SATYASARAN CHANGDAR
Curriculum Vitae

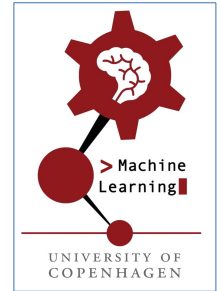*Department of Computer Science*
University Of Copenhagen, Denmark
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✉ *satyasaran@gmail.com*
🖱 *My Webpage*

⌨ *Github*   in *Linkedin*   Ⓢ *Skype*

Experience

Postdoc, Department of Food Science, University of Copenhagen, Denmark

March, 2024-Present

Food process (CIP) Modelling using hybrid data-driven/Physics informed Machine learning, Project name: SmartClean, Collaborating with Arla Foods.

- Developing cleaning models using hybrid data-driven approach to predict cleaning rates and collaborating with Arla Foods.
- Preparing teaching material for teaching Master student of Biosolution Master's degree program with Prof. Serafim Bakalis in Kalundborg.
- Research work has been accepted in AIChE Annual Meeting in San Diego, CA, USA, at the from Thursday, October 24, 2024 - Friday, November 1, 2024: Title "Physics-Informed Machine Learning for CIP Optimization in Dairy Manufacturing"
- **Experienced in writing external research funding applications to Innovation Fund Denmark with Prof. Serafim Bakalis.**

Supervisor : Dr. Serafim Bakalis, *Professor, Food Science, Department of Computer Science*, University of Copenhagen, Denmark (*Personal Web-page*)

Postdoc, Department of Computer Science, University of Copenhagen, Denmark

July,2021 – Feb, 2024

Applied Machine Learning/Deep Learning/ AI in Agriculture.

- Developed machine learning methods for analysis of multi-modal time series data (multi-spectral Images, sensors data) and Collaborating with Danish agriculture companies like DLF, Nordic Seed and Danespo etc. The project focuses machine learning modelling on multi-modal data from the *RadiMax* facility at Department of Plant and Environmental Sciences including sub-soil root images and isotopes and Yields measurement.
- Developed Machine Learning/ AI Models for investigating root growth and root function from Root length data acquired using deep learning *Github link*
- Developed Deep Learning Models using transfer learning (Resnet50, vision transformer) from large raw plant root image data to investigate root growth and root function and training on GPU clusters (Slurm) and visualization important region using GradCAM
- Worked on extracting morphological structures from segmented binary images to investigate crop root functions
- Supervised bachelor student (Mr. Noah Matthias Zaatari) of department of mathematics, University of Copenhagen working on project in the field of statistical machine learning.
- Supervised bachelor student (Mr. Martin Zillmer) of department of Computer Science, University of Copenhagen working on project in the field of Physics informed machine learning.
- Participated in BraTS 2023 challenges and submitted a manuscript of multimodal 3d medical image (MRI data) segmentation using deep learning (MPUnet, 2D Unet, and 3D Unet).
- **Experienced for External research funding application in Danish Data Science Academy (DDSA) in 2023**

June, 2023   Certified : Introduction to University Pedagogy from University of Copenhagen, Denmark

Supervisor : Dr. Erik Bjørnager Dam, *Professor, Machine Learning Section, Department of Computer Science*, University of Copenhagen, Denmark (*Personal Web-page*)

Joint Supervisor: Dr. Kristian Thorup-Kristensen, *Professor, Department of Plant and Environmental Sciences*, University of Copenhagen, Denmark (*Personal Web-page*)

International Research Collaboration

Feb,2019 – 2022

Modelling and solution Bio-fluid problems using Physics-Informed Machine Learning.
- Supervised and collaborated research work with PhD students registered under Dr. Soumen De, *Professor, Department of Applied Mathematics*, University of Calcutta, India (*Personal Web-page*) working on project in the field of Mathematical modelling of Bio-nano fluid using data-driven hybrid modelling.
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June,2021 – Present

Medical Image segmentation and Survival prediction: Semantic Segmentation of BraTS-2017-2020, Medical Image analysis group, University of Copenhagen under the guidance of professor Dr. Erik Bjørnager Dam, @ Nordic AI meet 2023.
- In this research we worked on 3D MRI brain tumor segmentation using 3D U-net with gradient accumulation and developed a ML model for prediction survival time based on diverse Radiomics, Entropy based and CNN features from the predicted mask

Teaching Experience

Associate professor, Department of Information Technology, Institute of Engineering & Management, Kolkata

Feb,2019 – June, 2021

Teaching and Research.
- Lecturing, grading, and mentoring undergraduate students.
- Supervised and evaluated students working on projects and labs in the field of Data Science using ML/DL.

Assistant professor, Department of Information Technology, Institute of Engineering & Management, Kolkata

Sep,2009 – Jan, 2019

Teaching and Research.
- Lecturing, grading, and mentoring undergraduate students
- Supervised and evaluated students working on projects and labs in the field of Data Science using ML/DL

Industry Experience

Software Engineer-Trainee, Infogain India pvt., Noida, India

Sep,2008 – Aug, 2009

Software development.
Roles: Code Optimization using C++, PERL and Unix Shell scripting and automated testing using Ruby/Waiter

Education

PhD, Applied Mathematics, University of Calcutta, Kolkata, India

2013–2018

Thesis: *Some problems on the nonlinear blood flow through stenosed arteries*.
Mathematical modelling and numerical simulation of bio-fluids

Supervisor: Dr. Soumen De, *Assistant Professor, Department of Applied Mathematics*, University of Calcutta, India (*Personal Web-page*)

Joint Supervisor: Dr. Samiran Ghosh, *Professor, Department of Applied Mathematics*, University of Calcutta, India (*Personal Web-page*)

Master of Technology, Computer Applications, Indian Institute Technology, Delhi, India

2006–2008 :

Thesis: *Authentication Using Hand Geometry*.
The objective of the work was to develop an automated identification system using geometry of hand images. The system reads a hand image and identifies the significant geometrical information from the hand image with minimum error using Independent component analysis and Zernike Moments. The project encompasses image preprocessing, feature extraction, feature matching and implemented in Matlab

Courses.
System software, Computer vision, Introduction to programming and data structures, Computer organization & operating systems, Database management systems, Digital image processing, Fuzzy sets & applications, Neuro-computing & applications, Data Mining etc.

Master of Science, Mathematics, Indian Institute Technology, Bombay, India

2003–2005 : **Thesis:** *Study of some problems on Differential Geometry* .
Advanced exposure to various areas on differential geometry

Courses.
Computer Programming, Mathematical Methods, Theory of probability, Mathematical Statistics, Data Mining, Time Series Analysis, Multivariate Analysis, Optimization, Linear Algebra, Numerical Analysis, Ordinary differential equations, Partial Differential equations, Analysis, Abstract Algebra etc.

2000–2003 : **Bachelor of Science, Mathematics, Midnapur College, Vidyasagar University, India**.

Publications

Journal Articles

Under Review

2023 **Satyasaran Changdar, Nabanita Sadhukhan, Bivas Bhaumik, Sabyasachi Mukhopadhyay, Soumen De, Serafim Bakalis, Erik Bjørnager Dam**, Exploring Nonlinear Wave Dynamics in Arterial Blood Flow: Insights from Physics-Informed Machine Learning and Symbolic Regression via Genetic Programming, (Engineering Applications of Artificial Intelligence).

2023 **Bivas Bhaumik, Satyasaran Changdar, Snehashish Chakraverty, and Soumen De**, Effects of viscosity and induced magnetic fields on weakly nonlinear wave transmission in a viscoelastic tube using physics-informed neural networks, (Mathematical Methods in the Applied Sciences).

Published

2024 **Satyasaran Changdar**, Behnaz Parjikolaei Razi, Frans W.J. van den Berg, and Serafim Bakalis. Physics-informed machine learning for cip optimization in dairy manufacturing (abstract accepted). *2024 AIChE Annual Meeting*. AIChE, 2024.

2024 De S Saha S and **Changdar S**. Physics informed machine learning based applications for the stability analysis of breakwaters. *Ships and Offshore Structures*. Taylor & Francis, 2024, **(Impact Factor:2.1)**.

2024 Soumini Dolui, Bivas Bhaumik, Soumen De, and Satyasaran Changdar. Nanoparticle aggregation and electro-osmotic propulsion in peristaltic transport of third-grade nanofluids through porous tube. *Computers in Biology and Medicine*, page 108617, 2024, **(Impact Factor:7.7)**.

2023 **Satyasaran Changdar**, Olga Popovic, Tomke Susanne Wacker, Bo Markussen, Erik Bjørnager Dam, and Kristian Thorup-Kristensen. Non-invasive phenotyping for water and nitrogen uptake by deep roots explored using machine learning. *Plant and Soil*. Springer Nature, 2023, **(Impact Factor:5.4)**.

2023 Susmita Saha, Soumen De, and Satyasaran Changdar. An application of machine learning algorithms on the prediction of the damage level of rubble-mound breakwaters. *Journal of Offshore Mechanics and Arctic Engineering*, pages 1–40. American Society of Mechanical Engineers, 2023, **(Impact Factor:1.76)**.

2023 Soumini Dolui, Bivas Bhaumik, Soumen De, and **Satyasaran Changdar**. Biomedical simulations of hybrid nano fluid flow through a balloon catheterized stenotic artery with the effects of an inclined magnetic field and variable thermal conductivity. *Chemical Physics Letters*. Elsevier ScienceDirect, 2023, **(Impact Factor:2.8)**.

2023 Bivas Bhaumik, Soumen De, and **Satyasaran Changdar**. Deep learning based solution of nonlinear partial differential equations arising in the process of arterial blood flow. *Mathematics and Computers in Simulation*. Elsevier ScienceDirect, 2023, **(Impact Factor:4.6)**.

2022 Susmita Saha, **Satyasaran Changdar**, and Soumen De. Prediction of the stability number of conventional rubble-mound breakwaters using machine learning algorithms. *Journal of Ocean Engineering and Science*. Elsevier, 2022, **(Impact Factor:7.1)**.

2022 Soumini Dolui, Bivas Bhaumik, Soumen De, and **Satyasaran Changdar**. Effect of a variable magnetic field on peristaltic slip flow of blood based hybrid nanofluid through a non-uniform annular channel. *Journal of Mechanics in Medicine and Biology*. World Scientific, 2022, **(Impact Factor:0.883)**.

2022 Bivas Bhaumik, **Satyasaran Changdar**, and Soumen De. An expert model based on physics-aware neural network for the prediction of thermal conductivity of nanofluids. *Journal of Heat Transfer*, volume 144. American Society of Mechanical Engineers Digital Collection, 2022, **(Impact Factor:1.855)**.

2022 Bivas Bhaumik, **Satyasaran Changdar**, and Soumen De. Combined impact of brownian motion and thermophoresis on nanoparticle distribution in peristaltic nanofluid flow in an asymmetric channel. *International Journal of Ambient Energy*, volume 43, pages 5064–5075. Taylor & Francis, 2022.

2022 Bivas Bhaumik, Shivam Chaturvedi, **Satyasaran Changdar**, and Soumen De. A unique physics-aided deep learning model for predicting viscosity of nanofluids. *International Journal for Computational Methods in Engineering Science and Mechanics*, pages 1–15. Taylor & Francis, 2022, **(Impact Factor:1.6)**.

2021 **Satyasaran Changdar**, Bivas Bhaumik, and Soumen De. Physics-based smart model for prediction of viscosity of nanofluids containing nanoparticles using deep learning. *Journal of Computational Design and Engineering*, volume 8, pages 600–614. Oxford University Press, 2021, **(Impact Factor:6.167)**.

2020 **Satyasaran Changdar**, Susmita Saha, and Soumen De. A smart model for prediction of viscosity of nanofluids using deep learning. *Smart Science*, volume 8, pages 242–256. Taylor & Francis, 2020.

2020 Avipsita Chatterjee, **Satyasaran Changdar**, and Soumen De. Study of nanoparticle as a drug carrier through stenosed arteries using bernstein polynomials. *International Journal for Computational Methods in Engineering Science and Mechanics*, volume 21, pages 243–251. Taylor & Francis, 2020.

2019 **Satyasaran Changdar** and Soumen De. Analytical investigation of nanoparticle as a drug carrier suspended in a mhd blood flowing through an irregular shape stenosed artery. *Iranian Journal of Science and Technology, Transactions A: Science*, volume 43, pages 1259–1272. Springer, 2019, **(Impact Factor:1.553)**.

2018 **Satyasaran Changdar**, Amit Kumar Mandal, and Soumen De. Analytical investigation of non-spherical nanoparticle as a drug agent suspended in a magnetohydrodynamic blood nanofluid flowing through an irregular shape stenosed artery. *Journal of Nanofluids*, volume 7, pages 1187–1194. American Scientific Publishers, 2018.

2018 **Satyasaran Changdar** and Soumen De. Investigation of nanoparticle as a drug carrier suspended in a blood flowing through an inclined multiple stenosed artery. *Bionanoscience*, volume 8, pages 166–178. Springer, 2018.

2017 **Satyasaran Changdar** and Soumen De. Transport of spherical nanoparticles suspended in a blood flowing through stenose artery under the influence of brownian motion. *Journal of Nanofluids*, volume 6, pages 87–96. American Scientific Publishers, 2017.

2017 **Satyasaran Changdar** and Soumen De. Analytical solution of mathematical model of magneto-hydrodynamic blood nanofluid flowing through an inclined multiple stenosed artery. *Journal of Nanofluids*, volume 6, pages 1198–1205. American Scientific Publishers, 2017.

2016   **Satyasaran Changdar** and Soumen De. Analysis of non-linear pulsatile blood flow in artery through a generalized multiple stenosis. *Arabian Journal of Mathematics*, volume 5, pages 51–61. Springer, 2016.

2015   Samiddha Mukherjee, Ravi Shaw, Nilanjan Haldar, and **Satyasaran Changdar**. A survey of data mining applications and techniques. *vol*, volume 6, pages 4663–4666. Citeseer, 2015.

In Conference Proceedings

2015   Sabyasachi Mukhopadhyay, Nirmalya Ghosh, Ritwik Burman, Prasanta K Panigrahi, Sawon Pratiher, M Venkatesh, Soham Mandal, and **Satyasaran Changdar**. An optimized hyper kurtosis based modified duo-histogram equalization (hkmdhe) method for contrast enhancement purpose of low contrast human brain ct scan images. In *2015 International Conference on Advances in Computing, Communications and Informatics (ICACCI)*, pages 1819–1821. IEEE, 2015.

2011   **Satyasaran Changdar**, Soumen De, and Samiran Ghosh. Numerical simulation of nonlinear newtonian blood flow through a stenosed artery under the influences of periodic body acceleration. Conference: 5th International and 41st National Conference on Fluid Mechanics and Fluid Power FMFP-2014 , IIT kanpur, 2011.

Fellowships, Awards & achievements

2006-2008   **GATE fellowship from MHRD, India**

2003   Received Bronze Medal for securing II position with first class during my B.Sc in the college

2003   Secured 4th position in B.Sc. in Mathematics in Vidyasagar University in 2003

2006   Secured All India Rank 42 in Mathematics in GATE 2006, conducted by IITs & IISC Bangalore

2003   Rank 23 in M.Sc Entrance Test in Mathematics conducted by IIT Bombay in 2003

2012-2015   Awarded the CERTIFICATES OF APPRECIATION for performing extremely well in conducting classes activities in the Department of Information Technology, Saltlake, Kolkata.

Professional Activities

2016-present   Reviewer (Journal): IEEE Transactions on Neural Networks and Learning Systems. Mathematics and Computers in Simulation. Brazilian Society of Mechanical Sciences and Engineering.

Teaching Skills

2009-2021   Numerical methods, Mathematical modelling, Discrete Mathematics, Graph Theory, Engineering mathematics, Applied Statistics, Operation research and Optimization, Introduction to C, C++ programming, and Python programming

Recent Talks/Workshop/FDP/Outreach activities

12-3-2024   (Talk) Using machine learning to understand interactions between root growth and isotopic uptake indicators. Modelling deep root images directly by Deep learning (Wheat-2018-2019),in RadiMax, UCPHRadibooster Status meeting, Odens, Denmark

05-02-2024– 09-02-2024   (FDP) Delivered invited talk on Data Science and its Applications in Faculty development program organised by Department of Computer Science and Engineering, Dr. B. C. Roy Engineering College, Durgapur, India

25-02-2022   (Talk) Department of Plant and Environmental science, University of Copenhagen, Denmark

17.11.2023   (Workshop) Responsible Conduct of Research: A case-based workshop for postdocs and assistant professors,University of Copenhagen, Denmark

30-10-2023   (Talk) Using machine learning to understand interactions between root growth and isotopic uptake indicators in RadiMax, UCPHRadibooster Status meeting, Sejet planteforædling, Horsens, Denmark

13-06-2022	(Talk) Machine Learning Section, Department of Computer Science, University of Copenhagen, Denmark
09-06-2022	(Online Workshop) RadiBooster AI workshop, University of Copenhagen, Denmark
03-03-2022	(Talk) Radibooster Status meeting, AU Flakkebjerg, Denmark
15-03-2022	(Online Talk) 8th Alummni Seminar, Department of Mathematics, Midnapur College, India
26-02-2022	(FDP) Department of Computer Science and Engineering, Dr. B. C. Roy Engineering College, Durgapur, India
25-02-2022	(Talk) Department of Plant and Environmental science, University of Copenhagen, Denmark
15-11-2021	(Talk) Machine Learning Section, Department of Computer Science, University of Copenhagen, Denmark

Computer skills

Programming Languages	Python, C, C++ and JAVA
Machine Learning	scikit-learn,TensorFlow, keras, PyTorch, cv2, scikit-image, Stats Models in R, Symbolic regression, Data pipeline in cloud, ETL, Amazon SageMaker, Azure ML, Azure Open AI, NLP, LLM, LLM fine tuning with RAG in Generative AI
Others	git commands, Computing in GPU /CPU Cluster, slurm

Position of Responsibility

2016-2020	**Class Teacher**, IEM, Kolkata.

Teaching Assistantship

2006-2008 :	**Numerical Methods using C**, IIT Delhi.

Languages

English, Bengali, Hindi.

Additional information

Nationality − Indian.