# Carlos Barreto

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## About me

Often described as observant, creative, patient, and persistent, with solid foundations of analytical and problem solving skills

Resourceful and adaptable engineer with experience in different fields, including cyber security, machine learning, electrical engineering, economics, and statistics

Excellent verbal and written communication skills developed working individually and in collaboration with people from diverse backgrounds

## Professional Experience

**KTH Royal Institute of Technology**, Stockholm, Sweden September 2021 – Present

**Postdoctoral Researcher**

- Analyzed cyber insurance markets and found that forcing insurers to share data of cyber security incidents can lead to free riding and a market with poor data quality
- Found the optimal strategies to learn cyber risks when insurers have limited historical information of past incidents
- Supervised 3 master thesis on topics related to cyber security and machine learning

**Vanderbilt University**, Nashville, TN July 2018 - August 2020

**Postdoctoral Researcher**

- Built models on how customers with smart appliances react to electricity prices
- Trained ML-based demand forecasters to implement bidding strategies in electricity markets
- Investigated attacks that induce errors on ML-based forecasters. Proposed an ensemble training strategy that mitigates this attacks
- Developed scripts to extend the functionality of power grid simulators to implement and analyze different market-based cyber attacks on power systems

**University of Texas at Dallas**, Richardson, TX January 2014 - May 2018

**CS Research Assistant**

- Carried out an extensive literature survey on insurance to understand how this mechanism can improve the cyber security of IT and industrial systems
- Studied attacks on electricity towers motivated by greed and facilitated by information asymmetries. Proposed a modified auction mechanism that can prevent these attacks
- Investigated attack strategies that exploit vulnerabilities in smart appliances and showed that it is possible to manipulate electricity prices and cause blackouts

## Skills

Programming languages: Python, Java, PHP, SQL

Used in the past: C, C#, VHDL, Verilog

Scientific computing: Python (Numpy/Pandas/SciPy/Scikit-learn/PyTorch/Keras), MATLAB

Software: GNU/Linux, version control (Git and GitHub), command interpreters (Bash scripting)

Languages: English (Fluent), Spanish (Native), Swedish (Beginner)

## Education

**University of Texas at Dallas**, Richardson, TX

Ph.D. and M.Sc. in Computer Science

Relevant Courses: Design and Analysis of Computer Algorithms; Machine Learning; Database Design; Information Security; Cyber-Physical Systems Security and Privacy; Robust Control Systems, Stochastic Dynamic Programming, Information Economics and Mechanism Design

**Universidad de los Andes,** Bogotá, Colombia

M.Sc. in Electronic Engineering

Relevant Courses: Optimization, Stochastic Processes, Machine Learning, Non-Linear Systems, Game Theory

**Universidad Distrital Francisco José de Caldas,** Bogotá, Colombia

B.S. in Electronic Engineering

Thesis: Comparative Study over FPGA of Four Embedded Systems based on Soft-Cores and uCLinux

## Projects

**PDTooldbox** Matlab toolbox designed to implement evolutionary dynamics from game theory. It has been used to simulate electricity markets and also to model biological and social processes. Available at https://github.com/carlobar/PDToolbox_matlab

## Volunteering

Have served as reviewer of multiple conferences and journals (mainly in the areas of control, cyber security, and power systems) and have participated as program committee member of ICPSS 2021 and GameSec 2021, 2022, 2023

Organized Distinguished Lectures at Digital Futures, a cross-disciplinary research centre in Stockholm, during the spring semester of 2023