

# Dr. E.S. Gopi

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<https://sites.google.com/view/gopi-es/home>



Dr. E. S. Gopi has solely authored 8 books and edited 1 book published by Springer in the area of signal processing and pattern recognition. He has got several research papers published in the reputed journals, reviewed book chapters and conference proceedings. He has 25 years of teaching and research experience. He is the coordinator for pattern recognition and the computational intelligence laboratory. He is currently Associate Professor, Department of Electronics and Communication Engineering, National Institute of Technology, Trichy (Government of India). His books are widely used all over the world. His book on “Pattern recognition and Computational intelligence using Matlab”, Springer, was recognized as one of the best eBooks under the “pattern recognition” and “Matlab” categories by the Book authority, Authorities’ leading site for book recommendations by thought leaders. He is the series editor for the series “Signals and Communication Technology”, a Springer publication. He has completed the project offered by GTRE (DRDO) as the principal investigator on “Hunting representative sensors and constructing regression model for between sensor outcomes using ML”. His video course on “Pattern recognition”, “Statistical theory of Communication” and “Linear algebra and stochastic process” are well appreciated by his fellow students. He is also serving as one of the Workshops, Tutorials & Symposia officers for Machine Learning For Communications Emerging Technologies Initiative (IEEE ComSoc). He organized the first virtual international conference (MDCWC2020) at NIT, Tiruchirappalli and edited the proceedings published by Springer. He has organized many workshops, which include MDCWC2021 as the special session during the IEEE Conference on ICIAfS2021, MDCWC2021, the first long virtual workshop at NIT, Tiruchirappalli. Recently, the second International conference on MDCWC2022 was organized by him. He was the convener for the conference. He has delivered many invited talks, which include the talk under the Global Initiative of Academic Networks (GIAN) course on “Machine learning for wireless communication” and Speaker for the IEEE Training school in Machine learning for wireless communication, TOMSK Polytechnic University. His research interests include Machine intelligence, pattern recognition, and statistical signal processing and Computational intelligence

## .Teaching and Research Experience

### [Total teaching and research experience=24 years]

2006-till date : Faculty in the Department of ECE at National Institute of Technology Tiruchirappalli (Government of India) and currently designated as the Associate professor

1998- 2006 : Served as the faculty at various Private Engineering Institutions

### Education

Doctor of Philosophy based on the research on Investigations on Linear Discriminant Analysis, National Institute of Technology Tiruchirappalli, 2015.

Master of Engineering in Communication Systems, Madurai Kamaraj University, **First Class with Distinction**, 2005

Bachelor of Engineering in Electronics and Communication Engineering, Anna university, **First class with Distinction**, 1998

### Impact on the learner's community

1. Video link on [GIAN Course](#)
2. You-tube video lectures on the following courses  
Pattern recognition: [Link](#)  
Statistical theory of communication [Link](#)  
Linear algebra and stochastic process [Link](#)
3. Series editor for the Book series, "Signals and Communication technology", Springer publications.
4. Elevated to Senior Member, IEEE
5. Editor for the [COMPSIGNITT](#), Monthly Newsletter launched by Pattern recognition and Computational intelligence group.
6. Executed the project on "Hunting representative sensors and constructing regression model between sensor outcomes using ML" offered by GTRE (Government of India)
7. Conducted first virtual international conference [MDCWC2020](#) during 22<sup>nd</sup> to 24<sup>th</sup> October 2020.
8. Conducted the special session [MDCWC2021](#) during 10th IEEE Conference on Information and Automation for sustainability on 12th August 2021
9. Conducted first long online workshop (evening hours) [MDCWC2022](#) during 30<sup>th</sup> May to 24<sup>th</sup> June 2022

10. Workshops, Tutorials & Symposia officer for Machine Learning For Communications Emerging Technologies Initiative (IEEE ComSoc) [ETIMLC](#)
11. Editing the book on "Machine Learning for Wireless Communication with Simulation Illustrations, Signals and Communication Technology series, Springer publications" [Link](#)

## Book publications

### Edited book publications

E.S.Gopi, [Machine Learning, Deep learning and computational intelligence](#)(2021), Proceedings of MDCWC2020, Lecture Notes in Electrical Engineering, Series, ISSN 978-981-16-0289-4, Springer publications

### Sole authored book publications

- E.S.Gopi, [Digital Signal Processing for wireless communication using Matlab](#), Signals and Communication Technology, second edition, Springer publications (2022)
- E.S.Gopi, [Pattern recognition and Computational intelligence techniques using Matlab](#) (2019), Transactions on computational science and computational intelligence, ISSN 2569-7072, Springer publications
- E.S.Gopi,, [Digital Speech processing using Matlab](#) (2014), Signals and Communication technology, ISSN 1860-4862 , Springer publications
- E.S.Gopi,, [Multi-Disciplinary Digital Signal Processing: A functional approach using Matlab](#) (2017), ISBN 978-3-319-57429-5, Springer publications
- E.S.Gopi,, [Digital signal processing for wireless communication using Matlab](#) (2015) ,ISBN 978-3-319-20651-6, Springer publications, second edition, 2021.
- E.S.Gopi,, [Digital signal processing for medical imaging using Matlab](#) (2012), ISBN 978-1-4614-3139-8, Springer publications
- E.S.Gopi,, [Mathematical summary for digital signal processing applications with Matlab](#) (2010),ISBN:978-90-481-3746-6, Springer publications
- E.S.Gopi,, [Algorithm Collections for Digital Signal Processing Applications Using Matlab](#) (2007), ISBN: 978-1-4020-6409-, Springer publication
- E.S.Gopi,, [Digital Image processing using Matlab](#) (2007) : ISBN:9788183715867, Scitech publications

## Teaching statement

**Fig.1. Cover pages of the books sole authored by myself**



I am in teaching field since 1998 at various capacity from Lecturer to the current designation as the Associate professor at one of the top Institute in India National Institute of Technology (with NIRF ranking 8 in Engineering). I enjoy revealing the simplicity behind the complex topics and creates interest to all level of student in the class. My academic work centered on algorithm development using signal and machine learning techniques, disseminating knowledge by writing books and recording video lectures. I had the chance to write 9 high level technical books.

I strongly believe that updating knowledge on continuous learning is important to become high quality teacher. The course “Pattern recognition” was structured by myself and floated as an open elective for B.Tech. students at our Institute. This course is very popular that leads to 150+students registration for the course. The course is

based on my book sole authored by myself “Pattern recognition and Computational intelligence using Matlab”, which is recognized as one of the 11 Best Pattern Recognition Books to read in 2022. [Link](#) . I also teach the following courses (a) Pattern recognition and the Computational intelligence for M.Tech (b) Statistical theory of Communication (c) Linear algebra, Probability and Stochastic process for M.Tech. (d) Digital Signal processing for wireless communication as the programme elective paper.

I usually record my video lectures and share with my students to facilitate them to watch the lecture again. In particular, it is very much help full for the slow learners. [Link](#)

One of the novel assessment methodology adopted to test my students is the Audio slide preparation. This enables the student to learn, do experiment and express his/her understanding through video and audio presentation. The evaluation is done as the peer assessment. This will enable other students to reinforce the topics presented by their peers through Audio slide presentation.

Apart from contributing to teaching, I concentrate on conducting workshops regularly. Machine Learning, Deep Learning and Computational Intelligence 2020 was launched during the pandemic period

as the Virtual conference and the proceedings was published by Springer. MDCWC2021 as the special session during ICIAFS2021 and the proceedings published in IEEE Explore. MDCWC2022 was conducted as the virtual workshop for the long period (duration 30th May to 24th June 2022) (60 contact hours).

## Research Publications

### Journal publications (SCI/SCIE)

- Vinodha, E.S.Gopi, Analysing the performance improvement of Hierarchical binary classifiers using ACO through Monte Carlo simulation and Multi-class Engine vibration data, Elsevier journal on Expert Systems with Applications (minor revision)
- Rajasekharreddy, Poreddy, E.S.Gopi [Improvement of Accuracy of under-performing classifier in decision making using discrete memory less channel model and Particle Swarm Optimization](#) (2022), Elsevier journal on Expert systems and applications, 2022
- G.Jayabrindha, E.S.Gopi, [Masking Technique based Attention Mechanism for Off-type Identification in Plants](#) (2022), Elsevier journal on Machine Learning with Applications, 2022
- M.Neema, E.S.Gopi, "[Data driven approach for mmWave channel characteristics prediction using deep neural network](#)", Springer journal on Wireless Personal Communications, (SCIE), 2021
- G.Jayabrindha, E.S.Gopi, "[An hierarchical approach for automatic segmentation of leaf images with similar background using kernel smoothing based Gaussian process regression](#)", Elsevier journal on Ecological informatics, Vol.63, 2021.
- G.Jayabrindha, E.S.Gopi, "[Ant Colony Technique for Optimizing the Order of Cascaded SVM Classifier for Sunflower Seed Classification](#)", IEEE Transactions on Emerging Topics in Computational Intelligence, pp.78 - 88, Vol.2, Issue 1, 2017
- E.S.Gopi, P.Palanisamy, "[Fast computation of PCA bases of image subspace using its inner-product subspace](#)", Elsevier journal on Applied Mathematics and Computation, Vol.219-12, pp.6729-6732, 2013
- E.S.Gopi, P.Palanisamy "[Neural network based class-conditional probability density function using kernel trick for supervised classifier](#)", Elsevier journal on neuro computing, Vol.154, pp. 225-229, 2014, ISSN:0925-2312.
- E.S.Gopi, P.Palanisamy, "[Maximizing Gaussianity using kurtosis measurement in the kernel space for kernel linear discriminant analysis](#)", Elsevier journal on neuro computing, Vol.144, pp.329-337, 2014, ISSN:0925-2312.
- E.S.Gopi, P.Palanisamy "[Formulating particle swarm optimization based membership linear discriminant analysis](#)", Elsevier journal on swarm and evolutionary computation, Vol.12, pp.65-73, 2013, ISSN:2210-6502.
- E.S.Gopi, "Digital image forgery detection using artificial neural network and independent component analysis", Elsevier journal on Applied Mathematics and Computation, Vol. 194-2, 2007, pp. 540-543. ISSN:0096-3003



## Reviewed Book Chapters

- Sharan Chandra, Gopi E S, Hrishikesh Shekhar and Pranav Mani ,” Deep Learning to Predict the Number of Antennas in a Massive MIMO Setup based on Channel Characteristics”, in the book "[Proceedings of MDCWC2020](#)", Springer publications, ,2021
- Yashvanth L, Dharanya V and Gopi E.S ,” Novel method of Self - Interference Cancellation in Full - duplex radios for 5G wireless technology using Neural Networks”, in the book "[Proceedings of MDCWC2020](#)", Springer publications, ,2021
- Pranav Mani, Gopi E S, Hrishikesh Shekhar and Sharan Chandra ,” Generative Adversarial Network and Reinforcement Learning to Estimate Channel Coefficients”, in the book "[Proceedings of MDCWC2020](#) ", Springer publications,2021
- S Swedha and E.S.Gopi ,” LSTM Network for Hotspot Prediction in Traffic Density of Cellular Network”, in the book "[Proceedings of MDCWC2020](#) ", Springer publications,2021
- Mayank Lauwanshi and E.S.Gopi ,” Rank reduction and Diagonalization of Sensing matrix for Millimeter wave Hybrid precoding using Particle Swarm Optimization”, in the book "[Constraint Handling in Metaheuristics and Applications](#)", Springer publications,2021
- Shailendra Singh and E.S.Gopi, “Maximising Downlink Channel Capacity of NOMA System using Power Allocation Based on Channel Coefficients using Particle Swarm Optimization and Back Propagation Neural Network”, in the book [Constraint Handling in Metaheuristics and Applications](#)', Springer publications, 2021
- Shaik Mahammad, E.S.Gopi, Vineetha Yogesh, "[The Roulette Wheel selection based Computational Intelligence technique to design an efficient transmission policy for Energy Harvesting Sensors](#)" ,Optimization in Machine learning and Applications, Springer, 2020
- Sankar N Nair, E.S.Gopi, "[Deep Learning Techniques for Crime Hotspot Detection](#)", Optimization in Machine learning and Applications, Springer, 2020
- G.J.Brinda, E.S.Gopi, "[Maximizing Profits in Crop Planning Using Socio Evolution and Learning Optimization](#)", Edited volume on [Socio-cultural Inspired Metaheuristics](#), Springer, 2019
- Rajasekharreddy, Poreddy, E.S.Gopi, [Feature Selection for Vocal Segmentation Using Social Emotional Optimization Algorithm](#), Springer, 2019
- Vineetha Yogesh, E.S.Gopi, Shaik Mahammad, "[Particle Swarm Optimization based HMM parameter estimation for spectrum sensing in Cognitive radio system](#)", Edited volume on [Computational intelligence for Pattern Recognition](#), Springer, 2018.
- Florintina.C, E.S.Gopi, "[Music composition inspired by sea wave patterns observed from beaches](#)", [Proceedings of the 2nd International Conference on Data Engineering and Communication Technology \(ICDECT 2017\)](#), Springer,2017.

- Kshitij Rachchh, E.S.Gopi, "[Inclusion of Vertical bar in the OMR sheet for Image Based Robust and Fast OMR Evaluation Technique using Mobile Phone Camera](#) ",[Proceedings of the 2nd International Conference on Data Engineering and Communication Technology \(ICDECT 2017\)](#), Springer, 2017
- E.S.Gopi, P.Palanisamy, "[Scatter Matrix versus the Proposed Distance Matrix on Linear Discriminant Analysis for Image Pattern Recognition](#)", Springer, pp.101-108, 2014
- E.S.Gopi, R.Lakshmi, N.Ramya, and S.M. Shereen Farzana, "[Music indexing using Independent Component Analysis with pseudo-generated sources,Independent Component Analysis and Blind Signal Separation](#)", Springer Berlin Heidelberg,pp.1237-1244, 2004

### Conference proceedings publications (IEEE and Elsevier publications)

- Neema, E.S.Gopi, Katoj Praveen kumar, "[User Spatial Localization for Vision Aided Beam Tracking Based Millimeter Wave Systems Using Convolutional Neural Networks](#)" 10th IEEE Conference on Information and Automation for sustainability, 2021
- C. Florintina, E.S.Gopi, "[Constructing a Linear Discrete System in Kernel Space as a Supervised Classifier](#)", - [Wispnet 2017](#), Chennai, 22-24 March 2017
- Jay.K.Patel and E.S.Gopi, "[Musical Notes identification using Digital signal processing](#)", Elsevier journal on procedia computer science (Cite score: 1.03) , Volume 57, 2015, Pages 876–884
- E.S.Gopi, P.Palanisamy, "[Formulating Particle Swarm Optimization based Generalized Kernel Function for Kernel-Linear Discriminant Analysis](#)", Elsevier journal on Procedia technology, Vol.6, pp.517-525, 2015
- Hari Babu Padarathi and E.S.Gopi, "[Medical data classifications using Genetic algorithm based Generalized Kernel Linear Discriminant analysis](#)", Elsevier journal on procedia computer science (Cite score:1.03), Volume 57, 2015, Pages 868–875.
- Hemant Sharma and E.S. Gopi. "[Signal processing approach for music synthesis using bird's Sounds](#)", Elsevier journal on Procedia Technology , Volume 10, 2013, Pages 287-294
- Vinoth S and E S Gopi. "[Neural network modeling of color array filter for digital forgery detection using kernel LDA](#)", Elsevier journal on Procedia Technology , Volume 10, 2013, Pages 287-294
- E.S.Gopi,"A Novel approach to transformed biometrics",second international conference on digital image processing during 26-28 Feb 2010,singapore.E.S.Gopi, Sylvester Vijay R, Vasudha Rangarajan,Lakshmanan Nataraj,"[Brain computer Interface Analysis using Wavelet Transformations and Auto Regressive Coefficients](#)", - ICECE , Bangladesh, December 21,2006
- E.S.Gopi, N.Lakshmanan, T.Gokul,S.KumarGanesh, Prerak.R.Shah,"[Digital Image forgery detection using Artificial Neural Network and Autoregressive Coefficients](#)", - IEEE Canada, Canadian Conference on Electrical and Computer Engineering.(CCECE-CCGEI) Ottawa 2006.

- E.S.Gopi, Poorani Vijayakumar, Shyamala Pandiyan, Preethi kannan, Revathy, "[A Novel Approach to Transformed Biometrics using ANN](#)", - Third International Conference on Intelligent Sensing and Information Processing ICISIP 06, Bangalore, India.
- E.S.Gopi, Vibha Viswanathan, Priya Sankaralingam, Sowmya ramakumar, "[A New approach to create high level features from low level features of audio clips](#)" International Conference on Communication, Circuits and Systems (ICCCAS2005), 27 to 30 May 2005, HongKong, China. PP 1022-1026.
- E.S.Gopi, S.R.Nirmala, Shreyans Chopra, N.H.Kaliprasad, "[Karhunen-Leove transform based hand identification system](#)" - Second International Conference on Intelligent Sensing and Information Processing-(ICISIP 05) 4-7 January 2005 at Le Royal Meridian, Chennai, India.

### **Other Conference proceedings publications**

- Arnab chakraborty, E.S.Gopi, "A Novel approach to transformed biometrics using sub-block based successive projections", ICFOCS 2011, National science seminar complex, Indian Institute of science, Bangalore, 7th to 9th August 2011. ISBN No:978-81-921929-0-1
- E.S.Gopi, Priya Sankaralingam, Vibha Viswanathan, Sowmya Ramakumar, "Performance Comparison of Assumed Traditional search approach method with ANN-IGA Based search method for Audio and Image data" ICIS-2005, Universiti Teknolgi Petronas, Malaysia.
- E.S.Gopi, C.Deepa Reddy, S.V.Sivasankari, S.Sundarraaj, M.Vijay, "Video Shot Classification using clustering based Artificial Neural Network"-International Conference Human-Computer Interface (ICHMI 2004) 20-23 December 2004 at Tata Auditorium, Bangalore, India
- E.S.Gopi, R.Ezhilarasi, V.Vidya, R.Ramya, "Audio Watermarking for voice mail using wavelet transformation" at International conference on Number Theory for Secure Communication held at Sastra, Deemed university, Kumbakonam, December, 20-21, 2003
- E.S.Gopi, N.Venkateswaran, L.Sujatha, "Fuzzy based watermarking using wavelet decomposition", Paper No.9 Proceedings of International Conference on Digital Aided Modeling and Simulation, (An evolutionary approach for Optimization) Coimbatore Institute of Technology January 6 to 8, 2003

### **Guest lectures delivered (Recent list)**

- Delivered Invited talk on "Machine learning for wireless communication" under Global Initiative of Academic Networks (GIAN) course, organized by VNIT, Nagpur
- Delivered guest lecture on "Machine learning for wireless communication-case study", during SERB sponsored one day workshop on Advanced Multicarrier Waveforms for Next Generation Wireless Systems on 18th November 2022 during 2.00 P.M. to 3.30. P.M. at NIT, Tiruchirappalli



- Delivered invited talk on "Maximum Likelihood, Bayes Optimal Classifier" on 7-07-2022 during Online Faculty Development Training Programme conducted by the Department of Computer Science, Anna University Regional campus, Tirunelveli
  - Delivered invited talk on "Maximum Likelihood, Bayes Optimal Classifier" on 7-07-2022 during Online Faculty Development Training Programme conducted by the Department of Computer Science, Anna University Regional campus, Tirunelveli
  - Delivered invited talk on "Linear and Logistic regression" on 9-07-2022 during Online Faculty Development Training Programme conducted by the Department of Computer Science, Anna University Regional campus, Tirunelveli
  - Delivered the Lecture (online) on "Predictive and Temporal Medical Data Modelling" during AICTE – ISTE sponsored One Week (Six Days) Online Induction/Refresher Programme on Medical Data Analytics with Python on 6th Jan 2022
  - Delivered the Lecture (online) on "Artificial Intelligence for Agriculture applications" Organized by Institute of Artificial Intelligence, MIT World peace University on November 22nd 2021
  - Delivered the Lecture (online) on "Machine learning for wireless communication" during the invited talk organized as part of by P.G. programme on Wireless Communication offered by SLTC and Internationally recognized degree from Liverpool John Moores University, UK on 11th September 2021
  - Delivered the invited talk (online) on "Machine learning for wireless communication" during CSIR sponsored Two days National Level Seminar on "Security issues and Challenges in 5G Wireless Networks" on 23rd August 2021
  - Delivered the lecture (online) on "Illustrations on the usage of Deep learning on wireless communication applications" during the special session on Machine Learning , Deep learning and Computational intelligence 2021 (MDCWC 2021), 10th IEEE Conference on Information and Automation for sustainability on 12th August 2021
  - Delivered online invited talk on "Dimensionality reduction techniques for Healthcare Applications", during FDP on Artificial Intelligence in Revolutionizing Healthcare on 23rd July 2021, sponsored by AICTE Training And Learning (ATAL) Academy, Government of India
  - Delivered online invited talk on "Tips on Technical writing", during KARYASHALA, High-End Workshop, "Methods and Tools for Effective Dissemination of Research Ideas and Findings" on 20th June 2021
  - Delivered online invited talk on "Digital speech processing" and "DFT and its applications" during FDTP on Discrete time signal processing on 1-06-2021 and 2-6-2021 respectively.
- Speaker for the IEEE Training school in Machine learning for wireless communication, TOMSK Polytechnic University (24 to 26 March 2021), Russia.[MLFWC](#)
- Delivered Online Lecture on "Linear regression and dimensionality reduction techniques for Biomedical pattern recognition" as the part of Short term course on "Advancements in Signal

Processing and Artificial Intelligence in Healthcare, on 16th Feb 2021 during 5.00 to 6.30 P.M., funded by SERB, Government of India, Organized by IIIT,Kancheepuram.

- Delivered online lecture on "Fuzzy clustering and Pattern recognition in Computer Science" on 31st December 2020 during 2.00 to 3.30 P.M., organized by ATAL Academy, Government of India
- Delivered online lecture on (a) Introduction to Data Science (b) Machine Learning and Deep learning for ATAL Academy, Government of India on 2nd November 2020 between 10.30 to 1.30 P.M.
- Delivered Guest lecture during SPARC sponsored workshop "Emerging technologies on 5G Communications" on 12th Feb 2020
- Delivered Guest lecture at "[World Standards Day 2019](#) ", Organized by Bureau of Indian Standards, Southern regional office, on 14th October 2019

## Recognitions

- Received Best performer Award 2022, NIT, Tiruchirappalli (Government of India)
- Life Time Golden Achievement award 2021, by Bharat Rattan Publishing House.
- "Best citizens of India 2013" by the International publishing house.
- "Shiksha Rattan Puraskar Award", certificate of excellence by Dr. Bhisma Narain Singh, Former Governor Assam and Tamil Nadu at India International Centre, New Delhi on 9th Feb 2013
- "Glory of India Gold Medal" by presented by Shri Syed Sibtey Razi, Former Governor of Jharkhand, at India International Centre, New Delhi on 9th Feb 2013