

# Dennis Hernando Núñez Fernández

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## EDUCATION

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- **‘MITx MicroMasters in Statistics and Data Science’, USA.** (2020 Sep - Presente)

The program provided MIT’s rigorous, high-quality curricula. It lasts 18 months, with courses about data science, statistics and machine learning. Funded by Aporta as part of the Advanced Program in Data Science & Global Skills.

- **‘The Cornell, Maryland, Max Planck Pre-doctoral Research School’, Germany.** (2020 Aug)

Rigorous selection on merit. The school lasted one week, with seminars by leading researchers (U. of Cornell, U. of Maryland, Max Planck Instit.) on data analysis, security and privacy, machine learning, and theory of deep learning.

- **‘10th Lisbon Machine Learning School’, Lisbon, Portugal.** (2020 Jul)

Selection based on merit. The school lasted one week, with a series of classes, laboratory sessions and lectures by renowned researchers. It covered both basic (e.g. neural networks) and advanced topics (e.g. deep learning, reinforcement learning).

- **‘Pi School of Artificial Intelligence’, Rome, Italy.** (2020 May - 2020 Jun)

Winner of a merit scholarship. It lasted 8 weeks, with seminars on AI, projects and mentoring. I worked on developing a summary generation system using BERT models, and giving a functional model for Entire Digital S.r.l. in record time.

- **‘Universidad Nacional de Ingeniería’, Lima, Peru.** (2010 Mar - 2015 Jul)

Bachelor of Science in Electronic Engineering, 1st place of graduation. GPA: 3.5/4.0. Relevant courses: Digital Systems, Signal Processing, and Theory of Control. Participation in the student branch IEEE UNI, and robotics competitions.

## LANGUAGES

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- **Spanish** (*native*), **English** (*advanced*), **German** (*basic*)

## ACHIEVEMENTS AND AWARDS

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- Winner of a scholarship for the Advanced Program in Data Science & Global Skills, hosted by MIT. (2020)
- Selected to participate in the Cornell, Maryland, Max Planck Pre-doctoral School CMMRS. (2020)
- Winner of a full grant for the School of Artificial Intelligence at Pi School. (2020)
- Selected as a winner of the AI Latin American SumMIT, held at the MIT Media Lab. (2020)
- Selected by Fondecyt Peru for a research stay at the University of Padua, Italy. (2019)
- LXAI Travel Grant for the Conference on Neural Information Processing Systems NeurIPS. (2019)
- Secure and Private AI Challenge Scholarship from Facebook AI. (2019)
- ICML Travel Grant for the International Conference on Machine Learning ICML. (2019)
- LXAI Travel Grant for the International Conference on Machine Learning ICML. (2019)
- Winner of a fellowship for the UNESCO/Poland Co-Sponsored Program at the AGH UST. (2016)
- First place in the graduating class of Electronic Engineering, Universidad Nacional de Ingeniería. (2015)

## PUBLICATIONS

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- *Pre-printed journal paper*: D. Núñez-Fernández, F. Barrientos-Porras, R. H. Gilman, M. Vittet-Mondonedo, P. Sheen, M. Zimic. ‘A Convolutional Neural Network for gaze preference detection: A potential tool for diagnostics of autism spectrum disorder in children’. arXiv preprint arXiv:2007.14432. (2020)
- *Workshop paper*: D. Núñez-Fernández, L. Ballan, G. Jiménez-Avalos, J. Coronel-Herrera, M. Zimic-Peralta. ‘Automatic semantic segmentation for prediction of tuberculosis using lens-free microscopy images’. ML for Global Health Workshop at ICML 2020. Vienna, Austria. (2020)
- *Workshop paper*: D. Núñez-Fernández, L. Ballan, G. Jiménez-Avalos, J. Coronel-Herrera, M. Zimic-Peralta. ‘Using Capsule Neural Network to predict Tuberculosis in lens-free microscopic images’. HSYS Workshop at ICML 2020. Vienna, Austria. (2020)
- *Workshop paper*: D. Núñez-Fernández, F. Porras-Barrientos, M. Vittet-Mondonedo, R. H. Gilman, M. Zimic. ‘Prediction of gaze direction using Convolutional Neural Networks for Autism diagnosis’. LatinX in AI Research at NeurIPS 2019. Vancouver, Canada. (2019)
- *Workshop paper*: B. Saldivar-Espinoza, D. Núñez-Fernández, F. Porras-Barrientos, A. Alva-Mantari, L. S. Leslie, M. Zimic. ‘Portable system for the prediction of anemia based on the ocular conjunctiva using Artificial Intelligence’. LatinX in AI Research at NeurIPS 2019. Vancouver, Canada. (2019)
- *Workshop paper*: D. Núñez Fernández. ‘Development of a hand pose recognition system on an embedded computer

using CNNs’. LatinX in AI Research at NeurIPS 2019. Vancouver, Canada. (2019)

- *Book chapter*: A. Aspilcueta Narvaez, D. Núñez Fernández, S. Gamarra Quispe, D. Lazo Ochoa. ‘Smart Campus IoT guidance system for visitors based on Bayesian filters’. BTSym 2019. Lima, Peru. (2019)
- *Workshop paper*: D. Núñez Fernández, B. Kwolek. ‘Hand Posture Recognition Using Convolutional Neural Networks’. LatinX in AI Research at ICML 2019. California, USA. (2019)
- *Book chapter*: D. Núñez Fernández. ‘Development of a hand gesture based control interface using Deep Learning’. SIMBig 2019. Lima, Peru. (2019)
- *Book chapter*: D. Núñez Fernández. ‘Implementation of an indoor location system for mobile-based museum guidance’. SIMBig 2019. Lima, Peru. (2019)
- *Conference paper*: D. Núñez Fernández. ‘Development of a hand pose recognition system on an embedded computer using Artificial Intelligence’. INTERCON 2019. Lima, Peru. (2019)
- *Conference paper*: D. Núñez Fernández. ‘Implementation of a WiFi-based indoor location system on a mobile device for a university area’. INTERCON 2019. Lima, Peru. (2019)
- *Conference paper*: D. Núñez Fernández. ‘Multi-subject continuous emotional states monitoring by using Convolutional Neural Networks’. XPOTRON 2019. Arequipa, Peru. (2019)
- *Conference paper*: D. Núñez Fernández, S. Hosseini. ‘Real-time handwritten letters recognition on an embedded computer using ConvNets’. SHIRCON 2018. Lima, Peru. (2018)
- *Conference paper*: D. Núñez Fernández. ‘A Real-Time Recognition System for User Characteristics Based on Deep Learning’. INTERCON 2018. Lima, Peru. (2018)
- *Book chapter*: D. Núñez Fernández, B. Kwolek. ‘Hand Posture Recognition Using Convolutional Neural Network’. CIARP 2017. Valparaiso, Chile. (2017)

## EXPERIENCE

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### • Research Assistant (2018 Jun - Present)

*Laboratory of Bioinformatics and Molecular Biology, Universidad Peruana Cayetano Heredia, Lima, Peru*

Deep Learning techniques were applied for the diagnosis of diseases, under the direction of PhD. Mirko Zimic.

- Project: ‘Detection of autism through emotion recognition and using Machine Learning’.
- Project: ‘Diagnosing of tuberculosis using Deep Learning on lens-free microscopy images’.
- Project: ‘Prediction of autism using gaze direction and convolutional neural networks’.
- Project: ‘Detection of anemia using Machine Learning on images of the ocular conjunctiva’.

### • Fellow (2020 May - 2020 Jun)

*School of Artificial Intelligence, Pi School, Rome, Italy*

A project was developed for Entire Digital S.r.l. in record time and under the supervision of PhD. Sébastien Bratières.

- Project: ‘Creation of an automatic summary generation system using BERT models’.

### • Research Fellow (2019 Dec - 2020 Mar)

*Visual Intelligence and Machine Perception Research Group, University of Padua, Padua, Italy*

A project was developed under the supervision of the PhD. Lamberto Ballán and thanks to funding from Fondecyt Peru.

- Project: ‘Implementation of a neural network for the diagnosis of tuberculosis using lens-less microscopy’.

### • Researcher (2019 Mar - 2019 Aug)

*Research Institute of the Faculty of Electrical and Electronic Engineering, Universidad Nacional de Ingeniería, Peru.*

A project on the Internet of Things was developed with funds that were won in a university call.

- Project: ‘Development of a IoT guidance system for the UNI-FIEE campus using Naive Bayes’.

### • Research Assistant (2016 Oct - 2017 Mar)

*Faculty of Computer Science and Telecommunications, AGH University of Science and Technology, Kraków, Poland.*

Project developed under the supervision of PhD. Bogdan Kwolek as part of the UNESCO/Poland Fellowship Program.

- Project: ‘Hand posture recognition using Convolutional Neural Network’.

### • Research and Development (2015 Jun - 2015 Sep)

*Telecommunications Research Center INICTEL-UNI, Universidad Nacional de Ingeniería, Lima, Peru.*

A project on the development of systems in FPGA was carried out, with the supervision of researcher Vanessa Gamero.

- Project: ‘Control of an analog camera with an FPGA for a custom satellite application’.

## ACADEMIC SERVICE

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- **Reviewer:** LXAI Workshop at NeurIPS (2019), LXAI Workshop at ICML (2020), IEEE INTERCON (2020), IEEE EIRCON (2020).

- **General and operations:** Session chair at UNESCO UCTE (2016), volunteer at LXAI Workshop at ICML (2019, 2020), volunteer at LXAI Workshop at NeurIPS (2019).

## TECHNICAL SKILLS

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- **Software:** Machine Learning Frameworks (Tensorflow, PyTorch, Caffe, Keras), Hardware Description Languages (VHDL, Verilog), OpenCL, CUDA, C/C++, Python, R, Java, OpenCV, Matlab, Git, Mercurial, L<sup>A</sup>T<sub>E</sub>X.
- **Hardware:** Parallella embedded platform (Xilinx Zynq SOC 7020 and 16 core Epiphany CPU), Raspberry Pi, FPGA Xilinx Spartan 3E, FPGA Altera Cyclone III and Cyclone II, ARM and Atmel microcontrollers, Arduino platform.

## RELEVANT RESEARCH PROJECTS

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- **‘Creation of an automatic summary generation system using BERT models’ (2020).** *Pi School of Artificial Intelligence, Italy.* Project developed by a partner and me for Entire Digital S.r.l. in record time. Several NLP techniques and BERT models were evaluated (on our collected dataset) for automatic biography generation.
- **‘Diagnosing of tuberculosis using Deep Learning on lens-free microscopy images’ (2020).** *Universidad Peruana Cayetano Heredia, Peru.* Implementation of a CNN architecture to detect TB with high accuracy on images obtained from a lens-free microscope. The dataset was collected by our team. Training using Tensorflow.
- **‘Prediction of autism using gaze direction and convolutional neural networks’ (2019).** *Universidad Peruana Cayetano Heredia, Peru.* Eye tracking system using CNNs in order to be applied for Autism diagnosis. Training using the captured dataset and Caffe. Implementation of the project using OpenCV and Python.
- **‘Development of a IoT guidance system for the UNI-FIEE campus using Naive Bayes’ (2019).** *Universidad Nacional de Ingeniería, Peru.* Implementation of a indoor location system for guidance using WiFi signals and a Bayesian estimator. The system was implemented on a Raspberry Pi 3. Offline analysis performed in Python.
- **‘Detection of anemia using Machine Learning on images of the ocular conjunctiva’ (2018).** *Universidad Peruana Cayetano Heredia, Peru.* Development of a portable system on a smartphone for predicting the level of anemia based on images of the ocular conjunctiva. The dataset was collected. Training using Tensorflow.
- **‘Hand posture recognition using Convolutional Neural Network’ (2016).** *AGH University of Science and Technology, Poland.* Development of a Gabor filter and a Deep Neural Network to recognize 10 hand postures with high accuracy on devices with low computing power. Training using Caffe and our collected dataset.
- **‘Control of an analog camera with an FPGA for a custom satellite application’ (2015).** *Telecommunications Research Center INICTEL-UNI, Peru.* Development of a FPGA-based system on a Xilinx FPGA Spartan-3 using the VHDL language. The system captures images from an analog camera using a decoder, clean them, store them in a memory SRAM, and send the processed images to a PIC32 microcontroller via the SPI protocol.

## RELEVANT EVENTS AND TRAINING

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- **MITx MicroMasters in Statistics and Data Science. USA (2020 Sep - 2022 Feb).** The program provided MIT’s rigorous, high-quality curricula. It lasts 18 months, with courses about data science, statistics and machine learning. The participation was funded by Aporta as part of the Advanced Program in Data Science & Global Skills.
- **Advanced Program in Data Science & Global Skills. USA (2020 Sept - 2022 Feb).** Winner of a merit scholarship. The duration is 18 months, and is developed by Aporta in partnership with the Massachusetts Institute of Technology (MIT). Workshops, seminars and mentoring on technical and global skills were provided. In addition to this, a final project was developed. The program included the ‘MITx MicroMasters in Statistics and Data Science’.
- **ACM SIGKDD International Conference on Knowledge Discovery and Data Mining KDD 2020. San Diego, USA (2020 Aug).** Selected as one of the winners of the KDD Student Registration Award, which allowed me to attend and participate in all the activities of this prestigious KDD 2020 conference. Remote participation.
- **The Cornell, Maryland, Max Planck Pre-doctoral Research School CMRRS 2020. Saarbrücken, Germany (2020 Aug).** Rigorous selection on merit. The school lasted one week, with lectures by top researchers (U. of Cornell, U. of Maryland, Max Planck Instit.) on data analysis, security and privacy, machine learning, and deep learning.
- **10th Lisbon Machine Learning School LxMLS 2020. Lisbon, Portugal (2020 Jul).** Selection based on merit. The school lasted one week, with a series of classes, laboratory sessions and lectures by renowned researchers. It covered both basic (e.g. neural networks) and advanced topics (e.g. deep learning, reinforcement learning).
- **Pi School of Artificial Intelligence. Rome, Italy (2020 May - 2020 Jun).** Winner of a merit scholarship. It lasted 8 weeks, with seminars on Artificial Intelligence, projects and mentoring. I worked on developing a summary generation system using BERT models, and giving a functional model for Entire Digital S.r.l. in record time.
- **International Conference on Machine Learning ICML 2020. Vienna, Austria (2020 Jun).** Two abstract papers accepted for oral presentation at the ML for Global Health Workshop and for poster presentation at the HSYS Workshop, the papers are respectively: ‘Automatic semantic segmentation for prediction of tuberculosis using lens-free microscopy images’ y ‘Using Capsule Neural Network to predict tuberculosis in lens-free microscopic images’.
- **The 58th Annual Meeting of the Association for Computational Linguistics ACL 2020. Seattle, USA (2020 Jun).** Selected after an application process as one of the winners of the ACL 2020 D&I financial grant, which allowed me to participate in all the activities related to this prestigious conference. Remote participation.

- **Robotics: Science and Systems RSS 2020. Oregon, USA (2020 Jun).** Accepted for the Inclusion@RSS program, which allowed me to participate of all the activities of this prestigious conference. Remote participation.
- **Conference on Neural Information Processing Systems NeurIPS 2019. Vancouver, Canada (2019 Dec).** Three abstract papers were accepted, after careful peer review process, for poster presentation at the LatinX in AI workshop, the abstract papers were entitled as follows: ‘Portable system for the prediction of anemia based on the ocular conjunctiva using Artificial Intelligence’, ‘Prediction of gaze direction using Convolutional Neural Networks for Autism diagnosis’, and ‘Development of a hand pose recognition system on an embedded computer using CNNs’.
- **International Conference on Machine Learning ICML 2019. Long Beach, California, USA (2019 Jun).** Abstract paper was accepted, after a careful peer review process, for poster presentation at the LatinX in AI workshop, the abstract paper was entitled: ‘Hand Posture Recognition Using Convolutional Neural Network’.
- **International Conference on Information Management and Big Data SIMBig 2019. Lima, Peru (2019 Aug).** Two papers were accepted for oral presentation at the main conference and for their publication in the conference proceedings, the two papers are entitled as follows: ‘Development of a hand gesture based control interface using Deep Learning’ and ‘Implementation of an indoor location system for mobile-based museum guidance’.
- **International Conference on Electronics, Electrical Engineering and Computing INTERCON 2019. Lima, Peru (2019 Aug).** Two papers accepted for oral presentation and publication in the conference proceedings, the papers are: ‘Development of a hand pose recognition system on an embedded computer using Artificial Intelligence’ and ‘Implementation of a WiFi-based indoor location system on a mobile device for a university area’.
- **International Conference on Electronics, Electrical Engineering and Computing INTERCON 2018. Lima, Peru (2018 Aug).** Paper accepted for oral presentation and publication in the conference proceedings, the paper is entitled: ‘A real-time recognition system for user characteristics based on Deep Learning’.
- **UNESCO Interregional Engineering Conference in Technology and Education UCTE 2016. Kraków, Poland (2016 Dec).** Organized by UNESCO and AGH University of Science and Technology. Chairman of one of the sessions, and oral presenter of ‘Implementation of a New Architecture for Hand Poses Recognition’.
- **Course ‘Soft Computing in Modelling and Control’. Kraków, Poland (2016 Oct - 2017 Mar).** Faculty of Mechanical Engineering and Robotics, AGH University of Science and Technology. Classes and laboratories of Fuzzy Logic, Neural Networks and Evolutionary Algorithms. Course of 5 ECTS credits. Lectured by PhD. Smoczek Jarosław.
- **Course ‘Computer Vision’. Kraków, Poland (2016 Oct - 2017 Mar).** Faculty of Computer Science, Electronics and Telecommunications, AGH University of Science and Technology. Classes and laboratories of Computer Vision, Image Processing and Machine Learning. Course of 5 ECTS credits. Lectured by PhD. Bogdan Kwolek.