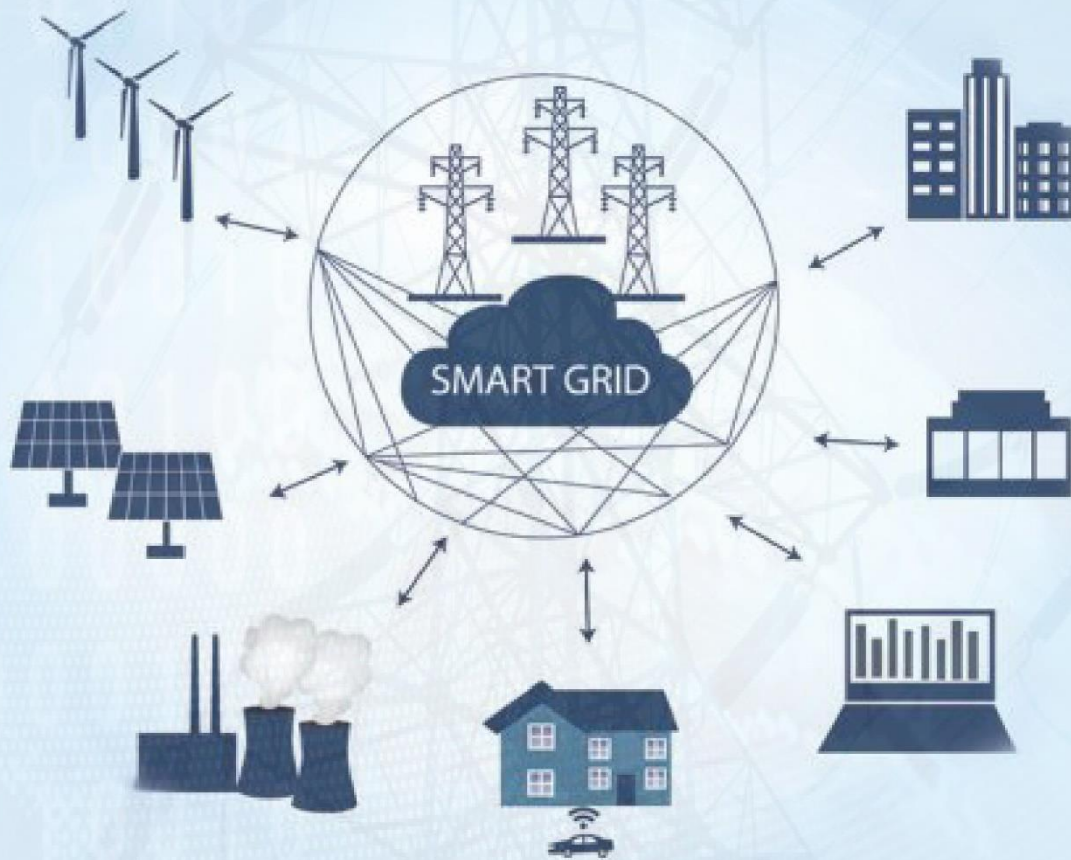


# VIDYUT

Volume-1 | Issue-3 | March-2023

Department of Electrical and Electronics Engineering  
Official Newsletter



**Trends In  
Electrical Industries  
You Must know**  
*Insight into Smart Grid*

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### **Insight into Smart Grid**

Machine Learning (ML) has developed significantly in the past decade owing to unprecedented growth in the data and computation resources available, which has spawned a lot of success stories such as Chat GPT. Amid the rapidly transforming software industry, the power system industry is trying to match the pace.

Recently, there has been a renewed interest in power sector due to the increased adoption of Distributed Energy Resources (DER) such as electric vehicles and energy storage systems. It has led to availability to new data at energy control center; power system is monitored and controlled at SCADA center both at the transmission and distribution level. The online monitoring will let us know the 'current' status of elements in the network. One such device is smart meter. Deployed instead of conventional energy meters, smart meter readings are expected to grow from 24 million a year to 220 million per day [1].

Phasor Measurement Unit (PMU) is another intelligent measuring device, which is currently being deployed in the power system. ComEd (Commonwealth Edison), a private US firm, is an electric utility that has listed out various use cases for PMU in power distribution system; Use cases are potential future applications for a particular technology [2]. Fault detection and isolation is possible in real-time basis with automation.

In Industry, Asset Management, using data analytics, is a popular use case for determining which asset such as transformer requires maintenance [2]. In academia, an interesting machine learning application is the *prediction of restoration time in distribution grids* [4]. The challenge in the application of

machine learning, especially in supervised models, is the availability of data. Future smart grid is a mission critical system with the expansion of cloud computing resources at SCADA center level, and Internet of Things devices connected at the end user level. With growth of supporting communication infrastructure, the cyber security of grid is also an issue. The online real-time monitoring of future power system using these technological developments will be robust, reliable, and secure.



## References:

- [1] S. Sagiroglu, R. Terzi, Y. Canbay and I. Colak, "Big data issues in smart grid systems," IEEE International Conference on Renewable Energy Research and Applications (ICRERA), Birmingham, 2016, pp. 1007-1012.
- [2] J. Zhao, H. Zheng, Al. Vukojevic, Deploying Grid Edge Analytics in Utility Distribution Systems [Online] Available: [https://site.ieee.org/pes-bdaps/files/2022/09/03\\_Deploying-grid-edge-analytics-in-Utility-Distribution-Systems\\_Junhui\\_Zhao.pdf](https://site.ieee.org/pes-bdaps/files/2022/09/03_Deploying-grid-edge-analytics-in-Utility-Distribution-Systems_Junhui_Zhao.pdf)
- [3] IBM, "IBM® Maximo® Application Suite: Energy and Utilities," [Online] Available: <https://www.ibm.com/products/maximo/energy-utilities>
- [4] Z. Wang (2022) Data-Driven Outage Modelling and Restoration Time Prediction in Distribution Grids [Online] Available: [https://site.ieee.org/pes-bdaps/files/2022/09/Presentation-3\\_Zhaoyu-Wang\\_\\_PES\\_Outage-modeling\\_V6.pdf](https://site.ieee.org/pes-bdaps/files/2022/09/Presentation-3_Zhaoyu-Wang__PES_Outage-modeling_V6.pdf)

Article by

Mr. Arun Abhishek I, Assistant Professor, EEE



## Students Achievements

### INUP - Idea to Innovation Student Fellowship at Centre for Nanotechnology, IIT Guwahati.

Mr. Ramana R P, Narendran K, Yokesh Kumar S of III year EEE students has been shortlisted for the MeitY sponsored prestigious INUP Idea to Innovation program at IIT Guwahati under the guidance of Dr. Sudhakar K B.



Ramana R P



Narendran K



Yokesh Kumar S

#### Nanoelectronics: Fabrication and Characterization



Dear Participant,

Date: 30/03/2023

**Sub:** Invitation to attend Offline Familiarization Workshop at Centre for Nanotechnology, IIT Guwahati from 25<sup>th</sup> to 27<sup>th</sup> April, 2023

We are happy to inform you that you have been shortlisted for attending the Offline Familiarization Workshop on 'Nanoelectronics: Fabrication and Characterization' at the Centre for Nanotechnology, IIT Guwahati.

The workshop is scheduled to be held from 25<sup>th</sup> to 27<sup>th</sup> April, 2023 and is sponsored by MeitY, Govt, under INUP-i2i program.

Your boarding and lodging will be provided by us. Also, your travel expenditure will be covered for minimum A/C 3-tier shortest route fare subject to a limit.

You are requested to confirm your participation on or before 10:00 AM, 10/04/2023. The confirmation and complete travel details must be provided by filling the given form: <https://forms.office.com/r/Dw6EdK6sM5>

These details are required for us in advance to plan for your stay at IIT Guwahati. Further details of the workshop will be provided in due course of time.

Looking forward to your active participation.

With Best Regards  
Organizing Committee – INUP-i2i,  
Centre for Nanotechnology  
Indian Institute of Technology Guwahati

## Certificate of Merit

Srinivasan .V of II Year EEE student has participated in a Delhi International Open Grandmasters Chess Tournament 2023 , secured 388 position on the merit list in possible 10 rounds.



**20TH DELHI INTERNATIONAL OPEN  
GRANDMASTERS CHESS TOURNAMENT 2023**

*Certificate of Merit*  
PROUDLY PRESENTED TO

**Srinivasan Vijayaraghavan** of **India**

for participating in the 20th Delhi International Open Grandmaster Chess Tournament 2023 organized by Delhi Chess Association under the aegis of All India Chess Federation & International Chess Federation at Jawaharlal Nehru Stadium, New Delhi from 23rd March to 30th March 2023.

He/She has scored **5½** points from possible 10 rounds and secured **388** Position on the merit list.

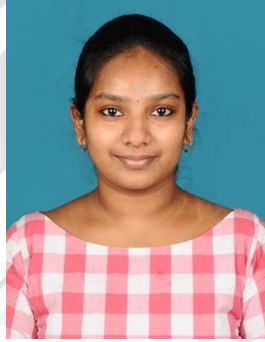
IA VASANTH BH  
Chief Arbiter

AK VERMA  
Organizing Secretary

BHARAT SINGH CHAUHAN  
Chairman, Organizing Committee

## Instincts 2023

- S.Keerthana, III year student secured 1<sup>st</sup> place in the event Lights, Camera, Thadhinginathom conducted at Instincts 2023 – A National Level Cultural Fest organised by SSN College of Engineering on 10<sup>th</sup> March 2023.





- S.Sabari, III year student secured 2<sup>nd</sup> place in the event WHAT A LOOK! conducted at Instincts 2023 – A National Level Cultural Fest organised by SSN College of Engineering on 10<sup>th</sup> March 2023



## Technical Symposium

Vasanth A, Sivakumar.S and RoshanRam.K of II year EEE students participated and won 1<sup>st</sup> prize with cash award in a National Level Technical Symposium “connecting wires” held at Chennai Institute of technology .



Srinidhi K and Sreenidhi R, II Year EEE 'B' participated and won a cash prize in a “National Level Technical Symposium” ( PRANAV 2K23 ) conducted by “Meenakshi Sundararajan College of Engineering” on 23.03.2023.

SubaniShree, II Year EEE 'B' Participated and won a cash prize in a “National Level Technical Symposium” (PRANAV 2K23) conducted by “Meenakshi Sundararajan College of Engineering” on 23.03.2023.



## PG Admissions Abroad (2019-23 Batch)



Ashwin Karthik R

MS in Advanced Control and Systems Engineering at  
University of Sheffield- UK



Master of Engineering (Crse) in  
Electrical and Computer Engineering, Control System at  
University of Alberta- Canada



MS in Electrical Engineering at  
National University of Singapore





Barath Baasu V B

MS in Renewable Energy at Exeter University, UK



University  
of Exeter

M.E in Electrical Practices at Carleton University, Canada



Carleton  
UNIVERSITY

MS in Electrical and Computer Science at  
Lakehead University, Canada



Lakehead  
UNIVERSITY

M.E in Electrical and Computer Science Engineering at  
Concordia University, Canada





Dharanesh K G

MS in Communication Systems at Lakehead University, Canada



MS in Communication Systems at Western University, Canada



## Placement Details



Santossh V of final year, EEE got placed in M/s Extreme Networks with 12 LPA



Deepika J B of final year, EEE got placed in M/s Brakes India .Pvt Ltd with 4.5 LPA

## External Project Funding

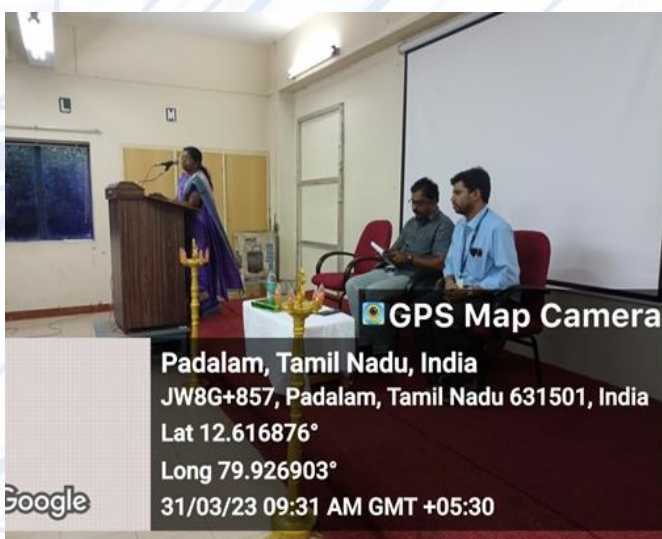
Mr V Santossh, Ms B Abinaya, and Mr B Shriman, Final year students of the Department Electrical and Electronics Engineering, have received a grant through Tamilnadu State Council for Science and Technology for the year 2022-2023. They have received a grant of **Rs. 7500** for the project titled “Building energy conservation using electric vehicle” (Project No. : EEE-1860, S.No. 884). The project is under the guidance of Mr S Thamizmani, Assistant Professor and S G Bharathidasan, Associate Professor/EEE.

## Events organized by Professional Societies

### PULSE'23 by Association of Electrical and Electronics Engineers

PULSE'23 is a National Level Technical Symposium organized by the Department of Electrical and Electronics Engineering, Sri Venkateswara College of Engineering. The symposium was conducted on 31<sup>st</sup> March 2023 that featured ten technical events. This symposium witnessed 379 total registrations with 144 registrations from different technical institutions across the State and 235 registrations from SVCE

The various technical events conducted in Pulse'23 include Paper presentation, Poster Presentation, Project Expo, CircuitSentry, ADDA, PoSysSim, CodeEmbed, ElectricWordza, Electric Rush and Tech Brain. The major technical events were paper presentation, projects expo and poster presentation. Innovative presentations were showcased by the students from various reputed colleges across the State.







## IEEE Student Branch Event

The IEEE Student Branch of Sri Venkateswara College of Engineering has organized the 'Model Phoebus Cartel 2.0', an inter-college level event. The event is scheduled to take place on 24<sup>th</sup> March 2023, Friday.

The inauguration was presided by Dr.KR.Santha Vice Principal & Head of the Dept of Electrical and Electronics Engineering. She addressed the gathering about the objectives of IEEE, and the benefits of being an IEEE member and provided several insightful details. After being inspired by the words of wisdom, the participants were all set to begin the event. An event technical debate- conducted titled "Model Phoebus Cartel-Second Edition". The event saw more than 20 teams registering across departments and years of study. The registered teams were assigned to a company from an industrial domain. After scoring the teams and tallying the overall scores the winners and runners were awarded a memento, certificate, and a cash prize of Rs.1500.





## Institution Innovation Council (IIC- SVCE)

IIC-SVCE organizes a field visit in association with Entrepreneurship Promotion and Incubation Centre (EPIC-SVCE) for Exposure and problem identification to IIT Madras Research Park, Taramani on 13.03.2023. A total of 50 students (5 Students from each department's) and 7 faculty members attended the field visit. It was led by the coordinators of IIC SVCE. The five students along with EEE Dept. IIC Coordinator Mr. Bharadwaj S attended the visit. Sharath Kumar, Aniruddh, Dhanya Kumar, (III Year) and Bharath & InfantVimal of (II Year) attended the field visit.

<b>SRI VENKATESWARA COLLEGE OF ENGINEERING</b> <b>INSTITUTION INNOVATION COUNCIL</b> (IC201810371- IIC SVCE Chennai) in association with <b>ENTREPRENEURSHIP PROMOTION AND INCUBATION CENTER (EPIC- SVCE)</b> Organizes <b>EXPOSURE AND FIELD VISIT FOR PROBLEM IDENTIFICATION</b> (Quarter-I IIC Calendar(Level-3) Activity) @ <b>IIT Madras Research Park, Taramani, Chennai-600113</b>			
Date: 13-03-2023, Time: 09:00 A.M Venue: IITM Research Park, Taramani, Chennai-600113			
Dr.S.Haiyavel, Dr.S.Natarajan, Mr.M.Athappan, Coordinators, IIC SVCE Chennai		Dr.KR.Santha President, IIC SVCE Chennai	
		Dr.S.Ganesh Vaidyanathan Principal	



## Industry Institute Interaction Cell

Industry Institute Interaction Cell of the Electrical and Electronics Engineering organized a meeting with industrial expert Dr. V. S. SrirajaBalaguru, TANGEDCO, Dr. J. Balamurugan, Senior Manager, TEDA, and Mr. P. G. Kamalakannan, Konstrakt Infratech for Regulation 2022 curriculum design. Dr. R. Kannadasan listed out the Industrial objectives framed by the Institute and the agenda of the meeting. Dr.KR.Santha, Prof & Head discussed the expected support from the industry. Dr.V.S. Sriraja Balaguru suggested that to create integrity among various courses, and the student must able to work in a multi-disciplinary domain. Dr. J. Balamurugan explained the importance of the Alumni club and to activate it efficiently. Also asked to get Industrial connectivity through Alumni. Mr.P.G.Kamalakaran suggested to take possible initiatives towards energy saving that can be implemented with the support of the students.



## INDIAN SOCIETY FOR TRAINING AND DEVELOPMENT

Indian Society For Training And Development Chennai Chapter - SVCE is conducting its first event for the pre-final year students. **“How to Build Yourself for an Interview?”**

On the 24<sup>th</sup> of March, 2023, the Indian Society for Training & Development Student Chapter of SVCE organized an event “How to build yourself for an interview”, for the pre-final year students.

The program began with a formal welcome address and the first session on “Resume Building” was delivered by Dr. T. Murugavel, HOD Department of Humanities and Social Sciences, SVCE. He enlightened the students on the difference between a resume and a cover letter and why the letter is also equally important. Also, he made clear how both the resume and cover letter should be structured and what contents will make a resume stand out from the others. Towards the end of the session, he also cleared the doubts put forth by the students. The second session “Facing Interviews” started with an introduction to the speaker, Mr. J. Vijayakumar, Chairman of the ISTD Chennai Chapter. He threw light on how the students must prepare well before an interview by getting to know about both, themselves and the organization.



## **Women's Day Celebration- 2023**

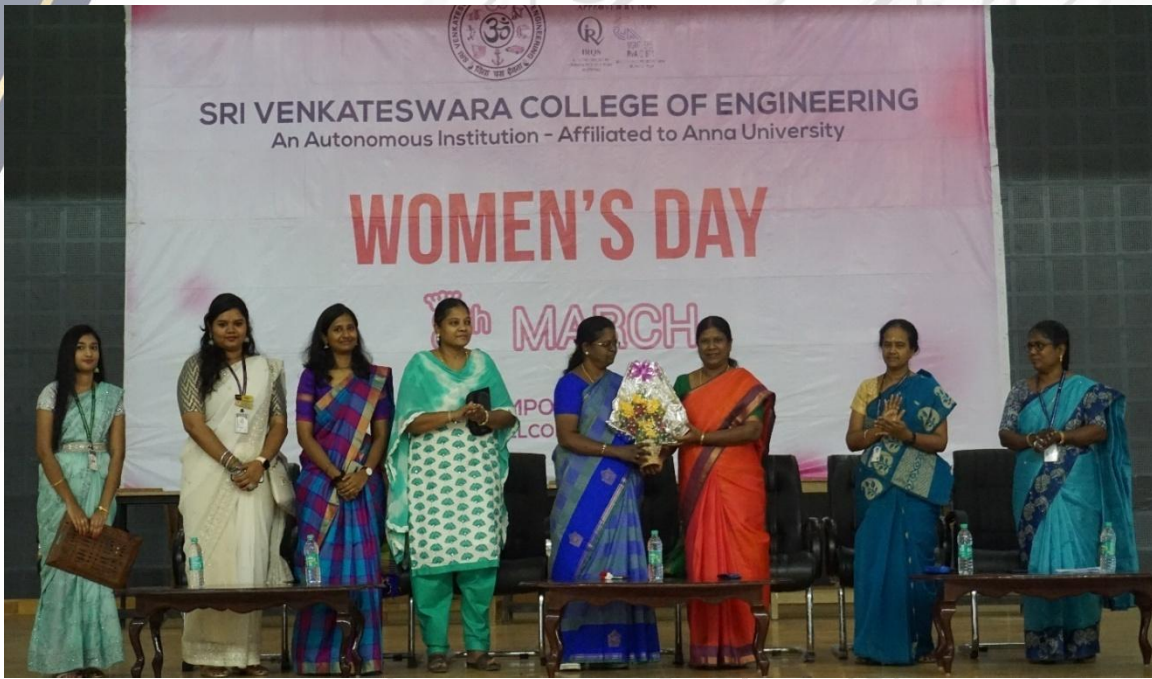
The WEC-SVCE commemorated International Women's Day 2023 on March 8 through a variety of activities for the female faculty members and students. Around 400 people attended the events and a vast number of female staff members and female students competed from all the departments.

The events took place in the Multi-Purpose Hall of the SVCE campus. The inaugural ceremony began around 10.00 AM and Ms. Vasanttha, III year INT, welcomed the attendees. Ms. Sahana, a II year CSE student initiated the event with a song of prayer.

Dr. KR.Santha, Vice Principal, WEC chairperson, and Head of the department of EEE gave a speech about being proud to be a woman after welcoming everyone and introducing the event's chief guest, Dr. Rosy Fernando, the founder of Startup Solutions in Chennai.

Dr. Rosy Fernando interacted with the audiences and delivered speech intended to inspire them. Students actively participated throughout her highly interactive talk.

After the events, the valedictory session began at 3.00 PM with a special dance and music programme by the music club, SVCE to entertain the students' gathered. The WEC, SVCE Chairperson awarded the certificates and cash prizes to the champions of all the competitions. Ms. Akshara, a third-year INT student and a student representative of the WEC, gave vote of thanks.



## Research Activity

Research scholar Mr.D.S.Purushothaman, AP/EEE (Reg. No. 1515399194) has presented his Pre-synopsis seminar titled as “Investigations on AN based FOPID Optimized Sensorless Control of BLDC Motor Drive” on 09.03.2023 (Thursday), at 10.00 AM in the Seminar Hall (Room No. 3108), Department of Electrical and Electronics Engineering, Sri Venkateswara College of Engineering, Sriperumbudur under the guidance of Dr.KR Santha, Professor &Head, EEE.

## SVCE Innovates 2023

Student research day was held on 30<sup>th</sup> March 2023, the event was inaugurated by Dr S Gunasekaran Dean (Research and Development), Founder President Indian – Spectrophysics Association, St Peter’s Institute of Higher Education, Avadi, Chennai. After inauguration Project display / demonstration by the students of EEE was carried out in function hall. Nearly 25 teams with 75 students from the department participated. Dr Nalin Kant Mohanty Professor, EEE evaluated the project and first three places were announced.

### Details of winners are given below

S.no	Name of students	Title of Project	Position	Name of Mentor
1.	Deepak H JassimAhemed R Bharathwaj P	Dynamic wireless charging for Electric Vehicles	1 <sup>st</sup> Place	Dr. Kumaravel S, Associate Professor
2.	Harini N Hareesh V Ashwanthrm T	Emergency traffic controller	2 <sup>nd</sup> Place	Dr. Shanmugavadiivu N, Asst. Professor
3.	KarthikeyanP Srihari R Yuvaraj M	Integrated renewable energy charging system for Electric Vehicles	3 <sup>rd</sup> Place	Dr. Gopinath C, Associate Professor

## Publications

Shivadharshini A, Snekha SL, Vignesh V, KR Santha, Sasikala M, Sudhakar K Bharatan published a journal paper “Design and fabrication of miniaturized DC-DC converter on Silicon Substrate” in Materials Today: Proceedings 2023, ISSN 2214-7853, DOI: 0.1016/j.matpr.2023.02.308



Shivadharshini A



Snekha SL



Vignesh V



KR Santha



Sasikala M



Sudhakar K Bharatan

materialstoday:  
PROCEEDINGS

Available online 6 March 2023



In Press, Corrected Proof [What's this?](#)

## Design and fabrication of miniaturized DC-DC converter on silicon substrate

[Shivadharshini A](#), [Snekha SL](#), [Vignesh V](#), [KR. Santha](#), [Sasikala M](#), [Sudhakar Bharatan](#)

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<https://doi.org/10.1016/j.matpr.2023.02.308>

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### Purpose:

Miniaturized DC-DC converters based on integrated IPDs can prove crucial in driving many such autonomous micro-systems for portable IoT based



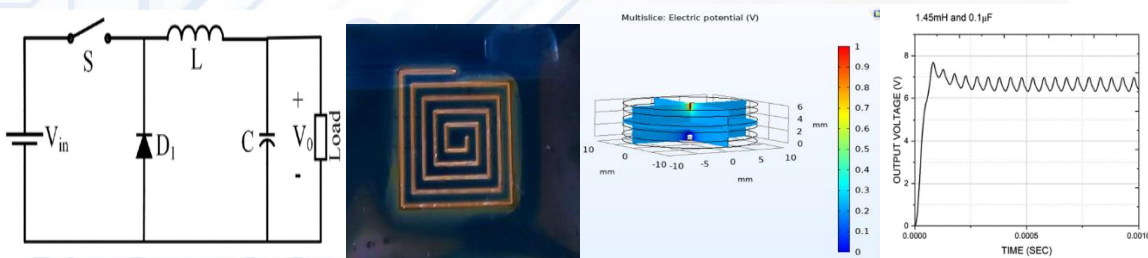
microelectronic and EV applications. This work mainly focuses on miniaturization of converter replacing bulky reactive components, thereby reducing the size of the converters, as well as achieving switching speeds in the range of  $>20$  MHz.

Methods:

In this research work, we first started with the mathematical design of the inductor and capacitor for low power DC-DC buck converter. The physical modeling of micro-inductor and micro-capacitor have been carried out using COMSOL Multiphysics software, followed by the fabrication of micro-inductor on a silicon substrate using RF sputtering technique. Finally simulated a miniaturized DC-DC converter in Proteus using the micro-inductor and capacitor values obtained in COMSOL based model and fabricated inductor values.

Device structure:

The planar square spiral inductors of  $1\text{cm} \times 1\text{cm}$  dimension with varying inductance values are modeled using the COMSOL software. The capacitor is modeled with  $0.1\ \mu\text{m}$  thick dielectric material sandwiched between two copper metal plates. RF sputtering technique is used to deposit Cu conductor for the micro-inductor of DC-DC converter. Planar copper is deposited over  $\text{SiO}_2/\text{Si}$  substrate with the help of a shadow mask.



**Circuit Diagram of DC-DC Fabricated Inductor on Capacitor Model using Converter output**

## Results:

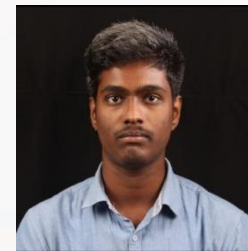
- Passive components are physically modeled using the COMSOL Multiphysics tool, resulted in the capacitor and inductor values of 611 nF and 0.5  $\mu$ H, respectively.
- Micro-inductor has been fabricated using RF sputtering which resulted in an inductor value of 0.1 nH.
- Based on the inductor design values, the circuit has been virtually simulated in Proteus software, an output voltage of 6.6 V and a rated power of 858 mW has been obtained, whereas, the fabricated inductor resulted in an output voltage of 9 V and a rated power of 171 mW.
- Rishi Kumar D, Yuvakishore K, Vignesh P, Sasikala M and Sudhakar K Bharatan published a journal paper “Modeling and simulation of Ga<sub>2</sub>O<sub>3</sub> thin film solar blind UV photodetector” in Materials Today: Proceedings, 2023, <https://doi.org/10.1016/j.matpr.2023.03.060>.



Rishi Kumar D



Yuvakishore K



Vignesh P




Sasikala M



Sudhakar K Bharatan



## Modeling and simulation of Ga<sub>2</sub>O<sub>3</sub> thin film solar blind UV photodetector

[Rishi Kumar D](#), [Yuvakishore K](#), [Vignesh P](#), [Sasikala Muthusamy](#), [Sudhakar Bharatan](#)  

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<https://doi.org/10.1016/j.matpr.2023.03.060> [>](#)

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### Purpose:

The impact of optical properties of Gallium oxide being a wide band gap material as photodetector is investigated. A highly spectral selective PiN-structure thin film solar blind UV photodetector with ohmic contact is designed and analyzed to determine its responsivity, quantum efficiency, transmittance and absorptance parameters using COMSOL Multiphysics tool.

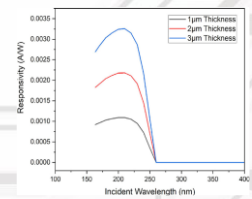
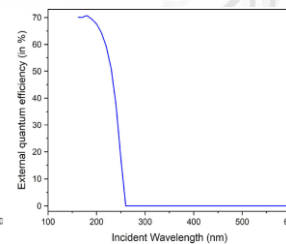
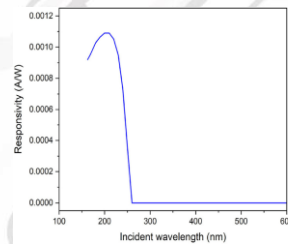
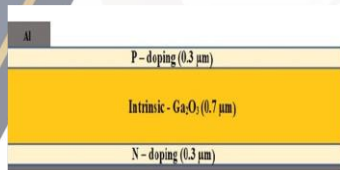
### Methods:

The device is simulated with 2 V reverse bias and 10  $\mu$ W incident power at room temperature as test condition. The electrical and optical parameters of the device such as doping profile, energy level, responsivity, EQE, and spontaneous emission are analyzed and reported. Study on metal contact depending on the work function of the material is carried out.

### Device structure and Results:

The 2D structure of the Ga<sub>2</sub>O<sub>3</sub> p-i-n based thin film photodetector with layer

thickness of  $1\mu\text{m}$  with p-doped region on the top of the device and n-doped region at the bottom with intrinsic region in between forming a p-i-n structure is designed.



## Device Structure Responsivity and EQE Vs Incident Wavelength Responsivity Vs Thickness

### Results:

- Under simulated test conditions of 2 V reverse bias and  $10\ \mu\text{W}$  of incident power,  $1\ \mu\text{m}$  thick  $\text{Ga}_2\text{O}_3$  photodetector exhibited responsivity in wavelength ranging from 100 nm to 260 nm, maximum responsivity of  $1.1 \times 10^{-3}\ \text{A/W}$  at 210 nm, and EQE of 70%. The photodetector shows higher Spectral selectivity in UV region with the minimal responsivity ( $10^{-9}$ ) in the visible and IR regimes.
- Active layers with thicknesses  $1\ \mu\text{m}$ ,  $2\ \mu\text{m}$  and  $3\ \mu\text{m}$ , exhibits responsivities of  $1.09\ \text{mA/W}$ ,  $2.18\ \text{mA/W}$  and  $3.25\ \text{mA/W}$ , respectively.
- $\text{Ga}_2\text{O}_3$  material system show ohmic behavior with Al and Mo metal contacts, and Schottky behavior for Au, Ni and Pt metal contacts.

## Faculty participation

- Dr. KR Santha Prof & Head, Vice Principal participated in the One day “Posh Awareness Programme” (Pervention of sexual Harassment ) held on 11<sup>th</sup> march at Meenakshi Sundararajan Engineering College, Kodambakkam, Chennai.
- Dr.N K Mohanty, Professor has successfully completed a NPTEL online certification course on “Python for Data Science “and received certificate.
- Bharadwaj S, Asst Prof, Dr KR Santha Prof & Head, Vice Principal and Ms. Arulmozhi S, Asst Prof, presented a paper titled "Design and analysis of integrated dual input dual output dc-dc converter for electric vehicle applications" in the 9th international conference on electrical energy systems (ICEES - 2023) organized by department of EEE, SSN college of engineering, Kalavakkam, during March 23-25, 2023.
- Dr S Kumaravel, ASP and Dr R J Venkatesh, Asst Prof, went on a industrial visit to Siemens Gamesa, Marimalainagar on 3.3.2023 through PALS.
- Ms.K Suganthi, Asst Prof, participated and completed 5 days online FDP on “Special Electrical Machines” conducted by NITTTR, Chennai.

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**NEWSLETTER**

**EDITORIAL TEAM**

**Dr. KR. Santha, Vice Principal & HOD/EEE**

**Dr. Sudhakar K Bharathan, AHOD/EEE**

**Dr. R. Karthikeyan, ASP/EEE**

**Ms. S. Sinthamani, Asst Professor/EEE**

**Ms. K. S Pavithra, Asst Professor/EEE**

**Mr. S. Sabari & Ms. N. Harini, III year/EEE**