



C.V. RAMAN | BHUBANESWAR
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Academic
year

ELECTRO SPARK

2025-26

Annual Magazine
of the Electrical Engineering Department

Message From Dignitaries

Message from founder and president

Welcome to this latest issue of our magazine, a publication that serves as a vital chronicle of our collective journey and unwavering commitment to Excellence. Looking back on our path from a founding vision to the vibrant reality we see today, I am filled with immense pride in the remarkable dedication, resilience, and ingenuity displayed by our entire team. Within these pages, you will find stories that not only showcase our recent achievements but also reflect the core values that continue to propel us forward. I extend my deepest gratitude to all our stakeholders for their continued support, and as we embrace the opportunities on the horizon, let us remain united in our purpose and inspired by the possibilities that lie ahead.

*Shri Sanjiv
Rout*



Founder &

President

C.V Raman Global University

*Bidyanagar , Mahura Janla,
Bhubaneswar , Odisha*

Message from principal

Er. R.K Prusti



Principle

C.V Raman polytechnic

*Bidyanagar, Mahura, Janla,
Bhubaneswar,*

It gives me immense pride and pleasure to present this year's edition of ELECTRO-SPARK, the annual magazine brought forth by the Department of Electrical Engineering at C. V. Raman Polytechnic, Bhubaneswar. A dynamic educational environment is built not just on rigorous academic curricula, but on the creative and technical expressions of its students and faculty. This magazine serves as a brilliant canvas showcasing the innovative ideas, technical powers, and holistic development of our future engineers. As the field of electrical engineering continues to be the backbone of sustainable development and modern technology advancement, it is highly encouraging to see our students actively engaging with these evolving paradigms.

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The Editorial Board takes immense pride in presenting the 2025-2026 edition of 'ELECTRO-SPARK'. This publication captures the vibrant academic spirit, technical prowess, innovative research projects, and creative reflections of students and faculty members from the Department of Electrical Engineering at C. V. Raman Polytechnic, Bhubaneswar.



Department of electrical engineering

C.V . Raman polytechnic, Bhubaneswar

Vision

To develop technically skilled Electrical Engineers contributes to sustainable development and technological advancement.

Mission

To Implement an effective -learning-earning process to develop skilled electrical engineers.

To provide technical and entrepreneurial skills to students to make them ready to be placed in Industry.

Encouraging the students to pursue higher education and career -oriented courses.

Developing the students as well as responsibility towards environment and society

Program outcome

01. Basic and Discipline specific knowledge : Apply mathematics, science and engineering fundamental to solve solve the engineering problems.

PEO4: To understand the ethical implications of engineering decision and act with professionalism in all aspects of their work.

02. Problem analysis: Identify and analyse well defined engineering using codified standard methods.

03. Design/development of solutions: Design solutions for well-defined technical problems and assist with the design of system components or processes to meet specified needs.

04. Engineering Tools, Experimentation and testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

6. Project management: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well defined engineering activities.

07. Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

Program educational objectives (PEO)

PEO1: To learn the fundamentals of electrical engineering in order to study and analyse electrical systems.

PEO2: To use analytical and critical thinking to recognize and resolve problems in electrical engineering.

PEO3: To demonstrate proficiency laboratory, ensuring safe and effective use of electrical equipment and tools.

Program specific outcome (PSO)

PSO1: Ability to apply electrical engineering knowledge, skills for testing, control & maintenance of electrical systems such as Machines, Power system, Drives, & Automation.

PSO2: Ability to identify problems in the diversified area of electrical Engineering and determine the hardware or software solutions to support the society, Environmental & industrial needs.



Mr. Subhankar Dash

Head of department
Electrical

Message from(H.O.D)

It gives me immense pride to present this edition of ELETRO SPARK, a vibrant showcase of the academic milestones, creative endeavors, and innovative spirit that define the Department of ELECTRICAL ENGINEERING. Beyond being a chronicle of our accomplishments, this magazine stands as a testament to our ongoing commitment to fostering critical thinking, research, and holistic growth among our students.

Through the insightful articles, creative expressions, and remarkable achievements featured in these pages, you will witness the passion and intellect of our vibrant community, brought to life by the dedicated efforts of our student contributors, faculty, and editorial team. I extend my heartiest congratulations to everyone who contributed to making this publication a reality, and I hope this collection inspires you, sparks curiosity, and offers a meaningful glimpse into the life and heart of our department.

Message from faculty

It gives me great pleasure to be a part of ELECTRO SPARK ,the annual magazine of the Department of Electrical Engineering .This magazine reflects the creativity, learning, and achievements of our students. Electrical Engineering is a field where theoretical knowledge becomes meaningful through practical learning. I encourage students to strengthen their fundamentals, participate in technical activities, and develop the confidence to explore new ideas. I appreciate the sincere efforts of our students and faculty members in bringing this magazine together. I hope ELECTRO SPARK inspires students to keep learning,creating, and growing in their professional journey.

Mr. Rashmi Ranjan
Martha



Assistant professor

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It is a pleasure to be a part of ELECTRO SPARK, the annual magazine of the Department of Electrical Engineering. This magazine beautifully reflects the creativity, knowledge, and achievements of our students. I encourage every student to learn beyond textbooks, gain practical knowledge, participate in technical activities, and develop confidence in their ideas. The field of Electrical Engineering is constantly evolving, offering many opportunities to learn and innovate. I sincerely appreciate the efforts of the students and faculty members who contributed to this magazine. I hope ELECTRO SPARK inspires everyone to keep learning, creating, and moving forward.

Content	Page No.
1. Smart grid infrastructure and renewable energy integration: Technical foundation and future horizons .	08
2. Industrial automation: Powering the smart factory .	11
3. Power guard (smart electricity theft protection and automatic supply cut-off system).	15
4. Electric vehicle and their impact on modern power systems	18
5. The future of DC distribution systems	19
6. Waste to energy : Converting waste into electricity	20
7. Wireless power transmission : principles, applications and future possibilities	21
8. Energy-efficient building and smart electrical systems	22
9. Underground vs overhead power transmission	23
10. High voltage direct current (HVDC) : Revolutionizing long distance power transmission	24
11. Mo “maa” Mo “maa” Mo “maa”	25

Content	Page No.
12. <u>Where peace begins</u>	26
13. <u>Roots of stillness</u>	27
14. <u>Boy still miss her</u>	28
15. <u>Life is so unpredictable</u>	32
16. <u>What my canvas knows</u>	33
17. <u>Rangoli day (colours - creativity - celebration)</u>	34
18. <u>Drawing program</u>	36
19. <u>Our achievers</u>	39
20. <u>NSS programme (once a nss volunteers is always a nss volunteers)</u>	42
21. <u>Beti bachao, beti padhao</u>	43
22. <u>Tree plantation drive (plant today , protect tomorrow) / Project works , teachers day</u>	44

Smart Grid Infrastructure and Renewable Energy Integration: Technical Foundations and Future Horizons

1. Introduction and architectural paradigm shift

Traditional electrical power distribution systems were constructed around a centralized, unidirectional operational paradigm. Large fossil-fuel, nuclear, or hydroelectric power stations produced electricity at bulk scale, which was transmitted over high-voltage networks and distributed down to passive end-consumers. While this conventional model operated effectively for decades, the urgent global imperative to reduce greenhouse gas emissions has driven rapid deployment of Variable Renewable Energy (VRE) sources, primarily solar photovoltaic (PV) and onshore/offshore wind turbines.

Unlike traditional synchronous generators, VRE generation is inherently stochastic, weather-dependent, and geographically decentralized. Integrating significant volumes of intermittent clean energy into legacy power grids introduces severe operational challenges, including voltage fluctuations, bi-directional power flow in distribution feeders, and reduced system inertia. The smart grid—a digitally enabled, two-way energy and information ecosystem—serves as the critical infrastructure required to transform rigid utility networks into dynamic, self-healing grids capable of balancing supply and demand in real time.

2. Core Structural Components of Smart Grids

At its foundation, a smart grid merges physical electrical power equipment with advanced information and communication technologies (ICT), high-speed digital sensors, and automated control platforms. Key structural components include:

- Advanced Metering Infrastructure (AMI): Replacing legacy electromechanical meters, AMI establishes two-way communication between utility providers and end-users. Smart meters record granular consumption data, enabling dynamic time-of-use (ToU) pricing, demand response programs, and automated outage notification.
- Phasor Measurement Units (PMUs): Deployed across high-voltage transmission lines, PMUs measure voltage and current waveforms at high sampling frequencies (30 to 60 times per second). Synchronized using Global Positioning System (GPS) signals, PMUs deliver real-time synchrophasor data that enables operators to monitor wide-area dynamic stability and prevent cascading failures.
- Software integration platforms process real time data stream from intelligent electronic device across distribution substation ADMS platform automatically control voltage regulators, switch capacitor banks, and operate reclosers to maintain optimal power quality.

3. Enabling Technologies for Clean Energy Integration

To accommodate high penetration levels of variable renewable resources without sacrificing system reliability, smart grids deploy several interconnected technologies:

- **Battery Energy Storage Systems (BESS):** Utility-scale battery installations—utilizing advanced lithium-ion, sodium-ion, or flow chemistries—act as vital energy buffers. BESS absorbs excess renewable energy during peak production windows (e.g., mid-day solar abundance) and dispatches power during peak demand periods, smoothing generation profiles.
- **Grid-Forming Inverter Systems:** Solar aPV arrays and wind turbines connect to the grid via power electronic inverters. As conventional thermal power plants retire, the loss of heavy rotating turbines reduces mechanical inertia. Advanced grid-forming inverters synthesize 'virtual inertia' by controlling output voltage magnitude and phase, maintaining frequency stability in low-inertia power systems.
- **AI-Driven Predictive Forecasting:** Machine learning algorithms analyze satellite meteorology, cloud-cover dynamics, and historical generation patterns to forecast solar irradiance and wind speed with high localized precision. These forecasts allow grid operators to schedule reserve capacity efficiently and reduce operational costs.
- **Virtual Power Plants (VPPs) & Demand Response:** By aggregating geographically distributed energy resources (DERs)—including residential rooftop solar, localized battery storage, and electric vehicles (EVs)—VPP software coordinates thousands of distributed units to function as a single, dispatchable power plant that provides grid frequency regulation and demand management.

4. Technical Challenges and Mitigation Strategies

While smart grids enable unprecedented operational flexibility, several technical and structural hurdles must be actively managed:

- **Inertia Loss and Frequency Response:** The replacement of synchronous generators with inverter-based renewables increases the rate of change of frequency (df/dt) during sudden load changes. Deployment of fast-acting frequency response (FFR) from BESS and grid-forming inverters provides essential damping against frequency deviations.
- **Cybersecurity Infrastructure:** Connecting millions of edge devices, smart meters, and remote telemetry nodes significantly expands the potential cyber attack surface. Utility operators must implement zero-trust security architectures, end-to-end data encryption, and AI-driven anomaly detection to safeguard critical infrastructure.
- **Grid Modernization Capital Investment:** Upgrading legacy distribution substations and reinforcing transmission capacity requires substantial financial capital. Modern regulatory framework models must incentivize utilities to invest in digital software solutions, energy storage, and flexible dynamic line rating technologies.

5. Conclusion

The development of intelligent smart grids represents the foundational pillar of the global clean energy transition. By synthesizing digital connectivity, advanced power electronics, energy storage, and artificial intelligence, smart grids effectively convert the variable nature of renewable energy into a controllable, resilient, and secure asset. Continued investment in research, standardized communication protocols, and modern energy policy will ensure a sustainable, decarbonized electrical grid for generations to come.



Industrial Automation: Powering the Smart Factory

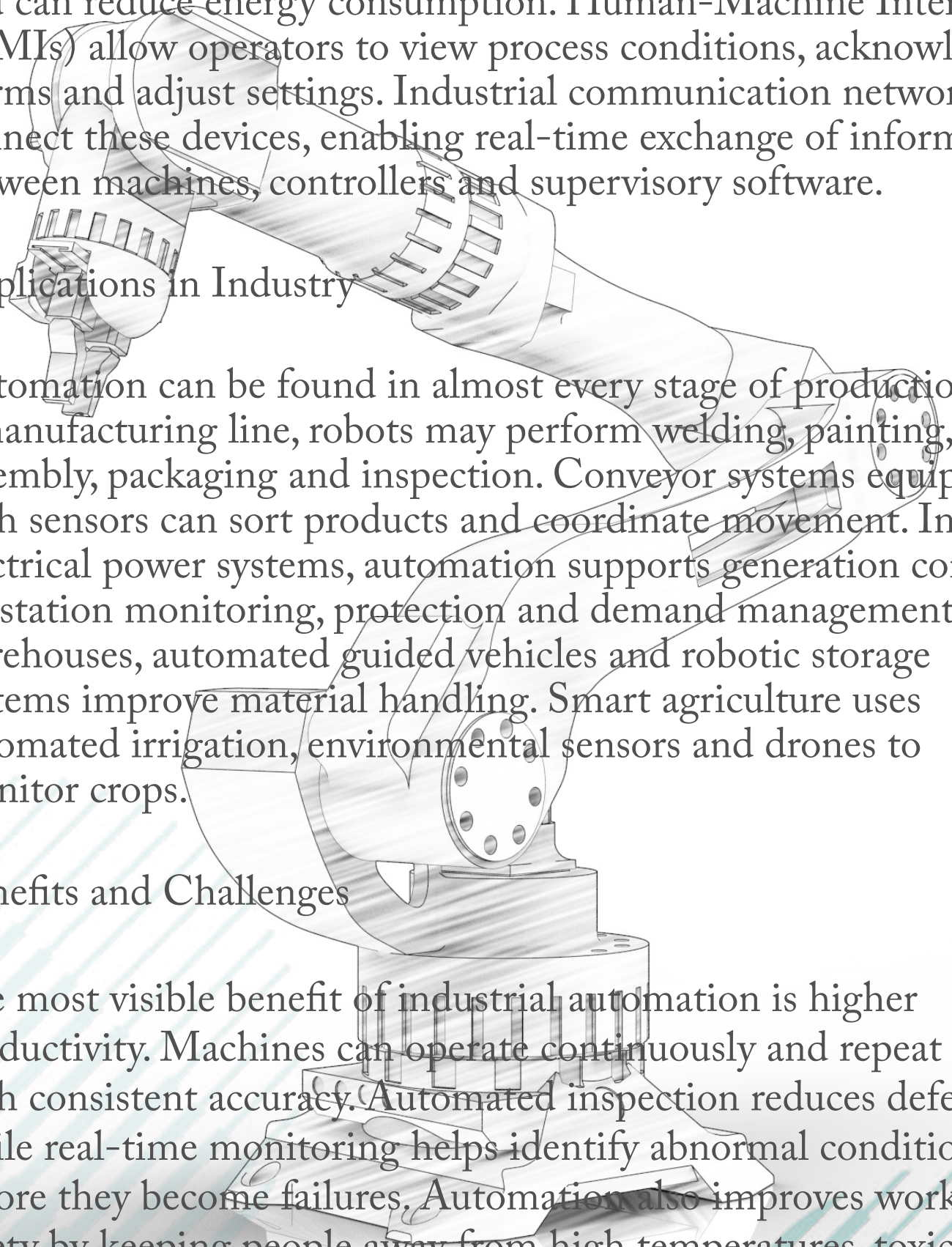
From manual control to intelligent, connected production

Introduction

Industrial automation is the use of control systems, computers, sensors, communication networks and software to operate industrial processes with minimum human intervention. It has transformed factories from labour-intensive workplaces into connected, data-driven production environments. Automation is now central to manufacturing, energy, transportation, water treatment, food processing and many other sectors. Its purpose is not simply to replace human effort; it is to improve safety, quality, productivity and decision-making.

Building Blocks of Automation

A modern automated system is made up of several coordinated layers. Sensors measure variables such as temperature, pressure, speed, position, flow and vibration. Controllers analyse these signals and generate commands. Programmable Logic Controllers (PLCs) are widely used because they are reliable, fast and suitable for harsh industrial conditions. Distributed Control Systems (DCS) are common in continuous-process industries such as power generation and chemical production, while Supervisory Control and Data Acquisition (SCADA) systems provide monitoring, data collection and supervisory control over large installations. Actuators convert control commands into physical action. Motors, valves, relays, pneumatic cylinders



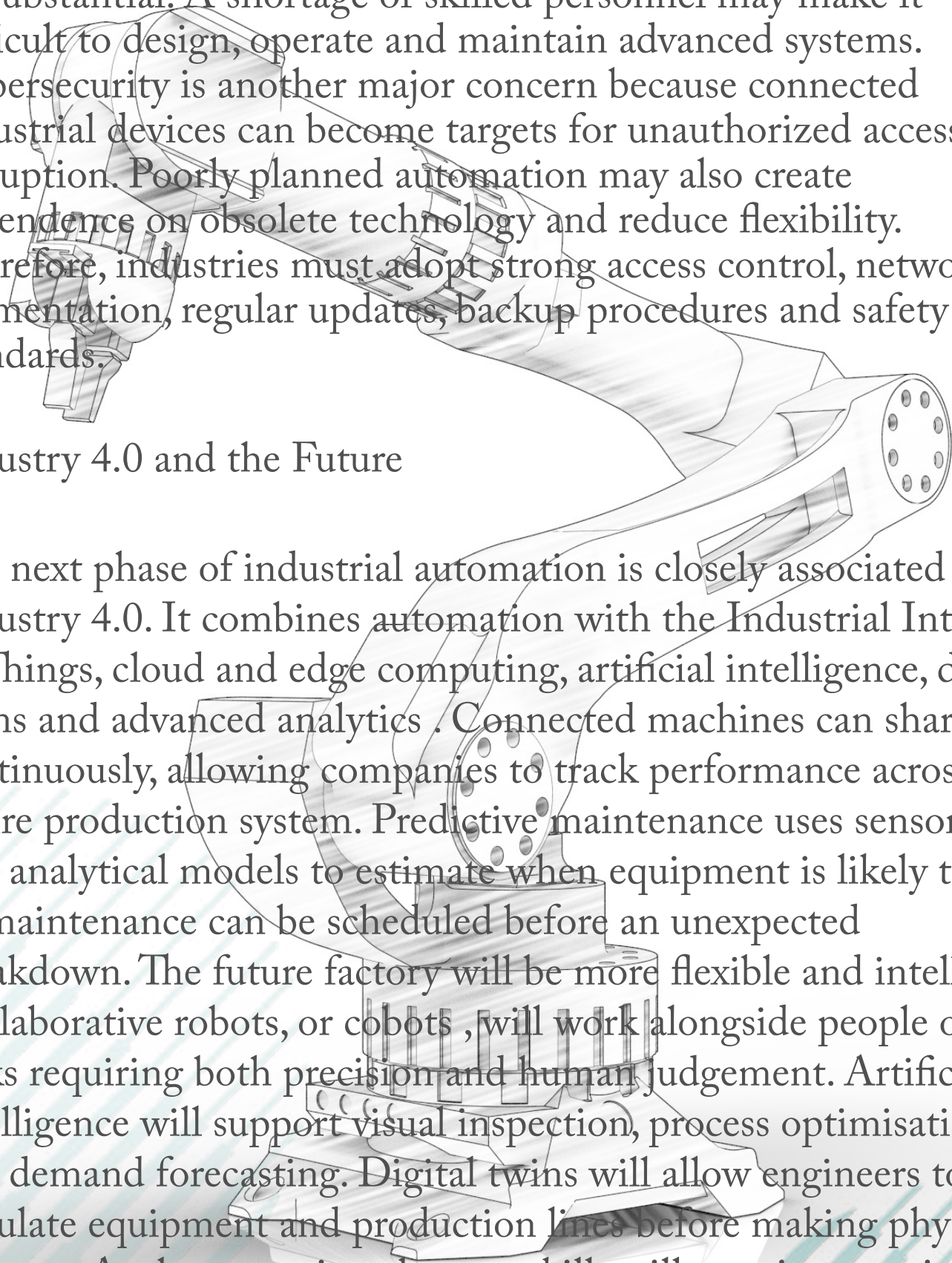
and hydraulic systems are examples of actuators used in industry. Variable Frequency Drives (VFDs) regulate the speed of motors and can reduce energy consumption. Human-Machine Interfaces (HMIs) allow operators to view process conditions, acknowledge alarms and adjust settings. Industrial communication networks connect these devices, enabling real-time exchange of information between machines, controllers and supervisory software.

Applications in Industry

Automation can be found in almost every stage of production. In a manufacturing line, robots may perform welding, painting, assembly, packaging and inspection. Conveyor systems equipped with sensors can sort products and coordinate movement. In electrical power systems, automation supports generation control, substation monitoring, protection and demand management. In warehouses, automated guided vehicles and robotic storage systems improve material handling. Smart agriculture uses automated irrigation, environmental sensors and drones to monitor crops.

Benefits and Challenges

The most visible benefit of industrial automation is higher productivity. Machines can operate continuously and repeat tasks with consistent accuracy. Automated inspection reduces defects, while real-time monitoring helps identify abnormal conditions before they become failures. Automation also improves workplace safety by keeping people away from high temperatures, toxic substances, heavy loads and moving machinery. Better process control can reduce waste, energy use and operating costs.



However, automation introduces important challenges. Initial investment in equipment, software, integration and training can be substantial. A shortage of skilled personnel may make it difficult to design, operate and maintain advanced systems. Cybersecurity is another major concern because connected industrial devices can become targets for unauthorized access or disruption. Poorly planned automation may also create dependence on obsolete technology and reduce flexibility. Therefore, industries must adopt strong access control, network segmentation, regular updates, backup procedures and safety standards.

Industry 4.0 and the Future

The next phase of industrial automation is closely associated with Industry 4.0. It combines automation with the Industrial Internet of Things, cloud and edge computing, artificial intelligence, digital twins and advanced analytics. Connected machines can share data continuously, allowing companies to track performance across an entire production system. Predictive maintenance uses sensor data and analytical models to estimate when equipment is likely to fail, so maintenance can be scheduled before an unexpected breakdown. The future factory will be more flexible and intelligent. Collaborative robots, or cobots, will work alongside people on tasks requiring both precision and human judgement. Artificial intelligence will support visual inspection, process optimisation and demand forecasting. Digital twins will allow engineers to simulate equipment and production lines before making physical changes. At the same time, human skills will remain essential. Engineers and technicians will need knowledge of electrical systems,

control engineering, programming, data analysis, safety and cybersecurity.

Conclusion

Industrial automation is a foundation of modern technological development. By combining sensors, controllers, machines, software and communication, it enables safer, faster and more reliable operations. Its successful implementation requires more than installing robots or computers; it demands careful planning, skilled professionals, ethical use of technology and continuous attention to cybersecurity and worker development. For college students, industrial automation offers a rich field of study and career opportunities in control systems, robotics, instrumentation, power systems, embedded systems and smart manufacturing. The engineers who understand both machines and data will help shape the factories of the future.

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Power guard

Smart electricity theft protection and automatic supply cut-off system

Introduction

Electricity theft and unauthorised power diversion are important challenge in electrical distribution system. Traditional systems may detect theft only after inspection or through energy-billing analysis. To address this problem, I am developed a prototype that can detect an abnormal difference between the current supplied and the current reaching the authorised load and automatically disconnected the supply.

Objective

The main objective of this project are:

- To detect possible unauthorised bypassing of electrical supply.
- To compare source-side and load-side current.
- To automatically disconnected the supply when an abnormal condition is detected.
- To provide indication when a possible theft/bypass condition occurs.
- To demonstrate how a Micro-control can be used for intelligent electrical protection.

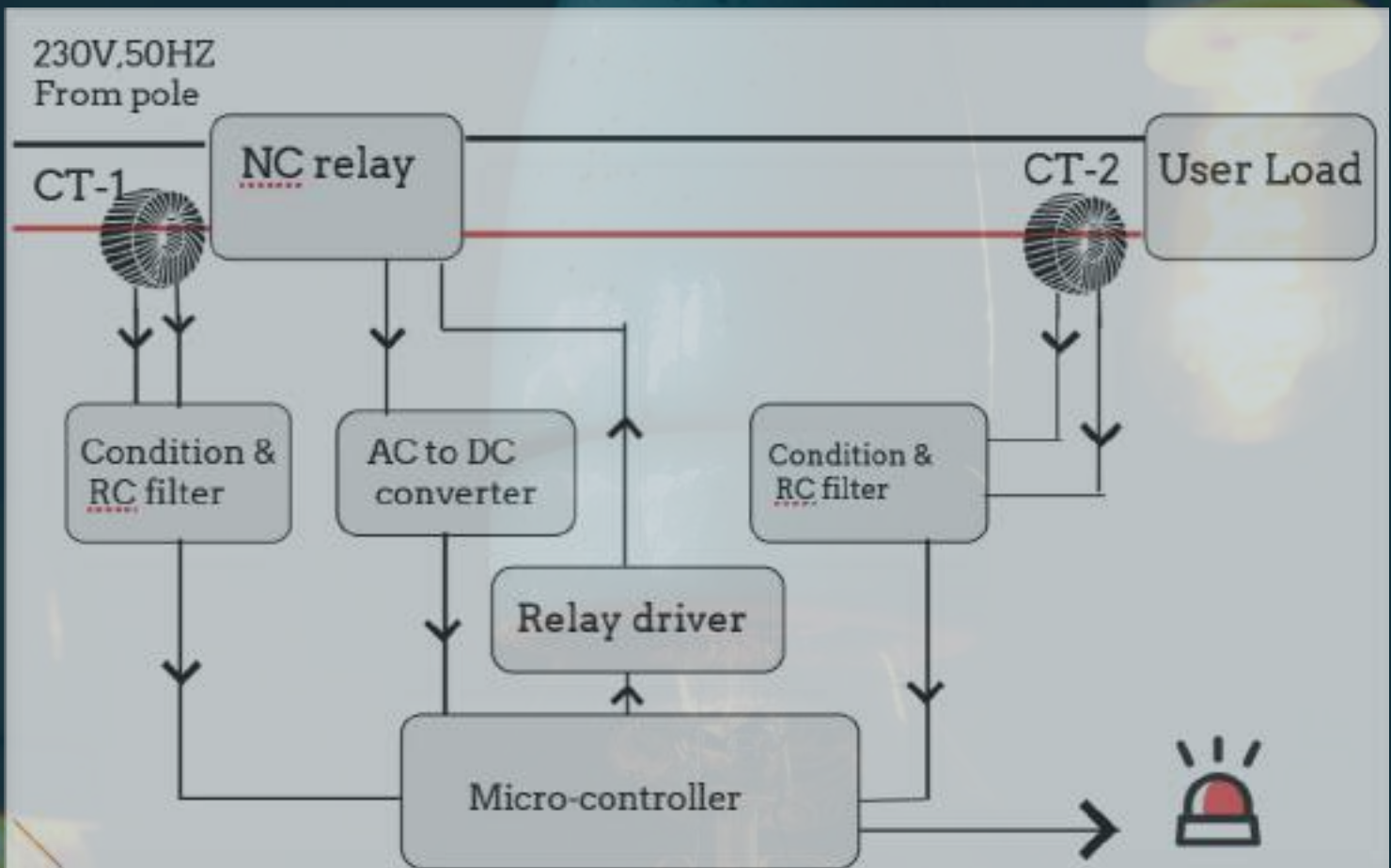
Construction

The proposed system is constructed using two current transformer, Micro-controller, relay driver, relay, isolated AC to DC power supply, and indicator.

CT-1 is installed on the source side to measure the current supplied to the system, while CT-2 is installed near the user side to measure the current reaching the authorised load. The output of both current transformer are connected to their respective signal conditioning and filter circuit to obtain suitable signals for the micro-controller.

An isolated AC to DC converter provides the required low voltage DC supply to the control electronics. The conditioned signals from CT-1 and CT-2 fed to the micro-controller which continuously compares the two measurements.

The micro-controller is connected to a relay driver, which controls an relay installed in the supply path. Under normal conditions the relay remains closed and the load receives power.



Working principle

The use two current transformer to monitor the electrical current at different points.

The Micro-controller then sends a signal to the relay driver. The relay operates and disconnects the supply to the load. At the same time, indicator Under normal operating condition the can be activated to show that an current measurements obtained from CT-1 and CT-2 remain within abnormal condition has been detected. the expected range. The Micro-controller continuously receives these signals after signal conditioning and compares them.

If an unauthorised bypass or current diversion course, the measured current relationship changes .When the difference exceeds predefined threshold for a specified time, the Micro-controller identifies it as an abnormal condition.

Advantages

1. Automatic detection of abnormal current condition.
2. Automatic supply cut-off.
3. Real time monitoring.

Major Components

Components		Function	
CT-1	measure source-side current	Micro-controller	Compare measurements and make decision
CT-2	measure load-side current	NC Relay	Disconnects the supply during an abnormal condition
RC filter	Reduce unwanted signal fluctuations/noise	Relay driver	Provide the required drive for the relay
signal conditioning circuit	Converter CT o/p into a suitable signal for the controller	Indicator	Indicates abnormal/ theft condition

Conclusion

This project demonstrates a practical approach to detecting possible electricity theft or unauthorised supply bypassing using current comparison

By combining CT-based sensing, signal conditioning ,a Micro-controller and an automatic relay mechanism, the prototype can detect abnormal condition and disconnect the supply.

Suman mehantry

Electric Vehicles and Their Impact on Modern Power Systems

The Transportation sector is undergoing a major transformation with the rapid growth of Electrical Vehicles (EVs). Powered primarily by rechargeable batteries, EVs offer an alternative to conventional vehicles that depend on petrol and diesel. Their increasing adoption can reduce dependence on fossil fuels and, when combined with renewable electricity, contribute to a cleaner and more sustainable energy system. However, the large-scale adoption of EVs also creates new challenges for modern power systems.

One of the major impacts of EVs is the increased demand for electricity. If many vehicles are charged simultaneously, especially during peak hours, the additional load can put stress on distribution transformers, feeders, and local power networks. It may also cause voltage fluctuations and increase power losses. Therefore, proper planning of charging infrastructure is essential for maintaining grid stability and reliability.

Smart charging provides an effective solution. Instead of charging vehicles whenever they are plugged in, smart charging systems can schedule charging according to electricity demand, grid conditions, and electricity prices. This can shift EV charging to off-peak periods and reduce pressure on the grid.

Another promising technology is Vehicle-to-Grid (V2G). In V2G systems, EV batteries can not only consume electricity but also supply stored energy back to the grid when required. With appropriate control systems, thousands of EVs could potentially operate as distributed energy-storage resources, supporting the grid during periods of high demand.

EVs can also strengthen the connection between transportation and renewable energy. Solar and wind power can be used to charge EV batteries, reducing the environmental impact of transportation. However, challenges such as charging infrastructure, battery degradation, grid upgrades, and cybersecurity must be addressed.



Ashutosh Sundaray

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Electrical

The Future of DC Distribution Systems

For more than a century, Alternating Current (AC) has been the dominant method for electricity distribution. However, the rapid growth of solar power, battery storage, electric vehicles, data centers, and electronic devices is creating renewed interest in Direct Current (DC) distribution systems. Modern DC networks can reduce unnecessary energy conversions and provide efficient power delivery for many applications.

A major advantage of DC distribution is that several modern technologies naturally operate on DC power. Solar photovoltaic panels and batteries produce and store DC electricity, while many electronic devices, LED lighting systems, computers, and telecommunications equipment ultimately use DC internally. In a conventional AC system, electricity may need to be converted between AC and DC several times, resulting in additional conversion losses. A suitable DC distribution system can reduce some of these conversion stages.

DC systems are particularly promising for data centers, where large numbers of servers and electronic devices require DC power. They can also be useful in commercial buildings equipped with solar panels, battery storage, and electric-vehicle charging infrastructure. In such systems, DC sources and loads can be connected through appropriate converters and protection equipment. Another important application is DC microgrids. A DC microgrid can integrate solar generation, batteries, electric vehicles, and DC loads under an intelligent energy-management system. Power-electronic converters can regulate voltage and control energy flow according to demand.

However, DC distribution also presents challenges. DC arc interruption can be more difficult than AC interruption because there is no natural current zero. Specialized circuit breakers, protection systems, standards, and control technologies are therefore required. Infrastructure compatibility and initial investment are additional considerations.



Anjali Singh

Regd No.- F24029002002

Waste-to-Energy: Converting Waste into Electricity

Rapid urbanization and population growth have resulted in a significant increase in municipal and industrial waste. Improper waste disposal can cause environmental pollution, occupy valuable land, and create health concerns. Waste-to-Energy (WtE) technology offers an alternative approach by converting suitable waste materials into useful forms of energy, particularly electricity and heat. It combines waste management with renewable and alternative energy generation.

One of the most widely used methods is incineration, in which combustible waste is burned at high temperatures. The heat produced converts water into steam, which drives a turbine connected to an electrical generator. The electricity generated can then be supplied to the local grid. Modern plants use pollution-control systems to reduce emissions and safely handle residues.

Another important method is anaerobic digestion. Organic waste such as food waste, agricultural residues, and sewage can be decomposed by microorganisms in the absence of oxygen. This process produces biogas, which mainly contains methane and carbon dioxide. After suitable treatment, the biogas can be burned in an engine or gas turbine to generate electricity. The remaining material can potentially be processed for other useful applications.

Waste-to-energy plants can provide several benefits. They can reduce the volume of waste sent to landfills, recover useful energy from waste, and provide a continuous source of electricity when properly operated. They can also support local energy generation and reduce dependence on conventional fossil-fuel-based power generation.

However, WtE technology also has challenges. High capital costs, waste segregation requirements, air-emission control, ash disposal, and efficient plant operation must be carefully managed. Burning poorly segregated waste can reduce efficiency and increase environmental risks. Therefore, waste management systems should prioritize reduction, reuse, recycling, and recovery before energy conversion.



Sandeep priyadarshi
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Wireless Power Transmission: Principles, Applications and Future Possibilities

Imagine charging an electric vehicle without plugging in a cable or powering electronic devices without direct electrical connections. This concept is made possible through Wireless Power Transmission (WPT), an emerging technology that transfers electrical energy from a power source to a receiving device without physical conductors. WPT has the potential to transform several areas of electrical engineering and everyday technology.

The basic principle of wireless power transmission is based on electromagnetic fields. In short-range applications, inductive coupling is commonly used. A transmitter coil connected to an alternating current source produces a changing magnetic field. When a receiver coil is placed within the appropriate range, the changing magnetic field induces a voltage in the receiver, allowing electrical power to be transferred. For longer distances, technologies such as microwave and laser power transmission can be explored. These methods convert electrical energy into electromagnetic radiation or optical energy, transmit it through space, and convert it back into electrical energy at the receiving end. WPT already has applications in smartphones, wearable devices, medical implants, electric toothbrushes, and industrial equipment. One of its most promising applications is wireless charging for electric vehicles. Charging pads installed in parking areas or roads could potentially allow vehicles to charge without conventional cables. Wireless power systems could also be useful in environments where physical cables are inconvenient or difficult to maintain, such as factories, underwater systems, and certain medical applications.



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Energy-Efficient Buildings and Smart Electrical Systems

Buildings consume a significant amount of electrical energy for lighting, heating, cooling, ventilation, appliances, elevators, and other services. With increasing electricity demand and growing environmental concerns, improving the energy efficiency of buildings has become an important engineering objective. The combination of energy-efficient design with smart electrical systems can reduce energy consumption while maintaining comfort, safety, and productivity.

An energy-efficient building begins with reducing unnecessary energy use. LED lighting, high-efficiency motors, energy-efficient air-conditioning systems, and improved insulation can significantly reduce electrical consumption. Natural lighting and ventilation can also reduce dependence on artificial lighting and mechanical cooling. Efficient electrical distribution systems further help minimize energy losses within the building.

Smart electrical systems take energy management to the next level by using sensors, smart meters, controllers, communication networks, and automated devices. Occupancy sensors can automatically switch lights and air-conditioning systems on or off depending on whether a room is being used. Smart thermostats can adjust temperature settings according to occupancy and environmental conditions. These technologies prevent energy from being wasted in unoccupied spaces.

Another important component is the Building Energy Management System (BEMS). It collects information from different electrical and mechanical systems and allows building operators to monitor and control energy consumption from a centralized platform. Real-time energy data can help identify inefficient equipment, abnormal consumption, and opportunities for energy savings.

Renewable energy can also be integrated into smart buildings. Rooftop solar photovoltaic systems and battery energy storage can supply part of the building's electricity demand. Smart inverters and energy-management systems can coordinate solar generation, battery charging, and electricity consumption according to demand.



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Underground vs Overhead

Power Transmission

Electrical power must be transmitted from generating stations to consumers through reliable transmission and distribution networks. Two major methods are overhead transmission and underground transmission. Each has different technical, economic, environmental, and maintenance characteristics, making the choice dependent on location and system requirements.

Overhead transmission uses conductors supported on poles or towers above the ground. It is the most common method for high-voltage transmission because it is generally less expensive to install and easier to inspect and repair. Faults can often be located visually, and damaged components can be replaced relatively quickly. Overhead lines also allow effective natural cooling of conductors.

However, overhead lines require significant right-of-way and can be affected by storms, lightning, vegetation, pollution, and physical damage. Their visual impact can also be a concern in urban and environmentally sensitive areas.

Underground transmission, on the other hand, places power cables beneath the ground. It is particularly useful in densely populated cities, airports, industrial areas, and locations where overhead lines are difficult to install. Underground systems require less visible infrastructure and are generally less exposed to weather-related damage. They can also reduce visual impact and improve land-use flexibility.

Despite these advantages, underground systems have higher installation and maintenance costs. Excavation, specialized cables, insulation systems, and cable accessories increase the initial investment. Fault detection and repair can also take longer because the cables are not directly accessible. In long AC underground cables, significant charging current and reactive-power effects must also be considered.

From an engineering perspective, overhead lines are often preferred for long-distance bulk transmission, while underground cables can be advantageous where space, aesthetics, safety, or environmental constraints are important.



Malaya Ranjan Behera
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High-Voltage Direct Current (HVDC): Revolutionizing Long-Distance Power Transmission

The increasing demand for electricity requires power to be transmitted efficiently over long distances. Traditionally, High-Voltage Alternating Current (HVAC) systems have been widely used for power transmission. However, for very long-distance transmission and certain specialized applications, High-Voltage Direct Current (HVDC) technology offers several important advantages. HVDC is therefore becoming an essential technology in modern electrical power systems.

In an HVDC system, electrical power is converted from alternating current (AC) to direct current (DC) at the sending end using a converter station. The DC power is then transmitted through overhead lines or underground/submarine cables. At the receiving end, another converter station changes the DC power back into AC for distribution and consumption.

One of the major advantages of HVDC is lower transmission losses over long distances. Since HVDC lines do not have reactive power flow and can operate efficiently at high voltage levels, they can transmit large amounts of power over considerable distances. HVDC also requires fewer conductors for certain transmission configurations, potentially reducing right-of-way requirements.

HVDC is particularly useful for connecting renewable energy sources located far from major load centers. Large offshore wind farms, for example, can transmit electricity to coastal cities using submarine HVDC cables. It can also connect asynchronous AC grids, allowing power exchange between networks operating at different frequencies or with different operating conditions.

Another important advantage is the precise control of power flow. Modern HVDC systems can rapidly control the amount and direction of transmitted power, which can help improve grid stability and support interconnected power networks.

However, HVDC systems have some challenges, including the high cost and complexity of converter stations, specialized equipment requirements, and the need for skilled personnel.



Ashuman Nayak
Redg no:
F24029002003

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Where Peace Begins

Peace does not always arrive with trumpe
a quiet breath,
learns to dry.

It lives inside a helping hand,
a door left open wide,
in choosing words that heal the heart
instead of words that divide.

It grows beneath the morning sun,
where strangers share a smile, and
in the courage to forgive after
walking many miles.

Peace is not a distant dream, nor
something we must chase; it
begins within the human heart,
then finds another place.

So let us plant it like a seed in
every word we say, and let
compassion light the road for
someone else's way.

For when one heart chooses kindness,
another heart may see the world
becomes a little softer, and a little
more free.

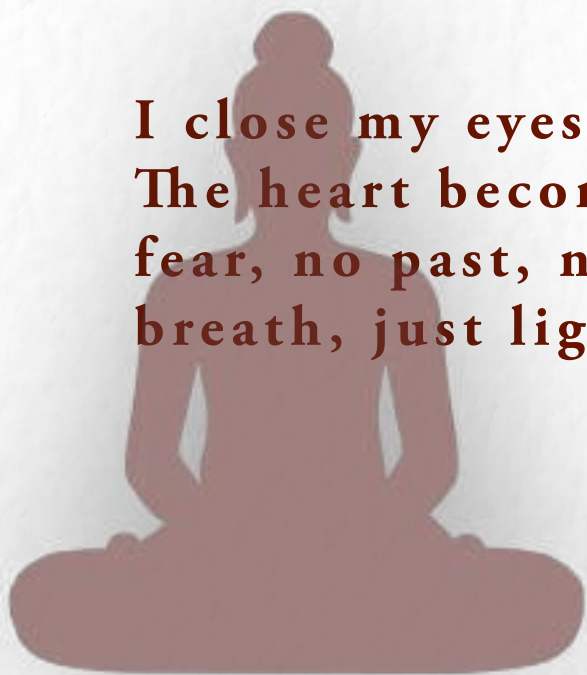
And perhaps that is where peace begins:
not somewhere far away, but in you, and
me, and us, with every gentle choice we
make

ROOTS OF STILLNESS

Beneath the golden morning light, I sit
in silence, calm and bright. The leaves
whisper, "Let worries cease," And every
breath becomes my peace.

My roots run deep into the earth, Where
silence gives new dreams their birth. Above,
the branches touch the sky, Teaching my
soul to rise and fly.

I close my eyes, the world grows still,
The heart becomes a quiet hill. No
fear, no past, no future's call— Just
breath, just light, surrender all.



Archana behara

Boy still miss her

There was a boy who had mastered the art of being invisible. He didn't want to disappear. People simply looked right through him. He existed somewhere in the forgettable middle—neither the star student nor the troublemaker. Just a quiet face in a crowded classroom, a name that faded from the attendance sheet, carrying a silence nobody knew how to read.

He was an introvert. Words often remained trapped inside him, so he learned to replace them with a smile. When someone hurt him, he smiled. When someone left, he smiled. And whenever someone asked, "Are you okay?" he always gave the same answer. "I'm fine."

When he was young, he fell in love without knowing what love really was. There was a girl who made ordinary days feel special. He didn't understand why he looked for her in a crowd or why a small conversation with her could stay in his mind for days. He only knew that he liked having her around.

Years passed. For a short while, life gave him something he had secretly wished for. They talked. They laughed. They shared little moments that meant far more to him than they probably ever knew. He thought perhaps this was what happiness felt like.

But happiness, he learned, could be temporary. People changed. Places changed. And eventually, so did the distance between them. He confessed his feelings in the only way an awkward, frightened boy could. She said no. He smiled. That night, however, he stared at the ceiling for a long time, wondering what was wrong with him.

After that, he became careful with people. He trusted less. Expected less. Loved less. At least, that was what he told himself.

Then another person entered his life. A girl he had barely known at first. It began with ordinary conversations—nothing extraordinary. But slowly, those conversations became something he looked forward to. She had a strange way of making him feel understood without asking him to explain every part of himself. When his day was difficult talking to her made it lighter. When his mind was crowded, she became a quiet place within it.

And without realizing when it happened, he fell in love again.

This time, he didn't want to confess. He was terrified. Because losing someone after telling them how you feel is painful. But losing someone because you told them how you feel? He thought that would be unbearable.

So he stayed quiet. He cared from a distance. He waited. He remembered the little things. And for a while, he was happy.

Then, slowly, she began to change. The conversations became shorter. The replies came later. The warmth he had grown used to seemed to disappear, little by little. Maybe she was busy. Maybe she was tired. Maybe nothing had changed at all.

But his mind didn't know how to believe in maybe. It only knew how to over think . Maybe she's tired of me. Maybe I've become annoying. Maybe I've hurt her. Maybe she'd be happier without me around.

He never asked her. That was his mistake. Instead, he made a decision for both of them. He started pulling away. A little at first. Then more. Until one day, he was simply gone.

Part of him was waiting for her to notice. To ask where he had gone. To say, "Don't leave." She didn't. And somehow, that silence hurt more than every goodbye that had come before it.

That night, he sat alone in the dark with his phone in his hand. Their old conversations were still there- the jokes, the late-night talks, the little moments he had saved without ever telling her how much they meant.

His thumb stopped over the message box. He wanted to type something. Anything.

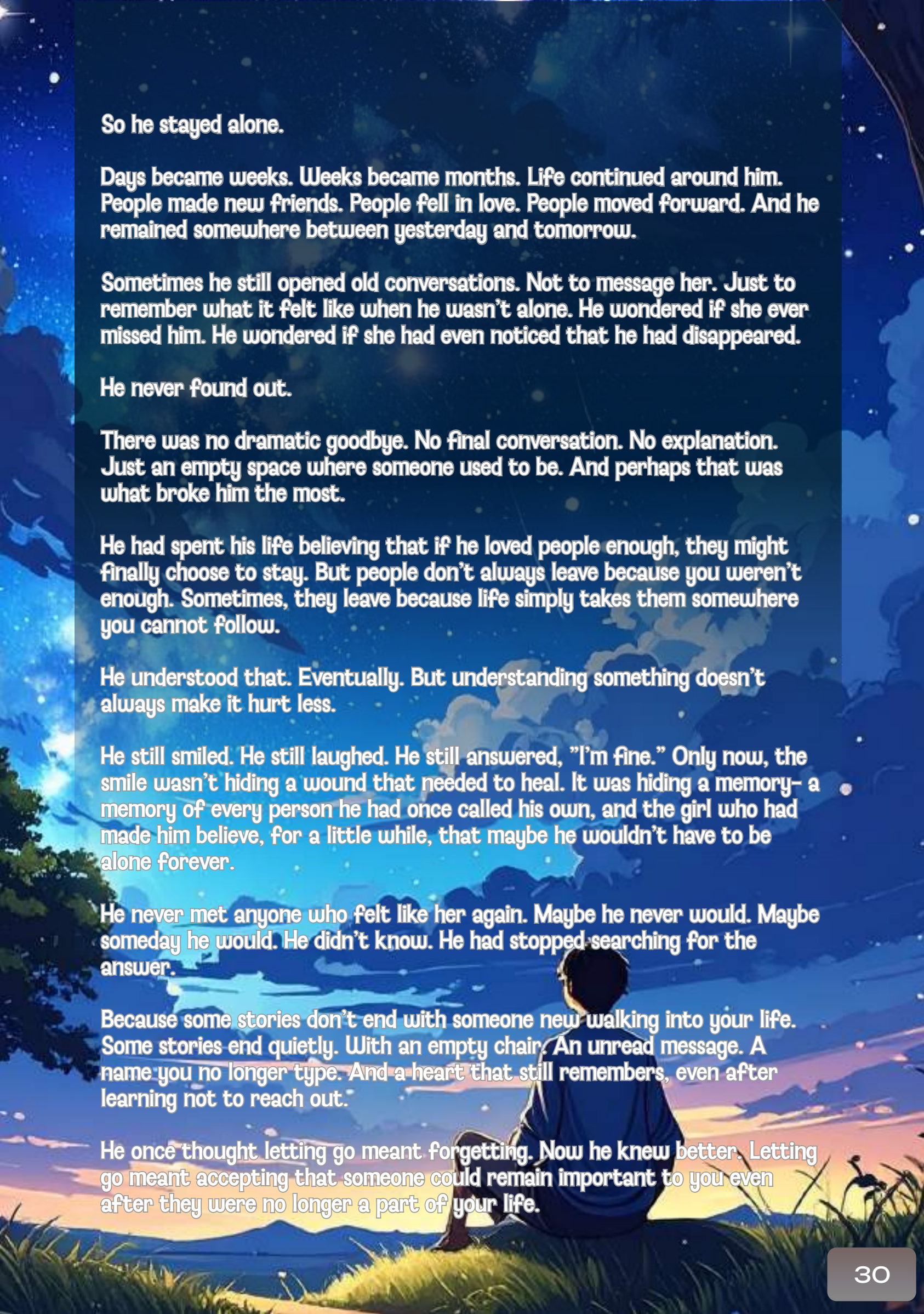
"I miss you."

"Did I do something wrong?"

"Can we talk?"

But he didn't send it. He locked the phone, placed it beside him, and for the first time, he understood how heavy silence could be.

After that, he stopped looking for people. Not because he hated them. Because he was tired. He didn't want another beginning that might become another goodbye. He didn't want to learn someone's favourite things only to eventually become a stranger who remembered them.

A person is sitting on a grassy hill, looking out over a body of water and mountains at sunset. The sky is a mix of orange, yellow, and blue, with some clouds. The person is seen from behind, sitting on the grass. The water is calm, and the mountains are in the distance.

So he stayed alone.

Days became weeks. Weeks became months. Life continued around him. People made new friends. People fell in love. People moved forward. And he remained somewhere between yesterday and tomorrow.

Sometimes he still opened old conversations. Not to message her. Just to remember what it felt like when he wasn't alone. He wondered if she ever missed him. He wondered if she had even noticed that he had disappeared.

He never found out.

There was no dramatic goodbye. No final conversation. No explanation. Just an empty space where someone used to be. And perhaps that was what broke him the most.

He had spent his life believing that if he loved people enough, they might finally choose to stay. But people don't always leave because you weren't enough. Sometimes, they leave because life simply takes them somewhere you cannot follow.

He understood that. Eventually. But understanding something doesn't always make it hurt less.

He still smiled. He still laughed. He still answered, "I'm fine." Only now, the smile wasn't hiding a wound that needed to heal. It was hiding a memory— a memory of every person he had once called his own, and the girl who had made him believe, for a little while, that maybe he wouldn't have to be alone forever.

He never met anyone who felt like her again. Maybe he never would. Maybe someday he would. He didn't know. He had stopped searching for the answer.

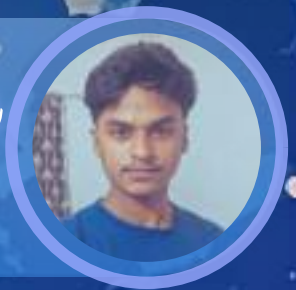
Because some stories don't end with someone new walking into your life. Some stories end quietly. With an empty chair. An unread message. A name you no longer type. And a heart that still remembers, even after learning not to reach out.

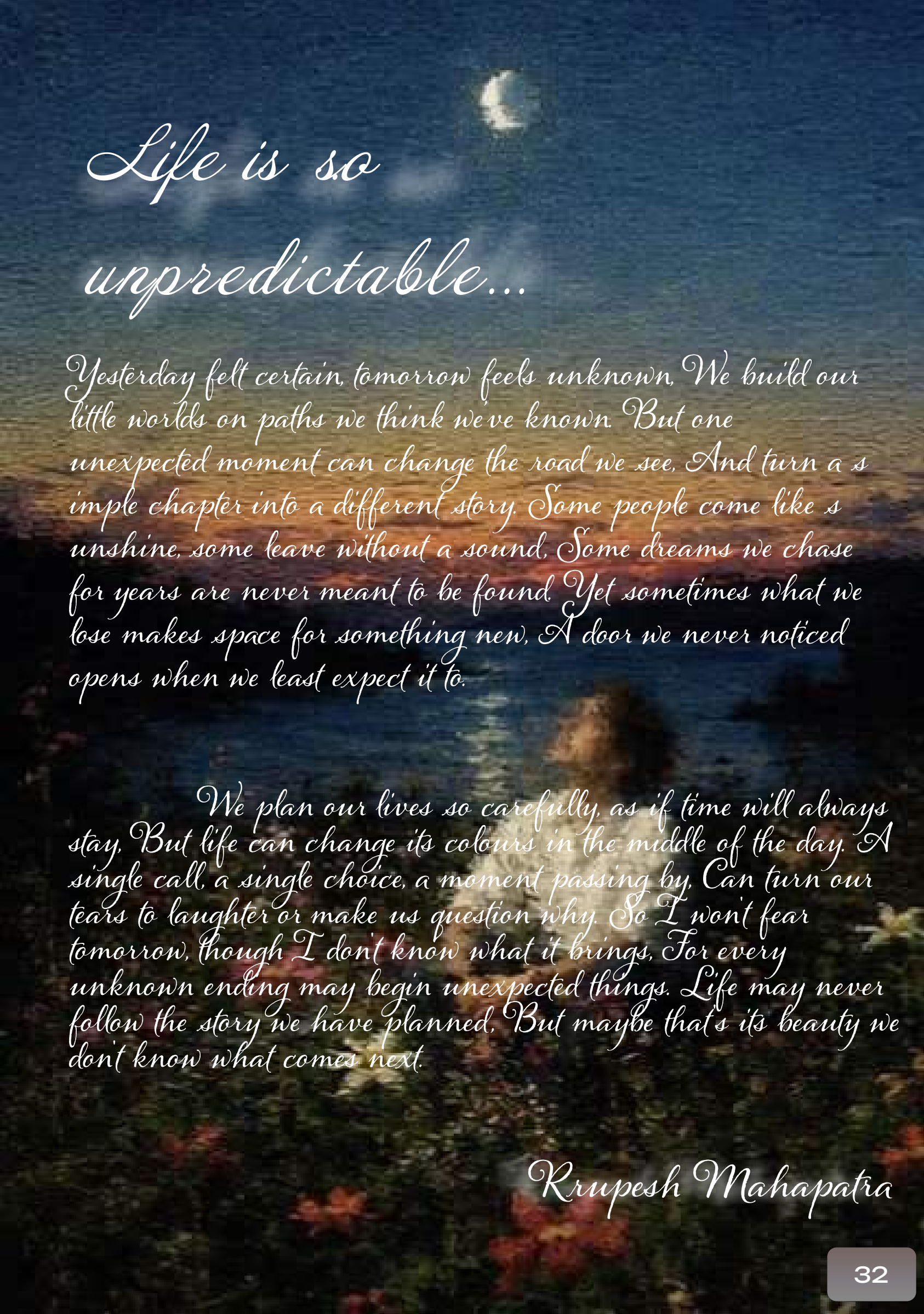
He once thought letting go meant forgetting. Now he knew better. Letting go meant accepting that someone could remain important to you even after they were no longer a part of your life.

And perhaps that was the cruellest art of all– to remember without returning, to care without reaching out, to miss someone without asking them to come back, and to keep living... even when a part of you is still standing at the door, waiting for someone who may never return.

“Boy
still
miss
her”

Tafeeq istiaque hussain
Batch 2025–26





Life is so unpredictable...

Yesterday felt certain, tomorrow feels unknown. We build our little worlds on paths we think we've known. But one unexpected moment can change the road we see, And turn a simple chapter into a different story. Some people come like sunshine, some leave without a sound. Some dreams we chase for years are never meant to be found. Yet sometimes what we lose makes space for something new. A door we never noticed opens when we least expect it to.

We plan our lives so carefully, as if time will always stay. But life can change its colours in the middle of the day. A single call, a single choice, a moment passing by. Can turn our tears to laughter or make us question why. So I won't fear tomorrow, though I don't know what it brings. For every unknown ending may begin unexpected things. Life may never follow the story we have planned. But maybe that's its beauty we don't know what comes next.

Krupesh Mahapatra

What my canvas knows

*My canvas knows the words I never say,
The feelings I hide and paint away.
Every colour carries a piece of me, A
silent truth that no one else can see.*

*The brush remembers every quiet tear,
Every little hope, every hidden fear. Where
words fall short and voices fade, My
paintings speak of the choices I've made.*

*Sometimes I paint the things I miss,
Sometimes a memory, sometimes a wish.
And every stroke, though simple and slow,
Reveals a part I never chose to show.*

*So if you ask what my heart has known, I may
not answer you can see it on my own. For when
my feelings refuse to flow, I let them speak
through what my canvas knows.*



Sriya Sreyashree Behera

“RANGOLI DAY”

Colours • Creativity • Celebration

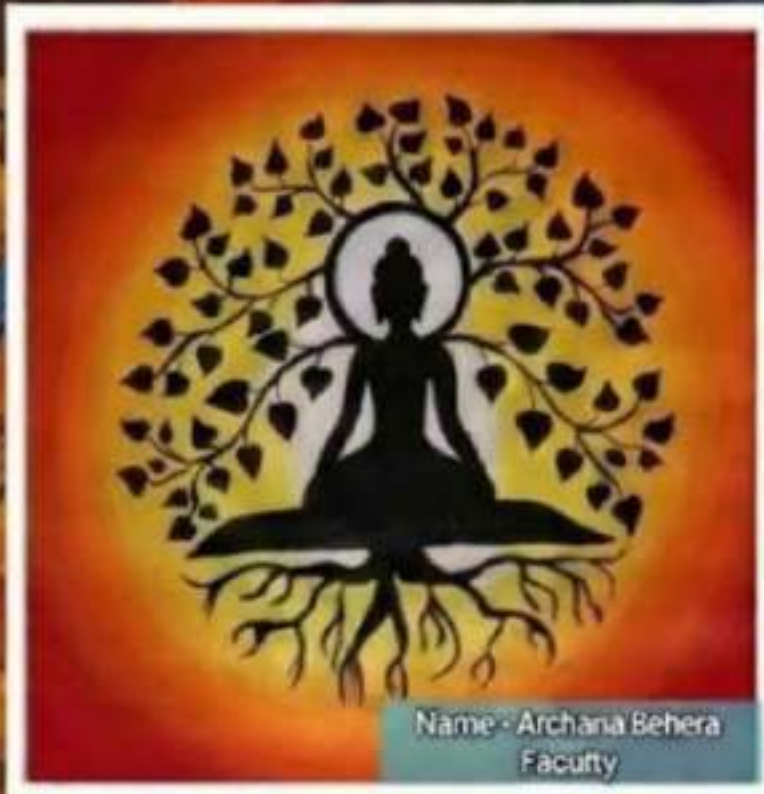


“RANGOLI DAY”

Colours • Creativity • Celebration



DRAWING PROGRAM



Creativity begins with imagination

DRAWING PROGRAM



Rajalaxmi malik



Shradhanjali pradhan



Amita Basti
Faculty



Amita Basti
Faculty

Creativity begins with imagination



S. Udaya kumar

OUR ACHIEVERS



Department of
Electrical Engineering

OUR ACHIEVERS



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Electrical Engineering

OUR ACHIEVERS



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// NSS PROGRAM //

"ONCE A NSS VOLUNTEER IS
ALWAYS A NSS VOLUNTEER"



BETI BACHAO, BETI PADHAO



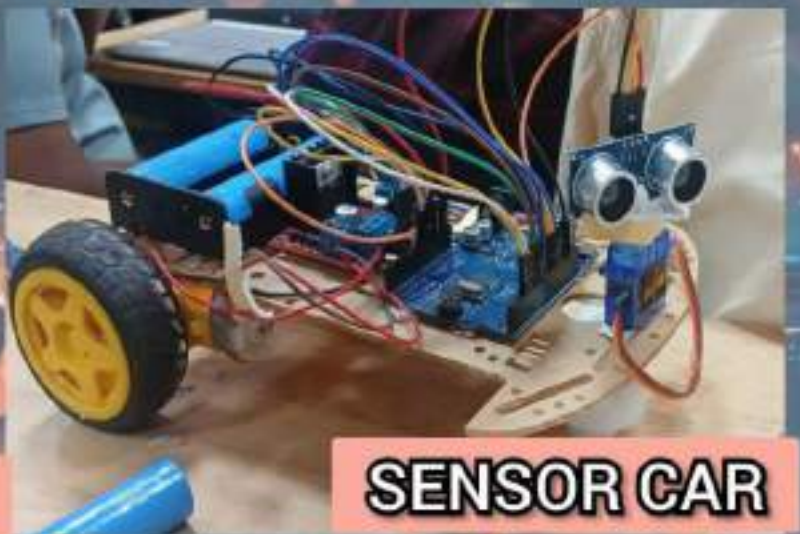
TREE PLANTATION DRIVE

“Plant Today, Protect Tomorrow”



Department of Electrical Engineering

PROJECT WORK



Major Project

Scraps to EV



TEACHER DAY



Editorial Team Message



Finally, we editors can officially say:

edit kar kar ke ungliyon mein chale pad gaye, aankhon ne resignation de diya, aur dimaag ne “Not Responding” dikha diya... but somehow, WE DID IT!

Making this magazine was not just about Electrical Engineering. While doing it, we somehow learned a lot of things that were definitely not in our syllabus.

Teamwork, coordination, patience, creativity, and most importantly... EDITING UNTIL WE FORGOT WHAT THE ORIGINAL FILE EVEN LOOKED LIKE.

There were corrections, re-corrections, “just one small change,” followed by another 17 changes, missing photos, wrong spellings,

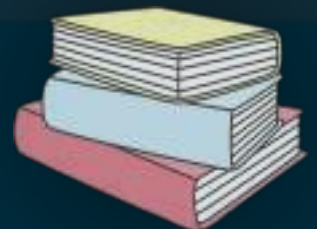
formatting disasters, and those legendary moments when someone said, “Bhai bas 5 minute ka kaam hai.” We all knew that was a lie.

But jokes apart, this magazine taught us that making something something We argued, laughed, got confused, fixed things, broke things again, and somehow managed to turn all that chaos into an actual magazine.

From electrical circuits to editing magazine we are done.

And now that it's finally done...

PLEASE, FOR THE LOVE OF GOD, DON'T ASK US TO EDIT AGAIN. 🙏🙏





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