DEEPAK N. SUBRAMANI

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EXPERIENCE

Indian Institute of Science, Bangalore, India	
***Associate Professor,* Department of Computational and Data Sciences** QUEST Lab**, Division of Interdisciplinary Sciences, IISc** • INR 1.5 crore in new research funding in 2025 • 5 PhD Students Graduated, 5 Funded Projects Completed • 8 Journal and 2 Conference (A*) Publications since 2025	31 Dec. 2024 - Present
***Assistant Professor,* Department of Computational and Data Sciences** • 10 Journal and 11 Conference Publications (3 A*/A) in 2019-2024 • INR 4.5 crore in research funding raised as PI (7.5 crore incl co-PI) in 2019-2024 • Average teacher rating of 4.7/5 across 12 PG courses at IISc	31 Dec. 2018 – 30 Dec. 2024
Massachusetts Institute of Technology, Cambridge MA, USA	
Postdoctoral Research Associate Advisor: Prof. Pierre F.J. Lermusiaux	2017 – 2018
• Developed a data-driven AI and IoT tool for efficient and sustainable fishing. • AI for optimal ship routing.	
Graduate Research Student Advisor: Prof. Pierre F.J. Lermusiaux	2012 – 2017
• Optimal path planning in strong, dynamic and uncertain environments • Uncertainty quantification and probabilistic regional ocean predictions	

SOFTWARE DEVELOPMENT

Conditional Diffusion Model for Time Series Forecasting (PyTorch)
Post-trained Language and Reasoning Models for Educational Application (PyTorch)
Neural Operators for SAR Object Detection (PyTorch)
Neural Operators for Ocean State Forecasting (PyTorch)
Stochastic Path Planner for Marine and Aerial Vehicles (GPU-CUDA)
Probabilistic Regional Ocean Forecasting System (Multi core CPU implementation using FORTRAN)
PINN Model for Turbulence Simulation (TensorFlow)
Transformer Neural Operator for IBVPs (TensorFlow)
Generative Optimal Path Planner (PyTorch)
Agent Based Models for Human Wildlife Conflict (Python)

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

Ph.D. in Mechanical Engineering and Computation Nov. 2017 (Defended) (Degree date is Feb 2018)
Thesis: Probabilistic Regional Ocean Predictions: Stochastic Fields and Optimal Path Planning
Major: Computational Science and Engineering
Minors: Stochastic Systems; Ocean Sciences; Technology and Public Policy;
Development in Resource Constrained Economies (set of three courses in each)

M.S. in Computation for Design and Optimization 2014
Thesis: Energy Optimal Path-Planning using Dynamically Orthogonal Level-Set Optimization GPA: 4.8/5

Indian Institute of Technology Madras, Chennai, India

M.Tech and B.Tech in Mechanical Engineering 2012
Masters specialization: Energy Technology GPA: 9.11/10
Minor: Operations Research
Thesis: Profile Match-up Algorithms for Geophysical Retrievals and Their Application for Data Assimilation

AWARDS

IISc Award for Excellence in Teaching 2022 — 2022
Indian Institute of Science, Bengaluru

Arcot Ramachandran Young Investigator Award — 2019 – 2021
Division of Interdisciplinary Research, IISc Bengaluru

Postdoctoral and Graduate Fellowship — 2015 – 2018
MIT-Tata Center

SNAME Graduate Travel Award in Ocean Engineering — Dec. 2017
Department of Mechanical Engineering, MIT, Cambridge, MA

Wunsch Foundation Silent Hoist & Crane Award for Outstanding Research — May 2017
Department of Mechanical Engineering, MIT, Cambridge, MA

First Place in Graduate Science — May 2017
De Florez Design Competition, MIT, Cambridge, MA

Best Demonstration/Prototype Award — Sept. 2016
Mechanical Engineering Research Exhibition 2016, MIT, Cambridge, MA

Esteemed Presenter Award for Best Computational Research — Sept. 2015
Mechanical Engineering Research Exhibition 2015, MIT, Cambridge, MA

Best Poster Award — Mar. 2015
Center for Computational Engineering Symposium, MIT, Cambridge, MA

Runner-up Poster Award — Nov. 2014
DyDESS 2014 Conference, Cambridge, MA

Institute Merit Prize (Highest GPA in Energy Technology) — 2012
Indian Institute of Technology Madras, India

GE Foundation Award — 2009-2011
GE Foundation Scholar-Leaders Program (Global)

National Talent Search (NTS) Scholar, India — 2005

RESEARCH (PHD/MASTER'S) SUPERVISION

1. **Graduated Research Students (as sole advisor)**
    a. **Deep Learning for Satellite Oceanography** (Devyani Lambhate, 2021, M.Tech (Research))
    b. **Polynomial Chaos-Gaussian Mixture Model Filtering: Theory, Schemes and Applications** (Srikanth Avasarala, 2022, M.Tech (Research))
    c. **Fast and Scalable Algorithms for Intelligent Routing of Autonomous Marine Vehicles** (PhD, Rohit Chowdhury, Graduated 2024)
    d. **Indian Summer Monsoon Onset Prediction** (PhD, Akanksha Rajak, Graduated 2025)
    e. **Salinity Variability in the Andaman Sea: Current Status and Impact of Climate Change** (PhD, P. Abhishek, Graduated 2025)
    f. **Physics Informed Neural Operators for Out of Distribution Generalization** (PhD, Sumanth Boya, Graduated 2026)
    g. **Ecological Digital Twins: Applications in Human-Wildlife Conflict** (PhD, P. Anjali, Graduated 2026)
2. **Ongoing Ph.D. Students (as sole advisor)**
    a. **Physics-Guided Neural Operators for Geoscientific Applications** (PhD, Rishi J, Joined 2022)
    b. **Turbulent simulations with PINNs** (PhD, Azhar, Joined 2022)
    c. **Explainable AI for Forecasting Indian Summer Monsoon Rain and Extremes** (PhD, Apoorva Dinesh Singh, Joined 2022)
    d. **AI-enabled Personalized Adaptive Learning Systems** (PhD, Nicy Scaria, Joined 2022)
    e. **Neural Operators for Machine Perception** (PhD, Mothish GVS, Joined 2024)

SPONSORED RESEARCH

AI for Heat Exchanger Application – 90 Lakhs
Shell India Technology Limited 2025 – 2026 [PI]

Development of a Machine Learning tool for the Prediction of City Scale Extreme Rainfall Events using a Hybrid Physics-AI Approach – 43.3 Lakhs
ISRO NRSC Mission Mode Project 2025 – 2027 [PI].

Fast and Scalable Algorithms for On-Board Routing of Autonomous Agents in Stochastic Dynamic Environments – 37 Lakhs
SERB 2022 – 2025 [PI].

MODES: Machine Learning for Ocean Data Assimilation, Estimation and Simulation – 57 Lakhs
Ministry of Earth Sciences 2022 – 2025 [PI].

WAKE-NET: A Fast and Scalable Physics Informed Neural Network for Wind Farm Simulation – 1.92 Crores
Shell India Technology Limited 2022 – 2025 [PI].

INSPIRE Faculty Fellowship – 35 Lakhs
Department of Science and Technology, Govt. of India. Jan 2019-Jan 2024 [PI]

Deep Learning for EV Fault Detection – 11 Lakhs
Altigreen Propulsion Private Limited 2022 – 2024 [PI].

DECOVID: Data-assimilation and Error Correction Of Viral Infectious Diseases Models – 5.5 Lakhs
Department of Science and Technology, SERB MATRICS Covid Special Call July 2020 – July 2021 [PI]

Arcot Ramachandran Young Investigator Award – 6 Lakhs
Indian Institute of Science, Bengaluru. Oct 2019 - Oct 2021 [PI]

Data Assimilation for Ship Routing – 5.56 Lakhs
Maersk Digital Center, Bangalore, India. Jan 2019 - Jul 2020 [PI]

SPADE: Stochastic Parmoon for Analysis, Design and Estimation – 98.4 Lakhs
Ministry of Human Resource Development STARS program. Mar 2020 – Mar 2023 [Co-PI; 50% Role]

Hardware Aware Algorithms in Scientific Computing – 1.6 Crores
UGC-Indo German Partnership 2021-2025 [Co-PI; 25% Role]
A BRICS Predicted Ocean Roadmap And Demonstration of Model Validations, Intercomparisons, and Applications for Sustainable Management of the coastal oceans (PARADIGM) – 1.02 Crores
DST-BRICS Initiative [Co-Investigator]

PROFESSIONAL ACTIVITY

- Topic Editor, Geoscientific Model Development, European Geosciences Union
- PC Member, European Conference on Artificial Intelligence
- Reviewer for AI Conferences: NeurIPS, IJCAI, ARR, ICRA
- Reviewer for Journals: Robotics and Autonomous Systems, International Journal of Control, Automation and Systems, IEEE Journal of Cybernetics, Journal of Computational and Nonlinear Dynamics, Dynamic Data-Driven Environmental System Sciences Conference, International Journal of Thermal Sciences, The Sea, Current Science, Sadhana, Remote Sensing of the Environment, IEEE TGRS.
- Expert Panel Member for Data Science at VIT-AP Recruitment
- Board of Studies Member, Data Science Program, Ramaiah University of Applied Sciences
- Board of Studies Member, Periyar University Mathematics Department
- Expert panel member on mathematical modelling of infectious disease spread – podcasts, news discussion, conferences.
- More than 40 Invited lectures were delivered at universities, colleges, and industry labs.
- Participant at the NASA JPL-Caltech Climate Summer School 2017
- Received the Kaufman Teaching Certificate in June 2015.
- Have taught more than 2000 industry working professionals upskilling courses on data science, and artificial intelligence with an average teacher rating of 4.84/5.

PUBLICATIONS

Google Scholar Profile: https://scholar.google.com/citations?user=d-V0TTwAAAAJ&hl=en
As on 04 Feb 2026 – Number of Citations: 1202, h-index: 18, i10-index: 29

Papers in Peer-Reviewed International Journals

1. Pasula, A., Subramani, D.N. (2026) Data driven deep learning for correcting global climate model projections of sea surface temperature and dynamic sea level in the Bay of Bengal. Clim Dyn 64, 78. https://doi.org/10.1007/s00382-026-08063-w
2. GVS Mothish, J Rishi, Shobhit Kumar Shukla and Deepak Subramani (2025). DNOD: Deformable Neural Operators for Object Detection in SAR Images. Transactions of Machine Learning Research.
   [J2C Certification. Top 3% of Accepted Papers]
   [Novel neural operator for Object Detection in SAR similar to the DETR framework]
3. Scaria, N., Kennedy, S. J. J., Latinovich, T., & Subramani, D. (2025). EvalYaks: Instruction tuning datasets and LoRA fine-tuned models for automated scoring of CEFR B2 speaking assessment transcripts. Computers and Education: Artificial Intelligence, 100539.
4. Pasula, A., & Subramani, D. N. (2025). Global climate model bias correction using deep learning. Machine Learning: Earth, 1(1), 015001.

   [Citations – 4. Work led by student Abhishek Pasula.]
   [Developed a deep neural operator model for correcting climate model biases with application to the Bay of Bengal]
5. Sumanth Kumar Boya, Deepak N. Subramani (2025), PINTO: Physics-informed transformer neural operator for learning generalized solutions of partial differential equations for any initial and boundary condition, Computer Physics Communications, Volume 315, 2025, 109702, ISSN 0010-4655, https://doi.org/10.1016/j.cpc.2025.109702.
   [Citations – 12. Work led by student Sumanth]
   [Developed a transformed based neural operator with a novel cross attention mechanism for generalising solution of IBVPs]
6. Anup, N., Vinayachandran, P. N., & Subramani, D. N. (2025). High-resolution simulation of the Bay of Bengal rain plume. Journal of Geophysical Research: Oceans, 130(8), e2025JC022676.
   [Work led by post-doc Anup, part of the DST-BRICS Project]
   [Performed analysis on high resolution ROMS simulation of the Bay of Bengal]
7. Patel, P., Vinayachandran, P. N., & Subramani, D. (2025). High frequency radar observations of east India coastal current eddies. Journal of Geophysical Research: Oceans, 130(6), e2024JC022154.
   [Work led by PhD student Pooja Patel.]
   [Developed a computational algorithm to detect eddies and study them.]
8. Azhar Gafoor CTP, Sumanth Kumar Boya, Rishi Jinka, Abhineet Gupta, Ankit Tyagi, Suranjan Sarkar, Deepak N. Subramani (2025); A physics-informed neural network for turbulent wake simulations behind wind turbines. Physics of Fluids 1 January 2025; 37 (1): 015110. https://doi.org/10.1063/5.0245113

   [Citations – 4. Impact Factor – 4.1, CS 6.5. Q1. Work led by student Azhar. Other student co-authors contributed to code development. Co-authors from Shell provided the data and the initial problem statement.]

   [Developed the first even PINN model for simulating turbulent fluid flow behind wind turbines. The work paves way for fast simulators and surrogate models for wind energy modelling.]
9. Anjali Purathekandy, Meera Anna Oommen, Martin Wikelski, Deepak N. Subramani (2024). An agent-based model of elephant crop raid dynamics in the Periyar–Agasthyamalai complex, India, **Ecological Modelling**, Volume 496, 2024, 110843, ISSN 0304-3800, https://doi.org/10.1016/j.ecolmodel.2024.110843.

[Impact Factor – 2.6. Q1 in Ecology. Work led by student Anjali. Co-authors provided field data for development and validation.]
[Developed the first Agent-Based Model (ABM) for Asian Elephants with movement, behaviour models, and crop raid dynamics. Validated with field survey data. Crop habituation, foraging efficiency and thermoregulation emerge as key drivers of crop raids.]

10. Abhishek Pasula, D. N. Subramani (2023). Cause and impact of Andaman Sea's salinity variability: A modeling study, **Deep Sea Research Part II: Topical Studies in Oceanography**, Volume 209, 105291, ISSN 0967-0645, https://doi.org/10.1016/j.dsr2.2023.105291.
[Citation -1. Impact Factor – 2.88. Q1 in Oceanography. Work led by student Abhishek]
[Identified the contribution of Summer Monsoon Current in Andaman Sea's salinity variability. Completed particle trajectory analysis and EOF analysis.]

11. R. Chowdhury and D. N. Subramani (2022). *Optimal Path Planning of Autonomous Marine Vehicles in Stochastic Dynamic Ocean Flows using a GPU-Accelerated Algorithm.* **IEEE Journal of Oceanic Engineering** doi: 10.1109/JOE.2022.3152514
[11 citations. Impact Factor – 3.8. Q1 in Ocean Engineering, Mechanical Engineering. Paper with student Rohit]
[A fast GPU-implemented algorithm for path planning giving 1000x speed-up compared to serial code.]

12. Chowdhury, R., Navsalkar, A. and D. Subramani (2022). GPU-Accelerated Multi-Objective Optimal Planning in Stochastic Dynamic Environments. **Journal of Marine Science and Engineering**, 10(4), p.533. https://doi.org/10.3390/jmse10040533
[7 citations. Impact Factor – 2.9. Q2 in Ocean Engineering. Paper with student Rohit and summer intern Atharva. Open Review Reports available on the publication DOI]
[Multi-objective and pareto optimal extension of the GPU-implemented path planner published in IEEE JoE.]

13. R. Gadi, P. N. Vinayachandran, D. N. Subramani (2021). *Data-Driven Feature Modeling of Southwest Monsoon Current*. **Ocean Modelling**. Vol 168, 101912 https://doi.org/10.1016/j.ocemod.2021.101912
[2 Citations. Impact Factor – 3.1. Q1 in Oceanography and Computer Science (Misc). Paper with research associate Ratnakar. Collaborators provided the data.]
[First application of the FORMS methodology in the Indian Ocean resulting in a significant improvement in representation of observed features in simulation.]

14. S. Avasarala and D. N. Subramani (2021). *A non-Gaussian Bayesian Filter for Sequential Data Assimilation with non-intrusive Polynomial Chaos Expansion*. **International Journal for Numerical Methods in Engineering.** 122(23), 7156-7181**.** https://doi.org/10.1002/nme.6827
[7 Citations. Impact Factor – 2.7 (20% acceptance). Q1 in Applied Mathematics and Numerical Analysis. Paper with student Srikanth.]
[A non-intrusive non-Gaussian algorithm that is expected to increase adoption of powerful GMM filtering for a variety of scientific applications.]

15. D. Lambhate, R. Sharma, J. Clark, A. Gangopadhyay and D. Subramani (2021). *W-Net: A Deep Network for Simultaneous Identification of Gulf Stream and Rings from Concurrent Satellite Images of Sea Surface Temperature and Height*. **IEEE Transactions on Geoscience and Remote Sensing**. DOI: 10.1109/TGRS.2021.3096202
[9 Citations. Impact Factor – 7.5. Q1 in Earth and Planetary Sciences. Paper with students Devyani and Raghav. Collaborators provided the data.]
[First application of deep learning for Gulf Stream and Rings detection. Novel architecture and physical interpretation of deep layers provided.]

16. S. Ganesan and D. N. Subramani (2020). *Spatio-temporal predictive modeling framework for infectious disease spread*. **Scientific Reports**. 11, 6741 (2021). DOI: 10.1038/s41598-021-86084-7
[27 citations. Impact Factor – 3.8. Q1 in Multidisciplinary. Sci. Rep. is a respected interdisciplinary

journal with wide readership from the Nature Publishing Group. Paper was ranked #1 by AltMetrics among papers of similar age in Sci. Rep.]
[A novel population balance PDE for predicting the spatio temporal spread of infectious diseases with a focus on Covid-19 in India]

17. G. Mannarini, D. N. Subramani, P. F. J. Lermusiaux and N. Pinardi (2019). *Graph-Search and Differential Equations for Time-Optimal Vessel Route Planning in Dynamic Ocean Waves* in **IEEE Transactions on Intelligent Transportation Systems**. DOI: 10.1109/TITS.2019.2935614.
[42 citations. Impact Factor – 7.9. Q1 in Computer Science (Applications) and Mechanical Engineering. IEEE TITS is a top journal for research on intelligent transportation systems.]
[This collaborative work with groups in Italy, USA and India (me from IISc) show the first direct comparison of our data-driven PDE-based methodologies for routing marine traffic and graph search methods, clearly showing the former's advantage.]

Arxiv Papers

1. Ganesan, S., Subramani, D., Anandh, T., Ghose, D. and Babu, G., 2021. Ensemble Forecast of COVID-19 for Vulnerability Assessment and Policy Interventions. MedRxiv Pre-print DOI: 10.1101/2021.08.31.21262943
[Early warning of Covid Wave 3 impact in Karnataka and science-based policy recommendations. Technical Report.]

Papers in Peer-Reviewed International Conferences (with Proceedings)

1. Rishi J, Mothish GVS, Deepak Subramani (2025). Conditional Diffusion Model with Nonlinear Data Transformation for Time Series Forecasting. **International Conference on Machine Learning (ICML) 2025**. Vancouver, Canada July 2025.
[Work completed with Ph.D. students. CORE2023 Ranking: A*. Acceptance Rate = 26.9%.]
2. Rishi J, Sumanth Kumar Boya, Azhar Gafoor and Deepak Subramani (2025). Discrete Residual Loss Functions for Training Physics-Informed Neural Networks. **ICCS 2025**, Singapore (July 2025). Accepted.
[Work completed with Ph.D. students Rishi, Azhar Gafoor and Sumanth Kumar. CORE2023 Ranking: Multiconference. Acceptance rate statistics is not readily available. Our paper received accept rating from all 4 reviewers (3 strong accept).]
3. Anjali Purathekandy, and Deepak Subramani (2024). A Dynamic Data Driven Agent Based Model for Characterizing the Space Utilization of Asian Elephants in Response to Water Availability. In: Dynamic Data Driven Application Systems. **DDDAS 2024**, Princeton, NJ, USA. Nov 4-8, 2024. Accepted.
[Paper won the **third best paper award**. DDDAS is the topmost conference in the field of data driven application systems. Work completed with my Ph.D. student Anjali.]
[This paper explores the impact of water availability on human-elephant conflict by using ABMs as a DDDAS.]
4. Rishi, J., Gafoor, A., Kumar, S., Subramani, D. (2024). On the Training Efficiency of Shallow Architectures for Physics Informed Neural Networks. In: Franco, L., de Mulatier, C., Paszynski, M., Krzhizhanovskaya, V.V., Dongarra, J.J., Sloot, P.M.A. (eds) Computational Science – **ICCS 2024**. ICCS 2024. Lecture Notes in Computer Science, vol 14834. Springer, Cham. https://doi.org/10.1007/978-3-031-63759-9_39
[Work completed with Ph.D. students Rishi, Azhar Gafoor and Sumanth Kumar. CORE2023 Ranking: Multiconference. Acceptance rate statistics is not readily available. Our paper received accept rating from all 4 reviewers (1 strong accept).]
[Explored the architecture necessary for efficient training of PINN models for different flow scenarios including turbulent flows.]
5. Scaria, N., Dharani Chenna, S., Subramani, D. (2024). Automated Educational Question Generation at Different Bloom's Skill Levels Using Large Language Models: Strategies and Evaluation. In: Olney, A.M., Chounta, IA., Liu, Z., Santos, O.C., Bittencourt, I.I. (eds) **Artificial Intelligence in Education. AIED 2024**.

Lecture Notes in Computer Science, vol 14830. Springer, Cham. https://doi.org/10.1007/978-3-031-64299-9_12

[Work completed with Ph.D. student Nicy Scaria and intern Suma Dharani Chenna.
CORE2023: A Ranking. Accepted as Main Paper (Oral). Acceptance rate = 23%. 5 citations as of 07 May 2025]
[Developed a new prompting strategy for AEQG tasks in the domain of Data Science and AI that ensures that the generated questions are aligned with Bloom's skill levels. Evaluated the generated questions with human experts through a statistical analysis.]

6. Nicy Scaria, Suma Dharani Chenna, and Deepak Subramani. (2024) How Good are Modern LLMs in Generating Relevant and High-Quality Questions at Different Bloom's Skill Levels for Indian High School Social Science Curriculum?. In Proceedings of the 19th Workshop on Innovative Use of NLP for **Building Educational Applications (BEA 2024)**, pages 1–10, Mexico City, Mexico. Association for Computational Linguistics.
[Work completed with Ph.D. student Nicy Scaria and intern Suma Dharani Chenna. BEA 2024 had 43% acceptance rate and was co-located with NAACL 2024.]
[Developed prompting strategy for AEQG tasks in the domain of high school social science in India that ensures that the generated questions are aligned with Bloom's skill levels. Evaluated the generated questions with human experts through a statistical analysis.]
7. Apoorva Singh, Ritesh Jha, Ravi Nanjundiah, Deepak Subramani (2024). A machine learning model for active-break spell forecasting of Indian Summer Monsoon from Outgoing Longwave Radiation data. **IEEE International Geoscience and Remote Sensing Symposium** 2024. Athens, Greece. Accepted.

   [Collaborative work completed with Ph.D. students Apoorva and Ritesh. IGARSS is a large remote sensing conference with high acceptance rates (acceptance rate unavailable).]
   [In this work we established a baseline linear machine learning model for multi class classification of active/neutral/break phase from a 15-day sequence of daily OLR images]
8. Akanksha Rajak, Deepak Subramani (2024). Comparison of Convolutional Autoencoder Architectures for Representation Learning of MODIS Aqua and Terra Observations. **IEEE International Geoscience and Remote Sensing Symposium** 2024. Athens, Greece. Accepted.

   [Work completed with Ph.D. student Akanksha. IGARSS is a large remote sensing conference with high acceptance rates (acceptance rate unavailable).]
   [In this work we established a baseline for spatial learning of climate variables to be used in a model for predicting the onser of monsoon 30 days in advance.]
9. Chowdhury, R., Murugan, R., and Subramani, D. (2023). Intelligent Onboard Routing in Stochastic Dynamic Environments using Transformers. In Proceedings of the 2023 **International Conference on Autonomous Agents and Multiagent Systems** (pp. 1688-1696).
   [Work completed with my Ph.D. student Rohit Chowdhury, and summer intern Murugan.
   CORE2023 A* Ranking. Acceptance Rate = 23%.]
   [Developed a decision transformer that learns on-board routing goals through expert trajectories from level set equations.]
10. A. Pasula and D. N. Subramani (2022). 4D-Var Data Assimilation of Sea Surface Temperature in a Regional Model of the Andaman Sea. OCEANS 2022, Hampton Roads, Hampton Roads, VA, USA, 2022, pp. 1-6, doi: 10.1109/OCEANS47191.2022.9977119.
    [Work completed with my Ph.D. student Abhishek. Popular conference for any application related to oceans conducted by IEEE/MTS.]
    [Improved ROMS simulation with 4D var data assimilation with Sea Surface Temperature.]
11. P. Anjali and D. N. Subramani (2021). Inter and Intra-Annual Spatio-Temporal Variability of Habitat Suitability for Asian Elephants in India: A Random Forest Model-based Analysis, 2021 IEEE International India Geoscience and Remote Sensing Symposium (InGARSS), Ahmedabad, India, 2021, pp. 467-470, doi:

10.1109/InGARSS51564.2021.9792132.
[1 citation. InGARSS is a respected geoscience conference in India conducted by the IEEE GRSS, India Chapter. Paper **won second prize** in the student presentation category.]
[Developed a Random Forest algorithm for species distribution modelling of Asian Elephants in India].

12. Chowdhury, R. and D. N. Subramani (2020). Physics-Driven Machine Learning for Time-Optimal Path Planning in Stochastic Dynamic Flows. In: Darema F., Blasch E., Ravela S., Aved A. (eds) Dynamic Data Driven Application Systems. DDDAS 2020. Lecture Notes in Computer Science, vol 12312. Springer, Cham. https://doi.org/10.1007/978-3-030-61725-7_34
[8 citations. DDDAS is the topmost conference in the field of data driven application systems conducted at MIT. Work completed with my Ph.D. student Rohit Chowdhury.]
[Developed a novel reinforcement learning algorithm that learns from a distribution of pre-planned time-optimal paths, and updates policy onboard by data assimilation.]
13. Lambhate, D. and D. N. Subramani (2020). *Super Resolution of Sea Surface Temperature Satellite Images*. In: IEEE/MTS Oceans '20 Gulfcoast. Oct 2020.
[7 citations. Popular conference for any application related to oceans. Work completed with student Devyani]
[Developed a novel Bayesian deep learning algorithm for super-resolution of SST.]

Papers Presented in Important Conferences (with no Proceedings; Peer-Review only of Abstract)

1. Pasula, A. and Subramani, D. (2024). A two-phase Neural Model for CMIP6 bias correction (No. EGU24-18857). EGU General Assembly 2024 Vienna, Austria. (Presented in person by Deepak)
2. Abhishek, P. and Subramani, D. (2024) AI-based correction of CMIP6 ocean projections. In 2024 AGU Ocean Sciences Meeting, New Orleans, USA. (Presented in person by Abhishek)
3. Patel, P., Vinayachandran, P.N. and Subramani, D. (2024), Variations of Eddy Characteristics Along the East Coast of India. In 2024 AGU Ocean Sciences Meeting, New Orleans, USA (Presented in person by Pooja Patel)
4. P Abhishek, D Subramani (2022) Inter-Annual Variability of Monsoon and Post-Monsoon Salinity in Andaman Sea, AGU Ocean Sciences Meeting 2022 at Hawaii, USA (Held completely online)
5. D Subramani, R Sharma, A Gangopadhyay (2020) Deep Learning for Detecting Gulf Stream and Eddies from Satellite Images, AGU Ocean Sciences Meeting 2020 at San Diego USA. (Presented orally in person)
6. P Abhishek, R Gadi, D Subramani (2020) Bayesian Estimation and Data Assimilation for Probabilistic Regional Forecasts in the northern Indian Ocean, AGU Ocean Sciences Meeting 2020 at San Diego USA. (Presented orally in person)

[Before joining IISc (31 Dec 2018)]

Papers in Peer-Reviewed International Journals

18. Subramani, D.N. and P.F.J. Lermusiaux (2019). Risk Optimal Path Planning in Stochastic Dynamic Environments. Computer Methods in Applied Mechanics and Engineering. Volume 353, 15 August 2019, Pages 391-415.

    [52 citations. Impact Factor – 6.9. Q1 in Computer Science Applications and Mechanical Engineering. CMAME is a top journal in the field of data-driven computational methods for engineering applications.]
    [Combined decision theory and data-driven stochastic planning methods for learning paths for autonomous agents that minimize risk of being sub-optimal in uncertain dynamic environments]
19. Subramani, D.N., Q.J. Wei and P.F.J. Lermusiaux (2018). *Stochastic Time Optimal Path Planning in Uncertain, Strong, and Dynamic Flows.* **Computer Methods in Applied Mechanics and Engineering**. 333, pp 218-237. doi: 10.1016/j.cma.2018.01.004
[60 citations. Impact Factor - 5.02. CMAME is a top journal in the field of data-driven computational

methods for engineering applications.]
[Developed data-driven time-optimal planning algorithm for robot motion in uncertain dynamic environments.]

20. Lermusiaux, P.F.J., D.N. Subramani, J. Lin, C.S. Kulkarni, A. Gupta, A. Dutt, T. Lolla, P.J. Haley Jr., W.H. Ali, C. Mirabito, and S. Jana (2017). *A Future for Intelligent Autonomous Ocean Observing Systems.* **The Sea Vol. 17: The Science of Ocean Prediction**, Special Issue of J. Marine Res., 75, 765–813.
[74 citations. Impact Factor - NA. The Sea is a prestigious and classic monograph with invited review papers recently revived. Co-authors are members of group led by Prof. Lermusiaux at MIT.]
[My contribution is a review of data-driven optimal planning methods for intelligent marine robots and a description of real-time demonstration with REMUS 600 AUVs]

21. Subramani, D. N., P. J. Haley, Jr., and P. F. J. Lermusiaux (2017). Energy-optimal path planning in the coastal ocean, **Journal of Geophysical Research: Oceans**, 122, 3981–4003, doi:10.1002/ 2016JC012231
[48 citations. Impact Factor – 2.71. JGR: Oceans is a flagship journal by the American Geophysical Union for research related to applications in oceanography.]
[Demonstrated realistic simulations of data-driven energy-optimal planning of autonomous gliders.]

22. Sun, W., P. Tsiotras, T. Lolla, D.N. Subramani, and P.F.J. Lermusiaux (2017). *Multiple-Pursuit/One-Evader Pursuit Evasion Game in in Dynamical Flow Fields.* **Journal of Guidance, Control, and Dynamics**. doi: 10.2514/1.G002125.
[84 citations. Impact Factor – 2.061. JGCD is a flagship journal by the AIAA for research related to control theory in aerospace applications. Co-authors are experts in pursuit evasion games with application to autonomous vehicles.]
[My contribution is towards developing the idea of using level-set equations for devising a stopping criterion for pursuit evasion games in dynamical flow fields.]

23. Lermusiaux, P.F.J., P.J. Haley Jr., S. Jana, A. Gupta, C.S. Kulkarni, C. Mirabito, W.H. Ali, D.N. Subramani, A. Dutt, J. Lin, A. Y. Shcherbina, C. M. Lee, A. Gangopadhyay (2017). *Optimal Planning and Sampling Predictions for Autonomous and Lagrangian Platforms and Sensors in the Northern Arabian Sea* **Oceanography** 30(2), 172-185.
[51 citations. Impact Factor – 3.883. Oceanography is a popular journal by The Oceanography Society that published invited review articles. Co-authors are members of group led by Prof. Lermusiaux at MIT.]
[My contribution is towards providing data-driven reachability front predictions for gliders deployed in a real-time sea exercise in the Northern Arabian Sea.]

24. Subramani, D.N. and P.F.J. Lermusiaux (2016). *Energy Optimal Path Planning by Stochastic Dynamically Orthogonal Level-Set Optimization*. **Ocean Modelling**, 100, pp 57-77.
[116 citations. Impact Factor - 3.503. OM is the most respected venue for data-driven computational modelling in the ocean domain.]
[First ever stochastic optimization technique for exact data-driven energy-optimal path planning of marine robots.]

25. Subramani, D., Chandrasekar, R., Ramanujam, K.S. and C. Balaji (2014). *A new ensemble-based data assimilation algorithm to improve track prediction of tropical cyclones.* **Natural Hazards,** 71, pp 659-682.
[18 citations. Impact Factor – 3.102. Natural Hazards is a popular venue for data-driven predictions of environmental hazards.]
[Developed a Bayesian inference algorithm for data-driven prediction of tropical cyclones.]

26. S. Ramanujam, C. Radhakrishnan, D. Subramani and C. Balaji (2012). *On the Effect of Non-Raining Parameters in Retrieval of Surface Rain Rate Using TRMM PR and TMI Measurements*. **IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing**, 5(3), pp. 735-743.
[20 citations. Impact Factor – 3.784. IEEE JSTARS is within the top 10 journals for remote sensing and computational methods in earth sciences. First author was a research scholar at IIT Madras.]
[My contribution was in developing a Bayesian retrieval algorithm from a precipitation radar. Co-authors

had developed a retrieval algorithm from Microwave Imager that needed information from radar data for correct inference, which I completed.]

Papers in Peer-Reviewed International Conferences (with Proceedings)

14. Subramani, D.N., T. Lolla, P.J. Haley and P.F.J Lermusiaux (2015). *A stochastic optimization method for energy-based path planning*. In: Ravela, S., Sandu, A. (Eds.), Vol. 8964 Lecture Notes in Computer Science, Springer, pp. 347-358.
[36 citations. The papers presented at the Dynamic Data Driven Environmental System Science Conference 2014 was published in LNCS.]
[Introduced the use of stochastic optimization for data-driven energy-optimal planning in dynamic environments.]
15. Subramani, D. N., P. F. J. Lermusiaux, P.J. Haley, Jr., C. Mirabito, S. Jana, C. S. Kulkarni, A. Girard, D. Wickman, J. Edwards, J. Smith (2017). *Time-Optimal Path Planning: Real-Time Sea Exercises*. In: Oceans '17 MTS/IEEE Aberdeen, 19-22 June 2017, DOI: 10.1109/OCEANSE.2017.8084776.
[34 citations. Popular conference for any application related to oceans.]
[First demonstration of real-time applicability of data-driven time-optimal planning with REMUS 600 AUVs in real-time.]
16. Mirabito, C., D.N. Subramani, T. Lolla, P.J. Haley, Jr., A. Jain, P.F.J. Lermusiaux, C. Li, D.K.P. Yue, Y. Liu, F.S. Hover, N. Pulsone, J. Edwards, K.E. Railey, and G. Shaw, (2017). *Autonomy for Surface Ship Interception*. In: Oceans '17 MTS/IEEE Aberdeen, 19-22 June 2017, DOI: 10.1109/OCEANSE.2017.8084817.
[8 citations. Popular conference for any application related to oceans.]
[Results and software of data-driven time-optimal planning of autonomous agents used to demonstrate a ship interception application.]
17. Sun, W., P. Tsiotras, T. Lolla, D. N. Subramani, and P. F. J. Lermusiaux, (2017). *Pursuit-Evasion Games in Dynamic Flow Fields via Reachability Set Analysis.* 2017 American Control Conference. Seattle, WA, 2017, pp. 4595-4600. doi: 10.23919/ACC.2017.7963664
[28 citations. ACC is a flagship international conference on science and engineering of control systems. Co-authors are experts in pursuit evasion games with application to autonomous vehicles.]
[My contribution is towards developing the idea of using level-set equations for devising a stopping criterion for pursuit evasion games in dynamical flow fields.]
18. Edwards, J., J. Smith, A. Girard, D. Wickman, P.F.J. Lermusiaux, D.N. Subramani, P.J. Haley, Jr., C. Mirabito, C.S. Kulkarni, and, S. Jana, (2017). *Data-driven Learning and Modeling of AUV Operational Characteristics for Optimal Path Planning*. In: Oceans '17 MTS/IEEE Aberdeen, 19-22 June 2017, DOI: 10.1109/OCEANSE.2017.8084779
[26 citations. Popular conference for any application related to oceans. Co-authors own and operated the AUV.]
[Developed data-driven models for predicting AUV speed from data collected by co-authors who operated the AUV.]
19. Ferris, D.L., D.N. Subramani, C.S. Kulkarni, P.F.J. Lermusiaux (2018). *Time-Optimal Multi-Waypoint Mission Planning in Dynamic Environments*. In: MTS/IEEE Oceans '18 Charleston, pp 1-8. doi: 10.1109/OCEANS.2018.8604683
[9 citations. Popular conference for any application related to oceans. First author was a Master's student under Prof. Lermusiaux, who worked with my help for his thesis while I was a post-doc.]
[Demonstrated a solution to the optimal tours to be taken by AUVs to visit multiple targets in a dynamic environment. The setup resembles a dynamic traveling salesman problem.]
20. Dutt, A., D.N. Subramani, C.S. Kulkarni, P.F.J. Lermusiaux (2018). *Clustering of Massive Ensemble of Vehicle Trajectories in Strong, Dynamic and Uncertain Ocean Flows*. In: MTS/IEEE Oceans '18 Charleston, pp 1-8. doi: 10.1109/OCEANS.2018.8604683
[9 citations. Popular conference for any application related to oceans. First author was a Master's

student under Prof. Lermusiaux, who worked with my help while I was a post-doc.]
[First demonstration of unsupervised clustering algorithms on massive ensembles of optimal paths taken by AUVs, with a goal to learn optimal paths from data.]

21. A. Gupta, P. J. Haley, D. N. Subramani and P. F. J. Lermusiaux (2019), "Fish Modeling and Bayesian Learning for the Lakshadweep Islands," OCEANS 2019 MTS/IEEE SEATTLE, 2019, pp. 1-10, doi: 10.23919/OCEANS40490.2019.8962892.
[25 citations. Popular conference for any application related to oceans.]
[Developed a fish modelling system using machine learning and dynamical ocean forecasts.]
22. Ali, W.H., M.H. Mirhi, A. Gupta, C.S. Kulkarni, C. Foucart, M.M. Doshi, D.N. Subramani, C. Mirabito, P.J. Haley, Jr., and P.F.J. Lermusiaux, (2019). SeaVizKit: Interactive Maps for Ocean Visualization. In: OCEANS '19 MTS/IEEE Seattle, 27-31 October 2019, doi:10.23919/OCEANS40490.2019.8962794
[14 citations. Popular conference for any application related to oceans.]
[Developed a web based visualization toolkit for ocean state forecasts.]

Papers Presented in Important Conferences (with no Proceedings; Peer-Review only of Abstract)

7. Subramani, D. N., & Lermusiaux, P. F. (2018, February). Probabilistic Risk-Optimal Path Planning and Sampling in Uncertain Environments. In 2018 Ocean Sciences Meeting. AGU.
8. Subramani, D. N., Haley Jr, P., & Lermusiaux, P. F. (2017, December). Stochastic Ocean Predictions with Dynamically-Orthogonal Primitive Equations. In AGU Fall Meeting Abstracts (Vol. 2017, pp. NG34A-02).
9. Subramani, D. N., Haley Jr, P. J., & Lermusiaux, P. F. (2016, December). Probabilistic Predictions of Regional Ocean Dynamics. In AGU Fall Meeting Abstracts (Vol. 2016, pp. A41G-0145).
10. D.N. Subramani, P. Haley Jr. and P.F.J. Lermusiaux (2016, April) Probabilistic Regional Ocean Predictions. SIAM Uncertainty Quantification Meeting. SIAM
11. Subramani, D. N., Haley Jr, P. J., & Lermusiaux, P. F. (2016, February). Energy Optimal Path Planning: Integrating Coastal Ocean Modelling with Optimal Control. American Geophysical Union Ocean Science Meeting, 2016, PO12A-07.

Patents

1. Lermusiaux, Pierre, Deepak Narayanan Subramani, Chinmay Kulkarni, and Patrick Haley. "Route determination in dynamic and uncertain environments." U.S. Patent 11,435,199, issued September 6, 2022.