KRISHNANUNNI C G

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EDUCATION

The University of Texas at Austin, TX **January 2021 – Present**
Ph.D. in Aerospace Engineering & Engineering Mechanics (GPA: 3.81 / 4.0)

Indian Institute of Technology Madras, India **August 2017 – December 2019**
Master of Science in Structural Engineering (GPA: 9.41 / 10)

National Institute of Technology Calicut, India **August 2013 – August 2017**
Bachelor of Science in Civil Engineering (GPA: 9.15 / 10)

FELLOWSHIPS, SCHOLARSHIPS, and AWARDS

- Best poster award at the Workshop on Scientific Machine Learning, UT Austin. **October 2024**
- Warren A. and Alice L. Meyer Endowed Scholarship in Engineering from the Cockrell School of Engineering, UT Austin. **June 2024**
- Travel Awards by the United States Association for Computational Mechanics (June 2024), Society for Industrial and Applied Mathematics Texas-Louisiana (November 2022).
- Scholarship by the American Society of Indian Engineers and Architects (ASIE). **November 2022**
- Best MS Thesis award, Indian Institute of Technology Madras. **August 2020**
- Best Major B. Tech project award, National Institute of Technology, Calicut, India. **August 2017**
- Summer research fellowship, Department of mathematics, IISc, Indian Academy of Sciences. **July 2015**

RECENT JOURNAL PUBLICATIONS

- C. G. Krishnanunni., Tan Bui-Thanh., Clint Dawson (2025). Topological derivative approach for deep neural network architecture adaptation. (Link)
- William Cole Nockolds., C. G. Krishnanunni., Tan Bui-Thanh., Xianzhu Tang (2025). A constant velocity latent dynamics approach for accelerating simulation of stiff nonlinear systems. (Link)
- C. G. Krishnanunni., Tan Bui-Thanh (2025). An adaptive and stability-promoting layerwise training approach for sparse deep neural network architecture. *Computer Methods in Applied Mechanics and Engineering* (accepted) (Link)
- Albert Orwa Akuno., L. Leticia Ramirez-Ramirez., Chahak Mehta., C. G. Krishnanunni., Tan Bui-Thanh., Jose Arturo Montoya (2022). Multi-patch epidemic models with partial mobility, residency, and demography. *Chaos, Solitons, & Fractals*. (Link)
- [Full list of publication is here]

RECENT INVITED TALKS

- Topological derivative approach for deep neural network architecture adaptation. *Computational Algebra Seminar*, Department of Mathematics, UT Austin, May 2, 2025.
- Layerwise sparsifying training and sequential learning strategy for neural architecture adaptation. *U. S. National Congress on Computational Mechanics*, New Mexico, July 23-27, 2023.
- A two-stage strategy for neural architecture adaptation. 5^{th} *Annual meeting of the SIAM Texas-Louisiana Section on Uncertainty Quantification*, Houston, November 4-6, 2022.

RECENT RESEARCH EXPERIENCES

Solving forward and inverse problems in Plasma fusion research
Collaborator: Dr. Tan Bui-Thanh (UT Austin) & Dr. Xianzhu Tang (Los Alamos National Laboratory)

- Research aimed at i) adaptive strategies for learning a surrogate for the Collisional-Radiative (CR) model; and ii) solving an inverse problem for runaway electron mitigation during a plasma disruption event.

Transformer-powered generative model for solving inverse problems via joint modeling with forward process
Collaborator: Dr. Kowshik Thopalli, Dr. Yamen Mubarka, Dr. Vivek Narayanaswamy, Dr. Jayaraman J. Thiagarajan (Lawrence Livermore National Laboratory, USA)

- Designed a transformer architecture based generative model that transports samples from a prior distribution to samples from posterior parameter distribution conditioned on an input measurement.

Developing efficient algorithms for neural architecture adaptation
Collaborator: Dr. Tan Bui-Thanh (UT Austin, USA)

- Research in mathematical optimization and machine learning aimed at developing a mathematically principled way for automatically determining neural network architecture for a given data-set.

Mathematical epidemiology project
Collaborator: Dr. Tan Bui-Thanh (UT Austin, USA) & Leticia Ramirez-Ramirez (CIMAT, Mexico)

- Research aimed at developing an epidemic model that takes into account the effects of human mobility on the evolution of disease dynamics in a multi-population environment.

LEADERSHIP/MENTORSHIP ROLES

- **Moncrief Summer Internship mentor**:
  - Mentored Jennifer Zheng on a project titled *Physics informed deep-learning approach enhanced by POD for forecasting solutions to time-dependent PDE.*
  - Mentored Giancarlo Villatoro on a project titled *A Unified Framework for Error estimation in Interpolation-Based Quadrature via Integration by Parts.*
- **SIAM-UT Mentorship program:** Worked with Venkata Hasith Vattikuti on a project focused on the use of reinforcement learning for solving a combinatorial optimization problem (nonlinear dimension reduction).
- **Roles in Conferences:** Co-organized mini-symposiums at USNCCM17, 5th SIAM TX-LA Annual Meeting, SIAM Conference on Mathematics of Data Science, Member of the local organizing committee for upcoming 8th SIAM TX-LA Annual Meeting held at UT Austin.

PROFESSIONAL EXPERIENCE

Graduate Teaching/Research Assistant **January 2021 - Present**
Oden Institute of Computational Engineering & Sciences, UT Austin *Austin, TX*

- Research assistant to Prof. Tan Bui-Thanh, Institute of Computational Engineering and Sciences.
- Teaching assistant for courses: Analytical methods, Mathematical methods in Science and Engineering.

Computing graduate student intern **June 2024 - August 2024**
Lawrence Livermore National Laboratory *Livermore, California*

- Research intern at the Machine Intelligence Group, LLNL.

Graduate Teaching/Research Assistant **August 2017 - December 2020**
Indian Institute of Technology Madras *Madras, India*

- Research assistant to Prof. B. N. Rao, Structural Engineering department, IIT Madras.
- Teaching assistant for courses: Structural optimization and Finite element analysis.

JOURNAL ROLES

Peer Reviewer: *Applied Mathematical Modelling,* Elsevier, *Sound and Vibration,* Elsevier.

SKILLS

Software: MATLAB®, LaTeX®, AutoCAD®, ORIGIN®, ANSYS ®

Programming Languages: C++, Java, Python

ML Library: TensorFlow, PyTorch

REFERENCES

- **Tan Bui-Thanh**
  Associate Professor,
  Leader of Pho-Ices group
  Department of Aerospace Engineering and Engineering Mechanics
  The Oden Institute for Computational Engineering and Sciences
  The University of Texas at Austin
  Austin, USA
  tanbui@ices.utexas.edu
- **Jayaraman J. Thiagarajan**
  Generative AI researcher
  Apple Inc.
  San Francisco Bay Area
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- **Xianzhu Tang**
  Physicist
  Los Alamos National Laboratory
  New Mexico, USA
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- **Kentaro Yaji**
  Associate Professor
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  Osaka University
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