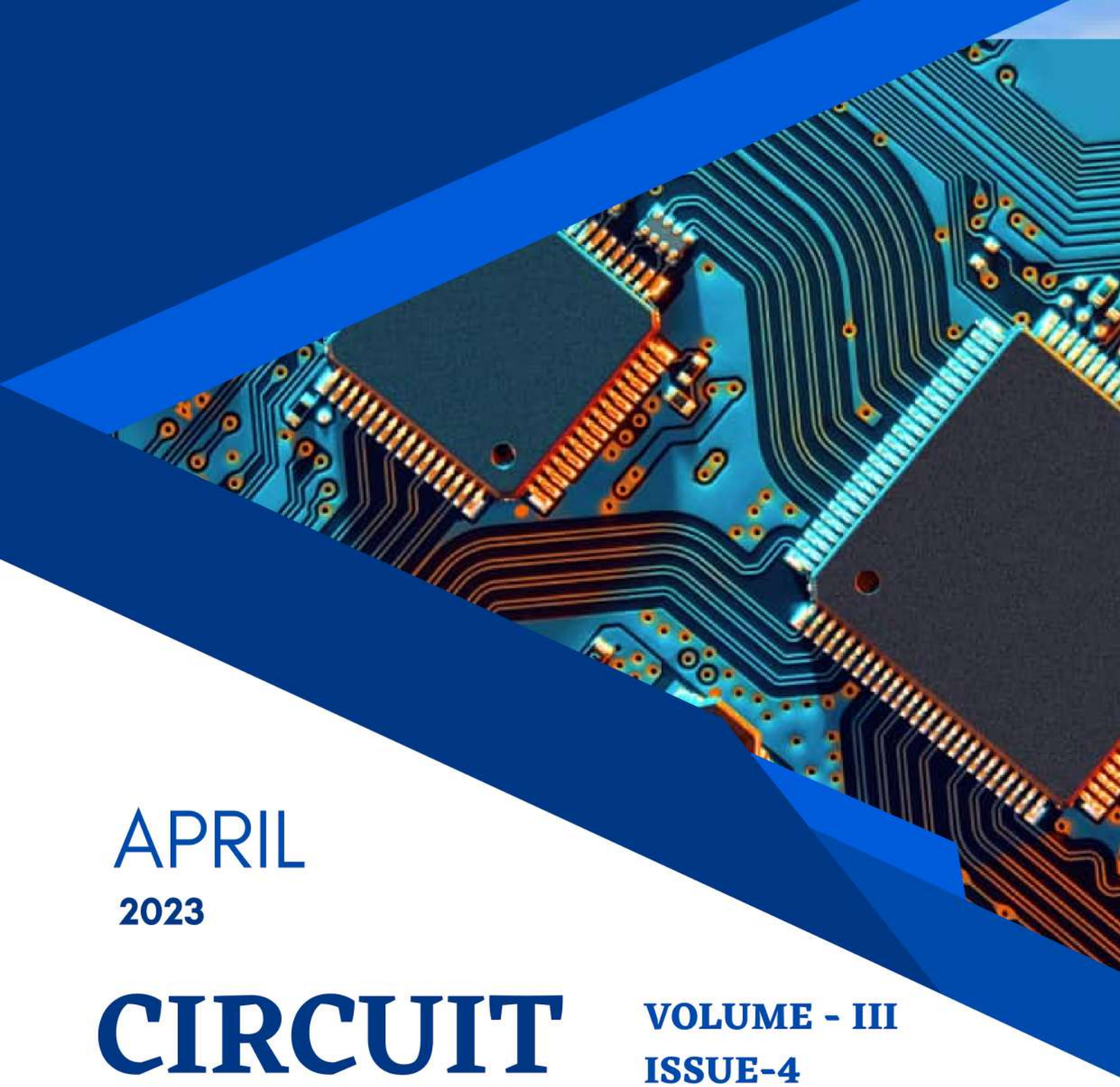

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CIRCUIT TIMES

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SVCE | SRI VENKATESWARA COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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VISION OF THE DEPARTMENT

To excel in offering value based quality education in the field of Electronics and Communication Engineering, keeping in pace with the latest developments in technology through exemplary research, to raise the intellectual competence to match global standards and to make significant contributions to the society.

MISSION OF THE DEPARTMENT

- To provide the best pedagogical atmosphere of highest quality through modern infrastructure, latest knowledge and cutting edge skills.
- To fulfill the research interests of faculty and students by promoting and sustaining in house research facilities so as to obtain the reputed publications and patents.
- To educate our students, the ethical and moral values, integrity, leadership and other quality aspects to cater to the growing need for values in the society.

Program Educational Objectives (PEOs)

PEO1: Create value to organizations as an EMPLOYEE at various levels, by improving the systems and processes using appropriate methods and tools learnt from the programme.

PEO2:Run an organization successfully with good social responsibility as an ENTREPRENEUR, making use of the knowledge and skills acquired from the programme.

PEO3:Contribute to the future by fostering research in the chosen area as an ERUDITE SCHOLAR, based on the motivation derived from the programme.

Program Specific Outcomes (PSOs)

PSO-1: An ability to apply the concepts of Electronics, Communications, Signal processing, VLSI, Control systems etc., in the design and implementation of application oriented engineering systems.

PSO-2: An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical and managerial skills to arrive appropriate solutions, either independently or in team.

ARTICLE

Infant cry signal processing and analysis using Artificial Neural Networks

D.Menaka, Associate Professor, Department of ECE, SVCE

Introduction

As a special type of speech and environmental sound, infant cry has been a growing research area covering infant cry reason classification, pathological infant cry identification, and infant cry detection in the past two decades. Automatic detection of a baby cry in audio signals is an essential step in applications such as remote baby monitoring. It is also important for researchers, who study the relationship between baby cry patterns and various health or developmental parameters. The infant cry signals have distinct patterns depending on the purpose of the cries. Preprocessing, feature extraction, and feature selection need expert attention and have taken much effort in audio signals recently. For this, it requires an enormous amount of data for effective classification. Both acoustic features and prosodic features extracted from different domains can discriminate frame-based signals from one another and can be used to train machine learning classifiers. Together with traditional machine learning classifiers such as KNN, SVM, and GMM, newly developed neural network architectures such as CNN and RNN are applied in infant cry research.

The Origin and role of infant cry

About 130 million babies are born globally each year. Taking good care of newborns is a big challenge, especially for first-time parents. Following the suggestions from other parents and books is not enough to solve the problems in practice. The main reason is that it is difficult to understand the meaning of the infant cries, which is the only way that infants communicate with the world. Infants portray suggestive unique cries while sick, having belly pain, discomfort, tiredness, attention and desire for a change of diapers among other needs. There exists limited knowledge in accessing the infants' needs as they only relay information through suggestive cries.Experienced parents, caregivers, doctors, and nurses understand the cries based on their experiences. Young parents get frustrated and have trouble calming down their babies because all cry signals sound the same to them. Accurately interpreting infant cry sounds and detecting infant cry signals automatically can help parents and caregivers provide better care to their babies.

Early diagnosis of diseases and disorders using cry signals is non-invasive and can be performed without 2 professionals around, hence, it can save more lives, especially in underdeveloped areas
Accurate and reliable detection of infant cry events in a stream of audio is a prerequisite for classification algorithms and screening tasks, which rely on the acoustic properties of the cry. One of the main difficulties in detecting a baby's cries in a domestic environment or in other natural environments, such as neonatal clinic units or nurseries, is the presence of noise and background sounds - speech, music, electronic toys, door opening, phone ringing, and many others.

This poses a considerable challenge for classical machine-learning approaches, which typically start by extracting a set of distinguishing features from the acoustic signal. Background noise may have a fundamental frequency or vocal qualities similar to those of an infant cry, hindering the detection algorithm. In addition, the signal-to-noise ratio (SNR) often varies. Speech in particular poses a considerable challenge for the detection, due to frequency content similar to baby cry, which may introduce false-positive events.

The Crux of infant cry signal processing

Due to the sensitivity of cry data, it has been difficult for researchers to acquire the data needed. To date, researchers either record cry clips by themselves or ask permission for datasets from other authors. Most databases are recorded in hospitals, Neonatal Intensive Care Units (NICU), homes, and clinics by recording in real-time or by setting up electronic recording devices close to infants' cribs for a long period of time. Most recordings contain noises because usually infants will not be left alone in a quiet room.

Signal processing techniques remove background noises and perform signal segmentation to build cry databases. Segmentation is the method to cut the cry recordings into shorter-length cries that don't have breaks and unrelated sounds. Once the database is available, feature extraction is the step to extract features from different domains of the cry signals. Features extracted from the time domain, cepstral domain, or prosodic domain represent 3 different aspects of cry signals. Selecting the most appropriate features and reducing the feature dimensions are other tasks to save computational time and build effective classification models.

Applying appropriate machine learning models for specific cry features is vital for classification or detection performance.

Automatic infant cry research generally involves five stages: data acquisition, pre-processing, feature extraction, feature selection, and classification. Discovering novel methods in any of the stages can help improve the performance of the final classification accuracy.

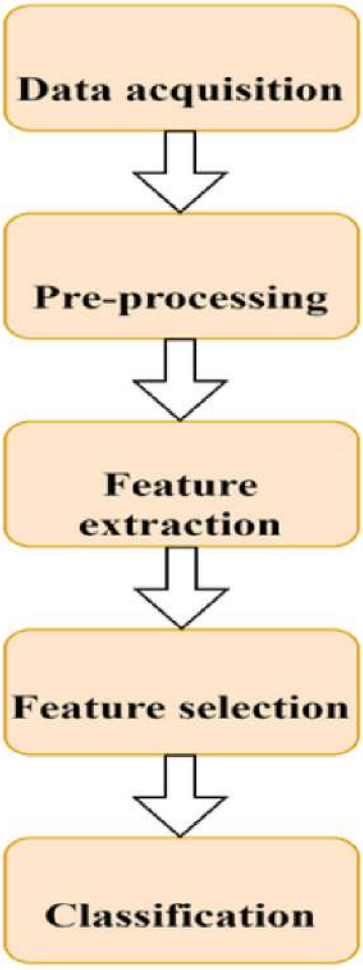


Figure 1. Stages of infant cry signal processing

Sound is a function of amplitude and time with parameters such as frequency, bandwidth, and decibel. The secondary audio dataset having wave extension format was obtained from the Coswara database and was combined with the secondary datasets provided by UNICEF. The pediatrician experts collected the audio dataset and accurately classified the files as either hungry, tired, sick, or burping. All the secondary audio files were recorded from strictly infants of the age 0 to 19 months of age as shown in Figure 2 below.

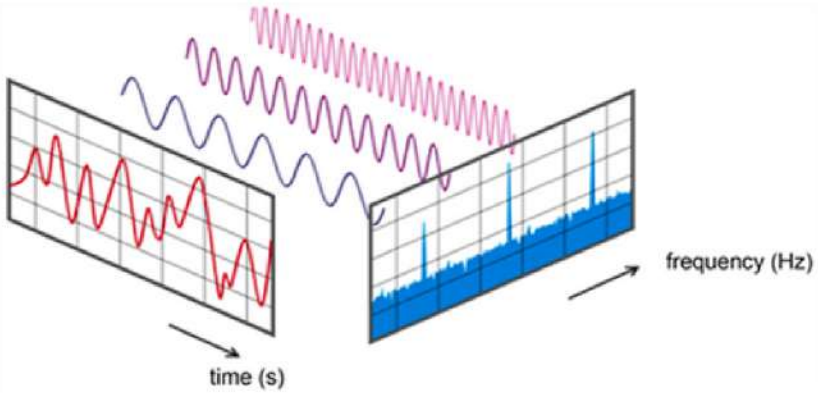


Figure 2. Representation of the audio record (Image source KNuggets Blog).

Study Variables

The study variables were the recorded infants' cry audio files from the four main classes that the study targeted. The main aim of this study was to come up with a classifier deep learning that could be used to discriminate the audio. The main classes were:

· Burping.
· Hungry.
· Tired.
· Sick.

The Convolution Neural Networks (CNN) outperformed other generic models at the accuracy level of evaluations. There were some machine learning models that really performed well based on training accuracy but really dropped in modeling the new datasets that were fed(testing). The convolutional neural networks did relatively well in generalizing the testing data thus having a higher accuracy. This promised the stability of the model thus affirming the operational stability of the model in the production environment. The convolution neural networks really possess the strength of downsampling with translational invariance. The dimension reduction has been scientifically embraced to reduce the computational time for the model. This brings a smooth significance to the efficient operations of the model in the production environment.

Applications of Infant Cry

Infant cry reason classification: In the early years of infant cry research, more work was done on automatically differentiating the cries of healthy infants from pathological cries and most work is on the Baby Chillanto database. In recent years, exploring the meaning of crying has attracted more research interest. Most methods on infant cry reason classification have an accuracy of around 80% while a few methods can reach over 90% accuracy on the Dunstan Baby database and a binary classification on the Baby Chillanto database reaches 97%. It's noticeable that researchers are using different datasets, most of which are self-recorded.

Infant pathological cry classification: Infant cry signals have been used to identify many diseases such as asphyxia, hypo-acoustic (hearing disorder), hypothyroidism, Hyperbilirubinemia, Cleft Palate, Respiratory Distress Syndrome, Ankyloglossia with a deviation of the epiglottis and larynx, etc. In the past decade, researchers continue to apply novel methods to classify normal cry and pathological cry. Asphyxiated cry is the most popular disease in infant cry research.

Infant cry detection: Infant cry detection is considered as a binary classification with a cry and not-cry categories. It is another attractive research topic in the last decade. The goal is to detect the infant's cry signals efficiently and accurately in various environments, such as cars, homes, hospitals, etc., while other sounds are happening at the same time. Since the data is recorded during a long period of time in a certain environment such as a home or hospital, the detection algorithm needs to be able to detect the cry sound despite the background sounds happening in the environment

STUDENT ARTICLE

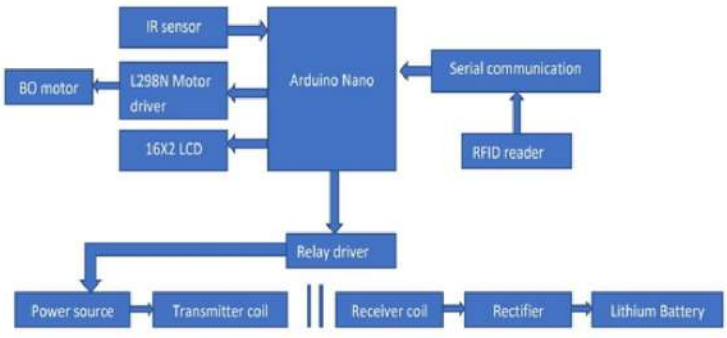
INDUCTIVE POWER TRANSFER FOR ELECTRIC CARS

K.P.Deepika, IV Year ECE

In today's trend, the demand for electric vehicles is increasing which ultimately leads to an increase in charging stations as well. In this project design, a wireless charging system is used to charge the e-vehicle wirelessly via inductive coupling. Besides, an IoT-based system is designed in which a person can use the RFID to pay the charging charges of that vehicle. The proposed model also employs the concept of a smart parking system to create smart charging stations that are analogous to petrol bunks. A web application is further developed to analyze the empty parking slots in the bunks for the user to easily recharge the RFID cards and check the available balance, and also to view the status of charging.

Wired charging of electrical vehicles gives rise to the need for different socket types for different car models. Moreover, wired charging leads to messy wires and cases of hazardous electric shock. The proposed model will prepare a new convenient way to recharge the battery of electric vehicles rather than using the traditional plug-in cable. Wireless charging extends the lifetime of batteries.

The major objective is to achieve Wireless power transfer via resonant inductive coupling between the transmitting and receiving coils in the near field or battery of an electric car. It implements an electric vehicle wireless charging station and charging platform to transmit electrical power wirelessly through free space and charge the battery of an electric car. It also develops a user-friendly application to recharge, check balance and identify empty parking slots.



The proposed system consists of three modules, the first module consists of a Bluetooth-controlled car using a BO motor and L298N motor driver The second module contains a transmitter and receiver coil to induce magnetic flux for charging the battery. The third module consists of IR sensors and a DC motor for sensing and opening gates for parking purposes. The amount for the service is detected using the RFID tag. The design is simple and cost-efficient and is useful in short-distance applications and operating at a lower frequency. It also reduces the risk of electric shock. The main issue facing wireless energy transfer is its efficiency, which deteriorates rapidly as the distance between the transmitter and receiver increases. Also Low levels of efficiency result in increased cost and slower charging.

EVENTS CONDUCTED

- Mr.S.Senthil Rajan, Secretary cum Treasurer and Mr.N.Sathish, Department Coordinator-ISTE SVCE Chapter organized ISTE Annual Engineering Students Convention-2023 on the title "Recent Technological Trends and Engineering Innovations Powering a Sustainable Future" on April 29, 2023, at Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur.

- Dr.M.Bindhu, Dr.K.Kavitha, Mr.D.Silambarasan, Mr.L.K.Balaj, Vignesh, and Mr.K.Ragupathi organized webinar series on various facets of technology titled "A Peek into the leading Edge" organized by Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur from 03.04.2023 to 07.04.2023.

- Dr.S.R.Malathi, Mr.M.Athappan, Mrs.R.Kousalya, Mrs.B.Sarala, Mrs.S.M.Mehzabeen, Mrs.S.M.Abinaya, Mr.D.Silambarasan and Mr.K.Ragupathi have organized 4-day value-added course titled "VD18703-Hardware Modeling and Analysis using EDA Tool" organized by Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur on 03.04.2023, 05.04.2023, 06.04.2023 and 11.04.2023.

- Dr.P.Jothilakshmi, Mrs.K.Srividhya, Mr.P.Muthukumaran, Mrs.C.GomatheeswariPreethika, Mr.V.Yokesh and Mr.L.K.Balaji Vignesh have organized 4 days value-added course titled "VD18704-RF Circuit Design-Theory and Simulation using EM Simulation Tools " organized by Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur on 03.04.2023, 05.04.2023, 06.04.2023 and 11.04.2023.

- Dr.A.Prasanth, Mr.V.Yokesh, Mr.S.Elangovan, Dr.T.J.Jeyaprabha, Ms.B.Sarala, Ms.R.Kousalya have organized 4 days value-added course titled “VD18706-System Design for IoT Applications” organized by Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur on 03.04.2023, 05.04.2023, 06.04.2023 and 11.04.2023.

- Dr.T.J.Jeyaprabha, ASP, ECE and Mr.S.Elangovan, AP, ECE have inaugurated online peer mentorship event on 29th April 2023 under FODSE - Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur.

- Dr.T.J.Jeyaprabha, ASP, ECE and Mr.S.Elangovan, AP, ECE have organized 1-day “Techentro Workshop” organized by Sri Venkateswara College of Engineering (Autonomous), Sriperumbudur on 20-4-2023.

ACHIEVEMENTS

BY FACULTY

- Ms.K.S.Subhashini attended " IBM Technology Speaks(online)" organized by the PALS Management office from 04.04.2023 to 05.04.2023

- Mrs.S.M.Abhinaya attended 2 days workshop "Hands-on Session for VLSI using Cadence tools", by the ECE department, SVCE, 12.04.2023-13.04.2023

- Mr.P.Arul attended the "L2M Conclave (online)" on 13th April.2023 organized by the PALS Management office.

- Mr.S.Elangovan attended "PALS TECHNOLOGY SPEAKS (online)" on 20th April 2023 organized by the PALS Management office.

- Mr. R. Ramesh Kumar and Mr. L.K. Balaji Vignesh attended one day workshop on "High-Frequency Design for 5G using ADS" organized by Madras Institute of Technology, Chrompet, Chennai on 21.04.2023.

- Mr.P.Arul attended Online Workshop on "Google Workspace" organized by the IT department, SVCE from 24.04.2023 to 28.04.2023

- Ms.K.S.Subhashini and Dr.R.Priyadharshini attended the " PALS Project Proposal Writing Workshop (online)" organized by PALS Management Office from 28.04.2023-29.04.2023

- Mr.L.K.Balaji Vignesh acted as Mentor for two batch students' poster presentation titled (Augmented Reality/Virtual Reality, Food Processing, and Shelf-Life Extension) in "21st Annual ISTE Tamilnadu Section Engineering Innovations Powering a Sustainable Future" organized by Sri Venkateswara College of Engineering, Sriperumbudur on 29.04.2023

- Dr.T.J.Jeyaprabha, ASP, ECE mentored the team Smart Blink with Team Members: NITISH KUMAR B, II, ECE, MAGESH S, II, ECE, KIRAN SEKAR S II ECE and ROBIN KUMAR J, II ECE and were awarded II Prize in Paper Presentation - 21st Annual ISTE

Tamil Nadu Section Engineering Students Convention, organized by Sri Venkateswara College of Engineering, Sriperumbudur on 29th April 2023.

- Dr.T.J.Jeyaprabha, ASP, ECE acted as Jury for ICICET 2023 - INTERNATIONAL CONFERENCE ON INNOVATIONS AND CHALLENGES IN ENGINEERING AND TECHNOLOGY 2023 on 26/04/2023.

BY UG STUDENTS

S.No	Branch	Year	Name of the Student	Name of the Program	Prize	Program Date	Place
1	ECE	III	Mr.Hariharan G	Capestart startup conclave	First (Cash Prize-15,000)	3/4/2023	Capestart in Association with Tamil nadu Startup, Kanyakumari

2	ECE	III	Mr.Hariharan G	Capestart startup conclave	First (Cash Prize-15,000)	3/4/2023	Capestart in Association with Tamil nadu Startup, Kanyakumari
3	ECE	III	Mr.Harshavardhan R	Capestart startup conclave	First (Cash Prize-15,000)	3/4/2023	Capestart in Association with Tamil nadu Startup, Kanyakumari
4.	ECE	II	Magesh S	Make-a-thon 4.0	I	31/03/2023 & 01/04/2023	SVCE in association with IETE
5.	ECE	II	Nithish Kumar B	Make-a-thon 4.0	I	31/03/2023 & 01/04/2023	SVCE in association with IETE
6.	ECE	II	Kiran Sekar	Make-a-thon 4.0	I	31/03/2023& 01/04/2023	SVCE in association with IETE

7.	ECE	II	Robin Kumar	Make-a-thon 4.0	I	31/03/2023 To 01/04/2023	SVCE in association with IETE
8.	ECE	II	Priyadharshini S	Make-a-thon 4.0	I	31/03/2023 To 01/04/2023	SVCE in association with IETE
9.	ECE	II	Parvesh R	Make-a-thon 4.0	Special Mention with Internship offer @Motherson Technologies Pvt. Ltd.	31/03/2023 To 01/04/2023	SVCE in association with IETE
10.	ECE	II	Ram Solaiappan A	Make-a-thon 4.0	Special Mention with Internship offer @Motherson Technologies Pvt. Ltd.	31/03/2023 To 01/04/2023	SVCE in association with IETE

11.	ECE	II	NITHISH KUMAR B,	21st Annual ISTE TamilNadu Section Engineering Students Convention	II Prize in Project Presentation	29/04/2023	ISTE is association with SVCE
12.	ECE	II	MAGESH S	21st Annual ISTE TamilNadu Section Engineering Students Convention	II Prize in Project Presentation	29/04/2023	ISTE is association with SVCE
13.	ECE	II	KIRAN SEKAR S	21st Annual ISTE TamilNadu Section Engineering Students Convention	II Prize in Project Presentation	29/04/2023	ISTE is association with SVCE

14.	ECE	II	ROBIN KUMAR J	21st Annual ISTE TamilNadu Section Engineering Students Convention	II Prize in Project Presentation	29/04/2023	ISTE is association with SVCE

- One student attended "IBM Technology Speaks(online)" on the 4th and 5th of April.2023 organized by the PALS Management office.

- Student leaders attended "SL Workshop III (online)" on 12th April.2023 organized by the PALS Management office.

- Seven Students attended the "L2M Conclave (online)" on 13th April.2023 organized by the PALS Management office.
- Twelve students attended " PALS TECHNOLOGY SPEAKS (online)" on 20th April 2023 organized by the PALS Management office.

- Mr.J.Shanmugam, Third year ECE completed his Internship on a collaborative research project, "Automated Decentralized Water Purification System", organized by the Department of Chemical Engineering, IIT Madras from 18.02.2023 to 01.04.2023.

FACULTY PUBLICATION

- Dr.G.A. Sathish Kumar, K. Kiruthika Devi, and B.T. Shobana published a book chapter titled “Ensemble learning-based feature selection of detection spam in the Twitter network" Springer, Algorithms for Intelligent Systems, Chapter 50, Pages: 627–636, 2023.
- Dr.T.J.Jeyaprabha, ASP, ECE acted as Reviewer for MakerFair for YESIST12 2023.

REVIEWER/EDITORIAL BOARD MEMBERS

- Dr. G. A. Sathish Kumar reviewed a research article in the Wiley International Journal of Communication Systems.

- Reviewed Five Papers for the First Edition of “The International Conference on Networking and Communications (ICNWC-2023) organized by the Department of Networking and Communications, School of Computing, SRM Institute of Science and Technology and IEEE Society – SRM student branch chapter conducted on April 5th and 6th, 2023.
- Dr.T.J.Jeyaprabha, ASP, ECE acted as a reviewer for the Second International Conference on Machine Learning, Deep Learning Computational Intelligence for Wireless Communication (MDCWC 2023).

INDUSTRIAL VISIT

- Second year ECE Students have undergone an Industrial visit to Retech Lasers, Tambaram, Chennai from 05.04.2023 to 06.04.2023

EDITORIAL BOARD

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STUDENT EDITORS

Mr. V.S.PRITHIVIRAJ - III Year ECE

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