

Curriculum Vitae

Phong C.H. Nguyen

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EDUCATION

Ph.D. in Mechanical Engineering	Chung-Ang University, Seoul, Republic of Korea	2021
	<i>Dissertation title:</i> “Computer-Aided Design for Additive Manufacturing with Functionally Graded Cellular Structures.”	
	<i>Academic advisor:</i> Prof. Young Choi	
M.E. in Mechanical Engineering	Hanoi University of Science and Technology, Hanoi, Vietnam	2016
B.E. in Mechanical Engineering	Hanoi University of Science and Technology, Hanoi, Vietnam	2013

RESEARCH EXPERIENCES

Research Associate		2021-present
	<i>Visual Intelligence Lab.</i> <i>School of Data Science</i> <i>University of Virginia, Virginia, United States.</i>	
	<ul style="list-style-type: none">• Application of artificial intelligence in solving physics problems<ul style="list-style-type: none">○ Develop deep learning architectures to assimilate the thermodynamic behavior of energetic materials.○ Develop algorithms for design optimization in material science, including the use of reinforcement learning and Bayesian optimization.○ Develop novel convolutional neural network (CNN) architecture to detect shock-drift-acceleration from the velocity-space signature field.	
Postdoctoral Researcher		2021
	<i>3D Digital Engineering Lab.,</i> <i>Department of Mechanical Engineering, College of Engineering</i> <i>Chung-Ang University, Seoul, Korea</i>	
	<ul style="list-style-type: none">• Develop a CAD system for lightweight design of mechanical components in new generation vehicles (Hyundai funded project)	
Graduate Research Assistant		2016-2021
	<i>3D Digital Engineering Lab.,</i> <i>Department of Mechanical Engineering, College of Engineering</i> <i>Chung-Ang University, Seoul, Korea</i>	
	<ul style="list-style-type: none">• Develop a CAD system for the design of cellular structures fabricated by additive manufacturing (National Research Foundation Korea funded project)• Develop a lightweight CAD system for collaboration in plant engineering (funded by the Ministry of Trade, Industry, and Energy, Korea)• Write annual research reports, academic articles, and research proposals.	

- Collaborate and coordinate with collaborators from both academia and industry sectors for conducting research projects.

TEACHING AND MENTORING EXPERIENCE

Workshop lecturer at Data Justice Summer Camp 2022 at University of Virginia June 2022

- Give lecture on “Introduction to database design”
- Give lecture on “Introduction to machine learning”
- Give lecture on “Introduction to neural network”

Graduate student mentoring in Visual Intelligence Lab., School of Data Science, University of Virginia 2021-present

- Mentor graduate students in Visual Intelligence Lab. in conducting research on the application of deep learning in uncertainty quantification and design optimization for energetic material.

Graduate student mentoring in 3D Digital Engineering Lab., School of Mechanical Engineering, College of Engineering, Chung-Ang University, Seoul, Korea 2018-2021

- Mentor graduate students in 3D Digital Engineering Lab. in conducting research on design for additive manufacturing of porous materials
- Mentor graduate students in academic writing and making presentations

Undergraduate student mentoring, Mechanical Engineering Short Term Research Program - Chung-Ang University, Seoul, Korea Winter, 2018
Summer, 2019

- Mentor undergraduate students in multiple short-term research programs on design engineering parts for additive manufacturing.
- Guided the student to make reports for poster presentations

HONORS AND AWARDS

Best presentation award, International Congress and Conferences on Computational Design and Engineering (I3CDE) 2019. July 2019

Best presentation award, The Asian Conference on Design and Digital Engineering (ACDDE) 2018 Nov 2018

Chung-Ang University Young Scientist Scholarship (CAYSS) 2016-2018

SELECTED PUBLICATIONS

Published:

1. Phong C. H. Nguyen, Nikolaos N. Vlassis, Bahador Bahmani, WaiChing Sun, H. S. Udaykumar, & Stephen S. Baek (2022). Synthesizing Controlled Microstructures of Porous Media using Generative Adversarial Networks and Reinforcement Learning. *Scientific Reports*, 12 (1), 1-16.
2. Youngdoo Kim, Phong C.H. Nguyen, Hoon Kim, and Young Choi (2022). Multi-morphology cellular structure design with smooth transition of geometry and homogenized mechanical properties between adjacent cells. *Materials & Design*, 128(110727).
3. Phong C.H. Nguyen, Youngdoo Kim, & Young Choi (2022). Lightweight design with metallic additively manufactured cellular structures. *Journal of Computational Design and Engineering*, 9(1), 155–167.
4. Cong Hong Phong Nguyen, Youngdoo Kim, Quang Thang Do & Young Choi (2021). Implicit-based computer-aided design for additively manufactured functionally graded cellular structures. *Journal of Computational Design and Engineering*, 8(3) 813–823.
5. Cong Hong Phong Nguyen & Young Choi (2021). Multiscale design of functionally graded cellular structures using decoupled modeling and level-set descriptions. *Structural and Multidisciplinary Optimization*, 64, 1983–1995.
6. Quang Thang Do, Cong Hong Phong Nguyen & Young Choi (2021). Homogenization-Based Optimum Design of Additively Manufactured Voronoi Cellular Structures. *Additive Manufacturing*, 45, 102057.

7. Cong Hong Phong Nguyen & Young Choi (2020). Concurrent density distribution and build orientation optimization of additively manufactured functionally graded lattice structures. *Computer-Aided Design*, 127.
 8. Youngdoo Kim, Cong Hong Phong Nguyen, Young Choi (2020). Automatic pipe and elbow recognition from three-dimensional point cloud model of industrial plant piping system using convolutional neural network-based primitive classification, *Automation in Construction*, 116.
 9. Cong Hong Phong Nguyen, Youngdoo Kim, & Young Choi (2019). Design for Additive Manufacturing of Functionally Graded Lattice Structures: A Design Method with Process Induced Anisotropy Consideration. *Int. J. of Precis. Eng. and Manuf.-Green Tech.*
 10. Cong Hong Phong Nguyen & Young Choi (2018). Triangular Mesh and Boundary Representation Combined Approach for 3D CAD Lightweight Representation for Collaborative Product Development. *ASME. J. Comput. Inf. Sci. Eng.*, 19(1): 011009.
 11. Cong Hong Phong Nguyen & Young Choi (2018). Comparison of point cloud data and 3D CAD data for on-site dimensional inspection of industrial plant piping systems. *Automation in Construction*, 91, 44-52.
 12. Cong Hong Phong Nguyen & Young Choi (2017). Parametric comparing for local inspection of industrial plants by using as-built model acquired from laser scan data, *Computer-Aided Design and Applications*, 15(2), 238-246.
- **Under preparation:**
 1. Phong C.H. Nguyen, Joseph B. Choi, Yen-Thi Nguyen, Pradeep K. Seshadri, H.S. Udaykumar, & Stephen Baek. Physics-Aware Recurrent Convolutional (PARC) Neural Networks to Assimilate Meso-scale Reactive Mechanics of Energetic Materials. *Nature Materials*.
 2. Phong C.H. Nguyen, Yen-Thi Nguyen, Joseph B. Choi, H.S. Udaykumar, & Stephen Baek. Deep-learned physics-aware energy localization model for multiscale shock-to-detonation simulation of heterogeneous energetic materials. *Propellants, Explosives, Pyrotechnics*.

CONFERENCES PRESENTATION

1. Phong C. H. Nguyen, Joseph B. Choi, Yen-Thi Nguyen, H.S. Udaykumar, & Stephen Baek. *Exploring the structure-property-performance linkage of energetic materials via physics-aware recurrent convolutions*. The 10th annual Mach Conference. April 6-8th, 2022. (Virtual conference).
2. Stephen Baek and H.S. Udaykumar and WaiChing Sun and Phong Nguyen. *Synthesizing realistic images of material microstructures using convolutional neural networks*. The 150th Annual Meeting & Exhibition of the Minerals, Metals & Materials Society (TMS2022). Anaheim, California, USA, February 28th - March 3rd, 2022.
3. Cong Hong Phong Nguyen & Young Choi. *Build Orientation Optimization for Structural Performance Enhancement of Functionally Graded Conformal Lattice Structure Fabricated by Fused Deposition Modeling*. Annual International Solid Freeform Fabrication Symposium (SFF 19). Austin, Texas, USA, August 12-14th, 2019.
4. Cong Hong Phong Nguyen & Young Choi. *Optimum Design of Lattice Structure with Additive Manufacturing Material Constraint*. International Congress and Conferences on Computational Design and Engineering (I3CDE), Penang, Malaysia, July 07-10th, 2019. **(Best presentation award)**
5. Cong Hong Phong Nguyen, Youngdoo Kim & Young Choi. *Optimum Design for Additive Manufacturing of Heterogeneous Lattice Structure with Orthotropic Material Model*. CAD'19. Singapore, June 24-26th 2019.
6. Cong Hong Phong Nguyen & Young Choi. *A Surface Mesh and Boundary Representation (B-rep) Combined Approach for Geometric Representation in Collaborative CAD*. Asian Conference in Design and Digital Engineering (ACDDE). Okinawa, Japan, Nov 1-3rd, 2018. **(Best presentation award)**
7. Cong Hong Phong Nguyen, Youngdoo Kim & Young Choi. *A Mesh and Boundary Representation (B-rep) Combined Approach for Lightweight Data Format Development in Collaborative CAD*. International Symposium on Precision Engineering and Sustainable Manufacturing (PRESM). Sapporo, Japan, July 5th, 2018.
8. Cong Hong Phong Nguyen, Soo-Won Chae & Young Choi. *Hybrid Representation for CAD/CAM/CAE System: A Combination between B-Rep and Polyhedral Model*. Asian Conference in Design and Digital Engineering (ACDDE). Zhangjiajie, August 26th, 2017.

ACADEMIC SERVICES

- Reviewer of academic journals (International Journal of Precision Engineering and Manufacturing-Green Technology, Journal of Computational Design and Engineering, International Journal of Naval Architecture and Ocean Engineering, Journal of Manufacturing Process, Applied Mathematical Modelling)

REFERENCES

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Young Choi, Ph.D.

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