Georgios Kostopoulos

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Summary

Currently pursuing a mechanical engineering degree with a specialization in machine learning at the National Technical University of Athens (NTUA). Actively engaged in cutting-edge research projects at the Machine Design Laboratory (MDLab), combining expertise in FEA software, modeling, and machine learning to drive innovation. With 10 years of service as a police officer, including experience at police headquarters and critical intelligence sectors. I have honed strong analytical and problem-solving skills, ready to tackle complex challenges.

Work Experience

Undergraduate Researcher Oct 2021 - present

Conducting research on Deep Learning-based modeling and dynamic optimization of gear pairs in the Machine Design Laboratory.

Police Officer Sep 2011 - present

- Proven experience in the intelligence and investigations sectors
- Strong track record of managing law enforcement operations and investigations
- Skilled in making informed decisions in high-pressure situations
- Experienced in working under tight deadlines and managing multiple priorities simultaneously

Projects

Static Transimission Error Analysis Toolkit Link to app

. The Static Transmission Error (STE) Analysis Toolkit is an app that utilizes deep learning technology to compute STE in real-time

. The app consists of two main sections: "Explore STE" and "Optimization Tools"

. This allows for an in-depth analysis to be performed in a dynamic and efficient manner

. Check Optimization tools → Discrete Analysis for some descriptive graphs

Graph Neural Network to predict plate with hole in tension FEA Link to test cases diagrams

Development of a graph neural network that make predictions of displacements u_x and u_y of a plate with hole in tension trained on data cases computed using finite element analysis.

Helical gears stresses FEA vs AGMA standards Link to technical report

This technical report provides a detailed analysis of gears using finite element methods, and compares the results with AGMA standards.

Thermodynamic Cycles Link to Github repo

. Modeling and constructing thermodynamic cycles with simulation software written in Python

. Calculation of important parameters (temperature, entropy, work) and creation of diagrams (T-s, h-s, P-v)

. Utilizing Factory design pattern for code maintenance and future adaptability

DC motor parameter estimation Link to technical report

. Estimating DC Motor parameters with numerical pptimization techniques

. Processing and plotting data measured from an Arduino

. Utilizing SciPy's "leastsq" function for optimization and applying curve fitting and State-Space Representation techniques

Uncertainty Propagation Link to Github repo

. Quantifying uncertainty in scalar function outputs with Python libraries including NumPy, SciPy, Seaborn and Matplotlib

. Using Delta method and Monte Carlo simulation, allowing for customization with user-defined inputs such as functions, input variables, covariance matrix, and sample size

. Computing uncertainty, generating samples, plotting distributions, calculating standard error of mean and confidence band, and offers flexibility in application to a variety of functions and inputs

Education

2019 - present Five-year MEng. Diploma at **School of Mechanical Engineering - National Technical University of Athens (NTUA)**

. Mechanical Design Major

. Currently at 8th semester

2014 - 2018 Bachelor's Degree at **Department of Mechanical Engineering Educators - School of Pedagogigal and Technological Education (ASPETE)**

. Drop out

. 40 courses passed

2011 - 2013 Constable's Degree at **Hellenic Police Constable School - Police Academy**.

Publications

[1] E. Sakaridis, C. Kalligeros, C. Papalexis, G. Kostopoulos, and V. Spitas, "Symmetry preserving neural network models for spur gear static transmission error curves," *Mechanism and Machine Theory*, 2023.

Skills

Technical Skills	**Tools & Technologies**
Python, Matlab, LaTeX	Anaconda, Jupyter Notebook, Git
Machine Learning, Deep Learning	PyTorch, TensorFlow, Keras
FEA	Abaqus, Calculix, GMSH, Netgen
Data Analysis, Data Visualization	Pandas, Matplotlib, Seaborn