

# Dennis Hernando Núñez Fernández

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## EDUCATION

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

Accepted after a rigorous merit-based selection to participate in the CMMRS 2020, a one week long school with one-on-one interaction with top researchers (from Cornell, Maryland and Max Planck Institute) and lectures/seminars given by them on databases & data analysis, security & privacy, large-scale machine learning and theory of deep learning.

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

Accepted after a careful selection process based on merit and background to participate in LxMLS 2020. Summer school lasted a week and consisted of a series of lectures, lab sessions and practical talks from top researchers. This summer school 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)

Won a merit-based grant to attend the Pi School of AI, a 8 weeks long school with classes and seminars on Machine Learning and Deep Learning, hands-on projects, and mentoring by top researchers. I worked on creating a summary generation system using BERT models, and providing a working model for the Entire Digital S.r.l. in record time.

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

Bachelor in Science with mention in Electronic Engineering. Ranked 1st in graduating class. GPA: 3.5/4.0 (A). Taking major courses on Digital Systems, Signal Processing, Control Theory and Telecommunications. Active participation in the IEEE Student Branch at Circuits and Systems Society and participated in some national 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)
- Awarded with the UNESCO/Poland Co-Sponsored Fellowship (2016)
- First place in the graduating class of Electronic Engineering, Universidad Nacional de Ingeniería (2015)

## PUBLICATIONS

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- *Pre-printed 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)

*Universidad Peruana Cayetano Heredia. Lima, Peru*

- 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)

*Pi School of Artificial Intelligence. Rome, Italy*

- Project for Entire Digital S.r.l.: ‘Creation of an automatic summary generation system using BERT models’.

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

*University of Padova. Padova, Italy*

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

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

*Universidad Nacional de Ingeniería. Lima, Peru.*

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

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

*AGH University of Science and Technology. Krakow, Poland.*

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

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

*Telecommunications Research Center INICTEL UNI. Lima, Peru.*

- 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**: Paralella 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 an 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 an FPGA-based system on a Xilinx FPGA Spartan-3 using VHDL hardware description language. The system captures images from an analog camera using a decoder, clean the images, save them on a SRAM and send from the FPGA to a PIC32 microcontroller via SPI protocol.
- **‘Implementation of a Programmable System-On-Chip PSoC on an FPGA’ (2014).** *Undergraduate studies.* Pseudo-random numbers were generated in an FPGA module and sorted using different algorithms which were executed on a 32-bit Nios II embedded soft-processor. Implemented using VHDL language and the Nios II SDK tool.
- **‘Development of a Sumo robot for competitions’ (2013).** *Undergraduate studies.* Implementation of a small autonomous robot for Robot-Sumo competitions. The tools used for this project were a microcontroller PIC 16F877A and several sensors and actuators. The algorithm was implemented in C programming language.
- **‘Development of a line follower robot for competitions’ (2012).** *Undergraduate studies.* Implementation of a small autonomous robot for Line Follower competitions. The tools used for this project were a microcontroller PIC 16F877A and several sensors/actuators. The algorithm was implemented in C programming language.

## RELEVANT EVENTS AND TRAINING

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- **Knowledge Discovery and Data Mining Conference KDD 2020. San Diego, USA (2020 Ago).** 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).** Accepted after a rigorous merit-based selection process to participate in the CMMRS 2020, a one week long school with one-on-one interaction with top researchers (from Cornell, Maryland and Max Planck Institute) and outstanding lectures/seminars given by them on databases & data analysis, security & privacy, Internet measurement & network architecture, large-scale machine learning and theory of deep learning.
- **10th Lisbon Machine Learning School LxMLS 2020. Lisbon, Portugal (2020 Jul).** Accepted after a careful selection process based on merit and background to participate in LxMLS 2020. Summer school lasted a week and consisted of a series of lectures, lab sessions and practical talks from top researchers. This summer school 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).** Won a merit-based grant to attend the Pi School of Artificial Intelligence, a 8 weeks long school with classes and seminars on Machine Learning and Deep Learning, hands-on projects, and mentoring by top researchers. I worked on creating a summary generation system using BERT models, and providing a working model for the Entire Digital S.r.l. in record time.
- **International Conference on Machine Learning ICML 2020. Vienna, Austria (2020 Jun).** Oral presentation of the paper ‘Automatic semantic segmentation for prediction of tuberculosis using lens-free microscopy images’ in the ML for Global Health Workshop, and poster presentation of the paper ‘Using Capsule Neural Network to predict Tuberculosis in lens-free microscopic images’ in the HSYS Workshop. Remote participation.
- **The 58th Annual Meeting of the Association for Computational Linguistics ACL 2020. Seattle, USA (2020 Jun).** Selected as a winner of the ACL 2020 D&I financial access subsidy, which allowed me to attend and participate of all the activities of this prestigious ACL 2020 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 2020. Vancouver, Canada (2019 Dec).** Three poster presentations: ‘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’ en el ‘LatinX in AI Workshop’.
- **Development and application of Artificial Intelligence and Bioinformatics in Health. Lima, Peru (2019 Nov).** Invited for the presentation of the talk: ‘Development and application of Artificial Intelligence in Health’, helded at the faculty of Pharmacy and Biochemistry, at Universidad Nacional Mayor de San Marcos (UNMSM).
- **Brazilian Technology Symposium BTSym 2019, satellite event Peru. Lima, Peru (2019 Nov).** Presentation of our accepted paper: ‘Smart Campus IoT guidance system for visitors based on Bayesian filters’.
- **22vo Meetup 2019 Data Science Research Peru. Lima, Peru (2019 Sep).** Invited for the presentation of the talk: ‘Research and development on Artificial Intelligence’, helded at Universidad Continental.
- **International Conference on Machine Learning ICML 2019. Long Beach, California, USA (2019 Jun).** Poster presentation of ‘Hand Posture Recognition Using Convolutional Neural Network’ in the LatinX in AI Workshop.
- **International Conference on Information Management and Big Data SIMBig 2019. Lima, Peru (2019 Aug).** Oral presentation of my two accepted papers, entitled: ‘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).** Performed oral presentation at the main conference of my two accepted papers, entitled: ‘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’.
- **Colloquium on Applications of Computer Science. Lima, Peru (2019 May).** Attender and presentation of ‘Prediction of gaze direction based on Convolutional Networks for the diagnosis of Autism’.
- **International Conference on Control of Dynamical and Aerospace Systems XPOTRON 2019. Arequipa, Peru (2019 Apr).** Performed oral presentation of my accepted paper, entitled: ‘Multi-subject continuous emotional states monitoring by using convolutional neural networks’.
- **Sciences and Humanities International Research Conf. SHIRCON 2018. Lima, Peru (2018 Nov).** Oral presentation of my paper: ‘Real-time handwritten letters recognition on an embedded computer using convnets’.
- **Course ‘Technologies for Internet of Things: Communication and Locatization’. Lima, Peru (2018 Sept).** Attender, Post Graduate Centre, Universidad Nacional de Ingeniería, Lima, Peru.
- **International Conference on Electronics, Electrical Engineering and Computing INTERCON 2018. Lima, Peru (2018 Aug).** Performed oral presentation at the main conference of my accepted paper, entitled: ‘A Real-Time Recognition System for User Characteristics Based on Deep Learning’.
- **UNESCO Interregional Engineering Conf. in Technology and Education UCTE 2016. Kraków, Poland (2016 Dec).** Session chair and presentation of ‘Implementation of a New Architecture for Hand Poses Recognition’.
- **Course ‘Soft Computing in Modelling and Control’. Kraków, Poland (2016 Oct - 2017 Mar).** Attender, 5 ECTS, AGH University of Science and Technology, Faculty of Mechanical Engineering and Robotics, Krakow, Poland.
- **Course ‘Computer Vision’. Kraków, Poland (2016 Oct - 2017 Mar).** Attender, 4 ECTS, AGH University of Science and Technology, Faculty of Computer Science, Electronics and Telecommunications, Krakow, Poland.
- **Course ‘Principles of Radar Remote Sensing’. Lima, Peru (2015 Apr - 2015 Jul).** Attender, course given by Pennsylvania State University (USA) and Universidad Nacional de Ingeniería (Peru).
- **Course ‘Circuit and System Insights’. edX (2015 Mar).** Attender, IEEE Continuing Education, 7 CEU.
- **Technology Fair, Project Competition and Robot Competition XPOTRON 2013. Arequipa, Peru (2013 May).** Participant in the line follower robot competition.
- **Congress and International Exhibition of Mechanical Engineering, Mechatronics, Electrical, Electronics and related branches CONEIMERA 2012. Huancayo, Peru (2012 Sep).** Participant in the line follower robot competition.