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THE SPARK

Igniting Innovations

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS
ENGINEERING

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA (A)
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

Inside

INTERNSHIPS

The following IV B.Tech students of EEE Department, have been selected for the 4-2 Full semester (4 months) internship at Reputed companies.

Name of the company	Number of students
TATA STEELS LIMITED, KHARAGPUR	1 - (22021A0217)
NRSC ISRO, HYDERABAD	1- (22021A0248)
SCHINDER ELECTRIC INDIA PRIVATE LIMITED, CHENNAI	5 - (22021A0222, 233, 234, 249, 23025A0258)
DRDL, HYDERABAD	3 - (22021A0212, 243, 23025A0256)
SOUTH CENTRAL RAILWAY, VIJAYAWADA	1 - (23025A0259)
ECIL, HYDERABAD	1 - (22021A0221)
ADANI CEMENT, KRISHNAPATNAM	1 - (22021A0224)
RANE MADRAS LIMITED, HYDERABAD	4 - (22021A0235, 238, 239, 23025A0254)
ENDAVA SOLUTIONS	1- (22021A0229)
MEGAVIZ TECHNOLOGIES PRIVATE LIMITED, HYDERABAD	1 - (22021A0207)
VOZIQ INDIA LIMITED, HYDERABAD	1 - (22021A0218)
DECCANR AUTOMOTIVE PRIVATE LIMITED, HYDERABAD	2 (22021A0215, 240)

Name of the company	Number of students
CRITZO TECH PRIVATE LIMITED, HYDERABAD	1 - (22021A0206)
PIL, MUMBAI	1 - (22021A0236)
S.R. ENGINEERING ENTERPRISES, HYDERABAD	1 - (22021A0246)
INDPOWER, VISAKHAPATNAM	4 - (22021A0211, 223, 23025A0260, 261)
SRI LATHA TRANSFORMERS, VISAKHAPATNAM	5 - (22021A0203, 216, 244, 250, 23025A0257)
FINCH SOLAR POWER PRIVATE LIMITED, TANUKU	4 - (22021A0245, 23025A0264, 265, 266)
AIM TECHNOLOGIES, KAKINADA	5 - (22021A0226, 227, 228, 237, 23025A0263)
KRIFY SOFTWARE TECHNOLOGIES PRIVATE LIMITED, KAKINADA	1 - (22021A0251)
TRONTECH LABS PRIVATE LIMITED, KAKINADA	6 - (22021A0208, 209, 225, 232, 241, 23025A0255)
SV GLOBAL SERVICES, HYDERABAD	1 - (21021A0233(R.A))
SRINIVAS ELECTRICALS, KAKINADA	5 - (22021A0202, 213, 214, 220, 23025A0267)

FACULTY APPRECIATION

- Dr. K. Ravindra, Professor of EEE, Director of IQAC & Capacity Building, JNTUK, was honored with a Letter of Appreciation by Aditya College of Engineering & Technology, Surampalem, for delivering an expert session during the Two-Day Hands-on Workshop on "**Electric Vehicle Modelling and Distribution Systems Planning using MATLAB**" held on 19th February 2026. The session provided valuable insights into electric vehicle modelling, distribution systems, and their real-world industrial applications.

FDPS ATTENDED

- Sri N. Sagar Teja, Assistant Professors(C) of the Department of Electrical & Electronics Engineering, participated in the One-Day Faculty Development Program (FDP) on "Multi-level Inverter Fed Multi-phase Electric Motor Drives for Electric Vehicle Applications" organized by the Department of Electrical Engineering, National Institute of Technology Andhra Pradesh (NIT AP), under the sponsorship of the Anusandhan National Research Foundation (ANRF), Government of India.
- Dr. V. Shanmukha Naga Raju participated in the 6-Day AICTE-ATAL Faculty Development Program on "Advanced Perspectives in IoT" organized by the Government College of Engineering, Aurangabad, from 09 February 2026 to 14 February 2026, gaining insights into emerging Internet of Things technologies and applications.
- Dr. V. Shanmukha Naga Raju attended the Two-Week Faculty Development Program on "Internet of Things and Edge AI" organized by the Electronics & ICT Academy, NIT Warangal, in association with UCEK, JNTUK, from 20 February 2026 to 01 March 2026, enhancing his knowledge of IoT systems, Edge AI, and their real-world applications.

WORKSHOPS

- The ISEA Project Phase-III Workshop titled "Smart Tech, Safe Choices – Exploring the Safe and Responsible Use of AI" was conducted on 10 February 2026 at the Alumni Auditorium, UCEK, JNTUK, Kakinada. The workshop aimed to create awareness among UG and PG students about the ethical and responsible use of Artificial Intelligence, data privacy, safety, and cybersecurity under the Information Security Education and Awareness (ISEA) Project. The program featured expert lectures, interactive sessions, and student engagement activities, providing participants with valuable insights into the safe and responsible adoption of emerging AI technologies.
- M.Tech students, research scholars and faculty members from EEE department attended Two-Day Hands on Workshop on "EV System Design Using MATLAB and Simulink" from 06 February 2026 to 07 February 2026, organized by Department of EEE in association with Arkance Mathworks. The two-day workshop schedule delivers a comprehensive progression from foundational vehicle modeling to advanced power architecture.

R407C AS A SUSTAINABLE ALTERNATIVE SF6 IN HIGH VOLTAGE APPLICATIONS

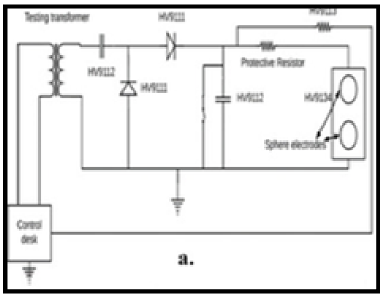
Introduction

SF6 is widely used in high-voltage equipment because of its excellent dielectric strength and arc-quenching ability, but its high global warming potential and long atmospheric lifetime have encouraged the search for environmentally safer alternatives. This study investigates R407C, alone and mixed with air and CO, as a potential replacement for SF6 in high-voltage insulation systems. AC and DC breakdown tests were performed using a sphere-electrode setup under different pressures and gas mixing ratios.

The results show that increasing the proportion of R407C improves breakdown voltage in R407C-air mixtures, while R407C-CO mixtures provide even better dielectric performance in selected conditions. Self-recoverability tests also showed that the gas retained acceptable insulating behavior after repeated breakdowns, although performance declined after many discharges due to electrode carbon deposition.

- **Why R407C is chosen over SF6 ?**

Gas-insulated electrical systems require insulating media with high dielectric strength, and SF6 has long been the preferred gas because of its outstanding electrical performance. However, SF6 is also one of the most harmful greenhouse gases, which has led researchers to search for alternatives that can reduce environmental impact without sacrificing too much performance. Many candidate gases and mixtures have been investigated, including air, nitrogen, carbon dioxide, and several fluorinated compounds, but each has limitations such as lower breakdown strength, toxicity, or high liquefaction temperature.



a.

The circuit diagram for R407C is a refrigerant blend that is non-toxic, non-flammable, and has zero ozone depletion potential. Because of these characteristics, it has gained interest as a possible insulating gas for high-voltage equipment. In this study, the authors evaluate whether R407C, both alone and mixed with air or CO, can provide insulation performance close to SF6 while offering better environmental compatibility.

Experimental Method

The experiments were carried out using a TERCO high-voltage test arrangement designed for AC and DC breakdown measurements.

The setup as shown in Fig. b included a control desk, high-voltage transformer, pressure vessel, and sphere electrodes with a 20 mm diameter - based procedures.

The gas chamber allowed the researchers to vary pressure and observe the voltage at which electrical breakdown occurred. The tests were performed according to IEC

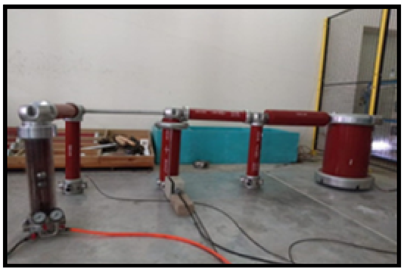


Fig. b

Discussion

The breakdown voltage increased as the percentage of R407C in the air mixture increased. This means the gas mixture became more resistant to electrical breakdown with more R407C added. In favourable cases, the R407C-air mixture reached about 0.85 to 0.90 times the breakdown strength of SF6, which is a strong result considering that air alone has much lower dielectric strength. The improvement is linked to the electronegative nature of R407C, which allows it to capture free electrons and reduce the likelihood of ionization and discharge. The R407C-CO mixtures also showed promising behaviour. In particular, the 80/20 ratio produced strong AC and DC breakdown performance under certain pressures. This suggests that CO can work well with R407C to improve the overall insulating behaviour of the mixture. The results indicate that optimized gas blending can significantly affect dielectric performance. Self-recoverability was good in the early breakdown shots, but the dielectric strength started to decline after repeated discharges because of carbon deposits on the electrodes. This shows that while R407C is promising, long-term surface effects must still be addressed before practical use.

Conclusion

This study demonstrates that R407C is a strong candidate for partial replacement of SF6 in high-voltage applications. R407C-air and R407C-CO mixtures showed better dielectric performance than air alone, and in some conditions approached SF6-level breakdown strength.Further work should focus on long-term stability, optimization of mixture ratios, and practical performance in real equipment.

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ENERGY STORAGE TECHNOLOGIES FOR A SUSTAINABLE FUTURE

The rapid growth of renewable energy sources such as solar and wind power has transformed the global energy landscape. However, renewable energy generation is often intermittent because sunlight and wind are not always available. Energy storage technologies play a crucial role in overcoming this challenge by storing excess energy and supplying it when needed.

Energy storage systems improve grid reliability, reduce dependence on fossil fuels, and support the transition toward a cleaner and more sustainable energy future. These technologies act as a bridge between energy generation and consumption, ensuring a continuous and stable power supply.

Fig.01: Energy storage system

WHAT IS ENERGY STORAGE?

Energy storage refers to the process of capturing energy produced at one time and storing it for use at a later time. It helps balance electricity supply and demand, enhances energy security, and increases the efficiency of renewable energy systems. Energy storage technologies are becoming essential components of modern power systems, electric vehicles, smart grids, and industrial applications.

KEY FEATURES OF ENERGY STORAGE

- **Renewable Energy Integration**: Energy storage allows excess solar and wind energy to be stored and utilized during periods of low generation.
- **Grid Stability:** It helps maintain a stable electricity supply by balancing fluctuations in energy demand and generation.
- **Peak Load Management**: Stored energy can be used during peak demand periods, reducing stress on power grids.
- **Energy Independence**:Communities and households can generate, store, and use their own electricity.
- **Emergency Backup:** Provides uninterrupted power supply during outages and natural disasters.

MAJOR ENERGY STORAGE TECHNOLOGIES

- **Lithium-ion Batteries**:Widely used in electric vehicles and renewable energy systems due to their high efficiency and energy density.
- **Pumped Hydro Storage**:Stores energy by pumping water to elevated reservoirs and generating electricity when water flows back down.
- **Flow Batteries**:Use liquid electrolytes stored in external tanks, making them suitable for large-scale energy storage.
- Thermal Energy Storage:Stores heat or cold energy for later use in industrial and residential applications.
- Flywheel Energy Storage:Stores energy in a rotating mass and delivers rapid power response when required.

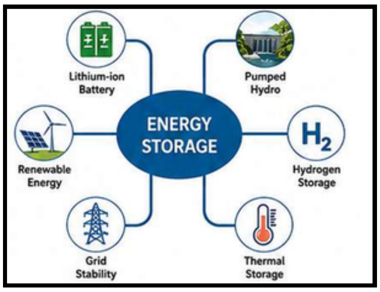

Fig.02: https://www.iea.org/topics/energy-storage

CHALLENGES OF ENERGY STORAGE

- **High Initial Cost**: Advanced battery systems and storage infrastructure require significant investment.
- **Limited Lifespan**: Some storage technologies experience performance degradation over time.
- **Resource Availability**: Battery manufacturing depends on materials such as lithium, cobalt, and nickel, which may have supply constraints.
- **Safety Concerns**: Improper handling or system failures can lead to overheating and fire hazards.
- **Recycling Issues**: Proper disposal and recycling of storage components remain major challenges

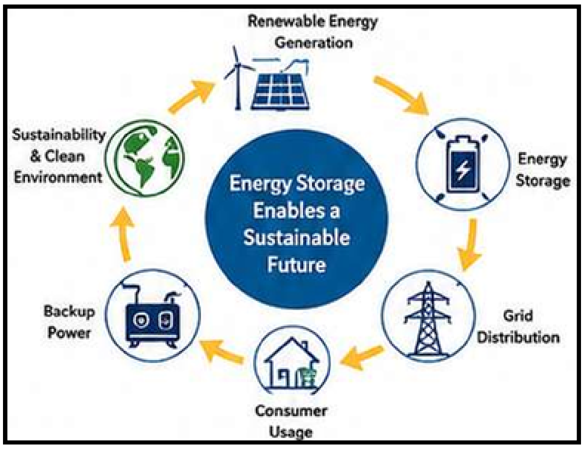

Fig.03: https://www.nrel.gov/research/energy-storage.html

CONCLUSION

Energy storage technologies are fundamental to achieving a sustainable energy future. They enhance renewable energy utilization, improve grid reliability, and support environmental conservation. Continuous research and technological advancements making energy storage an essential pillar of modern energy systems. As the world moves toward cleaner energy solutions, energy storage will play a vital role in ensuring a resilient, reliable, and sustainable power infrastructure.

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ARTIFICIAL INTELLIGENCE IN ELECTRONICS

What is Artificial Intelligence in Electronics?

Artificial Intelligence refers to the ability of machines to simulate human intelligence, such as learning, reasoning, problem-solving, and decision-making. Another important area is healthcare electronics, where AI-powered devices assist in diagnosis, monitoring, and treatment. Wearable devices can track vital signs and alert users or doctors in case of abnormalities.

Advantages of AI in Electronics

- Improved efficiency: Devices can perform tasks faster and more accurately.
- Automation: Reduces human effort and increases productivity.
- Personalization: Devices adapt to user preferences.
- Better decision-making: AI systems analyze large amounts of data quickly.

Challenges and Limitations

Despite its advantages, AI in electronics also faces challenges. High development costs, data privacy concerns, and the need for large datasets are major issues.

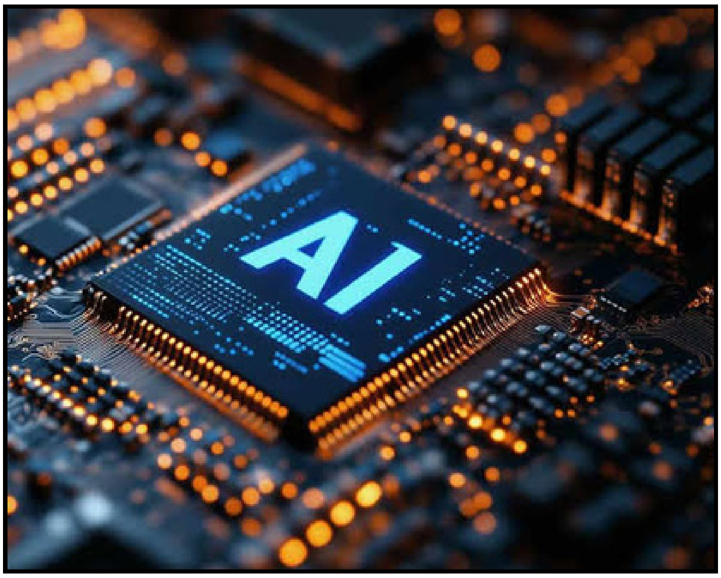

Fig.01: AI MICROPROCESSOR CHIP

Additionally, AI systems require significant computational power, which can increase energy consumption.

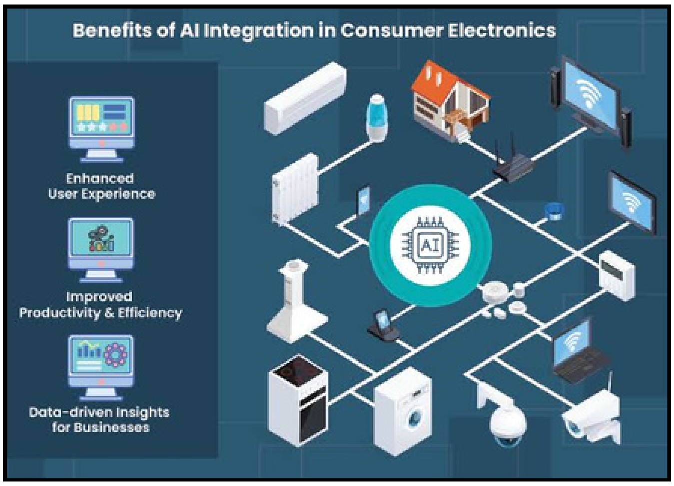

Fig.02: Benefits of AI Integration in consumer electronics

Future Scope

The future of AI in electronics is promising. With advancements in technologies like the Internet of Things (IoT) and 5G, AI-enabled devices will become more interconnected and intelligent. Smart homes, autonomous vehicles, and advanced robotics are expected to become more common, further integrating AI into everyday life.

Conclusion

Artificial Intelligence is revolutionizing the field of electronics by making devices smarter, more efficient, and user-friendly. As technology continues to evolve, the integration of AI in electronics will expand, leading to innovative solutions and improved quality of life. However, addressing challenges like privacy and energy consumption will be crucial for sustainable growth.

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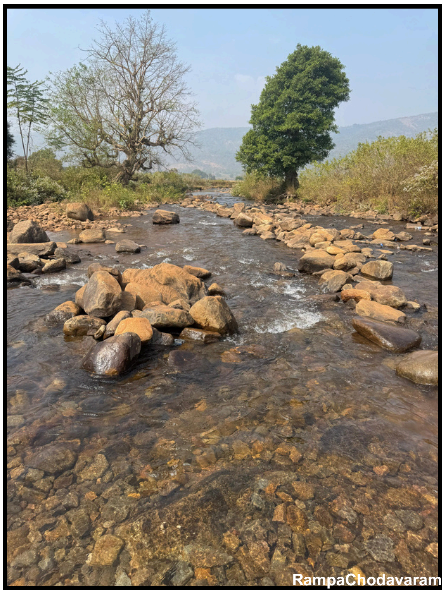

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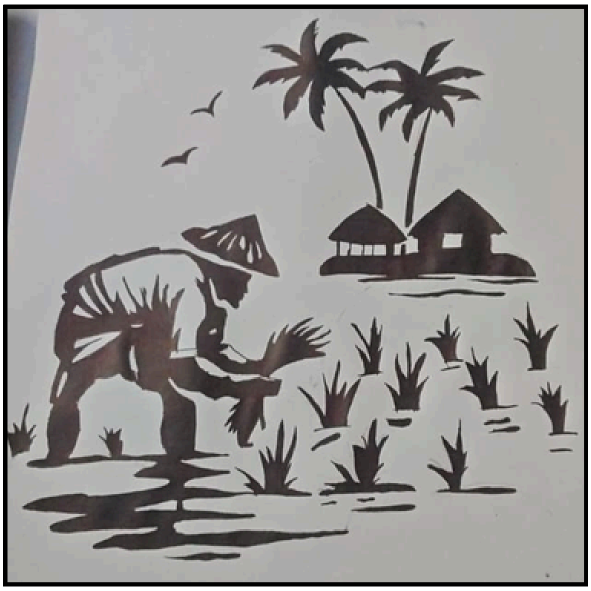

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