

JUAN BORREGO CARAZO

Cerdanyola del Valls, Barcelona ◊ UAB

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EDUCATION

Autonomous University of Barcelona

2018-Present

Ph.D. Student. Electronic Engineering Faculty. Microelectronic Systems Department.

Thesis Title: Neural Network Applications for Gesture Recognition in Embedded Automotive Hardware Under Industrial Doctorate Grant

University of Barcelona

2017-2018

Master in Science (MSc) in Foundations of Data Science

Master Thesis: Fully Convolutional Networks for Human Body Part Segmentation

Overall Mark: 8.9/10

Autonomous University of Barcelona

2016-2017

Master in Mathematics for Financial Instruments

Master Thesis: Classical Portfolio Optimization by Sharpe Ratio Maximization

Overall Mark: 9/10

Autonomous University of Barcelona

2011-2016

B.S. in Physics

Final Degree Project: Aggregation Kinetics of Superparamagnetic Colloids

Overall Mark: 7.78/10

EXPERIENCE

KOSTAL Elctrica, S.A.

November 2018 - Present

Ph.D. Student. Gesture Recognition for Embedded Automotive Hardware

Barcelona

- Development of an in house C library for CNNs and RNNs with quantization API
- Development of a 2-D gesture recognition application for the steering wheel. Coordination of a team of 2 embedded software developers.
- Implementation of SpArSe: Sparse Architecture Search for CNNs on Resource-Constrained Microcontrollers. Automatic and embedded hardware suited CNN and RNN architectures. Code oordination of a team of 4 software developers for digitization tasks at the production chain.

Caixabank, S.A.

June 2017 - January 2018

Performance Attribution

Barcelona

- Performance Attribution reporting for fixed income, variable income and mixed funds (VBasic and SQL).
- Liquidity risk assessment for mixed funds.
- Security checks and portfolio surveillance.

Banc Sabadell, S.A.

January 2017 - June 2017

Market Risk Intern

Sant Cugat, Barcelona

- Market risk statistics reporting: VaR and Expected Shortfall.
- Improvement of the computational pipeline in Visual Basic for the market risk statistics.

Trebol Energia
Intern Consultant

June 2016 - January 2017
Sant Joan Desp, Barcelona

- Spanish Electric Market (OMIE) knowledge.
- Data management for the client electric energy consumption.
- Buying and selling operations in the spot and intra spot electric market for clients.
- Spot and intra spot electric market price prediction with ARIMA series.

TECHNICAL STRENGTHS

Level	Fluent	Introductory / Used
Programming Languages	Python	C++
Query and Markup Languages		SQL, HTML
Deep and Machine Learning (ML)	Pytorch, Tensorflow, Scikit-Learn	
Embedded ML	CMSIS	
Bayesian Optimization	Ax, Hyperopt	GPyTorch, BoTorch
Scraping and Crawling		Requests, BeautifulSoup
Databases		PostgreSQL
Tools	Git	SVN

COMPETITIONS AND CHALLENGES

InnovateFPGA: Artificial Intelligence at the Edge Grand Final Contestant *December 2019*
Mushroom recognition application. Detection + classification pipeline by transfer learning with Pytorch. Deployment on FPGA with OpenVINO. MushApp [Link](#)

Climate Change Challenge Winner Team *November 2019*
Development of a strategy for the positioning of new temperature sensors in the city of Barcelona.

HiPEAC Student Challenge VII Final Contestant *October 2019*
Proof of concept for a health food application consisting in ingredients and composition extraction by deep learning based OCR.

SEAT Disrupt Winner Team *April 2019*
Proof of concept for an automotive virtual assistant for children ([Link](#))

PUBLICATIONS

Journals

Borrego-Carazo, J., Castells-Rufas, D., Biempica, E., & Carrabina, J. (2020). *Resource-Constrained Machine Learning for ADAS: a Systematic Review*. IEEE Access. [Link](#)

Castells-Rufas, D., Borrego-Carazo, J., Biempica, E., & Carrabina, J. (2020). *Continuous Touch Gesture Recognition Based on RNNs for Capacitive Proximity Sensors*. Accepted at Personal and Ubiquitous Computing, Springer.

Conferences

Borrego-Carazo, J., Castells-Rufas, D., Biempica, E., & Carrabina, J. *Capacitive-Sensing Module with Dynamic Gesture Recognition for Automotive Applications*. 2020 IEEE 23rd International Symposium on Design and Diagnostics of Electronic Circuits & Systems (DDECS). **Best Paper Award** [Link](#)

Borrego-Carazo, J., Castells-Rufas, D., Biempica, E., & Carrabina, J. *Extending SpArSe: Automatic Gesture Recognition Architectures for Embedded Devices*. Accepted at the 19th IEEE International Conference On Machine Learning And Applications. 2020 Code

Borrego-Carazo, J., Castells-Rufas, D., Biempica, E., & Carrabina, J. *Unsupervised Embedded Gesture Recognition based on multi-objective NAS and Capacitive Sensing*. Accepted at the 2nd International Conference on Advances in Signal Processing and Artificial Intelligence (ASPAI' 2020)

GRANTS

Industrial Doctorate Grant. Catalanian Government. 2018DI30

COLLABORATIONS, PROJECTS AND OTHERS

Arc Kernel for GPyTorch *Februar 2020*
Implementation of Arc Kernel for GPytorch library. Merged PR.

FLOP and RAM computation in Pytorch *April 2020*
FLOP computation for GRU, LSTM and RNN based NNs in Pytorch. Merged pull request.

Automatic Embeddable CNN+RNN for Gesture Recognition *June 2020*
Framework for obtaining convolutional and recurrent neural networks which are well performing but also suitable to be deployed in a micro-controller (in terms of RAM, FLASH and latency) Open Source Code.

TALKS

Advanced Factories 2020 *March 2020*
Neural Network tools for embedded applications. Focus on industrial applications.

JPhD-the scientific meeting of BNC-b students *September 2020*
Automatic Neural Networks for Sequence Classification in Embedded Devices. An extendable solution.

AI & Big Data Congress, Barcelona *October 2020*
Neural networks at the edge. A new horizon of possibilities for the embedded sector.