MANUEL FERNANDO FLORES CUENCA

manuelfer912@pusan.ac.kr
https://manuel0104.github.io/mypersonalportafolio/

PERSONAL PROFILE

I am a highly motivated and hard-working mechanical engineer with a great passion for developing artificial intelligence real-world applications. 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 (Peru)   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 (South Korea)   2022 – Present
   Grade : 3.9/4.0
   - Achieved the best presentation award by Korean Society of Mechanical Engineering.
   - Achieved a high score in thesis defense 97/100.

RESEARCH INTEREST

I am keen on exploring the use of deep learning in practical applications to automate inspection processes, enhancing efficiency, accuracy, and safety in structural assessment, and optimize design methodologies.

RESEARCH EXPERIENCE

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.
- Developed a web application in failure detection in a heat exchanger, associated with GS power plant (Pocheon-South Korea).

KYP Bioengineering   2017 – 2018
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 deep learning approaches.

Peruvian Army   2016 – 2017
Research Assistant

- Became part in the project "Satellite SDT" 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".

ADDITIONAL EXPERIENCE

"LYS" Filters   2019 – 2020
Product Engineer

- Mechanical design of air filters for heavy-duty equipment to meet quality standards to enhance the engine's life cycle.
- Researching the prediction of goods requirement long short-term memory model (LSTM) to enhance the efficiency in air filter production.

Lima Airport Partners "LAP"   2018 – 2019
Maintenance Engineer - Internship

- Supervision in the maintenance of HVAC equipment at the Peruvian International Airport "Jorge Chavez".
- Management of the logistic of spare parts supply.

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, TensorFlow, Keras.

ADDITIONAL COURSES

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.

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.

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.

PUBLICATIONS & THESIS

Bachelor Thesis

> **Flores Cuenca, M. F.**, & Verastegui Rodriguez, C. F. (2019). Design and Fabrication of a Low-cost Trans-radial Myoelectric Prosthetic Hand.

Master Thesis

> **Flores Cuenca, M. F.** (2023). A novel Deep learning Approach for Ultrasonic Guided Wave Inspection of Heat Exchanger Tubes through Optimized Data Splitting and Distribution.

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

> **Flores Cuenca, M.F.**, Malikov, A.K.u., Kim, J. *et al.* A novel flaw detection approach in carbon steel pipes through ultrasonic guided waves and optimized transformer neural networks. *J Mech Sci Technol.* (**Under review**)

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

- **Artificial Intelligence applications in Nondestructive testing by ultrasound**   2023
  Peru-Korea Academic Association (ASAPEC), Seoul, South Korea [Offline]
- **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 & SCHOLARSHIPS

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

LANGUAGES

- Spanish - Native
- English – Advanced
- Korean – Intermediate

VOLUNTEERING EXPERIENCE

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

Assisting with 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.

TEACHING EXPERIENCE

Deep learning application deployment – Teacher   Spring 2023

A one-month seminar held for both master's and undergraduate students majoring in Mechanical Systems Design at Pusan National University.

Introduction to Deep Learning – Teacher   Fall 2022

A two-week seminar held for both master's and undergraduate students majoring in Mechanical Systems Design at Pusan National University.

Introduction to Python 3 – Teacher   Summer 2021

Designed as part of the curriculum for freshmen in the mechanical engineering department at the National University of Callao.

Math and Physics – Teacher   2012-2019

Private tutor for 5th grade high school students, preparing them for challenging entrance exams for Peruvian universities, including the Pontifical Catholic University of Peru, National University of Callao, National University of San Marcos, and National University of Engineering.