MANUEL FERNANDO FLORES CUENCA

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https://manuel0104.github.io/mypersonalportafolio/

PERSONAL PROFILE

I am a highly motivated and hard-working mechanical engineer with a great passion for scientific and technological research. I find satisfaction in tackling new tasks, acquiring new knowledge, and being part of projects with a social impact. In addition to my professional interests, I enjoy playing football, traveling, experiencing new cultures, and I have a deep love for dance.

EDUCATION

Callao National University: BSc. Mechanical Engineering   2012 – 2017
    Grade : 3.0/4.0
    - Graduated in the 5th place over 65 students.
    - Achieved a high score in thesis defense 18/20.

Pusan National University: MSc. student   2022 – Present
    Grade : 4.14/4.50
    - Achieved the best presentation award by Korean Society of Mechanical Engineering.

RESEARCH INTEREST

My research interest lies in exploring the use of deep learning in practical applications. I aim to improve innovative solutions using generative artificial intelligence to automate specific tasks such as information retrieval in documents, manuals written in English and Spanish, leveraging large language models and diverse vector databases.

RESEARCH EXPERIENCE

Peruvian Army   2016 – 2017
Research Assistant

- Became part in the project "Satélite sondeo distancia a tierra" and gained adequate knowledge on the astronautic industry.
- Collaborated for a better partnership between the Peruvian Army with Peruvian state universities.
- Mechanical design of an inexpensive mini tractor to facilitated farmers' work, achieving the third place in the competition "Peruvian Army Prize, Encouragement to the research, development and innovation in Science and Technology".

KYP Bioengineering   2017 – 2019
Chief Technology Officer

- Mechanical and electronic design of low-cost 3D printers.
- Developing innovative actuation mechanisms of a transradial prosthetic hand, utilizing low-cost materials to accomplish specific tasks.
- Researching into the specifics of bio-signals in people with disabilities, specifically how signals vary depending on the patient and the type of amputation, extracting patterns of those using signal processing and machine learning approaches.

Pusan National University   2022 – present
Research Assistant

- Researching the improvement in the ultrasonic tomographic image through the application of image segmentation using deep convolutional neural networks, specifically U-Net architecture and EfficientNet B7 as backbone.
- Automating flaw detection in steel pipes using ultrasonic guided wave inspection and the transformer architecture, by conditioning the transformer encoder architecture for binary classification in time-series ultrasonic waveforms.

ADDITIONAL EXPERIENCE

"LYS" Filters   2019 – 2020
Product Engineer

- Mechanical design of oil, fuel, and air filters for automotive and heavy-duty equipment to meet quality standards to enhance the engine's life cycle.
- Researching the prediction of goods requirement using recurrent neural networks (RNNs) and long short-term memory model (LSTM) to enhance the efficiency in filter production.

RELEVANT RESEARCH SKILLS

Programming languages and mathematical packages: Python, C, JavaScript, MATLAB, LaTeX.

Computer-aided design software: Autodesk Fusion 360, Autodesk Inventor, Ansys workbench.

3D printing software: Ultimaker Cura, Simplify 3D, Slicer app.

Deep learning framework: Pytorch, Keras, Tensorflow.

ADDITIONAL COURSES

Python for Everybody   2018
Introduction to fundamental concepts of programming using Python as a programming language, increasing my knowledge of data retrieval, processing, and visualization.

Machine Learning Specialization   2018
This course helped me gain a deep insight into cutting-edge AI, grasping fundamental concepts in supervised and unsupervised learning.

CS50's Introduction to Computer Science   2020
11 weeks long course, developing a robust understanding of computer science and programming, learning C, python, JavaScript programming language plus CSS and HTML. Having a better understanding of concepts like abstraction, algorithms, data structures, software engineering and web development.

Deep learning Specialization   2021
Offered by deeplearning.ai. I enhance my capabilities in build and train neural network architectures such as convolutional neural networks, recurrent neural networks, LSTMs, transformers and techniques to optimize the model during training using strategies such as dropout, batch normalization, etc.

Generative AI with Large Language Models (LLMs)   2023
I learnt fundamentals of how this new technology works and its application in real world. I gained a detailed understanding of the state of the art in LLMs and how to fine-tunning models to utilize them in specific cases. Moreover, I explored the challenges that this current technology poses for business and application deployments.

PUBLICATIONS & THESIS

Bachelor Thesis

> **Flores Cuenca, M. F.**, & Verastegui Rodriguez, C. F. (2019). Diseño y fabricación de prótesis mioeléctrica de mano de 5 grados de libertad de bajo costo para personas con amputación transradial.

Journal articles

> Malikov, A.K.u., **Flores Cuenca, M.F.**, Kim, B. *et al.* Ultrasonic tomography imaging enhancement approach based on deep convolutional neural networks. *J Vis* (2023). https://doi.org/10.1007/s12650-023-00922-6

CONFERENCE PRESENTATIONS AND POSTERS

> **Flores Cuenca, M. F.**, "Enhancement of ultrasonic tomographic imaging based on semantic segmentation using deep learning", First Meeting of Peruvian Researchers in Asia and Oceania, Seoul, South Korea, October 2022. [Presentation]

> **Flores Cuenca, M. F.**, "Enhancement of ultrasonic tomographic imaging based on semantic segmentation using deep learning", KSME Annual Meeting, International Session, Jeju, South Korea, November 2022. [Presentation] *(Best presentation awarded)*

> **Flores Cuenca, M. F.**, "Improvement of ultrasonic tomographic imagining based on U-Net architecture using 3 different pre-trained backbones", 24th CSS-EEST, Shanghai Jiao

Tong University, China, December 2022. [Online Presentation]

Flores Cuenca, M. F., "Enhancing signal classification in steel pipes through guided wave mode tuning and transformer encoder architecture", KSME Busan branch spring conference, Pukyong National University, Busan, South Korea, June 2023. [Poster]

INVITED TALKS

- **Postgraduate studies in South Korea – Global Korea Scholarship (GKS)**　　2022
  National Agrarian University, Peru [Online]
- **Tips for embassy track application – Global Korea Scholarship (GKS)**　　2022
  Peru-Korea Academic Association (ASAPEC), South Korea [Online]
- **Artificial Intelligence applications in Mechanical Engineering**　　2022
  Callao National University, Peru [Online]

AWARDS & HONORS

- Encouragement to the research, development and innovation in Science　　2017
  and Technology Award, Peruvian Army.
- Global Korea Scholarship, National Institute for International Education　　2020
  5 scholarships were awarded in Peru.
- Best Presentation Award, Korean Society of Mechanical Engineering.　　2022

LANGUAGES

- Spanish - Native
- English – Advance
- Korean – Intermediate

VOLUNTEERING EXPERIENCE

Peru-Korea Academic Association (ASAPEC) – Seoul, South Korea

Supporting the organization in meetings and conferences organized by the association, this association constitutes a strategic initiative for the development of Peruvian researchers in South Korea.

Sprouting – Cambridge, Massachusetts

Tutoring Hispanic undergraduate students in STEM, guiding them to develop a literature review in a field chosen by the mentees. It consisted of a 1-hour meeting per week where I lead the group through acquiring articles, writing article summaries, and constructing a literature review.