KL (DEEMED TO BE UNIVERSITY)

KL ACCREDITED BY NAAC WITH A++ GRADE

CATEGORY 1 UNIVERSITY BY MHRD, Govt. of India

nirf 2024 NATIONAL INSTITUTIONAL RANKING FRAMEWORK RANKED 22 AMONG ALL UNIVERSITIES

44 YEARS OF EDUCATIONAL LEADERSHIP

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

APPLIED SIGNAL PROCESSING RESEARCH CENTRE (ASPRC)

APPLIED SIGNAL PROCESSING RESEARCH CENTRE (ASPRC)

Contents

Vision

Mission

Objectives of ASPRC

Research Areas

Faculty in research centre

Equipment details/ photo

Sponsored Projects Details

Prominent publications

Patents

Copyrights

Ph.Ds awarded and pursuing

Conferences

Books/ Book chapters

National and International collaborators

Research outcomes

VISION

- To evolve into a globally recognized Research Centre in the frontier areas of Applied Signal Processing Research.

MISSION

- To carry out quality having social and industrial relevance.
- To establish sophisticated laboratories under the excellence center in all the allied research domains of applied signal processing research to achieve 100% financial reliance through industrial consultancy and collaborations by promoting quality research.
- To pursue advanced research and development through creative and innovative efforts in terms of quality publications in applied signal processing research and allied technologies.

THE OBJECTIVES OF ASPRC

- The ASPRC lab aims to become a National Institute of Excellency in 5 years through global networking, high-standard Q1 publications, and conducting international conferences.
- To promote multidisciplinary research in the applied signal processing domain.
- To establish collaboration and netw orking with industry institutions.
- To enable researchers, engineers, and students to transform science and technology to build novel patents.

RESEARCH AREAS

- Advanced Submarine Target Motion Analysis.
- State of Art Submarine Target Motion Analysis.
- Ownship tactics under torpedo attack using speed constraint contact motion analysis.
- Submarine to submarine passive target tracking using deep neural Kalman filter.
- Performance Evaluation of All TMA Algorithms for BOT & Cal of MLA & SOA for Identified Zagging Targets.
- Est. of traj. for aerial target and dev. of end game alg. for manoeuvring of UAV.

  Bearings-only tracking using Hull mounted and Towed array measurements.

FACULTY IN RESEARCH CENTRE

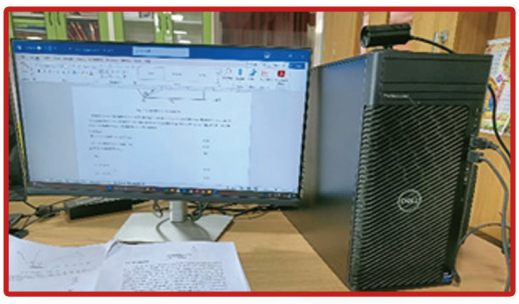
Dr. S Koteswara Rao,
Professor in ECE &
Former Scientist G, DRDO
Underwater Signal Processing
skrao@kluniversity.in

Dr. G V Subbarao,
Professor in ECE &
Professor Incharge - IRIC
Signal Processing for infrared imaging
gvs0raos@kluniversity.in

Dr. K S Ramesh,
Professor in ECE &
Signal Processing for Seismic
and atmospheric science
dr.ramesh@kluniversity.in

EQUIPMENT DETAILS/ PHOTO

1)HP Zbook Laptop



2) DELL Workstation Intel i9

SPONSORED PROJECTS DETAILS

S.no	Sponsored Project Title	File Number	Sanctioned Year	Completed Year	Amount in Lakhs
1	Advanced Submarine Target Motion Analysis	NRB-362/ SSB/15-16	2015	2018	18,76,500/-
2	Application of advanced statistical signal processing algorithms for earthquake precursors using GPS	MoES/P.O. (Seismo)/1 (310)/2016	2017	2019	5,00,000/-
3	Bearings-only tracking using Hull mounted and Towed array measurements	SR/WOS-A/ET-139/2017 (G)	2018	2019	6,68,000/-
4	State of Art Submarine Target Motion Analysis	NRB-452/ SSB/2019-20	2019	2022	26,96,700/-
5	Ownship tactics under torpedo attack using speed constraint contact motion analysis	CARS/2019	2019	2021	9,98,000/-
6	Submarine to submarine passive target tracking using deep neural Kalman filter	NRB/ SSB/496/20222-23	2022	2025	31,60,000/-
7	PERFORMANCE EVAL. OF ALL TMA ALGO. FOR BOT & Cal. OF MLA & SOA FOR IDENTIFIED ZIGGING TARGETS	NSTL/ CARS/2022/05	2022	2024	36,48,000/-
8	Est. of traj. For aerial target and dev. Of end game alg. For manoeuvring of UAV	DYSL-AT/ RSQR/ AS/2022- 23/01	2022	2024	20,76,800/-

PROMINENT PUBLICATIONS

S.no	Authors	Title	Year	Source title
1	Naga Divya G.; Koteswara Rao S.	Stochastic analysis approach of extended H-infinity filter for state estimation in uncertain sea environment	2024	International Journal of System Assurance Engineering and Management
2	Lakshmi M.K. Rao S.K. Subrahmanyam K.	Prediction of target state using angles-only ensemble Kalman filter	2024	International Journal of System Assurance Engineering and Management
3	Jahan K.; Koteswara Rao S.; Naga Divya G.	State Vector Fusion for Passive Underwater Tracking Using Two Sensor Arrays	2023	IETE Journal of Research
4	Uwigize P. ,Rao S.,K. Divya G.N.	Application of Kalman filter for radar target tracking.	2023	Journal of Physics: Conference Series
5	Koteswara Rao S.; Kavitha Lakshmi M.; Jahan K.; Naga Divya G.; Omkar Lakshmi Jagan B.	Acceptance Criteria of Bearings-only Passive Target Tracking Solution	2023	IETE Journal of Research
6	Rao S.K.; Omkar Lakshmi Jagan B.	Passive Target Tracking in Underwater Environment using Bearing and Frequency Measurements	2022	Oceans Conference Record (IEEE)

PROMINENT PUBLICATIONS

7	Omkar Lakshmi Jagan B.; Koteswara Rao S.; Kavitha Lakshmi M.	Underwater target tracking in three-dimensional environment using intelligent sensor technique	2022	International Journal of Pervasive Computing and Communications
8	Rao S.K.; Divya G.N.	Underwater State Estimation using Bearings only Measurements with an Emphasis on Sonar	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021
9	Rao S.K.; Jahan K.	Multi-Sensor Measurements Fusion for Passive Target Tracking in Underwater	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021
10	Srimukhi J.; Rao S.K.; Bhagya Sri E.; Lakshmi M.K.	Performance Evaluation of Non-Linear State Estimation Filter in Presence of Non-Gaussian Underwater Environment	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021
11	Kavitha Lakshmi M.; Koteswara Rao S.; Subrahmanyam K.	Pervasive underwater passive target tracking for the computation of standard deviation solution in a 3D environment	2021	International Journal of Intelligent Computing and Cybernetics
12	Jagan B.O.L.; Rao S.K.; Jahan K.	Unscented particle filter approach for underwater target tracking	2021	International Journal of e-Collaboration

PROMINENT PUBLICATIONS

13	Rao S.K.; Jahan K.	The Fusion of Bearing and Frequency Measurements from Multi-sensor Arrays for Underwater Target Tracking	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021
14	Kiran K.U.; Rao S.K.; Ramesh K.S.	Adaptive and Reliable GPS Uncertain Position Estimation Insightful Oceanography and Geography Applications	2022	International Journal of Communication Networks and Information Security
15	Rao S.K.; Kavitha Lakshmi M.; Ghosh A.	Neural Extended/Unscented Kalman Filter for Submarine Passive Target Tracking	2022	Oceans Conference Record (IEEE)
16	Omkar Lakshmi Jagan B.; Koteswara Rao S.	Measure of nonlinearity for underwater target tracking using hull-mounted sensor	2022	International Journal of Intelligent Computing and Cybernetics
17	Lakshmi K.; Rao S.K.; Subrahmanyam K.	Uncertainty zone estimation of angles only tracking in undersea environment	2022	Optik
18	Koteswara Rao S.	Bearings-only Passive Target Tracking: Range Uncertainty Ellipse Zone	2022	IETE Journal of Research
19	Naga Divya G.; Koteswara Rao S.	Prevalence of shifted Rayleigh filter for passive surveillance in underwater	2022	International Journal of Intelligent Computing and Cybernetics

PROMINENT PUBLICATIONS

20	Kavitha Lakshmi M.; Koteswara Rao S.; Subrahmanyam K.	Shifted Rayleigh filter: a novel estimation filtering algorithm for pervasive underwater passive target tracking for computation in 3D by bearing and elevation measurements	2022	International Journal of Pervasive Computing and Communications
21	Kumari T.S.; Koteswararao S.; Prabha I.S.	A Compendious Analysis of Feature Extraction Algorithms to Frame Fusion Rules	2022	International Journal of Computing and Digital Systems
22	Divya G.N.; Koteswara Rao S.	Implementation of ensemble Kalman filter algorithm for underwater target tracking	2022	Journal of Control and Decision
23	Rao S.K.; Lakshmi M.K.; Bhanu Prakash B.; Sai Ananth T.; Kumar R.Y.	Neural Unscented Kalman Filter for Submarine Active Target Tracking	2022	Oceans Conference Record (IEEE)
24	Divya G.N.; Rao S.K.	Application of cubature information filter for underwater target path estimation	2021	Pertanika Journal of Science and Technology
25	Naga Divya G.; Koteswara Rao S.	Application of sigma point particle filter method for passive state estimation in underwater	2021	Defence Science Journal

PROMINENT PUBLICATIONS

26	Rao S.K.; Divya G.N.	Underwater State Estimation using Bearings only Measurements with an Emphasis on Sonar	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021
27	Koteswara Rao S.	Bearings-Only Tracking: Observer Maneuver Recommendation	2021	IETE Journal of Research
28	Lakshmi K.M.; Rao K.S.; Kodukula S.	Three-Dimensional Submarine-to-Submarine Passive Target Tracking in the Presence of Non-Gaussian Noises	2021	International Journal of e-Collaboration
29	Rao S.K.; Jahan K.	Multi-Sensor Measurements Fusion for Passive Target Tracking in Underwater	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021
30	Srimukhi J.; Rao S.K.; Bhagya Sri E.; Lakshmi M.K.	Performance Evaluation of Non-Linear State Estimation Filter in Presence of Non Gaussian Underwater Environment	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021

PROMINENT PUBLICATIONS

31	Charitha N.; Rao S.K.; Diva G.N.	Design of UAE shaped microstrip patch environment safe antenna for ultra-wide band applications	AE	Journal of Green Engineering
32	Kavitha Lakshmi M.; Koteswara Rao S.; Subrahmanyam K.	Pervasive underwater passive target tracking for the computation of standard deviation solution in a 3D environment	2021	International Journal of Intelligent Computing and Cybernetics
33	Jagan B.O.L.; Rao S.K.; Jahan K.	Unscented particle filter approach for underwater target tracking	2021	International Journal of e-Collaboration
34	Rao S.K.; Jahan K.	The Fusion of Bearing and Frequency Measurements from Multi-sensor Arrays for Underwater Target Tracking	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021
35	Rajyalakshmi U.; Satya Prasad K.; Koteswara Rao S.	Shape and Texture Features Extraction Using Segmented Histopathological Images	2021	Lecture Notes on Data Engineering and Communications Technologies
36	Rao S.K.; Jahan K.	Application of AUV to Track a Maneuvering	2021	Lecture Notes in Networks and Systems

PROMINENT PUBLICATIONS

37	Jahan K.; Rao S.K.	Measure of Nonlinearity with Application to Bearings-Only Target Tracking	2021	International Journal of e-Collaboration
38	Divya K.S.; Rao S.K. Ramesh K.S.; Divya G.N.	Application of Particle Filter for Passive Underwater Bearing Only Tracking	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021
39	Divya K.S.; Ramesh K.S.; Rao S.K.; Naga Divya G.	Underwater Object Tracking using Unscented Kalman Filter	2021	Proceedings - 2021 3rd International Conference on Advances in Computing, Communication Control and Networking, ICAC3N 2021
40	Sowmya K.; Gautham C.H.; Reddy K.R.; Rao S.K.; Lakshmi M.K.	3d underwater environment passive target tracking with bearing and elevation measurements	2020	Journal of Green Engineering
41	Vineesha A.; Sudha Sri V.; Parimala V.; Ramesh K.S.; Rao S.K.	Analysis of seismic signals and estimation of power spectrum using Blackman turky method	2020	International Journal of Scientific and Technology Research
42	Ziddi M.G.S.M.; Nagendra K.G.; Sumanth K.; Ramesh K.S.; Rao S.K.	Improved particle filtering algorithm for underwater target tracking using bearing and frequency measurements	2020	Journal of Green Engineering
43	Teku S.K.; Sanagapallea K.R.; Inty S.P.	A two-stage processing approach for contrast intensified image fusion	2020	World Journal of Engineering

PROMINENT PUBLICATIONS

44	Jahan K.; Sanagapallea K.R.	Fusion of angle measurements from hull mounted and towed array sensors	2020	Information (Switzerland)
45	Jyosthna B.; Hemambica P.; Radhika B.N.; Rao S.K.; Lakshmi M.K.	Passive acoustic underwater environment target tracking using angles only measurements for auv	2020	Journal of Green Engineering
46	Kurada P.; Maruvada S.; Sanagapallea K.R.	Speech bandwidth extension using DWTFFT-based data hiding	2020	Radio engineering
47	Sri Mukhi J.; Krishna E.S.S.Y.; Jayanth G.; Rao S.K.; Lakshmi M.K.	Implementation of cubature kalman filter in 3d passive underwater environment target tracking	2020	Journal of Green Engineering
48	Sai Divya K.; Ramesh K.S.; Koteswara Rao S.; Naga Divya G.	Object tracking using bearings-only measurements with observer maneuver	2020	Journal of Green Engineering
49	Koteswara R.S.; Jahan K.; Kavitha L.M.	Implementation of Unscented Kalman Filter to Autonomous Aerial Vehicle for Target Tracking	2020	Proceedings - 2020 IEEE India Council International Subsections Conference, INDISCON 2020
50	Uday Kiran K.; Koteswara Rao S.; Ramesh K.S.	Precise positioning of GPSTEC using statistical signal processing algorithms for environmental space weather monitoring	2020	Journal of Green Engineering

PATENTS

S.No	Title of Patent	Employee Role	Collaboration Body	Granted/published date
1	A system and method of estimating target submarine's range, course and speed using doppler frequency and bearing measurements	Inventor	DRDO	30/06/2020
2	Target tracking using Bearing only measurements	Inventor	DRDO	30/04/2023
3	Adaptive Passive Target Tracking from Submarine to Submarine Using Doppler Frequency and Bearing Measurements.	Inventor	DRDO	12/12/2023
4	Autonomous Underwater vehicle to submarine target tracking using bearing and elevation measurements.	inventor	DRDO	14/03/2023
5	Method and system for Estimating motion parameters(TMP) of a target using bearings measurements.	Inventor	DRDO	23/02/2024
6	A Method and system for Estimating Errors in motion parameters(TMP) of a target using bearings measurements.	Inventor	DRDO	23/02/2024
7	A System and method of estimating target vehicle's range, course and speed using dopplers frequency and bearing measurements.	Inventor	DRDO	25/06/2024
8	A Solar Cooker Based on Coupled Solar Parabolic Concentrator and Fresnel Lens with Tracking System	Co-Inventor	KLEF	10/01/2023
9	A Solar- Wind Hybrid Energy Tree	Co-Inventor	KLEF	31/08/2023
10	An IoT Based Autonomous Self Powered PV Panel Cleaner Robot	Co-Inventor	KLEF	02/03/2023
11	A Novel Vertical Axis Wind Turbine Suitable for Low Wind Speed Region	Co-Inventor	KLEF	02/03/2023

COPYRIGHTS

S.No	Title of Copyright	Employee Role	Collaboration Body	Granted/ published date
1	Submarine to Submarine Passive Target Tracking in Severe Noisy Sea Environment.	Author	KLEF	14/03/2023
2	Autonomous Underwater Vehicle to Submarine Target Tracking Using Bearing and Elevation Measurements.	Author	KLEF	14/03/2023
3	Adaptive Passive Target Tracking from Submarine TO Submarine using DOPPLER FREQUENCY AND Bearing Measurements	Author	KLEF	12/12/2023

Ph.Ds AWARDED

S.no	Scholar Name	Scholar ID	Research Area	Affiliation Institution
1	Kausar Jahan	15304027	SPRG	KLEF
2	B Omkar Lakshmi Jagan	163060023	SPRG	KLEF
3	G Naga Divya	173040008	SPRG	KLEF
4	Matta Kavitha Lakshmi	163030080	SPRG	KLEF
5	Dr Sonu Kumar	2103040001	SPRG	KLEF
6	A. Sampath Dakshina Murthy	15304031	SPRG	KLEF
7	Lavanya M	15304002	SPRG	KLEF
8	Noonepali Haripriya	2300367	SPRG	KLEF

CONFERENCES

S.no	Title of the paper	Conference Name	Publisher Name	Impact Factor
1	Breast Cancer Cell-Nuclei Extraction Using Modified Multi-Phase Level Sets	2nd International Conference on Intelligent Computing and Control Systems, ICICCS 2018	IEEE Xplore	0.2
2	Application of total least squares version of ESPRIT algorithm for seismic signal processing	Advances in Intelligent Systems and Computing	Springer	0.5
3	Design of a Robust Estimator for Submarine Tracking in Complex Environments	Lecture Notes in Electrical Engineering	Springer	0.134
4	Application of parametric methods for earthquake precursors using GPS TEC	Advances in Intelligent Systems and Computing	Springer	0.174
5	Application of least squares algorithm for precise GPS receiver positioning	Advances in Intelligent Systems and Computing	Springer	0.174
6	Comparitive study on wind forecasting models for day ahead power markets	IEEE International Conference on Signal Processing, Informatics, Communication and Energy Systems, SPICES 2017	IEEE Xplore	0
7	Supervised classification of breast cancer malignancy using integrated modified marker-controlled watershed approach	7th IEEE International Advanced Computing Conference, IACC 2017	IEEE Xplore	0
8	Combination of Pseudo Linear Estimator and modified gain bearings-only extended Kalman filter for passive target tracking in abnormal conditions	2013 Ocean Electronics (SYMPOL)	IEEE Xplore	0

BOOKS/ BOOK CHAPTERS

S.no	Title	Books/ Chapter	Publisher Name	ISBN-Number	Published date
1	Battery Management System for Electric Vehicles	books	Iterative International Publishers	978-93-5747-041-4	2023-06-14
2	Biomass Power Generation Systems	books	Iterative International Publishers	978-93-5747-069-8	2023-08-31
3	Energy Storage Systems in Microgrids Operation	chapter	Routledge - Publisher of Professional & Academic Books	9781032565767	2023-12-23
4	Intelligent Data Collection Devices in Smart Grid	chapter	Springer Nature Switzerland AG	978-3-031-46091-3	2023-11-30
5	Machine Learning Applications for the Smart Grid Infrastructure	chapter	Springer Nature Switzerland AG	978-3-031-46091-3	2023-11-30
6	Modelling AC-DC Microgrid	chapter	Routledge - Publisher of Professional & Academic Books	9781032565767	2023-12-23
7	Passive Underwater Target Tracking using Bearings-only Measurements: Tracking of underwater vehicles	books	LAP LAMBERT Academic Publishing	978-3659157592	2012-06-26
8	Smart Grid Management for Smart City Infrastructure Using Wearable Sensors	chapter	Springer Nature Switzerland AG	978-3-031-46091-3	2023-11-30
9	Solar-Wind Hybrid System	books	IIP Iterative International Publishers	978-81-960632-1-4	2023-01-10

RESEARCH OUTCOMES

- ✓ Sophisticated statistical methods were created to analyze signals for DRDO.
- ✓ Developed software to track submarines and targets by employing advanced estimation techniques like the Extended Kalman filter, Unscented Kalman filter, and potentially a Modified gain Kalman filter. This software included a simulator that mimicked real-world sonar measurements, implemented in both MATLAB and Python for flexibility.
- ✓ This software can be used to monitor underwater activities and enhance submarine detection and tracking capabilities, aiding in strategic planning during tactical operations.
- ✓ This software will effectively filter out noise to accurately detect and track targets and tracking algorithm is robust enough to handle such unpredictable movements by the target.
- ✓ Research papers and patents were filed as a result of these projects.

NATIONAL AND INTERNATIONAL COLLABORATORS

1. NAVAL SCIENCE AND TECHNOLOGICAL LABORATORY (NSTL)

2. DEFENCE RESEARCH AND DEVELOPMENT ORGANIZATION (DRDO)

3. DRDO YOUNG SCIENTIST LABORATORY (DYSL - AT)

(DEEMED TO BE UNIVERSITY)

KL ACCREDITED BY NAAC WITH A++ GRADE

CATEGORY 1 UNIVERSITY BY MHRD, Govt. of India

nirf 2024 NATIONAL INSTITUTIONAL RANKING FRAMEWORK

RANKED 22 AMONG ALL UNIVERSITIES

44 YEARS OF EDUCATIONAL LEADERSHIP