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SAHRDAYA College of Engineering & Technology

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Volume 3

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- Collaborate with academia and industry around the globe, to strengthen the education and research ecosystem.
- Practice and promote high standards of professional ethics, good discipline, high integrity and social accountability with a passion for holistic excellence.

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SAHRDAYA
College of Engineering & Technology

RESEARCH BULLETIN

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1. SCI/SCOPUS INDEXED JOURNAL PAPERS PUBLISHED BY THE FACULTY IN 2022-23

A. Department of Biomedical Engineering (BME)

1. **Remya George, Reshma Jose, Meenakshy K, Jarin T, Senthil Kumar S.** (2023). Effects of long-term exercise training on physiological signal and personality traits in women in law enforcement. *Journal of Intelligent & Fuzzy Systems*, *44*(1), 1085-1097. (Scopus)

Abstract: *Law enforcement teams across the globe experience the highest occupational stress and stress-related diseases. Physical exercise and an active lifestyle are recommended as part of their profession to equip them to fight stress and related health adversities. The research is carried out using objective measures of Heart Rate Variability (HRV), Electro Dermal Activity (EDA), Heart Rate Recovery (HRR), and subjective questionnaires. HRV was generated with an electrocardiogram (ECG) signal acquired using NI myRIO 1900 interfaced with the Vernier EKG sensor. HRR was acquired with the help of a Polar chest strap exercise heart rate monitor and EDA acquisition was carried out with Mindfield E-Sense electrodes. Then statistical features are extracted from the collected data, and feed to the AQCNN (Aquila convolution neural network) classifier to predict the stress. Signal analyses were done in Kubios 4.0, Ledalab V3.x in a MATLAB environment. The results pointed out that exercise training is effective in increasing the vagal tone of the Autonomic Nervous System (ANS) and hence improves the recovery potential of the cardiovascular system from stress. The proposed AQCNN method improves the accuracy by 95.12% which is better than 93.13%, 85.36% and 80.13% from Statistical technique, CNN and ML-SVM respectively. The findings have the potential to influence decision-making in the*

selection and training of recruits in high-stress positions, hence optimizing the cost and time of training by identifying maladaptive recruits early.

B. Department of Biotechnology (BT)

1. **Leon Ittiachen**, & Babu, S. M. (2023). Evaluation of Antibacterial activity of Biosynthesized Silver nanoparticles coated Low Density Polyethylene films *Materials Today: Proceedings,* 80 (3), 2133-2137 (Scopus)

Abstract: *Silver nanoparticles are known to have antimicrobial properties. In the present paper, antibacterial activity of biosynthesized silver nanoparticles coated on low density polyethylene films was evaluated against Escherichia coli as the representative organism. Silver nanoparticles were biosynthesized using banana peel extract as the reducing agent and characterized by means of UV–Visible spectroscopy, Scanning Electron Microscopy and Energy Dispersive X-ray analyses. Formation of silver nanoparticles was confirmed by the Surface Plasmon Resonance spectrum with absorption maxima at 431 nm. Particles were seen to be highly polydispersed with the average size in the range of 50–390 nm. Presence of elemental silver was confirmed by the Energy dispersive X-ray spectroscopy analysis. Biosynthesized silver nanoparticles showed excellent antibacterial activity against Escherichia coli in the agar well diffusion test, with the zone of inhibition diameter measuring 19 mm. The silver nanoparticle coated low density polyethylene film was prepared successfully and our antimicrobial studies revealed that the coated films declined the growth profile of bacteria starting from the log phase. Hence biosynthesized silver nanoparticles incorporated low density polyethylene films can be suggested as an active packaging material for food packaging after further characterization and migration studies.*

2. **Amitha Joy, Febin Seethi V., Marria C. Cyriac, Jasmin Habeeb, Sunisha Sudhakaran & Shaheen Shah** (2023). Modelling of AgrA inhibitors to combat anti-microbial resistance in *Staphylococcus aureus. Journal of Biomolecular Structure and Dynamics 16*, 1-8.(SCIE)

Abstract: *Staphylococcus aureus is a Gram-positive bacterium found on human skin that causes skin and soft tissue infections, as well as pneumonia, osteomyelitis, and endocarditis. The prevalence of antibiotic resistant strains has made the treatments less effective. An efficient alternate method for battling these contagious diseases is anti-virulence strategy. The AgrA protein, a key activator of Accessory Gene Regulator system in S. aureus, is vital to the virulence of the organism and, consequently, its pathogenesis. Using a Machine Learning algorithm, the Support Vector Machine (SVM), and a ligand-based pharmacophore modelling method, prediction models of AgrA inhibitors were developed. The metrics of the SVM model were inadequate, hence it was not used for virtual screening. For ligand-based pharmacophore modelling, 14 of 29 compounds were removed from the active set due to a lack of shared pharmacophore properties, and 504 compounds were designated as decoys. A 3D pharmacophore model was created using LigandScout 4.4.5, with a fit score of 57.48, including a positive ionizable group, one hydrogen bond donor, and three hydrogen bond acceptors. The model after further validation was used to virtually screen an external database which resulted in six hits. These compounds were docked with the AgrA domain crystal structure to determine the inhibitor activity. Further, each docked complex was subjected to a 100 ns molecular dynamics simulation. CID238 and CID20510252 demonstrated potent inhibitory binding interactions and hence can be used to develop AgrA inhibitors in future after proper validation.*

3. **Nivya R. M., and Amitha Joy.** (2023). In silico discovery of novel calcineurin inhibitors using ligand-based 3- D pharmacophore modelling and Molecular Dynamics Simulation. *Journal of Biomolecular Structure and Dynamics 16*, 1-8. (SCIE)

Abstract: *Calcineurin is a serine-threonine protein phosphatase that is activated with the binding of calmodulin in the presence of increased calcium concentration and has a major role in various signaling pathways. Its role in regulating homeostasis, developmental processes, and different disease progression has already been reported. The dysregulated Ca2þ/calcineurin/NFAT1-4 pathway is observed in Autoimmune disorders and hence the use of Calcineurin inhibitors like Cyclosporin A (CsA) and Tacrolimus (FK506) is widely done in such cases. Recent studies indicate the uncontrolled overexpression of the Calcineurin protein in the pathophysiological pathway of neurodegenerative diseases. The in vitro and animal model studies with standard calcineurin inhibitors (CnIs), which are widely labeled as immunosuppressant drugs, have shown a significant reduction of neurodegeneration in respective models. These results compel the identification of novel calcineurin inhibitors against neurodegenerative diseases. With this scenario, the present work focuses on the computer-aided identification of novel CnIs via ligand-based 3-D pharmacophore modeling. Known CnIs, CsA, and FK506, were used to build the pharmacophore models which were validated and screened against external databases to retrieve possible hits. Docking investigations, pharmacokinetic properties, and molecular dynamics simulations along with toxicity predictions were performed on the hits that were obtained. According to the study, a total of 5 molecules ILB 162, ILB 005, ILB 439, ILB 390, and ILB 198, were found to be the best calcineurin inhibitors with binding affinity in the range of −9.7 to −9.0 Kcal/mol with 1MF8 (PDB). The stability of interactions of these molecules was further validated via Molecular dynamics*

simulation studies to confirm these to be the potential calcineurin-inhibiting molecules.

C. Department of Computer Science Engineering (CSE)

1. **J. Krishnadass, C. Narmatha, P. Manimegalai, Prajoona Valsalan, S. Manimurugan & Mohammed Mustafa** (2023). Ovarian Cysts Classification using Novel Deep Reinforcement Learning with Harris Hawks Optimization Method. *The Journal of Supercomputing*, *79*(2), 1374-1397. (SCI)

Abstract: *Ovaries are important parts of the female reproductive system because they produce the egg or ovum needed for fertilization. Cysts frequently impact female follicles, so torsion, infertility, and cancer can result from an enormous ovarian cyst. As a result, this is critical to get a diagnosis as quickly as feasible an ultrasound examination is performed to diagnose an ovarian cyst. So, this work gathered ultrasound images of different women's ovaries and determined whether or not an ovarian cyst was detected. This work proposed a novel technique to detect the ovarian cyst using images of ovarian ultrasound cysts from an ongoing database. Initially pre-processed by removing noise, followed by feature extraction, and finally classifying using new deep reinforcement learning with Harris Hawks Optimization (HHO) classifier. Automatic feature extraction is implemented using the recent popular convolutional neural network (CNN) technique that extracts image features as conditions in the reinforcement learning algorithm. Deep Q-Network (DQN) is generated to train a Q-network and detect the disease, and the swarm-based method of HHO utilizes the optimization method to produce optimal hyperparameters in the DQN model known as HHO-DQN. Extensive experimental evaluations on datasets show that the*

proposed HHO- DQN approach outperforms existing active learning approaches for ovarian cyst classification.

2. **Divya Radhakrishnan, Dinesh Peter James** (2022). Eye-Tact: An ensemble-based multi-model and multidimensional approach for fall prediction and evaluation in Parkinson's Disease patients, *Expert Systems*, e13182 (SCI)

Abstract: *Artificial Intelligence (AI), as a mainstream science today, has the potential to significantly improve human wellbeing and wellness. An automated caretaking system is being developed in this study to enable constant monitoring of people without requiring much human intervention. To do so, we must take into account a wide range of people's movements and varied perspectives in real-time contexts. The proposed system, coined "Eye-Tact", integrates a vision-based multimodel architecture with wearable sensors to identify poses and detect falls. For people with Parkinson's disease (PD), this patient-specific, vision-based keypoint analysis model has been successfully deployed for person identification and aberrant activity recognition. The proposed Multi Model Ensemble Technique (MMET) employs a variety of sensors to acquire data on physiological and other parameters that are necessary for fall prediction and evaluation. The measures used in the proposed system are precision, recall, F1 score and support. The above mentioned parameters are used to evaluate the performance of different models, including XGBoostClassifier, CatBoostClassifier, and RandomForestClassifier. The results reveal that the RantomForestClassifier outperforms other types of classifiers with 97% of accuracy. The proposed work demonstrates its capacity to develop a system that carefully understands and analyses heterogeneous data cautiously using state-of-the-art technologies.*

3. **Priya, K. V., and J. Dinesh Peter** (2023). Enhanced Defensive Model Using CNN against Adversarial Attacks for Medical Education through Human-Computer Interaction, *International Journal of Human-Computer Interaction*, 1-13 (SCI)

Abstract: *The design of human-machine interfaces is more precise and demanding in the medical and healthcare industries. Medical monitoring equipment demands more consistent and effective interpretation, as well as fast and straightforward operation due to its monitoring and reference functions. Consequently, it is crucial to consider how people interact with computers when designing the interface for medical monitoring devices. Nowadays people are giving more importance to health than anything in the world. Therefore, as it is related to peoples' safety, the architecture of human-computer communication must be carefully considered in the studies and development of high-end medical equipment. The price of training physicians and other medical professionals is rising dramatically. Most of the countries have stepped forward from the traditional medical teaching system to a more human computer interactive teaching and learning environment with innovative technologies. This article focuses on the related researches, existing HCI applications for healthcare and the application of deep neural network for disease classification. The proposed work is to develop a healthcare learning platform to offer healthcare education to both medical practitioners and also for common people. This can be implemented as Mobile apps using human-computer interface technology and also as a website with Artificial Intelligence and Machine Learning Techniques. This proposal's primary goal is to provide anytime, everywhere access to healthcare education for*

physiological and medical teaching courses, consequently advancing national health care.

D. Department of Electronics and Communication Engineering (ECE)

1. **Ambily Francis, Immanuel Alex Pandian, and J. Anitha.** (2022). A boon to aged society: Early diagnosis of Alzheimer's disease–An opinion. *Frontiers in Public Health,* 10, 1076472 (SCI)

Abstract: *Alzheimer's disease is a highly terrible condition for both the victims and their loved ones to endure. It is a degenerative neurological condition that steadily worsens until the patient is no longer able to do daily tasks. Even though there is no complete cure for the illness, several medications can slow its progression. Therefore, the computer-based early diagnosis of Alzheimer's disease from magnetic resonance images is a blessing for the affected individuals and their loved ones. After the age of 60, every person's brain, notably the ventricles and hippocampus, begins to shrink. But, for some unknown reasons, the shrinking rate will be higher for some people. In this context, the four cognitive stages of the human brain are: cognitively normal (CN), mild cognitive impairment convertible (MCIc), mild cognitive impairment non- convertible (MCInc), and Alzheimer's disease (AD). The stages are differentiated in terms of the shrinkage rate of the hippocampus and ventricle. The mild cognitive impairment non-convertible stage refers to the normal aging stage. In this stage memory problems due to normal aging can be identified. However, Alzheimer's disease will never develop from this stage. The early stage of Alzheimer's disease with a significant rate of brain shrinking is known as the moderate cognitive impairment convertible stage. The patients with mild cognitive impairment convertible stage will become Alzheimer's patients within years. In the field of early detection of*

AD, many algorithms address the classification of AD and CN. However, if the system accurately distinguishes between MCIc and MCInc, early detection of AD can be asserted. So the classification between MCIc and MCInc deserves more attention in this field. The work analyses the algorithms for binary classifications of MCIc vs MCInc and AD vs CN.

2. **Ambily Francis and Immanuel Alex Pandian.** (2023). Ensemble learning approach for multi-class classification of Alzheimer's stages using magnetic resonance imaging. *TELKOMNIKA (Telecommunication Computing Electronics and Control)* , 21 (2), 374-381. (Scopus)

Abstract: *Alzheimer's disease (AD) is a gradually progressing neurodegenerative irreversible disorder. Mild cognitive impairment convertible (MCIc) is the clinical forerunner of AD. Precise diagnosis of MCIc is essential for effective treatments to reduce the progressing rate of the disease. The other cognitive states included in this study are mild cognitive impairment non-convertible (MCInc) and cognitively normal (CN). MCInc is a stage in which aged people suffer from memory problems, but the stage will not lead to AD. The classification between MCIc and MCInc is crucial for the early detection of AD. In this work, an algorithm is proposed which concatenates the output layers of Xception, InceptionV3, and MobileNet pre-trained models. The algorithm is tested on the baseline T1-weighted structural magnetic resonance imaging (MRI) images obtained from Alzheimer's disease neuroimaging initiative database. The proposed algorithm provided multi-class classification accuracy of 85%. Also, the proposed algorithm gave an accuracy of 85% for classifying MCIc vs MCInc, an accuracy of 94% for classifying AD vs CN, and an accuracy of 92% for classifying MCIc vs CN. The results exhibit that the proposed algorithm outruns*

other state-of-the-art methods for the multi-class classification and classification between MCIc and MCInc.

3. **Binet Rose Devassy, Jobin K Antony** (2023). Histopathological image classification using CNN with squeeze and excitation networks based on hybrid squeezing. S*ignal, Image and Video Processing* , 17, 3613-3621. (Scopus, SCIE)

Abstract: *Histopathological image analysis of biopsy sample is the most reliable method for the detection and diagnosis of cancer. Automation in histopathological image analysis will help the pathologists to confirm their remarks with a second judgment. The proposed framework employs a CNN model with squeeze and excitation (SE) module based on hybrid squeezing method. In this approach, two levels of squeezing are provided for the feature maps using color-based spatial squeezing and channel-wise pooling. This squeezed weight adaptively scales each channel by boosting meaningful feature maps and diminishing less important features. The proposed CNN model is tested for the classification of histopathological images using Camelyon 16 and BreaKHis dataset. The experiments were conducted in four phases such as (i) CNN model without squeeze and excitation module (ii) CNN model with only channel pooling method (iii) CNN model with color-based spatial squeezing method (iv) CNN model with color-based spatial squeezing and channel pooling SE block. From the experimental results, the proposed model confirms better performance for histopathological image classification in terms of accuracy, precision, recall, F1 score and ROC. The computational load of the proposed model is also evaluated against regular CNN without SENet for obtaining the same evaluation metrics. The result shows the proposed model contributes 35% reduction in computational load in terms of trainable parameters. The performance of the proposed model is*

compared with state-of-the-art CNN methods and it is proved that the proposed model outperforms well in terms of evaluation metrics with very few numbers of model parameters.

4. **Sebastian, J., Gnana King, G.R.** (2023). A Novel MRI and PET Image Fusion in the NSST Domain Using YUV Color Space Based on Convolutional Neural Networks. *Wireless Personal Communications* , 131, 2295-2301. (SCI)

Abstract: *Medical image fusion techniques combine medical images from various modalities to enhance the accuracy and reliability of medical diagnoses, and they are becoming increasingly significant in a variety of clinical applications. A novel CNN-based MRI and PET image fusion in the NSST domain is proposed in this research. The PET image is first converted to YUV color space. Then, the MRI and the Y component of the PET are fed to CNN to produce a weight map. The obtained weight map and the MRI and Y component of PET are decomposed using NSST. The decomposed bands are then merged based on local similarity-based fusion criteria. By applying inverse NSST, the fused image is produced. The original U and V components are combined with the fused image to get the result. The objective analysis and visual quality assessment proved that the results obtained are superior to those obtained by conventional fusion algorithms.*

2. PATENTS FILED/ PUBLISHED/ GRANTED

Name of Patentee	Title	Patent Reg No:	Published/Granted
Dr. Vishnu Rajan	Portable Automatic Accident Detection and Emergency Response system	202341039885	Filed

Abstract: *Accidents are one of the common features in human life experience. But the horrifying aftereffects of this are a large number of injured and permanently disabled people worldwide. Mostly we use the manual observation technique which is employed in the traffic management center to spot crashes. Although manual observation is often reliable, it has significant disadvantages. Therefore, it is necessary to create systems for automatically identifying and evaluating traffic events. This is done using the implementation of machine learning and AI object detection using Raspberry pi, which is used to program all the required algorithms. The demo board is fed a variety of accident surveillance footage as input, and during an event the system would alert the nearby emergency service.*

3. PUBLICATIONS IN BOOKS AND BOOK CHAPTERS

Book Chapters

1. **Gnana King G R.** (2022). Medical Tourism and Internet of Things. In Big Data Analytics for Business Intelligence: Descriptive Case Studies on Smart Tourism in India. E-ISBN :978-81-950884-0-9(p.165) Shanlax Publications.
2. **Dr. Vishnu Rajan, Ambily Francis** (2022). Implementation of Deep Learning Approaches for Early Detection of Parkinson's Disease From MRI Images. In Advancement, Opportunities, and Practices in Telehealth Technology. DOI: 10.4018/978-1-6684-5231-8.ch010(p. 187-197) IGI Global
3. **Gnana King G R.** (2023). Intelligent 5G Networks and Augmented Virtual Reality in Smart Transportation. In Artificial Intelligence in Cyber-Physical Systems Principles and Applications. ISBN 9781032164830 (p.95-104) Taylor and Francis.
4. **Sreetha E S** (2022).Comparative Study on Recognition of Food item from Images for Analyzing the Nutritional Contents. In Disruptive Technologies for Big Data and Cloud Applications. ISBN: 978-981-19-2177-3 (pp 269–276) Springer.

4. PUBLICATION IN CONFERENCE PROCEEDINGS

1. **Ms.Marria C Cyriac**, “In silico molecular docking and MD simulation analysis of flavonoids as potential inhibitors of SARS CoV-2” Proceedings of International Conference on Advances in Biosciences and Biotechnology 2022

International Conference on Advances in Biosciences and Biotechnology 2022 "ISSN:2278-9197"

2. **Dr. Ambii Mechoor**, "In silico studies of flavonoids as potential inhibitor of Rhizopus Delemar ", Proceedings of International Conference on Advances in Biosciences and Biotechnology 2022 International Conference on Advances in Biosciences and Biotechnology 2022, "ISSN:2278-9197 Vol:XI Special Issue-2022 Page:46"

3. **Dr. Amitha Joy,** "Virtual screening for identification of novel drug for Parkinson's Disease" Proceedings of International Conference on Advances in Biosciences and Biotechnology 2022, International Conference on Advances in Biosciences and Biotechnology 2022 "ISSN:2278-9197 Vol:XI Special Issue-2022 Page:54"

4. **Dr.Uma Krishnakumar** "Green Synthesized Nanoparticles as a Biofilter Media", Proceedings of International Conference on Advances in Biosciences and Biotechnology 2022, International Conference on Advances in Biosciences and Biotechnology 2022 , "ISSN:2278-9197 Vol:XI Special Issue- Page:178"

5. **Ranimol, G.,** C. B. Devipriya, and Swetha Sunkar. "Docking and molecular dynamics simulation studies for the evaluation of laccase mediated biodegradation of triclosan." Conference BioSangam 2022, Emerging trends in Biotechnology (BIOSANGAM 2022).

6. Simon, Albin, Rinta Raju, M. P. Amitha, Mohammed Hashim**, Jibin Jose**, and **Remya George**. "TOYBOT: An Interactive exercise companion for rehabilitation of sedentary geriatric and obese children." 6th Conference on Information and Communication Technology (CICT), pp. 1-5. IEEE, 2022.

7. **Ms. Sreetha E S, "**An investigation on impact of malnutrition in human health and technique to evaluate the nutrient intake from the food image", IEEE International Power and Renewable Enrgy Conference(IPRECON) IEEE International Power and Renewable Enrgy Conference(IPRECON), International 16-18 December 2022, Electronic ISBN:978-1-6654-9175-4

8. **Ms. Deepa Devassy, "**Energy-Efficient Chicken Swarm Optimization Algorithm Using Multiple Cluster Head Selection In Wireless Sensor Networks", Third International Conference on Innovation in Science and Technology for Sustainable Development, August 2022 , DOI:10.1109/ICISTSD55159.2022.10009926

9. **Ms. Anly Antony M, Dr. R SatheeshKumar**, "A Comprehensive Review On Quality Prediction Of Fruits And Vegetables Using Feature Extraction And Machine Learning Techniques", Sixth International conference on electronics, Communication, Aerospace Technology, (ICECA2022), DOI:10.1109/ICECA55336.2022.10009478

10. **Ms. Priya K. V, "**Analysis of hydration estimation Strategies using Deep Learning", Sixth International conference on electronics, Communication, Aerospace Technology(ICECA2022), Electronic ISBN:978-1-6654-8271-4

11. **Anly Antony M, Dr. R Sundar, "**Stress Prediction using Enhanced feature selection and KNN model ", IEEE International Conference on Advanced computing and Communication Technologies for High Performance Applications(ACCTHPA 2023) , Electronic ISBN:979-8-3503-9844-1

12. **Dr. R SatheeshKumar, "**A Review on Federated Learning Techniques", 6th National conference on Computational Intelligence 30th January 2023

13. **Dr. Manishankar S**, "A Cloud based Interactive Framework for Emergency Medical Data Sharing", Forth Annual International Conference on Data Science, Machine Learning and Block Chain Technology 16th and 17th March 2023

14. **Rehna Baby Joseph, "**Fungal Diseased Mango Leaves Segmentation using soft computing Methods ", International Conference on Advanced Computing and Communication systems 17th &18th March 2023, Electronic ISBN:979-8-3503-9737-6

15. **Dr. R SatheeshKumar, Dr. R Sundar**, "Obesity Risk Prediction using Machine Learning Approaches", First IEEE International conference on Networking and Communications, 5th and 6th April 2023 , Electronic ISBN:979-8-3503-3600-9

16. **Dr. R SatheeshKumar**, "Pneumonia Detection using CNN", International conference on Innovations in Computing Materials Communication Technologies, 10th May 2023

17. Manju, P., **Binet Rose Devassy, Vishnu Rajan,** and **GR Gnana King**. "A Novel Approach for Nuclei Segmentation Using U-Net."International Conference on Networking and Communications (ICNWC), 2023 pp. 1-6. IEEE, 2023.

18. **Varghese, Angel Ann, J. Krishnadas**, and **R. Satheesh Kumar**. "Candlestick Chart Based Stock Analysis System using Ensemble Learning." International Conference on Networking and Communications (ICNWC), 2023, pp. 1-7. IEEE, 2023.

19. Davies, Theres, **R. Satheesh Kumar**, and **Anly M. Antony**. "A Novel Method for Concrete Crack Detection Using Image Processing Technique." Advanced Computing and Communication Technologies for High-Performance Applications (ACCTHPA), 2023, pp. 1-8. IEEE

20. Anson, Johnson Madambi, Lena Leo, Richard Milton, Jasmy Davies, and **Deepa Devassy.** "Exode: Humanoid Healthcare Robot." International Conference on Sustainable Computing and Data Communication Systems (ICSCDS), 2023 pp. 967-972. IEEE

21. **Varghese, Angel Ann, J. Krishnadas,** and **Anly M. Antony.** "Robust Air Quality Prediction Based on Regression and XGBoost." Advanced Computing and Communication Technologies for High Performance Applications (ACCTHPA), 2023, pp. 1-6. IEEE,

22. **Silpa, P. A.,** and **P. Praveena.** "Poly saccharide assisted exfoliation of graphite towards highly conductive graphene nano ink for biocompatible sensors." International Conference on Communication, Embedded-VLSI Systems for Electric Vehicle (ICCEVE 2023), Hybrid Conference, Kottayam, India, 2023, pp 10 - 17. IEEE

23. Ajith, Athira P**., Gnana King,** and **K. Vidyamol**. "Color Attenuation Prior Based Single Image Dehazing." 10th International Conference on Signal Processing and Integrated Networks (SPIN), 2023, pp. 654-658. IEEE, 2023.

24. Ansar, Muhammad Naisal, Aljo Jose, Angela Sabu, Jisa Joy, Lijo Poulose, and **Ambily Francis**. "Vein Detection and Cannula Insertion using Raspberry Pi." 2023, 2nd International Conference on Applied Artificial Intelligence and Computing (ICAAIC), pp. 1387-1393. IEEE, 2023. Electronic ISBN:978-1-6654-5630-2

25. Joseph, K. A., Syam Krishna PS, **Ambily Francis,** and **Anju Babu**. "Deep Learning based Beach Cleaning Robot." 2023 2nd International Conference on

Applied Artificial Intelligence and Computing (ICAAIC), pp. 1387-1393. IEEE, 2023. Electronic ISBN:978-1-6654-5630-2

26. Xavier, Adlee, K. Alisha John, M. M. Akshara, Lakshmi M. Nair, and **Vishnu Rajan**. "Navitrolley-An AI Integrated Path Finding Robot." International Conference on Computing, Communication, Security and Intelligent Systems (IC3SIS), pp. 1-5. IEEE, 2022.

27. Ajith, Athira P., K. **Vidyamol, Binet Rose Devassy,** and P. Manju. "Dark Channel Prior based Single Image Dehazing of Daylight Captures." Advanced Computing and Communication Technologies for High Performance Applications (ACCTHPA) 2023 pp. 1-6. IEEE, 2023.

28. **Manju, P., Binet Rose Devassy, K. Vidyamol,** and Athira P. Ajith. "Evaluation of Optimizers for Predicting Epilepsy Seizures." Advanced Computing and Communication Technologies for High Performance Applications (ACCTHPA) pp. 1-6. IEEE, 2023.

29. **Vijikala, V.,** Ananya Menon, Abhay Ramesh, Melvin Davis, and T. J. Yadhukrishna. "Brushless Direct Current Motor Analysis and Controller Design." Third International Conference on Intelligent Computing Instrumentation and Control Technologies (ICICICT), 2023 pp. 1729-1736.

30. **Maria, A. S., R. Sunder,** and **Anly M. Antony**. "Stress Prediction Using Enhanced Feature Selection and KNN Model." Advanced Computing and Communication Technologies for High Performance Applications (ACCTHPA) 2023 pp. 1-5. IEEE, 2023.

5. LIST OF RESEARCH FUNDS SANCTIONED DURING 2022-23

Name of the Project	Name of the Principal Investigator/ Co Investigator	Department of Principal Investigator	Amount Sanctioned	Duration of the project	Name of the Funding Agency	Type (Government/non-Government
CanDSEN	Dr. Dhanya Gangadharan, Dr. Jeethu Raveendran	BTE& BME	200000	1 year	KSUM	Government
Marble Maze Labyrinth	Dr. Arun Thomas	ECE	200000	1 year	KSUM	Government
CRAYO TANK-TOP	Mr. Saran KB	ECE	150000	1 year	KSUM	Government
Communicative and assistive device for differently abled children	Ms Reshma Jose	BME	200000	1 year	KSUM	Government
Universal Chlorometer	Dr. Jeethu Raveendran	BME	250000	1 year	KSUM	Government
Nanograf Pvt. Ltd	Dr. Silpa PA	ECE	500000	1 year	KSUM	Government

6. FACULTY AWARDED PhD

Name of the faculty	Dept	Title	University	Month and year
Dr. Ambily Francis	ECE	DEVELOPMENT OF COMPUTATIONAL METHODS FOR THE DETECTION OF ALZHEIMER'S DISEASE	Karunya Institute of Technology & Sciences, Coimbatore.	November 2023

Abstract: *Alzheimer's disease is a degenerative brain condition that affects memory, thought processes, and even the most fundamental cognitive functions. Accurately detecting the disease in its early stages is the main issue in this field. Cognitive normal (CN), mild cognitive impairment convertible (MCIc), mild cognitive impairment non-convertible (MCInc), and Alzheimer's disease (AD) are the four cognitive states of the human brain. The early stage of Alzheimer's disease is known as mild cognitive impairment convertible (MCIc). The condition that comes before MCIc is known as the mild cognitive impairment non-convertible state (MCInc). Minor memory problems that develop with aging are known as MCInc and affect all aged individuals. The transition from MCInc to MCIc must be captured precisely in order to make the assertion of early detection of AD. The work initially implemented the fast Hessian detector and local binary pattern algorithms to improve the classification accuracy of AD vs CN and MCIc vs CN. However, the results did not yield a significant improvement for MCIc vs MCInc. To address this, the work extended the approach to an ensemble of pre-trained models,*

resulting in enhanced classification accuracy for MCIc vs MCInc as well as AD vs CN and MCIc vs CN. Subsequently, the researchers incorporated the local binary pattern algorithm as a layer in a CNN to further improve classification accuracy for different categories of AD.

Name of the faculty	Dept	Title	University	Month and year
Dr. Divya R	CSE	AN ENSEMBLE-BASED MULTIMODAL APPROACH TO IDENTIFY FALLS IN ELDERLY PEOPLE WITH MOVEMENT DISORDERS	Karunya Institute of Technology & Sciences, Coimbatore.	November 2023

Abstract: *Human fall detection has become a crucial area of research, aiming to provide timely medical assistance and prevent injuries in elderly populations. Falls can lead to fractures, head injuries, and other serious health complications, reducing the quality of life and increasing healthcare costs. In fact, falls are the leading cause of injury-related deaths among adults over the age of 60. Early detection of falls can allow for prompt medical attention, reducing the risk of complications and improving the chances of recovery. The proposed thesis is focused on developing and evaluating advanced fall detection systems using state-of-the-art technologies and machine learning algorithms. The aim is to create a system that can process and analyze data from various sources, including sensors and cameras, to provide accurate and reliable fall detection. The process will involve several phases: data collection, preprocessing, feature extraction, and activity recognition. The use of multiple sensors and cameras will provide a*

comprehensive understanding of the user's movements and posture, allowing for more accurate fall detection. The performance of a sensor-based fall detection system was evaluated using three classifiers - CatBoost, RandomForest, and XGBoost. The classifiers were trained and tested on two classes - C0 (non-fall) and C1 (fall) - using precision, recall, F1 score, and support as evaluation metrics. The results show that RandomForest achieved the highest overall accuracy of 93.8%, followed by CatBoost with 92.95% and XGBoost with 92.82%. For class C0, all classifiers achieved high precision and recall values, indicating good performance in detecting non-fall events. However, for class C1, the classifiers had a lower precision, recall, and F1 score values, indicating that detecting fall events is more challenging. The proposed system will also explore the use of machine learning algorithms, such as the Random Forest classifier and PoseNet model, to improve the accuracy and efficiency of fall detection. The performance of the system will be evaluated using various metrics, such as accuracy, precision, recall, and F1 score, to ensure that it meets the required standards for fall detection systems. The proposed system has the potential to improve healthcare, security, and entertainment by providing an accurate and reliable fall detection system that can be adapted to various applications. Based on the evaluation metrics used for the PoseNet model, it achieved a high level of performance in human pose estimation and fall detection. The model had an average precision of 0.932 for the boundary measure and 0.892 for the maximum detection area. The PoseNet model also achieved high recall scores, with an average recall of 0.932 for the boundary measure and 0.873 for the maximum detection area. These results demonstrate the effectiveness of the PoseNet model in accurately detecting and tracking human poses, making it a promising solution for human fall detection applications.

Name of the faculty	Dept	Title	University	Month and year
Dr. Reshma Jose	BME	CLASSIFICATION OF LIVER CANCER CT IMAGES USING DEEP BELIEF AND OPPOSITION BASED LEARNING TECHNIQUES WITH OPTIMIZATION	Karunya Institute of Technology & Sciences, Coimbatore.	November 2023

Abstract: *Liver cancer is one of the most serious health problems worldwide. The mortality rate of liver cancer is the highest among all types of cancer. Current method of diagnosis include Computerized Tomography (CT), Magnetic Resonance Imaging (MRI), and Positron Emission Tomography (PET). As a traditional approach, liver biopsy is periodically suggested to assess the condition of the liver and help medical experts to decide the best treatment for patients but it is undesirable since it is very expensive and involves invasive and high-risk procedures. With the most recent advancements in computer technology, medical experts now make use of CAD (Computer Aided Diagnosis) to improve their image interpretation skills for accurate prediction. The current models are inefficient and produce poor results. Different processes in CAD include image acquisition, pre-processing, segmentation, feature extraction and classification. Several pre-processing techniques such as histogram equalization and anisotropic diffusion filtering were compared with other techniques and found to give better results. Super segment Pixel Based Iterative Clustering (SSBIC) and Otsu's Thresholding were found to be superior for Liver cancer image segmentation. The*

classification by Adaptive Grey Wolf Optimization- One Nearest Neighbor (AGWO-ONN) and Adaptive Grey Wolf Optimization- Convolution Neural Network (AGWO-CNN) was used for classification of benign and malignant tumors AGWO-classification ONN's accuracy is roughly 97.0 %, whereas AGWO-classification CNN's accuracy is roughly 97.6 %. As a result, it is demonstrated that e proposed Liver cancer classification model can efficiently classify cancerous and normal cells.

Name of the faculty	**Dept**	**Title**	**University**	**Month and year**
Dr. Jis Paul	CSE	DEVELOPMENT OF MACHINE LEARNING CLASSIFIER MODELS FOR THE CLASSIFICATION OF MOTION SICKNESS LEVELS USING BIOSIGNALS	Anna University, Chennai.	December 2022

Abstract: *Multiple biosignals from EEG output, center of pressure, and head and waist movement trajectories are fed into various classifier models to predict the behavior of Human Motion sickness. Experimental simulation process was carried out in the MATLAB environment and to prove the validity of the developed classifiers statistical analysis has also been carried out.*

7. FACULTY PURSUING PhD

Sl No.	Name of the faculty	Dept	Year of Registration	University/Institute
1.	Ms Mayasree O	ASH	2023	NIT Calicut
2.	Ms Asha Devassykutty	CE	2023	NIT Calicut
3.	Ms. Livya George	CSE	2022	Amrita School of Engineering (Amritha Vishwa Vidyapeedam)
4.	Mr. Saran K B	ECE	2021	NIT Calicut
5.	Ms. Vidyamol K	ECE	2021	NIT Calicut
6.	Ms. Ann soniya	BM	2021	IIT Kharagpur
7.	Mr. Kiran Philip Isaac	BM	2021	IIT Madras

8.	Mr Adarsh SR	EEE	2021	Amrita University
9.	Ms. Neethu John	EEE	2021	Amrita University
10.	Ms. Anly Antony M	CSE	2020	Sahrdaya College of Engineering & Technology (KTU)
11.	Ms. Marria C Cyriac	BT	2019	Sahrdaya College of Engineering & Technology (KTU)
12.	Mr . C. Willson Joseph	CSE	2019	Karunya University
13.	Ms. Jasmi Davis	CSE	2019	Avinashilingam University
14.	Ms. Sreetha E S	CSE	2019	Karunya University
15.	Ms. Anju Babu	ECE	2019	Karunya University

16.	Ms. Deepa Devassy	CSE	2018	Karunya University
17.	Ms. Priya K V	CSE	2018	Karunya University
18.	Ms. Ann Rija Paul	CSE	2018	Karunya University
19.	Ms. Roshni R Menon	CSE	2018	Karunya University
20.	Mr. Shyam Krishna	CSE	2018	Karunya University
21.	Ms. Salini .P. J	BT	2018	Cochin University of Science & Technology
22.	Ms Drisya K Sasi	EEE	2018	APJ Abdul Kalam Technological University
23.	Mr. Sebin Davis K	EEE	2018	Karunya University

24.	Ms. Binet Rose Devassy	ECE	2017	APJ Abdul Kalam Technological University
25.	Ms. Sony N S	BME	2017	Amrita Vishwa Vidhya Peetham
26.	Ms. Ranimol G	BT	2016	Sathyabama Institute of Science and Technology, Chennai
27.	Ms. Smeera Thomas	BT	2016	Karunya University
28.	Mr. Francis John V	BT	2013	GEC, Thrissur (Calicut University)

8. LIST OF FACULTY WITH PhD

Sl. No.	Name of the faculty	Dept	University/Institute	Year of award
1	Dr. Ambily Francis	ECE	Karunya University	2023
2.	Dr. Reshma Jose	BME	Karunya University	2023
3.	Dr. Divya R	CSE	Karunya University	2023
4.	Dr. Jis Paul	BME	Anna University	2023
5.	Dr. Drisya M	CE	NIT Calicut	2021
6.	Dr. Silpa P A	ECE	Karunya University	2021
7.	Dr. P Praveena	BT	Bharathiar University	2021
8.	Dr. Joseph Jestin	ASH	Bharathidasan University,	2021
9.	Dr. Krishnadas J	CSE	Karpagam University	2020
10.	Dr. Remya George	BME	University of Calicut	2020
11.	Dr. Finto Raphel	BME	NIT, Calicut	2019
12.	Dr. Jeethu Raveendran	BME	Amrita Vishwa Vidyapeetham	2018
13.	Dr. Yuvraj V	BME	VIT	2018

14.	Dr. Amitha Joy	BT	Bharathiar University	2018
15.	Dr. Sukhila Krishnan	ASH	Utkal University	2018
16.	Dr. Uma Krishnakumar	BT	National Institute of Technology, Calicut	2017
17.	Dr. Vishnu Rajan	ECE	Jodhpur National University	2017
18.	Dr. R Sunder	CSE	Manonmaniam Sundaranar University	2016
19.	Dr. R Satheeshkumar	CSE	Anna University	2016
20.	Dr. G R Gnana King	ECE	Anna University	2016
21.	Dr. V. Vijikala	EEE	Anna University	2016
22.	Dr. Leon Ittiachen	BT	Vellore Institute of Technology	2014
23.	Dr. Midhila Padman	BT	Mysore University	2013
24.	Dr Nixon Kuruvilla	ASH	VTU, Belgaum	2012
25.	Dr. Dhanya Gangadharan	BT	University of Kerala	2010
26.	Dr. Ambili Mechoor	BT	University of Kerala	1998
27.	Dr. Sudha George Valavi	ASH	CUSAT	1997
28.	Dr. Ajith Cherian	ASH	M S University of Baroda	1995

9. LIST OF UNIVERSITY-APPROVED RESEARCH SUPERVISORS

Sl. No.	Name of the faculty	Department	Year of approval
1.	Dr. Praveena Padmam	BT	2023
2.	Dr. Silpa PA	ECE	2023
3.	Dr. Sukhila Krishnan	ASH	2023
4.	Dr. Jeethu Raveendran	BME	2021
5.	Dr.Finto Raphel	BME	2021
6.	Dr. Amitha Joy	BT	2021
7.	Dr.Yuvraj V	BME	2020
8.	Dr.Ambili Mechoor	BT	2020
9.	Dr.Dhanya Gangadharan	BT	2020
10.	Dr. Uma Krishnakumar	BT	2020
11.	Dr. Sudha George Valavi	ASH	2019
12.	Dr. R Sunder	CSE	2018

13.	Dr. V. Vijikala	EEE	2018
14.	Dr. Nixon Kuruvilla	ASH	2018
15.	Dr. R Satheeshkumar	CSE	2017
16.	Dr G R Gnana King	ECE	2017
17	Dr. Leon Ittiachen	BT	2016

10. LIST OF RESEARCH SCHOLARS

Sl. No	**Name of the Student**	**Dept**	**Supervisor**	**Year of Joining**	**Fellowships if any**
1.	Sonu Varghese K	CSE	Dr. R Satheeshkumar	2022	KTU Fellowship
2.	Alan Mathew George	EEE	Dr. V. Vijikala	2021	Part Time
3.	Shamya A	EEE	Dr. V. Vijikala	2021	Part Time
4.	Keerthana IP	CSE	Dr. Satheesh Kumar	2021	JRF
5.	Amrutha Krishnan	ASH	Dr. Sudha George Valavi	2021	CERD Fellowship

6.	Nivya R.M	BT	Dr.Amitha Joy	2021	CERD Fellowship
7.	Pooja Das M	BT	Dr. Dhanya Gangadharan	2020	CERD Fellowship
8.	Anly Antony M	CSE	Dr. R Satheeshkumar	2020	Part time
9.	Marria C Cyriac	BT	Dr. Leon Ittiachen	2019	Part time
10.	Sumi Maria Babu	BT	Dr. Leon Ittiachen	2018	YIP
11.	Sangeetha Gopal	BT	Dr. Leon Ittiachen	2018	YIP
12.	Meera Mohan	CSE	Dr. R Satheeshkumar	2018	Part time
13.	Chaithanyadas	ECE	Dr. G R Gnana king	2018	Part time
14.	Jinu Sebastian	ECE	Dr. G R Gnana king	2017	Part time

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