Contracts: An application for the 1695-1710MHz band" *Accepted for presentation at the Telecommunications Policy Research Conference*, September 2019

• Das, Debarun, Znati, Taieb, Weiss, Martin B.H., Bustamante, Pedro, **Gomez, Marcela M.**, Rose, Stephanie, "Crowdsourced Misuse Detection in Dynamic Spectrum Sharing Wireless Networks", *International Conference on Networks*, 2019

• Bustamante, Pedro, **Gomez, Marcela M.**, Weiss, Martin B.H., Znati, Taieb, Park, Jerry, Das, Debarun, Rose, Stephanie, "Agent-based Modeling Approach for Developing Enforcement Mechanisms in Spectrum Sharing Scenarios: An Application for the 1695 - 1710 MHz Band", *TPRC Conference Paper*, 2018

• **Gomez, Marcela M.**, Weiss, Martin B.H., Lehr, William, and McHenry, Giulia, "Spectrum Valuation: Implications for Sharing and Secondary Markets", *TPRC Conference Paper*, 2018

• **Gomez, Marcela M.**, Weiss, Martin B.H., McHenry, Giulia, and Doyle, Linda, "Matching Markets for Spectrum Sharing", *TPRC Conference Paper*, 2017

• Weiss, Martin B.H., Krishnamurthy, Prashant, and **Gomez, Marcela M.**, "How can Polycentric Governance of Spectrum Work?." – Revised Version. *2017 IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*. IEEE, 2017

• Weiss, Martin B.H., Krishnamurthy, Prashant, and **Gomez, Marcela M.**, "How can Polycentric Governance of Spectrum Work?." *TPRC Conference Paper*, 2016

• **Gomez, Marcela M.**, and Weiss, Martin B.H., "Wireless Network Virtualization: Opportunities for Spectrum Sharing in the 3.5 GHz Band." *International Conference on Cognitive Radio Oriented Wireless Networks.* Springer International Publishing, 2016

• **Gomez, Marcela M.**, "Wireless Network Virtualization as an Enabler for Spectrum Sharing" *Pacific Telecommunications Council*, Hawaii, USA, 2016. *Best Student Paper Award*

• Weiss, Martin B.H., Lehr, W.H., Acker, A. and **Gomez, Marcela M.**, "Socio-technical considerations for Spectrum Access System (SAS) design." *2015 IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN).* IEEE, 2015

• **Gomez, Marcela M.**, Cui, L., and Weiss, M. "Trading Wireless Capacity Through Spectrum Virtualization Using LTE-A." *TPRC Conference Paper, 2014*

• Cui, Liu, **Gomez, Marcela M.**, and Weiss, Martin, "Dimensions of cooperative spectrum sharing: Rights and enforcement." *2014 IEEE International Symposium on Dynamic Spectrum Access Networks (DYSPAN)*. IEEE, 2014

• **Gomez, Marcela M.**, and Weiss, M. "How do limitations in spectrum fungibility impact spectrum trading?." *TPRC Conference Paper, 2013*

Book Chapters

• Weiss, Martin B.H. and **Gomez, Marcela M.**, "Polycentric Governance for Spectrum Sharing" in Frequencies: International Spectrum Policy, Eds. Taylor, Gregory and Middleton, Catherine. *Forthcoming*

Posters

• Bustamante, Pedro, **Gomez, Marcela M.**, Weiss, Martin B.H. *"Using Agent-based Modeling to Analyze Enforcement Alternatives in Spectrum Sharing Scenarios"*, Modeling the World's Systems Conference, Washington, DC, USA. *Forthcoming*

• **Gomez, Marcela M.** and Weiss, Martin B.H. *"Wireless Network Virtualization: Opportunities for Spectrum Sharing in the 3.5 GHz Band."*, Telecommunications Policy Research Conference,

Virginia, VA, USA, 2015

Opinion Articles

• "Spectrum Sharing, a way to keep Philly on cutting edge". Published by *The Philadelphia Inquirer* on February 10, 2017. Available at: `http://www.philly.com/philly/opinion/20170210_Commentary__Spectrum_sharing_a_way_to_keep_Philly_on_cutting_edge.html`

TEACHING AND ADVISING

Courses Taught

School of Science and Technology, Universidad del Azuay **Cuenca, Ecuador**
Invited Instructor
• **July 2019**: Research Methods and Data Analysis with Python

Course taught to current faculty and staff members at Universidad del Azuay as part of their continuous education program. This initiative was led by the International Research Network (IReNe) of Universidad del Azuay

School of Computing and Information – University of Pittsburgh **Pittsburgh, PA**
Visiting Research Assistant Professor
• **Summer 2019**: INFSCI 2950: Independent Study
• **Summer 2019**: INFSCI 2725: Data Analytics (Online Course)
• **Spring 2019**: INFSCI 2950: Independent Study
• **Fall 2018**: INFSCI 2725: Data Analytics (Online Course)
• **Summer 2018**: INFSCI 2725: Data Analytics (Online Course)
• **Fall 2017**: INFSCI 3350: Doctoral Seminar on "Governance in Information Systems" (Co-instructor)
• **Fall 2017**: INFSCI 1070/TELCOM 2000: Introduction to Telecommunications and Networks

School of Information Sciences - University of Pittsburgh **Pittsburgh, PA**
Teaching Fellow
• **Summer 2015**: INFSCI 1070/TELCOM 2000: Introduction to Telecommunications and Networks

School of Information Sciences - University of Pittsburgh **Pittsburgh, PA**
Teaching Assistant and Co-instructor
• **Spring 2013**: INFSCI 1079/TELCOM 2010: Computer Networking Laboratory

School of Science and Technology - Universidad del Azuay **Cuenca, Ecuador**
Lecturer
• **Mar - Jul 2011**: Control Theory

Alliance Française **Cuenca, Ecuador**
Instructor
• **Mar - Jul 2011**: French Instructor

School of Science and Technology - Universidad del Azuay **Cuenca, Ecuador**
Teaching Assistant
• **Sep - Feb 2008**: Electromagnetic Theory

Curriculum Development

Spring 2019: Computational Modeling Curriculum
- Led a faculty working group to develop curriculum on Computational Modeling for the Undergraduate program of the School of Computing and Information of the University of Pittsburgh

Spring 2018: INFSCI 2725 - Data Analytics
- Designed and developed an online version of the Data Analytics course for the Master of Science in Information Science (MSIS) program of the School of Computing and Information of the University of Pittsburgh

Students Advised

University of Pittsburgh
School of Computing and Information *Spring 2019 - Present*
Masters of Science in Information Science (MSIS) Program Advisees:
- Herminio Bodon
- Maya Bayer
- Seongming Park (Master's Thesis co-advisor)

INTERNSHIPS

CONNECT - Trinity College Dublin **Dublin, Ireland**
Visiting Researcher *Oct. - Dec. 2016*
The Science Foundation Ireland Research Centre for Future Networks and Communications
- Worked with Professor Linda Doyle on the study of secondary spectrum markets for service-driven networks
- Developed an agent-based model for capturing the negotiations and interactions among entities in a secondary spectrum market
- Utilized *matching markets* concepts to model negotiations among market participants
- Studied alternatives for implementing service differentiation in the market

Superintendencia de Telecomunicaciones
(Ecuadorean Telecommunications Regulatory Body) **Cuenca, Ecuador**
Intern *April - June 2008*
As an Intern, I completed the following activities:
- Developed coverage maps for 2G and 3G technologies
- Monitored the operations of AM, FM, and TV Broadcasting stations in Cuenca, Ecuador
- Detected interfering radio stations in the area using spectrum analyzers
- Created a database of network operators in the Andean region of Ecuador
- Performed inspections of the operations of the 3G and 3.5G cellular technologies in Cuenca, Ecuador
- Performed regular inspections of operations of 2G cellular base stations in Cuenca and its surrounding areas.

SELECTED TALKS AND PRESENTATIONS

School of Computing and Information, University of Pittsburgh
Pittsburgh, PA
October 2018: Telecommunications Seminar Speaker. Presentation title: *"Matching Markets for Spectrum Sharing"*

Universidad del Azuay
Cuenca, Ecuador
June 2018: Keynote speaker at the Science and Technology Forum of Universidad del Azuay. Presentation title: *"Present and Future of Electromagnetic Spectrum"*

Canadian Spectrum Summit
Calgary, AB, Canada
May 2017: Research paper: *"Polycentric Governance for Spectrum Sharing"*

IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)
Baltimore, MD, USA
Mar 2017: Research paper: *"How can Polycentric Governance of Spectrum Work?"*

Pacific Telecommunications Council
Honolulu, HI, USA
Jan 2016: Research paper: *"Wireless Network Virtualization as an Enabler of Spectrum Sharing"*

Telecommunications Policy Research Conference (TPRC)
Multiple Locations
Sept 2018: Research paper: *"Spectrum Valuation: Implications for Sharing and Secondary Markets"*, Washington, DC, USA
Sept 2017: Research paper: *"Matching Markets for Spectrum Sharing"*, Virginia, VA, USA
Sept 2015: Poster: *"Wireless Network Virtualization: Opportunities for Spectrum Sharing in the 3.5 GHz Band."*, Virginia, VA, USA
Sept 2014: Research paper: *"Trading Wireless Capacity Through Spectrum Virtualization Using LTE-A."*, Virginia, VA, USA
Sept 2013: Research paper: *"How do limitations in spectrum fungibility impact spectrum trading?."*, Virginia, VA, USA

PROFESSIONAL SERVICE

Journal Reviewer

- Institute of Electronics and Electrical Engineers (IEEE) Transactions on Services Computing (2019)
- Institute of Electronics and Electrical Engineers (IEEE) Systems Journal (2019)
- Transactions in Mobile Computing (2018)
- Wireless Personal Communications (2016)

Conference Reviewer

- Modeling the World's Systems Conference (2019)
- IEEE Transactions in Cognitive Communications and Networking - Dynamic Spectrum Access Networks (DySPAN) Conference (2017)

Faculty Service

School of Computing and Information **University of Pittsburgh**
Member of the Faculty Recruiting Committee *2018 - 2019*

Other Service

Fulbright Commission - Ecuador branch
Member of the Grantee Selection Committee *2018*

ACTIVITIES AND MEMBERSHIPS

Research Activities

University of Pittsburgh **Pittsburgh, PA**
Visiting Research Assistant Professor *Spring 2019 – Present*
Member of the working group on the Alzheimer's Disease Initiative of the University of Pittsburgh

This group aims at modeling the causal pathways of Alzheimer's disease. This is part of a broader initiative of Dr. Art Levine, former Executive Vice Chancellor and Dean of the School of Medicine of the University of Pittsburgh and the Center for Modeling and Managing Complicated Systems (MoMaCS) of the School of Computing and Information

University of Pittsburgh **Pittsburgh, PA**
Visiting Research Assistant Professor *Spring 2019 – Present*
Member of the working group on modeling large-scale public health issues

This is a joint effort between the Center for Modeling and Managing Complicated Systems (MoMaCS) of the School of Computing and Information, and the Graduate School of Public Health of the University of Pittsburgh. The objective is to work on large scale agent-based models to study impactful problems such as the 'opioid crisis'

University of Pittsburgh **Pittsburgh, PA**
Visiting Research Assistant Professor *Fall 2018 – Present*
Member of the working group on the "Pitt Modeling Stack"

This group brings together researchers from multiple disciplines with the objective to develop a software stack to accelerate modeling. This is an initiative of the Center for Modeling and Managing Complicated Systems (MoMaCS) of the School of Computing and Information of the University of Pittsburgh

University of Pittsburgh **Pittsburgh, PA**
Visiting Research Assistant Professor *Sep 2018 – Present*
Founder of the Blockchain and Smart Contracts Research Group

This group brings together scholars from Political Science, Law, Economics, Computer and Information Science, Engineering, and English, to create multidisciplinary discussion opportunities. Our objective is to find avenues for collaboration, explore possible publication venues, and possibilities for developing grant proposals

University of Pittsburgh **Pittsburgh, PA**
Visiting Research Assistant Professor *Sep 2017 – Present*
Founding Member of the Governance and Technology Research Group

This group combines expertise from different schools and departments across the University of Pittsburgh to advance research on governance of socio-technical systems. Our main objective is to stimulate thinking across disciplines, and establish collaborations that can be translated into multidisciplinary research products

Professional Memberships

University of Pittsburgh **Pittsburgh, PA**
Institutional Mentoring Program Across a CommuniTy of Color (IMPACT)Oct 2018 – April 2019
Nominated by the Dean of the School of Computing and Information to participate as a mentee in the inaugural IMPACT cohort of the University of Pittsburgh

Networking Networking Women (N^2W) Group
Member *2017–Present*
Community of researchers in the communications and networking research fields

IEEE Women in Engineering
Member *2017–Present*

IEEE
Member *2015–Present*

Student Leadership

Women in Information Science (WIS) Group - University of Pittsburgh
Member *2014–Present*
Co-President from Fall 2015 to Summer 2016

Student Council School of Science and Technology - Universidad del Azuay
President *2008*

Volunteering

Humane Animal Rescue (HAR) **Pittsburgh, PA**
Volunteer *Jan 2018–Present*
Volunteering activities include Dog Walker and Foster, and dog handling at HAR events

TECHNICAL SKILLS

- *Computational Modeling - Agent-based Modeling*
  - Repast Simphony
  - NetLogo
- *Data Analysis*
  - Python
  - R and RStudio
  - Tableau
- *General Programming*
  - Matlab
  - Python

LANGUAGES

Spanish: Native speaker

English: Fluent

French: Fluent