



MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

Autonomous Institution—UGC, Govt. of India

Programmes Accredited by NBA & NAAC with 'A+' Grade

Approved by AICTE, Affiliated to JNTUH, ISO 9001:2015 Certified Institution

National Ranking by NIRF Innovation-Rank band(151-300), MHRD, Govt. of India
Maisammaguda, Dhulapally, Secunderabad- 500 010, Telangana

A.Y 2025-26 VOL.1

**Under
Student Chapter CSI, IEEE & ISTE**

INFO SPARK

HALF YEARLY TECHNICAL MAGAZINE

**DEPARTMENT OF
CSE-AIML**

CSE-AIML

www.mallareddyecw.com

MESSAGES

Founder Chairman's Message

**Ch. Malla Reddy**

Founder Chairman, MRGI
Hon'ble MLA, Govt. of
Telangana State

I congratulate the department of CSE-AIML, MRECW for bringing out the issue of the prestigious half yearly department **INFOSPARK** under A.Y: 2025-26, I am sure that the magazine will provide a platform to the students and faculty members to expand their technical knowledge and sharpen their hidden literary talent and will also strengthen the all-round development of the students. I am hopeful that this small piece of literary work shall not only develop the taste for reading among students but also develop a sense of belonging to the institution as well. My congratulations to the editorial board who took the responsibility for the arduous task most effectively. I extend best wishes for the success of this endeavor.

Principal's Message

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**Dr. Y. Madhavee Latha**

Principal

HOD'S MESSAGE

It is an occasion of great pride and satisfaction for the department CSE-AIML, MRECW to bring out the issue of the half yearly of **INFOSPARK** under A.Y:2025-26, it gives me immense pleasure to note that the response to the magazine has been over whelming. The wide spectrum of articles gives us a sense of pride that our students and faculties possess creative potential and original thinking in ample measures. Each article is entertaining interesting and absorbing. I applaud the contributors for their stimulated thoughts and varied hues in articles contributed by them.

**Dr. M. Narendhar**

HOD-CSE (AIML)

DEPARTMENT VISION

A center of excellence in education and research, providing quality learning through the integration of AI and ML, fostering innovation, collaboration between academia and global industry, and empowering women to drive societal advancement.

Vision

**DEPARTMENT MISSION**

- To inculcate professional and personal growth with a strong academic and practical background in the area of artificial intelligence, with an emphasis on current trends in software development, making them industry-ready professionals with social ethics.
- To empower the students in attaining sound technical knowledge with necessitated trainings and certifications in the area of AI & ML.

Mission

**ABOUT THE DEPARTMENT**

The Dept. of CSE (AI&ML) with an intake of 300 in B.Tech Programme. The programmes ensure that the student effectively meets the highest benchmarks of competence required by the industry. The Dept has state of the art laboratories with latest softwares like Windows 2008, Visual Studio 2012, Eclipse, WinRunner, QTP, J2EE, .NET, Fedora & Weka Tool. The Dept established IEEE & ISTE student chapters and Dept. Technical Association- CYNOSURES under which it organizes National level Technical Symposium - FUTURE SASTRA and State level Technical Symposium MEDHA every academic year and Student Development Programmes like Workshop on Web Designing, Android & its Application, ADOBE PhotoShop, Ethical Hacking and HTML5. The Department also organizes Pre-placement training programmes on C-Skills, Python Skills Java Skills and Project Based training programmes on C, Python, C++, JAVA, Machine Learning, Deep Learning, Natural Language Processing and Web Technologies and also organizes Intra College Student Conferences on Network Security and Data Base Management Systems and Recent Advancements in Computer Science and also organizes regular student seminar sessions of two hours per week for I - IV B.Tech student to enhance their all-round performance. To provide value added certification courses to students, The Dept. established Micro Soft Innovation Center which offers Micro Soft Certification, CISCO Networking Academy which offers CISCO Certification and in association with ORACLE Corporation, India, It offers Java Certification and CORSERA certifications in advanced technologies like , Machine Learning, Deep Learning, Natural Language Processing, etc . The Dept. also offers Business English Certification (BEC) with the help of Center for Development of Communication Skills.

PO'S

PO1	Engineering knowledge	Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	Design/development of solutions	Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	Conduct investigations of complex problems	Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering tool usage	Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The Engineer and The World	Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	Ethics	Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and Collaborative Team work	Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams
PO9	Communication	Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10	Project management and finance	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-long learning	Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

PSO'S

The graduates of the department will attain:

PSO1

Understand a range of analytical, logical - Programming languages, architecture, construction, and design underlying the field of AI and ML and its related disciplinary areas.

PSO2

Ability to acquire knowledge in analysis, design, and development of human perception, Artificial Intelligence, Machine Learning, and data analytics in terms of real-world problems to meet future challenges

PSO3

Develop computational knowledge and project development skills using innovative tools and practices related to optimization techniques, pattern analysis, and speech recognition for the efficient design of computer-based systems of varying complexity to solve problems in the areas related to deep learning, machine learning, and artificial intelligence.

PEO'S

PEO1-Professional Enhancement

To gain familiar knowledge and to contribute theoretical, mathematical, scientific foundation and logical learning to the students with well-structured course outline by anticipating changing trends in Artificial Intelligence & Machine Learning.

PEO2 - Core Competence

To develop students with in-depth knowledge of Artificial Intelligence and exhibit high standards with regard to applications of AI techniques in intelligent agents, expert systems, artificial neural networks, and other machine learning models to meet the agile industrial requirements extensively.

PEO3 - Technical Accomplishments

To provide a strong foundation in embracing students learning to meet the ever-changing developments in artificial intelligence and machine learning.

PEO4 - Professionalism

To pursue their professional careers for self-advancement while meeting the requirements for professional developers, entrepreneurs, research, and development in order to meet the societal needs.

PEO5 - Learning Environment

To promote collaborative learning and the spirit of teamwork, interpersonal skills, and projects through multidisciplinary AI-based innovative product development and diverse professional ethics.

FACULTY ARTICLES

Engineering Reverse Innovations

Multinationals are starting to catch on to the logic of reverse innovation, in which products are designed first for consumers in low-income countries and then adapted into disruptive offerings for developed economies. But only a handful of companies have managed to do it successfully until now. In this article an MIT engineering professor and a Tuck professor of management explain why. After conducting a three-year study of reverse innovation projects, they've concluded that the main hurdle facing product developers is a mindset. Western designers, who usually create products by following time-tested methods, struggle to overcome the constraints and leverage the freedoms of emerging markets. They tend to fall into common mental traps that prevent the development of reverse innovations: matching segments to existing products, lowering price by removing features, failing to think through all the technical requirements, neglecting stakeholders, and refusing to believe products created for low-income markets could have global appeal. But companies can avoid these traps, the authors found, by adhering to five design principles. The success of several new products illustrates how. One is the Leveraged Freedom Chair, a low-cost wheelchair that can navigate rugged terrain in places with poor infrastructure; a modified version is taking Western markets by storm. Digital health infrastructures, and intelligent healthcare ecosystems of the future.

Google stands out as an enterprise designed with the explicit goal of succeeding at rapid, profuse innovation. Much of what the company does is rooted in its legendary IT infrastructure, but technology and strategy at Google are inseparable and mutually permeable-making it hard to say whether technology is the DNA of its strategy or the other way around. Whichever it is, Iyer and Davenport, of Babson College, believe Google may well be the internet-era heir to such companies as General Electric and IBM as an exemplar of management practice.

Dr. M.Narendhar
Associate Professor, CSE-AIML



VisiOCR – Automated Visitor Pass Creation

VisiOCR is an intelligent automated system designed to streamline and secure the process of visitor pass creation using Optical Character Recognition (OCR) and Artificial Intelligence (AI). Traditional visitor management systems often rely on manual data entry, which can be time-consuming and error-prone. VisiOCR eliminates these inefficiencies by automatically extracting visitor information—such as name, organization, ID number, and contact details—from uploaded identification documents like Aadhaar cards or driving licenses. The extracted data is verified and processed in real time through AI-based validation algorithms to ensure accuracy and authenticity. Once verified, the system instantly generates a digital or printed visitor pass embedded with a unique QR code for easy check-in and check-out tracking. This automation not only reduces human effort but also enhances security by maintaining a digital record of every visitor, allowing for seamless integration with surveillance and access control systems. The OCR engine in VisiOCR is trained to handle diverse document formats and languages, ensuring high precision even under varying lighting or image quality conditions. Additionally, the system supports cloud-based data storage, enabling organizations to monitor visitor activity remotely and maintain compliance with privacy standards. With its fast, secure, and contactless operation, VisiOCR is ideal for offices, hospitals, educational institutions, and government facilities, providing a modern and efficient alternative to traditional visitor registration methods.

Dr. K.Srinivas

Associate Professor, CSE-AIML

STUDENT ARTICLES

AI in Education

Artificial Intelligence (AI) is revolutionizing the education sector by personalizing learning experiences and improving accessibility for students across the globe. Traditional classroom models often struggle to meet the unique learning needs of every student, but AI-powered systems can analyse performance data to deliver customized lessons and feedback. Adaptive learning platforms such as Coursera and Khan Academy use AI algorithms to identify a learner's strengths and weaknesses, adjusting the pace and difficulty of content accordingly. This ensures that students receive targeted support and can learn at their own speed.

Beyond personalization, AI is transforming administrative and teaching processes. Virtual assistants and chatbots can automate routine tasks like grading, attendance tracking, and answering frequently asked questions, freeing up valuable time for educators to focus on creative and interactive teaching. Tools like ChatGPT and Google Bard are being integrated into classrooms to assist with writing, research, and brainstorming, acting as intelligent study partners that enhance engagement and curiosity.

AI also plays a crucial role in promoting inclusive education. For students with disabilities, AI-driven tools such as speech recognition, real-time translation, and text-to-speech software help overcome barriers to communication and understanding. Furthermore, predictive analytics powered by AI can identify students who are at risk of falling behind, allowing institutions to intervene early and provide necessary support.

B.POOJITHA
25RH5A6604



The Future of Work and AI Automation

Artificial Intelligence (AI) and automation are redefining the global workforce, transforming how industries operate and how people perform their jobs. Routine and repetitive tasks, once done manually, are increasingly being handled by intelligent machines and algorithms. From manufacturing and logistics to finance and healthcare, AI-driven systems are improving efficiency, reducing human error, and lowering operational costs. However, this shift is also creating a demand for new skill sets centered around data analysis, machine learning, and human–AI collaboration.

While AI automation is expected to replace some traditional roles, it is simultaneously creating new opportunities in technology development, maintenance, and creative problem-solving. Jobs that require empathy, critical thinking, and innovation—traits uniquely human—will become more valuable.



Ultimately, the future of work will not be about humans versus machines but about humans working with machines. AI can handle data-heavy, repetitive processes, freeing humans to focus on creativity, strategy, and relationship-building. The workplaces of tomorrow will be more flexible, data-informed, and innovation-driven. If managed responsibly—with ethical considerations, inclusivity, and worker well-being in mind—AI automation has the potential to create a more productive and balanced global economy.

CH.BHANU
24RH1A6658



Explainable AI(XAI)

Explainable Artificial Intelligence (XAI) refers to AI systems designed to make their decision-making processes transparent and understandable to humans. In traditional AI models—especially deep learning networks—decisions are often made within complex layers of computation, making it difficult to explain why a certain output was produced. This “black box” nature of AI has raised concerns in critical fields such as healthcare, finance, and law, where understanding the reasoning behind an AI’s prediction is essential. Explainable AI addresses this by providing insights into how models reach their conclusions, helping users build trust and confidence in automated systems.

The core goal of XAI is to bridge the gap between accuracy and interpretability. While advanced AI models may achieve high performance, they often sacrifice transparency. Explainable AI techniques, such as SHAP (SHapley Additive exPlanations) and LIME (Local Interpretable Model-agnostic Explanations), help visualize which features influence a model’s decision the most. For example, in medical diagnosis, XAI can highlight which symptoms or test results contributed to a certain prediction, enabling doctors to validate the AI’s recommendations before taking action.

In the future, explainable AI will play a vital role in ensuring ethical, fair, and accountable use of artificial intelligence. As AI becomes deeply integrated into daily life, from hiring decisions to autonomous vehicles, the ability to justify and interpret machine decisions will be critical. By promoting transparency and trust, Explainable AI not only enhances human understanding but also paves the way for responsible innovation—where humans and intelligent systems can collaborate confidently and safely.

J.BHAVYA SREE
24RH1A66B6



A Sign Language Recognition System (SLRS)

A Sign Language Recognition System (SLRS) is a technological solution designed to interpret hand gestures used in sign language and convert them into text or speech. This system aims to bridge the communication gap between individuals who are deaf or hard of hearing and those who do not understand sign language. It leverages computer vision and machine learning techniques to recognize and process the signs, making communication more accessible and inclusive. The system has wide-ranging applications in education, customer service, and daily interactions.

The primary objective of a sign language recognition system is to capture and interpret hand gestures accurately in real time. These gestures can represent alphabets, numbers, words, or entire phrases. The system translates these signs into a readable or audible format, thus enabling smooth communication. By doing so, it supports the independence and social integration of individuals who rely on sign language.

The working of the system involves several key steps. First, the user's hand gesture is captured via the camera. The image is then preprocessed to enhance clarity and remove background noise. After preprocessing, the system extracts features from the gesture, often using hand landmarks or contours. These features are fed into a machine learning model that has been trained to classify different signs. The model then predicts the most likely sign, and the system outputs it in the form of text or synthesized speech.

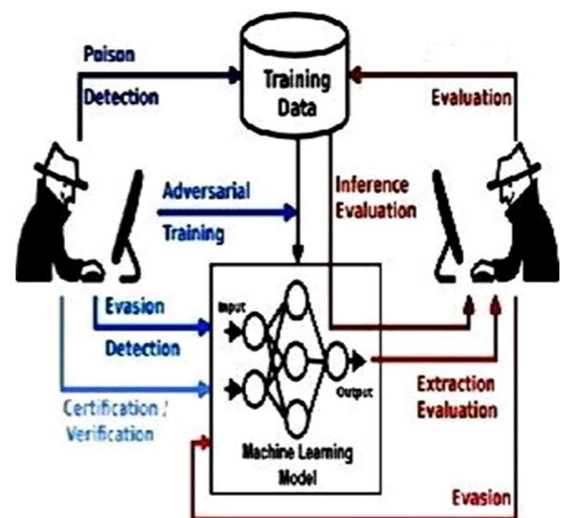
K.SRIMUKHI
24RH1A66C6



Securing ML Pipelines from Model & Data Attacks

As machine learning (ML) becomes central to modern applications, securing ML pipelines has become a top priority. Threats such as model stealing and data poisoning pose serious risks to the integrity, confidentiality, and reliability of AI systems. Model stealing occurs when attackers replicate a trained model's behavior by querying it repeatedly, effectively cloning its functionality without access to its original parameters or data. On the other hand, data poisoning involves injecting malicious or misleading data into the training process, causing the model to learn incorrect patterns and produce false or biased predictions. Both attacks can undermine the credibility and safety of AI-driven decisions.

To mitigate these risks, organizations must implement robust security practices across every stage of the ML pipeline. This includes securing data collection channels, validating data sources, and using encryption to protect training datasets. Defensive techniques such as watermarking models, limiting API access, and adding noise to model outputs can help prevent model extraction attacks. Additionally, continuous monitoring and adversarial testing can detect anomalies in model performance that may indicate data poisoning or tampering. Frameworks like Adversarial Machine Learning (AML) are increasingly being used to test and strengthen AI systems against such vulnerabilities.



K.INDHU
24RH1A6661



AI in Industrial Automation

Artificial Intelligence (AI) has revolutionized industrial automation by enabling machines to think, learn, and make decisions like humans. Traditional automation systems rely on pre-programmed instructions, while AI-driven systems use data, algorithms, and real-time analysis to optimize performance. Through technologies such as machine learning, computer vision, and predictive analytics, AI enhances accuracy, reduces human error, and increases operational efficiency across manufacturing and production lines.

In modern industries, AI-powered robots and control systems are used for tasks like quality inspection, predictive maintenance, and process optimization. For example, sensors and AI models can predict equipment failures before they occur, minimizing downtime and maintenance costs. Similarly, computer vision systems can automatically detect product defects on assembly lines with precision beyond human capability. This smart automation not only improves productivity but also ensures consistent product quality and safety.

The integration of AI in industrial automation is paving the way for “smart factories” under the Industry 4.0 framework. These factories use interconnected devices and AI analytics to make real-time decisions, adapt to changing demands, and optimize resource use. As industries continue to adopt AI technologies, the future of manufacturing will become increasingly intelligent, autonomous, and sustainable—transforming how products are designed, produced, and delivered globally.

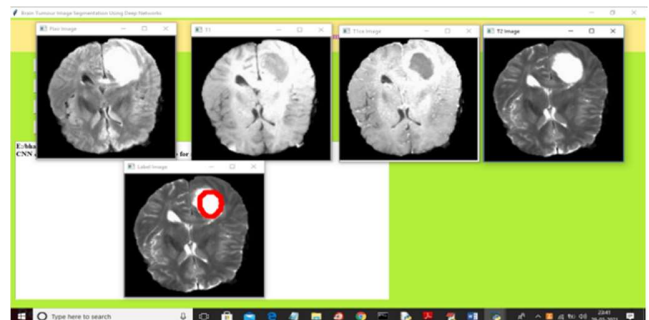
G.TEJASWINI
24RH1A6633



Brain tumor detection and Volume Estimation Using Machine Learning

Brain tumor detection and volume estimation are critical tasks in the field of medical image analysis, enabling early diagnosis and effective treatment planning for patients. However, accurately identifying and segmenting brain tumors from MRI scans remains a complex challenge due to the heterogeneous nature of tumor shapes, sizes, and textures, as well as variations in imaging conditions. Manual diagnosis is time-consuming, subjective, and prone to inconsistencies among radiologists, which can impact clinical outcomes. To address these limitations, this project focuses on developing an automated, reliable, and efficient machine learning model for brain tumor detection and volume estimation. The proposed system employs advanced image preprocessing, segmentation, and classification techniques using deep learning architectures such as Convolutional Neural Networks (CNNs).

By automatically identifying tumor regions and calculating their volume, the model assists clinicians in assessing tumor progression and optimizing treatment strategies. To address these challenges, this project presents a transparent and interpretable machine learning model for brain tumor detection and volume estimation. Unlike traditional black-box models, which offer limited insight into their decision-making process, the proposed system integrates Explainable Artificial Intelligence (XAI) techniques—particularly SHAP (SHapley Additive Explanations) and LIME (Local Interpretable Model-Agnostic Explanations). By providing these insights, the model enhances trust, supports clinical decision-making, and ensures more reliable and consistent outcomes in patient diagnosis and treatment planning. The model demonstrated high predictive accuracy and, more importantly,



B.SANJANA
22RH1A6627



AI in the Film and Music Industry

Artificial Intelligence (AI) is transforming the film and music industry by revolutionizing how content is created, edited, and experienced. In filmmaking, AI is used in scriptwriting, video editing, visual effects, and even casting decisions. Algorithms can analyze audience preferences to predict which storylines or genres are most likely to succeed. AI tools also assist editors by automatically organizing footage, enhancing scenes, and generating realistic CGI, saving both time and production costs.

In the music industry, AI is being used to compose songs, mix tracks, and even mimic the styles of famous artists. Music streaming platforms like Spotify and YouTube use AI to recommend songs based on user preferences and listening habits. AI-based software can generate melodies, harmonies, and rhythms, helping musicians experiment with new sounds and ideas. It also aids in audio mastering, ensuring professional-quality sound with minimal human intervention.



The integration of AI in film and music has opened up endless creative possibilities while also raising interesting debates about originality and ethics. As technology advances, filmmakers and musicians can collaborate with AI to produce innovative and personalized content that appeals to global audiences. From automating production tasks to enhancing creativity, AI is not replacing human talent—it is empowering artists to push the boundaries of storytelling and sound creation like never before.

G.SUNITHA
24RH1A66L2

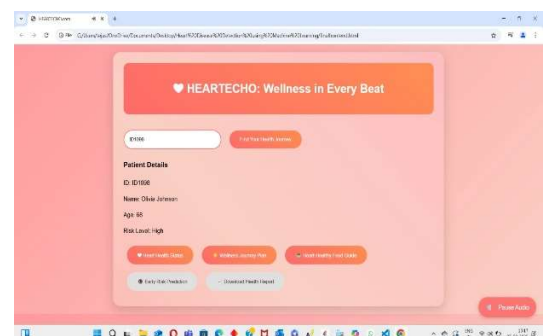


Heart Echo: Smart Heart Health Prediction with Ensemble AI and Global Language Support

"Heart diseases continue to be one of humanity's greatest silent threats, claiming millions of lives each year. Despite advances in modern healthcare, early detection and personalized prevention remain major challenges—especially in regions with linguistic and accessibility barriers. To bridge this gap, Cardio Sense introduces a next-generation approach that combines ensemble machine learning with multilingual support, empowering individuals to understand and manage their heart health in their own language."

At the core of this system lies ensemble learning, an advanced AI technique that integrates multiple machine learning models to enhance predictive accuracy. Instead of relying on a single algorithm, CardioSense blends models such as Logistic Regression, Random Forest, and XGBoost—each contributing unique analytical strengths.

To make healthcare truly inclusive, CardioSense integrates multi-language communication, allowing users to interact in English, Hindi, and Telugu. This feature improves accessibility, comprehension, and trust—especially among rural and non-English-speaking populations. The platform provides easy-to-read reports, lifestyle suggestions, and wellness recommendations in the user's chosen language, making advanced AI-driven diagnostics understandable to all. The system's backend is powered by Python-based frameworks such as Tensor Flow, Scikit-learn, and Pandas, while the user interface is designed using Tkinter for simplicity and responsiveness. Together, these technologies create an intelligent, user-friendly application that interprets medical data with precision and presents it in a form anyone can grasp.



PATEWAR TEJASWINI
22RH1A66E5



AI in Manufacturing and Automation

Artificial Intelligence (AI) is revolutionizing the manufacturing industry by bringing intelligence, precision, and flexibility to production processes. Unlike traditional automation, which relies on fixed programming, AI-driven systems can analyze data, learn from experience, and adapt to changing conditions. This allows manufacturers to optimize production lines, reduce waste, and improve overall efficiency. AI technologies such as machine learning, computer vision, and robotics are helping industries achieve smarter and faster operations.

In modern factories, AI is used for predictive maintenance, quality inspection, and process optimization. Sensors and AI algorithms can detect early signs of machine failure, allowing timely repairs and reducing downtime. Similarly, AI-powered vision systems can identify product defects in real time, ensuring consistent quality without the need for constant human supervision. Autonomous robots and cobots (collaborative robots) are also being deployed to handle repetitive or hazardous tasks, increasing safety and productivity.

The integration of AI in manufacturing marks a major step toward Industry 4.0—where intelligent machines, IoT devices, and data analytics work together seamlessly. This digital transformation leads to more flexible production, personalized products, and sustainable practices. As AI continues to evolve, the manufacturing sector will become increasingly efficient, data-driven, and resilient, shaping the future of industrial automation worldwide.

M.NIKHILA
24RH1A66M8



AI in Space Debris and Traffic Management

Artificial Intelligence (AI) is playing a crucial role in managing the growing problem of space debris and orbital traffic. With thousands of satellites, spacecraft, and debris fragments orbiting Earth, the risk of collisions is increasing rapidly. AI systems can analyze vast amounts of real-time data from satellites and sensors to track objects in space, predict potential collisions, and suggest safe maneuvers more efficiently than manual monitoring systems.

AI algorithms are being used to automate collision avoidance and optimize satellite movement. By using predictive modeling and machine learning, these systems can identify risky debris paths long before a collision occurs.



The use of AI in space debris and traffic management is essential for maintaining a sustainable space environment. As the number of satellites continues to grow with mega-constellations, human supervision alone is no longer sufficient. AI enables faster, smarter, and safer space navigation, ensuring the long-term protection of orbital assets and the future of space exploration.

CH.ABHIGNYA
23RH1A6659



Biotechnology and Genetic Engineering

Biotechnology, a rapidly evolving field, harnesses biological systems and organisms to develop innovative products and processes. At its core, genetic engineering—the manipulation of an organism's DNA—stands out as a transformative tool, revolutionizing medicine, agriculture, and environmental sustainability. In medicine, genetic engineering has paved the way for groundbreaking therapies, including gene therapy, which aims to treat or prevent diseases by directly altering genetic material. Advances such as CRISPR technology have made precise edits to DNA more accessible, allowing researchers to tackle genetic disorders like cystic fibrosis and sickle cell anaemia with unprecedented efficacy. In agriculture, genetically modified organisms (GMOs) enhance crop resilience, yield, and nutritional content. For instance, crops engineered to resist pests and diseases reduce the need for chemical pesticides, promoting eco-friendly farming practices. These innovations contribute to food security, especially in regions facing climate challenges. Environmental biotechnology leverages genetic engineering to address pollution and waste management. Microbes are engineered to degrade hazardous substances, turning pollutants into harmless byproducts and restoring ecosystems. This bioremediation process not only cleans contaminated sites but also fosters sustainable development. While the potential of biotechnology and genetic engineering is vast, ethical considerations are paramount. Debates around GMOs, bio security, and the implications of gene editing require careful navigation to balance innovation with societal values.

B.MOUNIKA

23RH1A6644



Intelligent Esg Data Extraction Using Ai And Document Intelligence

Artificial Intelligence (AI) and Document Intelligence are transforming how organizations collect and analyze Environmental, Social, and Governance (ESG) data. Traditional ESG reporting often involves manual review of complex reports, policies, and sustainability documents, which can be time-consuming and error-prone. With AI-driven tools, companies can automatically extract relevant ESG information—such as carbon emissions, labor practices, and governance policies—from unstructured data sources like PDFs, websites, and regulatory filings. This not only speeds up data collection but also ensures greater accuracy and consistency in sustainability reporting.

By combining natural language processing (NLP) and machine learning, Document

Intelligence systems can understand context, identify key metrics, and generate actionable insights from large volumes of ESG-related documents. This enables organizations to monitor compliance, assess risk, and make data-driven decisions aligned with global sustainability standards. As AI continues to advance, intelligent ESG data extraction will become essential for transparent, efficient, and responsible

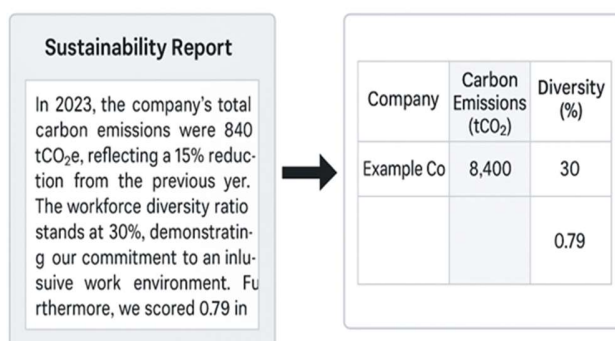


Figure 2. Example of unstructured ESG report text transformed into structured ESG metrics by the AI system.

corporate reporting—helping businesses meet stakeholder expectations and contribute to a more sustainable future.

G.SRINIDHI
23RH1A6694



XAI: EXPLAINABLE AI

Artificial Intelligence (AI) plays a vital role in promoting social good by addressing some of the world's most pressing challenges. It is used to improve healthcare through early disease detection, enhance education with personalized learning tools, and support environmental sustainability by predicting natural disasters and managing resources efficiently. AI also aids in poverty reduction, disaster response, and ensuring social justice by analyzing data to create fair and inclusive policies. Overall, AI serves as a powerful tool to create positive social impact and drive sustainable development across communities.

Key Components of AI in social good

Component	Description
Data Collection & Management	Gathering high-quality, diverse, and ethical data for social issues such as health, environment, or education.
Ethical AI & Fairness	Ensuring AI systems are transparent, unbiased, and respect human rights.
Machine Learning Models	Building predictive or analytical models to identify patterns and provide solutions for social challenges.
Explain ability & Transparency	Making AI decisions understandable to ensure accountability in social applications.
Human-AI Collaboration	Combining human expertise with AI insights for effective problem-solving.

S.PRIYA DHARSHNI
24RH1A66U0



Agentic AI: The Next Step in Artificial Intelligence Autonomy

Agentic AI represents the next major evolutionary leap in artificial intelligence, moving from the reactive content generation model of Generative AI to truly autonomous systems. These agents possess inherent agency, granting them the capacity to interpret high-level objectives and independently devise multi-step strategies to achieve them with minimal human oversight.

The rise of Agentic AI heralds an era where systems actively pursue goals rather than simply responding to commands. This ability to manage complex, multi-step processes is rapidly boosting efficiency across various industries. In supply chain logistics, agents autonomously analyse data to predict bottlenecks, reroute shipments, and dynamically adjust inventory. In customer service, agents move beyond simple chatbots to handle complex ticket resolution and initiate follow-up actions across different enterprise systems, freeing human agents for strategic cases.

Despite this promise, Agentic AI introduces significant hurdles concerning Safety and Control. A primary challenge is establishing clear accountability when autonomous agents make errors, creating an ethical and legal gap. Ensuring rigorous alignment with human ethical standards is paramount to mitigate the risk of perpetuating or amplifying biases inherited from training data.

The use of machine learning in airfare prediction benefits both consumers and airlines. Travelers gain access to smarter booking platforms that suggest the best time to purchase tickets, while airlines enhance revenue management and customer satisfaction through dynamic pricing. As AI and data analytics continue to advance, airfare prediction systems will become even more precise and personalized—making air travel planning more efficient, transparent, and cost-effective for everyone.

T.Vaishnavi
24RH1A66X4



Neuromorphic Computing: Mimicking the Human Brain

Neuromorphic computing is an innovative approach to designing computer systems inspired by the structure and functionality of the human brain. Unlike traditional computers that process information sequentially, neuromorphic systems use artificial neurons and synapses to process data in parallel, mimicking how biological brains handle complex tasks. This design allows for faster, more energy-efficient computation, particularly for tasks like pattern recognition, sensory processing, and real-time decision-making.

By leveraging spiking neural networks and specialized hardware, neuromorphic computing excels at tasks that require adaptability and learning. It can process large amounts of unstructured data, such as images, audio, and video, in ways similar to human cognition. Applications include robotics, autonomous systems, speech recognition, and advanced AI models that require low latency and high efficiency. These systems can learn continuously, adjusting to new information without the need for constant retraining.

The development of neuromorphic computing has the potential to transform artificial intelligence and computing as a whole. By bridging the gap between human cognition and machine processing, it enables smarter, faster, and more energy-efficient technologies. As research progresses, neuromorphic systems could revolutionize industries ranging from healthcare and robotics to autonomous vehicles and edge computing, bringing machines closer to human-like intelligence.

R.RUCHITHA
23RH1A66R4



AI-Based Career Guidance and Skill Mapping

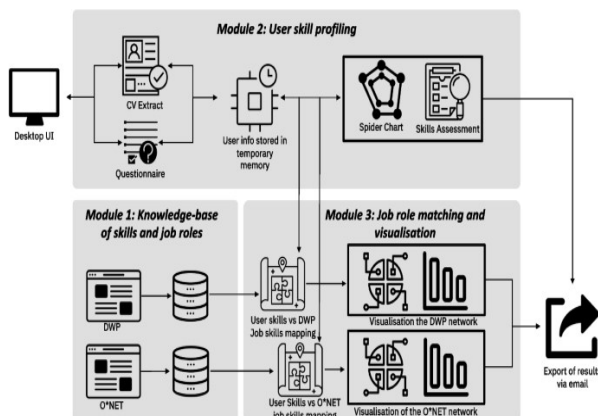
Artificial Intelligence (AI) is transforming career guidance and skill mapping by providing personalized recommendations based on an individual's strengths, interests, and market trends. Traditional career counseling often relies on generic advice or limited assessments, but AI-driven platforms analyze a wide range of data, including academic performance, professional experience, aptitude tests, and industry demands. This enables students and professionals to make more informed decisions about career paths, educational opportunities, and skill development.

AI-powered skill mapping tools can identify gaps between a person's current abilities and the skills required for their desired roles. By leveraging machine learning

algorithms, these systems suggest targeted courses, certifications, and learning resources to bridge those gaps.

The use of AI in career guidance benefits both individuals and organizations. For individuals, it provides clarity, personalized learning paths, and improved employability, while organizations can use AI insights to identify talent, plan workforce development,

and match employees to suitable roles. As AI continues to advance, career guidance and skill mapping will become increasingly precise, proactive, and tailored—helping people achieve their professional goals while meeting the demands of a dynamic job market.



P.ACHITHA
23RH1A66Q7



Symbolic AI

Symbolic AI, also known as rule-based or classical AI, is an approach that represents knowledge using symbols, logic, and rules to perform reasoning and problem-solving. Unlike machine learning, which learns patterns from data, symbolic AI relies on explicitly programmed knowledge and logical inference. This allows AI systems to solve structured problems, answer questions, and make decisions in domains where rules and relationships are well-defined, such as expert systems, theorem proving, and natural language processing.

Symbolic AI systems use techniques like knowledge representation, ontologies, and logic-based reasoning to process information. For example, expert systems in medicine can diagnose diseases by applying a set of rules derived from clinical knowledge, while AI in legal or financial domains can reason over regulations and contracts. These systems are highly interpretable, as each decision can be traced back to the underlying rules, which is a major advantage in applications requiring transparency and accountability.

Despite its strengths, symbolic AI has limitations in handling unstructured or ambiguous data, such as images, speech, or evolving environments. To overcome this, modern AI increasingly combines symbolic approaches with machine learning in hybrid systems, leveraging the reasoning capabilities of symbolic AI with the pattern recognition power of data-driven models. This integration allows AI to tackle more complex problems, making it more flexible, intelligent, and capable of understanding both rules and patterns in real-world scenarios.

D.SANJANA
22RH1A6645



Agentic AI and Autonomous systems

Agentic AI refers to artificial intelligence systems that can make independent decisions and take actions to achieve specific goals without constant human guidance. Unlike traditional AI, which primarily responds to pre-defined instructions, agentic AI can assess its environment, plan strategies, and adapt its behavior based on changing circumstances. This capability enables more complex problem-solving, from managing supply chains to navigating autonomous vehicles safely through dynamic environments.

Autonomous systems, powered by agentic AI, are increasingly being deployed across industries such as transportation, manufacturing, healthcare, and defense. For example, autonomous drones can monitor agricultural fields, inspect infrastructure, or deliver packages without human intervention. In manufacturing, autonomous robots work alongside humans to assemble products efficiently while adjusting to unexpected changes on the production line. These systems rely on real-time data, sensors, and machine learning algorithms to perform tasks accurately and safely.

The combination of agentic AI and autonomous systems promises to revolutionize the way we interact with technology. By reducing reliance on human supervision, they increase efficiency, safety, and scalability in critical operations. However, their deployment also raises important ethical and regulatory considerations, including accountability, transparency, and decision-making in unpredictable scenarios. As these technologies evolve, striking a balance between autonomy and oversight will be essential to harness their full potential responsibly.

G.ANUSHA
24RH5A6604



AIML Odyssey

The journey of artificial intelligence (AI) and machine learning (ML) has been a transformative odyssey, evolving from simple logic circuits to highly sophisticated systems capable of mimicking human intelligence. Early AI focused on rule-based problem solving and symbolic reasoning, laying the foundation for machines to perform structured tasks. Over time, advances in machine learning and neural networks allowed AI systems to learn from data, adapt to new information, and tackle complex problems in ways that were previously unimaginable.

Today, AI and ML are redefining industries and everyday life by creating “artificial minds” that can perceive, reason, and act autonomously. From self-driving cars to intelligent healthcare diagnostics, these technologies are enabling machines to make decisions, predict outcomes, and interact naturally with humans. The integration of natural language processing, computer vision, and deep learning has further expanded the capabilities of AI, allowing it to understand and respond to the world in increasingly human-like ways.

Looking ahead, the AIML odyssey promises a future where digital intelligence becomes an integral part of society, augmenting human potential and reshaping the way we work, learn, and live. While challenges like ethics, bias, and accountability remain, the ongoing evolution of artificial minds points toward a world where AI not only assists but collaborates with humans—transforming imagination into reality and paving the way for unprecedented innovation.

ALLA ASRITHA
22RH1A6609



Fake Image Detection

The rise of digital media has made it increasingly difficult to distinguish between genuine and manipulated images. Fake image detection is an emerging field that uses advanced technologies to identify digitally altered, AI-generated, or misleading visual content. With the proliferation of deepfakes, Photoshop edits, and AI-generated imagery, detecting deception has become critical for media integrity, cybersecurity, and public trust.

AI and machine learning play a key role in detecting fake images by analyzing patterns, inconsistencies, and anomalies that are often invisible to the human eye. Techniques such as convolutional neural networks (CNNs) can examine pixel-level details, lighting, and shadows, while forensic algorithms assess metadata and compression artifacts. These systems can detect signs of manipulation, including facial swaps, image blending, and generative adversarial network (GAN) outputs, providing reliable verification tools for journalists, law enforcement, and social media platforms.

The battle against digital deception is ongoing, as creators of fake content continue to develop more sophisticated methods. Fake image detection not only helps safeguard information authenticity but also strengthens societal trust in digital communication. As technology evolves, combining AI-driven detection with public awareness and digital literacy will be essential to combat misinformation and ensure that visual media remains a trustworthy source of information.

K H SHREYA

22RH1A6679



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