

ANDREAS MENTZELOPOULOS

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EDUCATION

Massachusetts Institute of Technology - MIT	2020 – pres. (Aug. 2025)
PhD Mechanical Engineering and Computation, minor in Finance	.
SM Computer Science (pursuing, follow thesis progress here)	
SM Mechanical Engineering	2020 – 2022
GPA: 4.9 / 5.0	
University of Michigan – Ann Arbor	2016 – 2020
BSE Mechanical Engineering, minor in Mathematics	
BES Naval Architecture & Marine Engineering	
GPA: 3.86 / 4.00	

INTERESTS & BIO

Generative Modeling, Time-series Forecasting, Deep Learning
I am an impact driven professional with a strong record of developing scalable machine-learning models. I have a solid academic background in mathematical modeling, probability and stochastic processes, machine learning, optimization, and numerical methods. My PhD research focuses on time-series forecasting and generative modeling for high-resolution images and time-series. My previous experience includes roles in finance (quant trading research), technology (software), and engineering.

SKILLS

Computer languages	Python*, MATLAB*, C++, Julia	* expert
Machine/Deep Learning frameworks	PyTorch*, TensorFlow, scikit-learn*	
Developed gen-AI models	Diffusion*, VAE*, GANs	
Developed time-series models	Transformers*, LSTM*, GRU, XGBoost, LightGBM	

WORK EXPERIENCE

CITIC Securities CLSA, Quantitative Trading Strategies, Intern, New York, NY	06 – 08/2024
1. Developed the firm’s deep learning statistical arbitrage trading framework (conceptualization and coding). a. Formulated market neutral long-short strategies. b. Implemented a transformer-based stock returns forecasting model based on proprietary indicators. c. Backtested the framework on the Hong Kong markets (public equities). d. Outperformed internal strategies in terms of returns, Sharpe ratio, and portfolio turnover.	
MathWorks, Engineering Development Group, Intern, Natick, MA	06 – 08/2023
1. Led quality engineering efforts for the Simscape family of products. a. Designed and implemented test suites for simscape multibody example models, ensuring robustness and reliability across updates. b. Implemented test suites for the Gas, Moist Air, and Isothermal Liquid libraries, assuring reliability and performance. 2. Re-designed and optimized the hydraulics of the customer-facing forklift example model, which was publicly released with MATLAB R2024a.	
American Bureau of Shipping, Offshore Equipment Group, Intern, Houston, TX	06 – 08/2020
1. Conducted engineering reviews for pressure vessel designs in compliance with ASME Section VIII Div. 1 safety regulations for high-stakes offshore and marine environments. 2. Worked on the classification of BP’s Mad Dog Phase 2 – Argos semi-submersible offshore drilling platform, reviewing over 340 technical drawings. 3. Developed and verified allowable chemical cargo lists for 12 chemical tankers in accordance with the IBC Code, effective January 2021.	

RESEARCH EXPERIENCE

Stochastic Analysis and Nonlinear Dynamics Lab, Tow Tank, MIT

09/2020 – pres.

Graduate Student Research Assistant, PI: Prof. Michael Triantafyllou, Prof. Themis Sapsis

1. LOBSTgER (Learning Oceanic Bioecological Systems Through generative Representations):

- Developed a family of diffusion models to synthesize and enhance high-resolution awareness photography images, focusing on marine animals local to Massachusetts and the Gulf of Maine. Project in collaboration with photographer [Keith Ellenbogen](#), who provides training data.
- Developed unconditional latent diffusion models generating 640x1024 images, which generalize to higher resolutions. Please find samples [here](#).
- Developed conditional latent diffusion models for underwater image restoration and enhancement tasks, particularly focusing on low-visibility, color distortion, and lens blocking issues of underwater photography. Please find samples [here](#).
- Recognized on [MIT News](#) (06/25). Recognized at the “Meet the Scientists Series” (10/24) and “Computer Science Education Weekend” (12/24) at the Museum of Science in Boston.

2. Firstling Digital Twin (for marine risers):

- Developed a transformer-based deep neural network for underwater pipeline vibrations forecasting.
- The twin predicts the pipeline’s full motion (nonlinear, nonstationary dynamics) from sparse measurements on the body. The model accommodates wave input data if available and can forecast fatigue.
- The model has been validated on field data from BP’s Atlantis platform operating in the Gulf of America.

3. Virtual Towing Tank (for vortex-induced vibrations):

- Conducted studies to determine the most suitable generative model for pipe vibration data, comparing GANs, VAEs, and Diffusion models.
- Developed conditional latent diffusion models that generate densely sampled time-series based on physical parameters like tension and flow velocity as conditioning information, equivalent to altering experimental conditions in the lab.
- Validated on data collected at the MIT Towing Tank.
- Generated data are higher fidelity than CFD data and are obtained much faster with significantly less compute.

SELECTED PUBLICATIONS ----- (for full list reference [google scholar](#), pre-prints [here](#))

1. **(Submitted) Mentzelopoulos, A.,** Fan, D., Sapsis, T., Karniadakis, G., Triantafyllou, MS, “[Deep generative modeling of vortex-induced vibrations](#)” (pre-print), Engineering Applications of Artificial Intelligence, 2025.
2. **Mentzelopoulos, A.,** Fan, D., Sapsis, T., Triantafyllou, MS, “[Deep learning vortex-induced vibrations: time-space forecasting with transformers](#)”, Journal of Fluids and Structures, 2025.
3. **Mentzelopoulos, A.,** Fan, D., Sapsis, T., Triantafyllou, MS, “[Variational autoencoders and transformers for multivariate time-series generative modeling and forecasting: Applications to vortex-induced vibrations](#)”, Ocean Engineering, 2024.
4. **Mentzelopoulos, A.** Ferrandis, J.d.A., Rudy, S., Sapsis, T., Triantafyllou, M.S, Fan, D., “[Data driven prediction and study of vortex induced vibrations by leveraging hydrodynamic coefficient databases learned from sparse sensors](#)”, Ocean Engineering, 2022.

SELECTED HONORS & AWARDS ----- (for full list reference [personal website](#))

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| 1. Onassis Foundation Scholarship , Onassis Foundation (most prestigious graduate scholarship awarded to Greek students globally) | 12/2022 |
| 2. MathWorks Fellowship , MathWorks (awarded to 20 MIT students) | 09/2022 |
| 3. Society of Naval Architecture and Marine Engineering Award , MIT (awarded to 1 student at MIT) | 05/2021 |
| 4. William M. Kennedy Scholarship , Society of Naval Architects & Marine Engineers (awarded to 1 student globally) | 04/2021 |
| 5. MIT SMA2 Fellowship , MIT (awarded to 1 graduate student at MIT) | 09/2020 |
| 6. Undergraduate Scholarship , Society of Naval Architects & Marine Engineers (awarded to 4 students globally) | 07/2019 |
| 7. ABS Scholarship , American Bureau of Shipping | 05/2018 |

RELEVANT COURSEWORK (MIT)

Machine Learning

1. Machine Learning (6.7900)
2. Deep Learning (6.S898)
3. Parallel Computing & Scientific Machine Learning (6.7320)
4. Computer Vision (6.8300)
5. Nonlinear Optimization (6.7220)
6. Intro to Machine Learning (6.036)

Finance

1. Advanced Data Analytics and Machine Learning in Finance (Natural language processing with applications in Finance - 15.S08)
2. Financial Engineering (15.456)
3. Managerial Finance (15.041)

Mathematics

1. Numerical Methods for Partial Differential Equations (6.7330)
2. Stochastic Systems (2.122)
3. Numerical Fluid Mechanics (2.29)
4. Dynamics (2.032)
5. Marine Hydrodynamics (2.20)