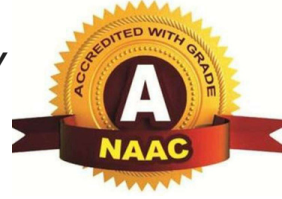


# Report on Capacity Building Program

24 JANUARY - 28 MARCH 2026

SSBT's COLLEGE OF ENGINEERING & TECHNOLOGY  
BAMBHORI, JALGAON - 425001, MS, INDIA

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# About the Program

Recognizing the importance of preparing professionals in cutting-edge fields, SSBT's College of Engineering & Technology, Bambhori, Jalgaon, has taken proactive steps to ensure its faculty members' continuous professional development to meet the modern era's demands.

As part of this initiative, the institute organized a capacity-building program focused on Artificial Intelligence (AI) to align with its commitment to staying at the forefront of technological advancements. This program, scheduled from 24 January - 28 March 2026 reinforces the institute's dedication to embracing emerging technologies and integrating them into academic and research endeavors.

Senior faculty members served as resource persons, while all faculty members participated enthusiastically, fostering a collaborative environment of peer learning.

## Objectives



The objectives of the program are as follows:

1. Empowering faculty members with cutting-edge technologies
2. Developing a culture of shared learning among faculty members
3. Inculcating creativity, critical thinking, communication, and cooperation among faculty members
4. Equip faculty with fundamental and advanced AI knowledge to integrate into their teaching and research.

## Outcomes



The outcomes of the program are as follows:

1. Enriching curriculum with cutting-edge technologies
2. Motivating students for creativity, critical thinking, communication, and cooperation
3. Engaging faculty to apply Engg. knowledge in societal, environmental & sustainable issues
4. Gain a strong theoretical and practical foundation in AI and its applications.

In the program, 96 faculty members from all departments attended the sessions.

# Artificial Intelligence: Yesterday, Today and Tomorrow Technology

Date: 24 Jan. 2026



Dr. G. K. Patnaik  
Principal

Artificial Intelligence has evolved from simple rule-based systems to advanced machine learning, deep learning, and generative AI models. Important milestones in this development include expert systems, neural networks, fuzzy logic, reinforcement learning, computer vision, natural language processing, and large language models. AI is now widely used in healthcare, education, transportation, finance, agriculture, manufacturing, defense, and engineering. Modern AI systems support automation, intelligent decision-making, predictive analysis, speech recognition, and efficient data processing. AI technologies are helping doctors diagnose diseases, supporting teachers in personalized learning, improving traffic systems, enabling intelligent financial management, and increasing productivity in industries. Recent developments in generative AI have made it possible to create text, images, videos, music, software, and virtual assistants automatically. AI is also becoming an important part of robotics, smart cities, cybersecurity, and scientific research. Future developments may include autonomous systems, intelligent agents, human-AI collaboration, explainable AI, and ethical AI frameworks. Although challenges such as privacy, bias, transparency, and employment changes remain, the continuous growth of AI is expected to transform industries, research, education, and society by making systems smarter, faster, safer, more efficient, and more accessible to people across the world.

# AI & Emerging Technologies

Date: 07 Feb. 2026



Dr. P. H. Zope

Associate Professor in Computer Engineering

Artificial Intelligence is closely connected with many emerging technologies such as the Internet of Things, robotics, wearable devices, edge computing, cloud computing, virtual reality, and autonomous systems. AI enables these technologies to collect and process large amounts of data, make intelligent decisions, and respond automatically to changing conditions. Intelligent devices are increasingly used in healthcare, education, transportation, agriculture, and industry. For example, AI-powered wearable devices can monitor health conditions, while smart robots can assist in manufacturing and medical applications. Edge computing combined with AI allows faster processing and reduced dependence on cloud systems. The integration of AI with emerging technologies creates new opportunities for innovation, automation, and improved quality of life. These systems help save time, reduce human effort, and improve efficiency. Future developments are expected to make intelligent technologies more efficient, accessible, reliable, affordable, and useful in everyday life and professional activities.

# Root Cause Analysis using ML

Date: 07 Feb. 2026



Dr. Dnyaneshwar K. Kirange  
Professor in Computer Engineering

Machine learning is widely used for root cause analysis in industries and organizations because it helps identify the fundamental reasons behind system failures, production losses, quality issues, and operational problems. By analyzing both historical and real-time data, machine learning algorithms can discover hidden patterns, relationships, and trends that may not be visible through traditional methods. Techniques such as classification, clustering, association rules, and predictive modeling support faster and more accurate fault diagnosis. Machine learning can identify the sequence of events leading to a failure and help engineers determine the exact cause of the problem. Root cause analysis using machine learning reduces repeated failures, improves system reliability, and supports better decision-making. It is increasingly applied in manufacturing, healthcare, finance, maintenance, and transportation systems. Although challenges such as poor-quality data and model accuracy exist, machine learning provides an effective and intelligent approach for solving complex industrial and organizational problems.

# Transformative Role of AI in Tax Planning

Date: 07 Feb. 2026



Dr. Richa A. Modiyani

Associate Professor in Business Administration

Artificial Intelligence (AI) is rapidly transforming tax planning from a reactive, year-end compliance activity into a proactive, data-driven, and strategic function. Traditional tax planning practices are often constrained by manual data handling, delayed insights, complex regulations, and a higher risk of errors or missed deductions. In an increasingly dynamic regulatory environment, these limitations create challenges for individuals and businesses alike. The integration of AI into tax planning addresses these issues through automation, real-time data analysis, and predictive analytics. AI systems can process large volumes of financial information efficiently, identify eligible deductions and credits, and forecast tax liabilities well in advance. Machine learning algorithms continuously adapt to changes in tax laws and individual financial patterns, enabling personalized and optimized tax strategies throughout the financial year rather than only at its end. AI also strengthens tax compliance by monitoring regulatory updates in real time, reducing the likelihood of non-compliance and associated penalties. Importantly, AI does not replace tax professionals; instead, it enhances their role by providing actionable insights that support informed decision-making. Human expertise remains essential for interpretation, ethical oversight, and strategic application. Overall, AI represents a significant advancement in tax planning, improving accuracy, efficiency, and strategic alignment when integrated responsibly, effectively.

# Artificial Intelligence in Plant Disease Detection

Date: 07 Feb. 2026



Dr. Dinesh D. Puri  
Associate Professor in MCA

Artificial Intelligence (AI) has emerged as a transformative technology in agriculture, particularly in the detection and management of plant diseases. Early identification of plant diseases is crucial for preventing crop loss, ensuring food security, and improving agricultural productivity. Traditional methods of disease detection rely on manual inspection by experts, which can be time-consuming, costly, and prone to human error. AI-based solutions provide a faster, more accurate, and scalable alternative. AI in plant disease detection primarily uses techniques from Machine Learning and Deep Learning. These technologies analyze images of plant leaves to identify patterns, spots, discoloration, and other symptoms associated with diseases. Convolutional Neural Networks (CNNs), a type of deep learning model, are widely used for image classification tasks. By training on large datasets of healthy and diseased plant images, these models can accurately classify diseases such as leaf blight, rust, and powdery mildew. The process typically involves capturing images of plant leaves using smartphones or drones, followed by preprocessing steps like image resizing and noise removal. The AI model then extracts features and compares them with learned patterns to predict the type of disease. Many mobile applications have been developed that allow farmers to upload photos and receive instant diagnosis along with recommended treatments. The advantages of AI-based plant disease detection include high accuracy, real-time analysis, reduced dependency on experts, and cost-effectiveness. It also enables precision agriculture, where farmers can apply pesticides only where needed, reducing environmental impact. Furthermore, integrating AI with Internet of Things (IoT) devices allows continuous monitoring of crop health. However, there are challenges such as the need for large and diverse datasets, variability in environmental conditions, and limited access to technology in rural areas. Ensuring the reliability and robustness of AI models is also essential. In conclusion, AI has the potential to revolutionize plant disease detection by making it faster, more accurate, and accessible.

# STAC-Net: A Spectro-Temporal Contrastive Framework for Genu Valgum Detection in Adolescent

Date: 07 March 2026



Dr. Surendra P. Ramteke  
Associate Professor in Computer Engineering

STAC-Net is an Artificial Intelligence framework developed for detecting genu valgum, commonly known as knock-knee, in adolescents using short monocular walking videos. The framework combines biomechanical analysis, spectrogram-based temporal features, pose estimation, and contrastive learning to improve the accuracy and reliability of diagnosis. Human body keypoints are extracted from walking videos using pose estimation techniques, and important biomechanical parameters such as knee angle, hip movement, stride length, and joint displacement are analyzed. Spectrogram-based features capture changes in movement over time, while contrastive learning helps the model distinguish between normal and abnormal gait patterns. The framework is designed to work even in the presence of noise, different lighting conditions, and minor variations in walking style. Explainable AI techniques such as Grad-CAM improve transparency by highlighting the important regions and movements influencing the final decision. Early detection of genu valgum can prevent future orthopedic complications and support timely treatment, rehabilitation, and improved musculoskeletal health in adolescents.

# Oral Cancer Detection Using Artificial Intelligence

Date: 07 March 2026



Dr Atul H Karode

Associate Professor in E&TC Engineering

Artificial Intelligence is being used for the early detection of oral cancer through image processing, computer vision, and deep learning techniques. AI systems can analyze medical images of the mouth, tongue, gums, and oral tissues to identify abnormal patterns and possible signs of cancer with high accuracy. Convolutional neural networks and other deep learning models are commonly used for classifying healthy and diseased tissues. Early detection of oral cancer is very important because it improves treatment outcomes and reduces the risk of disease progression. AI-based healthcare systems support doctors in making faster, more reliable, and more accurate decisions. These systems can also reduce the time required for diagnosis and help in remote screening in areas where medical experts are not easily available. Although challenges such as data quality, image variability, and privacy remain, Artificial Intelligence has great potential to improve oral cancer diagnosis and healthcare services.

# Industrial Engineering Approaches to Financial Forecasting Using Moving Averages and AI

Date: 07 March 2026



Dr. Prashant Narendrarao Ulhe  
Associate Professor in First Year Engineering

Monitoring of a smart city using Artificial Intelligence (AI) is essential for efficient urban management and improved quality of life. AI integrates data from various sources such as IoT sensors, surveillance cameras, traffic systems, and public utilities to provide real-time monitoring and analysis. This enables city authorities to make informed decisions quickly and accurately. For instance, AI can analyze traffic patterns and automatically adjust signal timings to reduce congestion and travel time. It also enhances public safety by detecting unusual activities or emergencies through intelligent video surveillance systems. In addition, AI plays a vital role in environmental monitoring by tracking air quality, noise levels, and water usage, helping authorities take preventive measures. Waste management systems use AI to monitor garbage levels in bins and optimize collection routes, reducing operational costs and improving cleanliness. Smart energy systems also use AI to control street lighting and power consumption efficiently. Furthermore, AI-based monitoring systems can predict potential problems such as equipment failures or infrastructure damage, allowing timely maintenance. Overall, the use of AI in smart city monitoring improves efficiency, reduces human effort, enhances safety, and promotes sustainable urban development, making cities smarter and more responsive to citizens' needs.

# Structural Health Monitoring Yesterday and Today with AI

Date: 07 March 2026



Dr. Pravin A. Shirule  
Professor in Civil Engineering

Structural health monitoring is used to assess the condition, performance, and safety of buildings, bridges, dams, tunnels, towers, and other civil engineering structures. Traditional methods mainly rely on manual inspection and visual observation, which may not detect hidden damage or internal defects at an early stage. Modern structural health monitoring systems use sensors, wireless communication, data acquisition systems, and Artificial Intelligence to continuously monitor the behavior of structures. AI can analyze vibration signals, images, strain measurements, temperature, displacement, and acoustic data to detect cracks, corrosion, fatigue, leakage, and structural weakness in real time. Machine learning algorithms can also predict future failures and identify areas that require urgent maintenance or repair. Intelligent monitoring improves safety, reduces maintenance cost, prevents unexpected failures, and increases the lifespan of infrastructure. These systems are widely used in smart cities, transportation networks, railway bridges, high-rise buildings, and industrial structures. AI-based structural health monitoring is becoming increasingly important in civil engineering because it provides faster, more accurate, and more reliable information for repair, maintenance, and public safety decisions.

# Process Control & Safety Analytic

Date: 13 March 2026



Dr. S. A. Thakur

Associate Professor in Chemical Engineering

Artificial Intelligence is transforming process control and industrial safety by improving efficiency, reliability, and risk management in chemical and manufacturing industries. AI-based methods such as machine learning, neural networks, fuzzy logic, and predictive analytics are used for process monitoring, fault detection, predictive maintenance, and safety optimization. Intelligent systems can continuously analyze large amounts of industrial data in real time, identify abnormal conditions, and prevent accidents before they occur. AI-based predictive maintenance reduces equipment failure and minimizes production downtime. In process industries, AI also supports energy optimization, quality control, and improved production efficiency. Intelligent monitoring systems can automatically adjust operating conditions to maintain safe and stable performance. AI is also useful in identifying hazardous situations, reducing human error, and supporting emergency decision-making. Although challenges such as data quality, cybersecurity, and model interpretability remain, these technologies are creating safer, smarter, more reliable, and sustainable industrial operations for the future.

# AI in Additive Manufacturing (3D Printing)

Date: 13 March 2026



Dr. Pradeep M. Solanki

Associate Professor in Mechanical Engineering

Artificial Intelligence is playing a major role in additive manufacturing and 3D printing by improving accuracy, quality, efficiency, and reliability. AI algorithms are used to optimize process parameters such as temperature, speed, layer thickness, and material composition. Machine learning models analyze manufacturing data to predict defects, improve material selection, and support intelligent decision-making during production. AI also enables real-time monitoring of the printing process, allowing early detection of errors and automatic correction before product failure occurs. Intelligent systems support automated quality control and predictive maintenance of manufacturing equipment, reducing downtime and maintenance costs. The integration of AI with additive manufacturing reduces production time, material wastage, and overall cost while improving product performance and precision. These technologies are widely used in aerospace, automotive, healthcare, and industrial applications. Although challenges such as high computational requirements and data availability remain, AI-driven additive manufacturing represents an important step toward smart and intelligent production systems.

# OSOWOG & Future Energy

Date: 13 March 2026



Dr. K. Shrivastava

Professor in Mechanical Engineering

One Sun One World One Grid is an international initiative that aims to create a globally interconnected power grid for sharing renewable energy, especially solar energy, across different countries and regions. The concept is based on the idea that sunlight is always available somewhere in the world, making it possible to transfer solar power from one region to another. Artificial Intelligence plays an important role in this system through energy forecasting, smart grid management, load balancing, and power optimization. AI-based techniques can analyze weather conditions, energy demand, and grid performance to improve energy distribution and reduce transmission losses. Intelligent systems also support real-time monitoring, fault detection, and efficient utilization of renewable resources. The integration of renewable energy with AI-driven smart grids can help meet future energy demands, reduce dependence on fossil fuels, lower environmental pollution, and support sustainable development across the world.

# Monitoring of Smart City using AI

Date: 13 March 2026



Dr. Farooq Ismail Chavanl

Associate Professor in Civil Engineering

Monitoring of a smart city using Artificial Intelligence (AI) is essential for efficient urban management and improved quality of life. AI integrates data from various sources such as IoT sensors, surveillance cameras, traffic systems, and public utilities to provide real-time monitoring and analysis. This enables city authorities to make informed decisions quickly and accurately. For instance, AI can analyze traffic patterns and automatically adjust signal timings to reduce congestion and travel time. It also enhances public safety by detecting unusual activities or emergencies through intelligent video surveillance systems. In addition, AI plays a vital role in environmental monitoring by tracking air quality, noise levels, and water usage, helping authorities take preventive measures. Waste management systems use AI to monitor garbage levels in bins and optimize collection routes, reducing operational costs and improving cleanliness. Smart energy systems also use AI to control street lighting and power consumption efficiently. Furthermore, AI-based monitoring systems can predict potential problems such as equipment failures or infrastructure damage, allowing timely maintenance. Overall, the use of AI in smart city monitoring improves efficiency, reduces human effort, enhances safety, and promotes sustainable urban development, making cities smarter and more responsive to citizens' needs.

# AI-Driven Renewable Energy Forecasting: Powering the Future Innovation

Date: 13 March 2026



Dr. Amol Wani

Associate Professor in First Year Engineering

The rapid expansion of solar and wind energy is reshaping modern power systems, driving the transition toward a low-carbon and decentralized energy landscape. However, the stochastic and non-linear nature of renewable resources introduces significant challenges in grid stability, dispatch planning, and real-time energy management. To address these complexities, Artificial Intelligence (AI) has emerged as a transformative enabler, delivering high-precision, data-driven forecasting solutions. Contemporary approaches now extend beyond conventional machine learning to advanced deep learning architectures such as LSTM, GRU, and transformer-based time-series models, capable of capturing complex temporal dependencies in renewable generation patterns. Recent innovations, including probabilistic forecasting, physics-informed neural networks (PINNs), and hybrid AI models, are enhancing prediction accuracy while embedding physical constraints of power systems into learning frameworks. The convergence of AI with IoT-enabled sensors, edge computing, digital twins, and high-resolution satellite-based meteorological data enables real-time, adaptive, and scalable forecasting systems. These intelligent models support ultra-short-term to long-term predictions, facilitating optimal unit commitment, dynamic grid balancing, energy storage optimization, and efficient participation in real-time energy markets. As renewable penetration continues to rise, robust, interpretable, and adaptive forecasting systems will be essential for ensuring grid resilience and operational efficiency. Overall, AI-driven renewable energy forecasting represents a cornerstone technology for enabling smart grids, accelerating energy transition, and building sustainable, future-ready power systems.

# Human Powered Machines using AI

Date: 13 March 2026



Dr. Pravin D. Patil

Assistant Professor in First Year Engineering

Running training has evolved significantly with the integration of Artificial Intelligence (AI). Traditionally, human coaches have guided athletes based on experience, observation, and personalized interaction. Today, AI-powered systems are transforming how runners train, monitor performance, and achieve their fitness goals. This report compares AI-based training with human coaching in the context of running. AI-based running training relies on technologies such as Machine Learning, wearable sensors, and mobile applications. Devices like smartwatches and fitness trackers collect real-time data including heart rate, pace, distance, and sleep patterns. AI algorithms analyze this data to create customized training plans, adjust intensity levels, and provide instant feedback. Apps such as Strava and Nike Run Club use AI to suggest workouts, track progress, and even predict performance outcomes. AI systems are available 24/7, offering consistency and scalability at a relatively low cost. On the other hand, human coaches bring experience, intuition, and emotional intelligence to training. They can understand an athlete's mental state, motivation, and physical limitations in a holistic way. Human trainers provide encouragement, adapt plans based on subtle cues, and help prevent injuries through proper technique guidance. Their ability to build relationships and offer psychological support is something AI currently cannot fully replicate. In terms of advantages, AI training offers precision, data-driven insights, and convenience. It is especially useful for beginners and recreational runners who need structured guidance. However, it may lack personalization in complex situations and cannot fully interpret emotional or psychological factors. Human coaching excels in personalized attention, motivation, and adaptability but may be expensive and less accessible. A hybrid approach combining AI tools with human coaching is becoming increasingly popular. AI can handle data analysis and routine planning, while human coaches focus on strategy, motivation, and overall well-being. In conclusion, both AI and human coaching have unique strengths in running training. While AI enhances efficiency and accessibility, human trainers provide depth and empathy. The future of running training lies in integrating both approaches to maximize performance and athlete satisfaction.

# SCADA

Date: 13 March 2026



Dr. Shital Patil  
Assistant Professor in Computer Engineering

SCADA (Supervisory Control and Data Acquisition) is widely used across many industries for monitoring, control, automation, and data acquisition of industrial processes. Artificial Intelligence (AI) and Machine Learning (ML) further enhance SCADA capabilities by enabling intelligent monitoring, predictive analytics, and autonomous decision support. AI-driven SCADA systems improve operational efficiency through predictive maintenance, anomaly detection, alarm rationalization, and process optimization. Machine learning algorithms such as Decision Trees, Random Forests, Support Vector Machines, Neural Networks, and Deep Learning models analyze vast industrial datasets to predict failures, optimize control parameters, detect cyber threats, and support real-time decision-making. These technologies are increasingly applied in power systems, manufacturing, smart grids, and water management to create more proactive and data-driven control systems.

The future of SCADA lies in the convergence of Cloud Computing, Edge Computing, AI/ML, IIoT, and high-speed 5G networks, leading to highly intelligent and autonomous industrial ecosystems. These advancements promise improved reliability, reduced downtime, stronger cybersecurity, and continuous optimization of industrial operations. However, challenges such as data quality, model interpretability, scalability, and integration complexity must be addressed for effective deployment of machine learning in SCADA. Despite these challenges, the collaboration of these advanced technologies is driving SCADA from traditional supervisory control toward smart, adaptive, and future-ready automation platforms.

# AI in Pricing and Promotions

Date: 13 March 2026



Dr. M. V. Rawalani  
Professor in MBA

Artificial Intelligence (AI) has emerged as a powerful tool for improving pricing and promotional decisions by enabling organizations to rely on real-time data rather than traditional assumptions. AI-driven pricing models analyze factors such as customer demand, competitor pricing, and market trends to determine optimal pricing strategies that enhance revenue and profitability. In promotions, AI facilitates personalized offers by studying customer behavior, preferences, and response patterns, thereby increasing campaign effectiveness while reducing unnecessary discounts. Additionally, AI-based analytics helps organizations evaluate promotional performance through key metrics like conversion rates and customer engagement, allowing for continuous improvement. Its ability to integrate with systems such as POS, CRM, and ERP further enhances its practical application across industries like retail, e-commerce, aviation, and FMCG. Overall, AI enables smarter, faster, and more efficient pricing and promotional strategies, leading to improved customer satisfaction and better business performance.

# A Review on Biomedical Signal Processing using Machine Learning Techniques

Date: 13 March 2026



Dr. Karhe R.R.

Assistant Professor in Electrical Engineering

A focus on the use of machine learning algorithms in bio-medical signal processing. Bio-medical signals are complex and heterogeneous, and their analysis and interpretation can be challenging for healthcare professionals. Machine learning algorithms provide a powerful tool for extracting valuable information from bio-medical signals that can be used for personalized treatment plans and improved patient outcomes., the different types of bio-medical signals and their classification, the challenges associated with using machine learning in bio-medical signal processing, and the different machine learning algorithms that have been used in this field. We also highlight the potential applications of this research in improving diagnosis, treatment, and monitoring of diseases. Overall, the use of machine learning algorithms in bio-medical signal processing has the potential to revolutionize healthcare, but further research is needed to address the challenges associated with this field and to fully realize its potential.

# AI-Enabled Power Transmission System

Date: 13 March 2026



Dr. Suhas Shembekar

Associate Professor in Electrical Engineering

The increasing complexity, decentralization, and dynamic behaviour of modern power systems—driven by renewable energy integration, distributed generation, and smart grid technologies—necessitate advanced monitoring and operational strategies. Artificial Intelligence (AI) has emerged as a transformative tool to enhance the reliability, efficiency, and resilience of power systems. This work presents a comprehensive overview of AI-based techniques applied to power system monitoring and operation, including machine learning, deep learning, and reinforcement learning approaches. The study also discusses challenges such as data quality, model interpretability, cybersecurity concerns, and computational requirements. Case studies and recent developments are reviewed to demonstrate the practical implementation and effectiveness of AI in modern power networks. The integration of AI in power system monitoring and operation not only improves system performance but also plays a crucial role in achieving sustainable and intelligent energy systems.

# Tiny ML to Edge AI

Date: 13 March 2025



Dr. Sarkarsinha H. Rajput

Associate Professor in Computer Engineering

Tiny Machine Learning and Edge AI enable Artificial Intelligence to run on small, low-power devices such as sensors, microcontrollers, smartphones, and embedded systems. These technologies support real-time data processing without depending on cloud computing or constant internet connectivity. TinyML and Edge AI reduce latency, improve privacy, decrease energy consumption, and make intelligent systems faster and more reliable. AI models can run directly on the device, allowing immediate responses and reducing the need to send sensitive data to external servers. Applications include smart homes, wearable healthcare devices, precision agriculture, robotics, industrial monitoring, autonomous vehicles, and environmental sensing. For example, Edge AI can detect machine faults in factories or monitor patient health through smart devices in real time. The combination of TinyML and Edge AI is becoming increasingly important for intelligent Internet of Things systems. These technologies support affordable, portable, and efficient AI solutions for future smart environments and connected devices.

# Large Language Models as Agentic Brains

Date: 17 March 2026



Dr. Sandip Patil  
Professor in First Year Engineering

Large Language Models (LLMs) have progressed beyond traditional text generation systems to become central reasoning and decision-making components in agentic artificial intelligence architectures. When used as agentic brains, LLMs enable autonomous agents to interpret goals, understand contextual information, plan multi-step actions, and interact with external tools and environments. This capability allows AI systems to exhibit goal-driven, adaptive, and self-directed behavior rather than simple reactive responses. Through mechanisms such as task decomposition, memory integration, reflection, and tool invocation, LLM-based agents can operate effectively in dynamic and uncertain environments. The adoption of LLMs as agentic brains has significant potential in engineering automation, including autonomous software development, smart manufacturing, system optimization, and predictive maintenance. Furthermore, multi-agent systems powered by LLMs enhance collaboration by allowing multiple agents to communicate and coordinate using natural language. Despite these advantages, challenges such as hallucinations, safety and alignment risks, high computational costs, and limited explainability remain key concerns. Addressing these issues is essential for the reliable deployment of agentic AI systems. This abstract highlights the role, capabilities, applications, and limitations of large language models as agentic brains, emphasizing their importance in shaping the future of autonomous and intelligent engineering systems.

# Explainable AI (XAI)

Date: 17 March 2025



Dr. K. P. Adhiya

Professor in Computer Engineering

Explainable Artificial Intelligence focuses on making AI decisions transparent, understandable, and easier for humans to interpret. Many advanced AI models, especially deep learning and neural network systems, operate as black boxes, making it difficult to understand how they generate predictions or decisions. Explainable AI uses techniques such as feature importance, SHAP, LIME, Grad-CAM, saliency maps, rule-based explanations, and decision trees to interpret model behavior and identify the factors influencing the output. Transparent AI systems increase trust, reliability, accountability, fairness, and user confidence. Explainable AI is especially important in healthcare, finance, education, law, cybersecurity, and autonomous systems, where decisions must be clearly understood and justified. For example, doctors need to know why an AI system predicts a disease, banks must understand why a loan application is rejected, and self-driving vehicles must explain critical actions. Explainable AI also helps detect bias, improve model accuracy, satisfy legal requirements, and support ethical and responsible use of Artificial Intelligence.

# AI for Recruitment & Talent Acquisition

Date: 17 March 2026



Dr. Faroza A. Kazi

Assistant Professor in MBA

Artificial Intelligence (AI) plays a crucial role in enhancing the capabilities of Software Defined Networking (SDN) by making networks more intelligent, adaptive, and efficient. In SDN, the control plane is separated from the data plane and managed by a centralized controller. AI integrates with this controller to enable automated decision-making and real-time network optimization. One of the key roles of AI in SDN is intelligent traffic management. AI algorithms analyze network traffic patterns and dynamically adjust routing paths to reduce congestion and improve bandwidth utilization. AI also strengthens network security by detecting anomalies, identifying cyber-attacks such as Distributed Denial of Service (DDoS), and enabling the controller to take immediate preventive actions. Another important role is fault detection and self-healing. AI continuously monitors network devices, detects failures or unusual behavior, and allows SDN to reroute traffic automatically, ensuring minimal disruption. Additionally, AI helps in resource optimization by analyzing network usage and allocating bandwidth efficiently, improving Quality of Service (QoS). Overall, AI transforms SDN into a smart and autonomous network system by improving performance, reducing operational costs, enhancing security, and enabling faster and more reliable network management.

# Structural Health Monitoring Using AI

Date: 17 March 2025



Dr. Pankaj Punase

Associate Professor in Civil Engineering

Structural health monitoring is used to assess the condition, performance, and safety of buildings, bridges, dams, tunnels, and other civil engineering structures. Traditional methods rely on manual inspection and visual observation, which can be time-consuming and less accurate. Modern structural health monitoring systems use sensors, data acquisition devices, wireless communication, and Artificial Intelligence to continuously observe structural behavior. AI techniques can analyze vibration data, images, strain measurements, and other signals to detect cracks, corrosion, damage, and structural weakness in real time. Machine learning models can also predict future failures and support preventive maintenance. Intelligent monitoring improves safety, reduces maintenance cost, minimizes the risk of accidents, and increases the lifespan of infrastructure. AI-based structural health monitoring is becoming increasingly important in civil engineering because it provides faster, more reliable, and more efficient assessment of structures, helping engineers make better decisions regarding repair, maintenance, and public safety.

# Prompting Techniques for Language Models

Date: 17 March 2025



Dr. Akash Waghmare

Associate Professor in Computer Engineering

Prompting techniques are used to improve the performance, accuracy, and reliability of large language models. Different methods such as zero-shot prompting, one-shot prompting, few-shot prompting, chain-of-thought prompting, and instruction-based prompting help language models generate more useful and relevant responses. Zero-shot prompting allows the model to perform a task without examples, while few-shot prompting improves performance by providing sample inputs and outputs. Chain-of-thought prompting encourages the model to explain its reasoning step by step, leading to better problem-solving and decision-making. Effective prompts can improve creativity, logical reasoning, text generation, summarization, translation, and coding tasks. Prompt engineering is becoming an important skill in education, research, software development, healthcare, and business applications. Properly designed prompts make AI systems more efficient, reliable, and easier to use. They also help reduce errors, misunderstandings, and irrelevant responses in real-world applications.

# Role of AI in Software Defined Network

Date: 28 March 2026



Dr. N. M. Kazi

Associate Professor in E&Tc Engineering

Artificial Intelligence (AI) plays a crucial role in enhancing the capabilities of Software Defined Networking (SDN) by making networks more intelligent, adaptive, and efficient. In SDN, the control plane is separated from the data plane and managed by a centralized controller. AI integrates with this controller to enable automated decision-making and real-time network optimization.

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# Human-AI Collaboration in Teaching

Date: 28 March 2026



Dr. Sunita Patil

Associate Professor in First Year Engineering

Human-AI collaboration in teaching combines the strengths of educators and artificial intelligence to enhance learning outcomes. AI tools assist teachers by analysing student performance, personalizing content, automating grading, and providing real-time feedback. This reduces workload and allows teachers to focus more on student engagement and concept clarity. However, AI cannot replace human teachers, as they provide creativity, emotional support, and ethical guidance. Teachers interpret AI insights and maintain meaningful classroom interactions. While this collaboration improves efficiency and learning experiences, challenges such as data privacy, ethical concerns, and the digital divide must be addressed. Overall, Human-AI collaboration creates a balanced and effective teaching approach, making education more adaptive, interactive, and future-ready.

# Application of AI in Concrete Technology

Date: 28 March 2026



Dr. Sonali Patil

Associate Professor in Civil Engineering

Artificial Intelligence (AI) is increasingly being applied in concrete technology to improve efficiency, accuracy, and decision-making. Traditional methods of testing and analyzing concrete are time-consuming and costly, whereas AI enables fast and data-driven predictions. AI techniques such as Artificial Neural Networks (ANN) and machine learning models are widely used for mix design optimization and compressive strength prediction. These models analyze input parameters like water-cement ratio, aggregates, and curing time to estimate concrete performance without extensive laboratory testing. AI is also used in crack detection and structural health monitoring through deep learning and image processing. This allows early identification of defects, improving safety and maintenance planning. Additionally, AI helps in assessing the durability of concrete under different environmental conditions. Although AI offers advantages like reduced cost, higher accuracy, and real-time monitoring, it requires large datasets and careful model training. Overall, AI plays a crucial role in developing smart, durable, and sustainable concrete infrastructure.

# Smart Manufacturing

Date: 28 March 2026



Dr. Ajay Ravindra Bhardwaj  
Associate Professor in Mechanical Engineering

Today, the manufacturing industry is aiming to improve competitiveness through the convergence with cutting-edge ICT technologies in order to secure a new growth engine. Smart Manufacturing, which is the fourth revolution in the manufacturing industry and is also considered as a new paradigm, is the collection of cutting-edge technologies that support effective and accurate engineering decision-making in real time through the introduction of various ICT technologies and the convergence with the existing manufacturing technologies. Smart manufacturing is rapidly evolving technology characterizing optimal use of workforce and energy and improved manufacturing performance by utilizing interconnecting machines and tools. It is implemented by interconnection of state-of-the-art robotic technology, industrial Internet of Things, cloud computing, big data processing and artificial intelligence. Integration of artificial intelligence to smart manufacturing enables system intelligence and independently accomplishes complicated tasks such as monitoring the quality of products, predictive maintenance of machines, etc. Digital twin, a virtual model for physical object, helps to attain the optimization of the entire manufacturing process. Understanding smart manufacturing is crucial, as it offers the potential for significant innovations across various industries, underscoring the growing interest and advantages within the manufacturing sector. This subject is important because it underscores the possibility of enhancing efficiency and productivity in industries, which are vital for national economies. The goal of this study is to look at the current state of smart manufacturing and talk about the technologies that go along with it.

# AI-Based Design Optimisation

Date: 28 March 2026



Dr. P.G.Damle

Professor in Mechanical Engineering

ADAS (Advanced Driver Assistance Systems) refers to a set of electronic, sensor-based technologies designed to assist drivers in making safer decisions on the road by detecting potential hazards, issuing alerts, and in some cases automatically taking corrective actions. These systems rely on key components such as cameras, radar, LiDAR, ultrasonic sensors, Electronic Control Units (ECUs), and Human-Machine Interfaces (HMI). The working of ADAS is organized into three functional layers: the Perception Layer, which gathers environmental data to detect vehicles, pedestrians, and traffic signs; the Planning Layer, which processes this data using AI algorithms to determine appropriate actions; and the Action or Alert Layer, which either warns the driver or performs control actions like braking or steering assistance. Artificial Intelligence plays a vital role in enhancing ADAS performance through techniques such as computer vision, deep learning, sensor fusion, path planning, and decision-making algorithms, while reinforcement learning enables continuous improvement through experience. The integration of System-on-a-Chip (SoC) technology further enhances system efficiency by combining processing, memory, and AI capabilities into a compact unit. ADAS also spans multiple levels, from basic driver assistance to fully autonomous driving systems. Overall, AI-driven ADAS technologies are transforming the automotive sector by improving safety, minimizing human error, and advancing the development of intelligent and autonomous transportation systems.

# Robotics and Autonomous Systems

Date: 28 March 2026



Dr. D. B. Sadaphale

Associate Professor in First Year Engineering

Robotics and autonomous systems use Artificial Intelligence to perform tasks without continuous human control or supervision. Intelligent robots can sense the environment using sensors, cameras, GPS, lidar, and other devices, process information, make decisions, and complete different activities automatically. Robotics is widely used in manufacturing, healthcare, agriculture, defense, transportation, warehousing, mining, and space exploration. In industries, robots are used for assembly, welding, packaging, inspection, painting, and material handling. In healthcare, robotic systems support surgery, rehabilitation, patient monitoring, and medicine delivery. Autonomous systems include drones, self-driving vehicles, service robots, industrial robots, and unmanned aerial or ground vehicles that can operate independently. Artificial Intelligence improves the accuracy, speed, flexibility, and adaptability of these systems by enabling object detection, navigation, speech recognition, path planning, and intelligent decision-making. Machine learning allows robots to learn from experience and improve their performance over time. Robotics and autonomous systems can reduce human effort, increase productivity, improve safety, and perform dangerous tasks in hazardous environments. Although challenges such as cost, safety, cybersecurity, and ethical concerns remain, these technologies are expected to play a major role in the future of industry, healthcare, transportation, and daily life.

# Intelligent Tutoring System for Adaptive Learning

Date: 28 March 2026



Dr. C. U. Nikam

Associate Professor in First Year Engineering

Artificial Intelligence (AI) has emerged as a transformative force in modern education, particularly through its application in Intelligent Tutoring Systems (ITS) for adaptive learning. Traditional instructional approaches often fail to address individual learner differences in pace, prior knowledge, and learning styles. Intelligent Tutoring Systems overcome these limitations by providing personalized, learner-centered instruction that closely resembles human tutoring. AI acts as the core engine of ITS, enabling real-time analysis of learner behavior, performance, and interactions to dynamically adapt instructional content and strategies.

AI-based ITS integrate key components such as the domain model, student model, tutoring model, and user interface to deliver customized learning experiences. Machine Learning algorithms analyze large volumes of learner data to identify strengths, weaknesses, and misconceptions, while continuously refining teaching strategies. Natural Language Processing facilitates meaningful interaction between learners and systems through conversational agents and virtual tutors. Adaptive assessments and immediate feedback further enhance learner engagement, motivation, and knowledge retention. The implementation of AI in ITS supports self-paced learning, reduces cognitive overload, and improves academic outcomes across diverse educational settings, including schools, higher education, online learning platforms, and professional training. Despite challenges such as data privacy concerns, development costs, and limited emotional intelligence, ongoing advancements in AI promise more human-like, emotion-aware, and immersive tutoring systems. Overall, AI-driven Intelligent Tutoring Systems represent a significant step toward equitable, scalable, and effective adaptive learning, shaping the future of personalized education.

# Smart Maintenance Systems Powered by AI

Date: 28 March 2026



Dr. D. C. Talele

Associate Professor in Mechanical Engineering

Smart Maintenance Systems Powered by AI are transforming how industries manage equipment and infrastructure by shifting from reactive repairs to predictive and prescriptive strategies. Leveraging machine learning algorithms, IoT sensors, and real-time data analytics, these systems continuously monitor the health of machinery, detecting anomalies and forecasting potential failures before they occur. By analyzing patterns in vibration, temperature, pressure, and operational data, AI models can accurately predict when a component is likely to fail, enabling maintenance teams to act proactively — minimizing unplanned downtime, reducing repair costs, and extending asset lifespan. Many Platforms exemplify how AI-driven maintenance is being deployed across manufacturing, aviation, energy, and transportation sectors. Beyond prediction, advanced systems can also prescribe optimal maintenance schedules, auto-generate work orders, and even guide technicians through augmented reality interfaces. The result is a smarter, leaner maintenance ecosystem that improves operational efficiency, enhances worker safety, and delivers significant ROI. As AI capabilities continue to evolve, smart maintenance systems are becoming a cornerstone of Industry 4.0, enabling organizations to move toward fully autonomous, self-healing operational environments.

# Glimpses



GPS Map Camera  
**Jalgaon, Maharashtra, India**  
 Bambhori Pr. Chandsar, Jalgaon, Maharashtra  
 425002, India  
 Lat 21.014226° Long 75.502635°  
 Saturday, 24/01/2026 04:02 PM GMT +05:30

	Decimal	DMS
Latitude	21.014014	21°0'50" N
Longitude	75.502665	75°30'9" E

2026-03-13(Fri) 03:53(pm)

	Decimal	DMS
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2026-03-13(Fri) 03:27(pm)

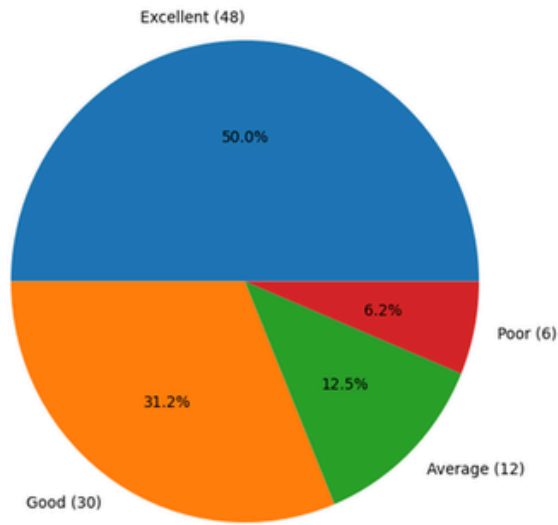
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2026-03-07(Sat) 04:16(pm)

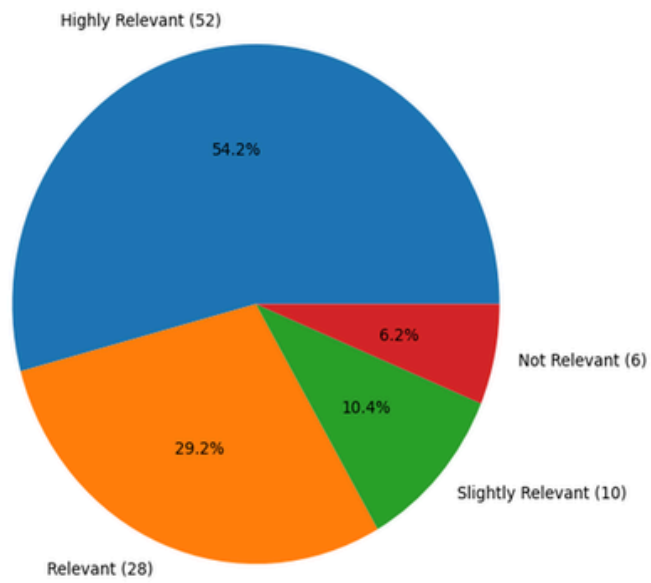
	Decimal	D
Latitude	21.014016	21°0
Longitude	75.502666	75°3

# Feedback

How would you rate the overall organization and management of the Capacity Building Program 2026?

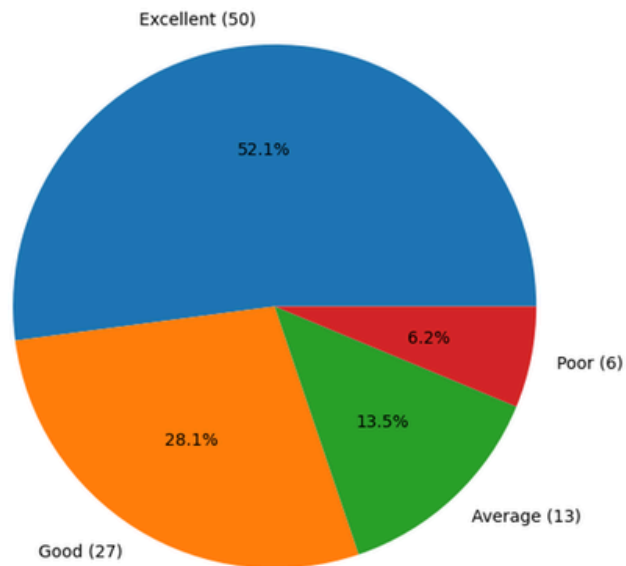


How relevant were the topics presented in the program to your academic, research, or professional interests?

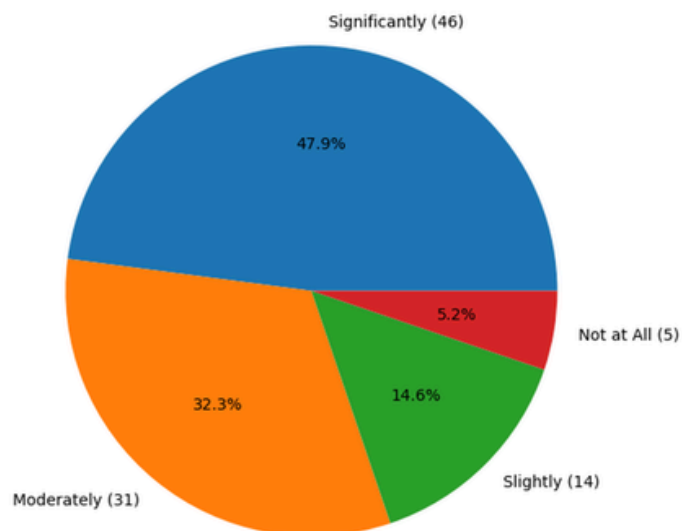


# Feedback

How would you rate the quality and clarity of the presentations delivered during the program?

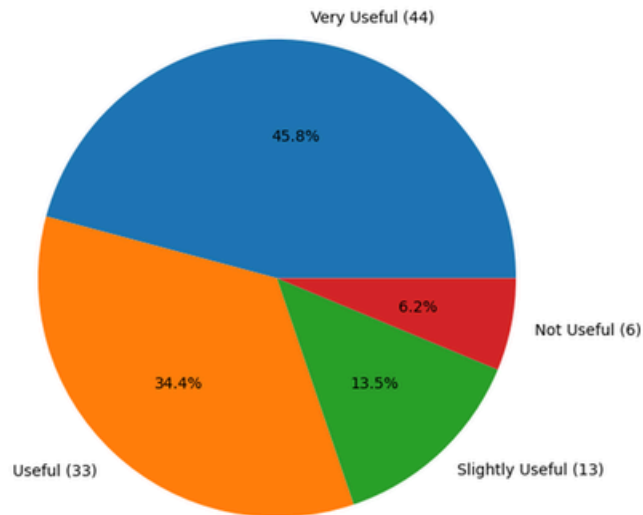


How much did the program improve your understanding of Artificial Intelligence and its applications?

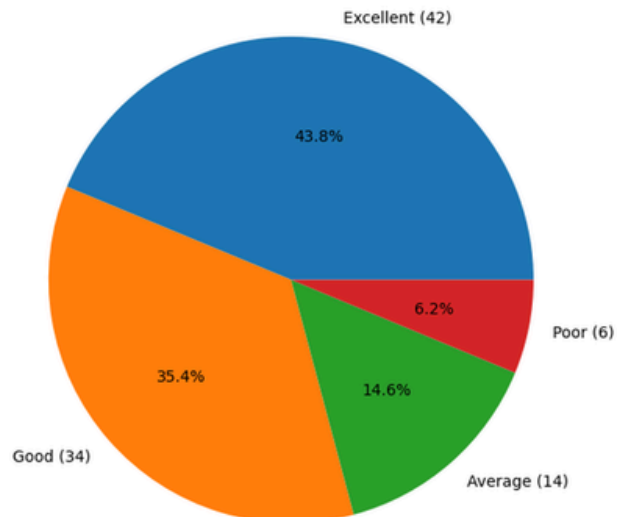


# Feedback

How useful were the examples, case studies, and practical applications discussed during the sessions?

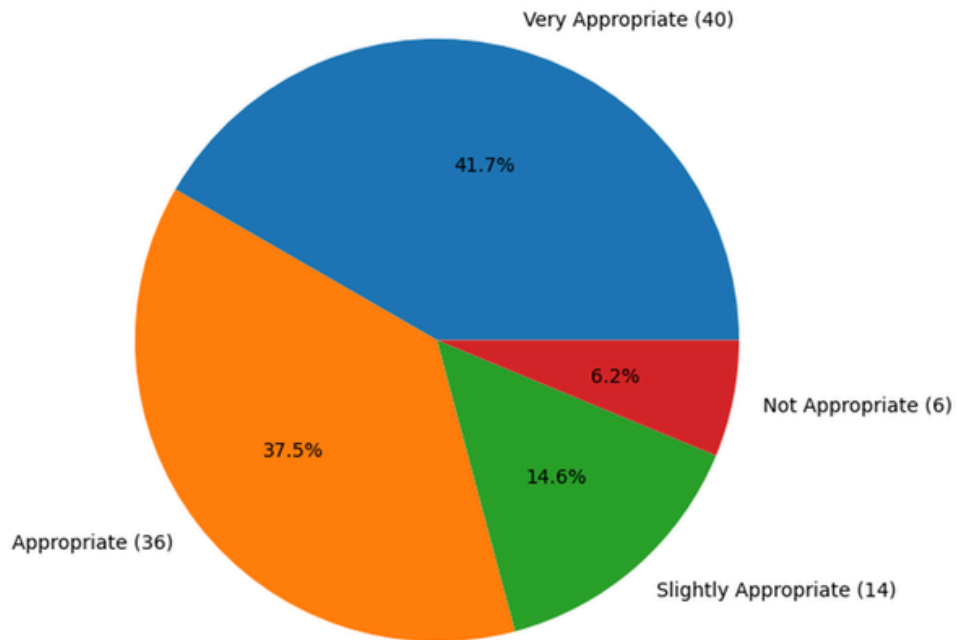


How would you rate the opportunities for interaction, discussion, and question-answer sessions during the program?

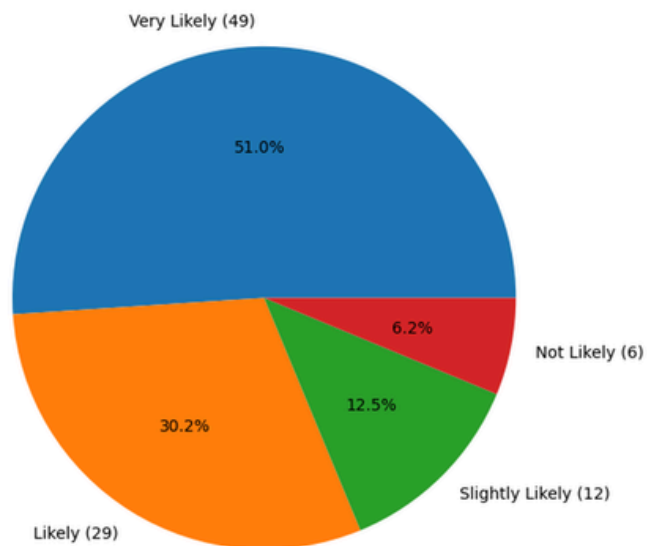


# Feedback

How appropriate was the duration and schedule of the program?

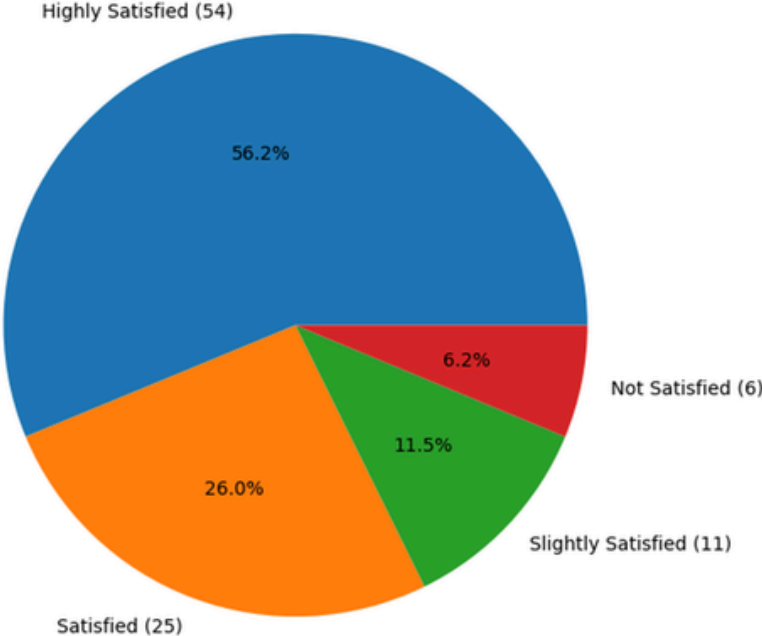


How likely are you to apply the knowledge gained from this program in your teaching, research, or professional work?



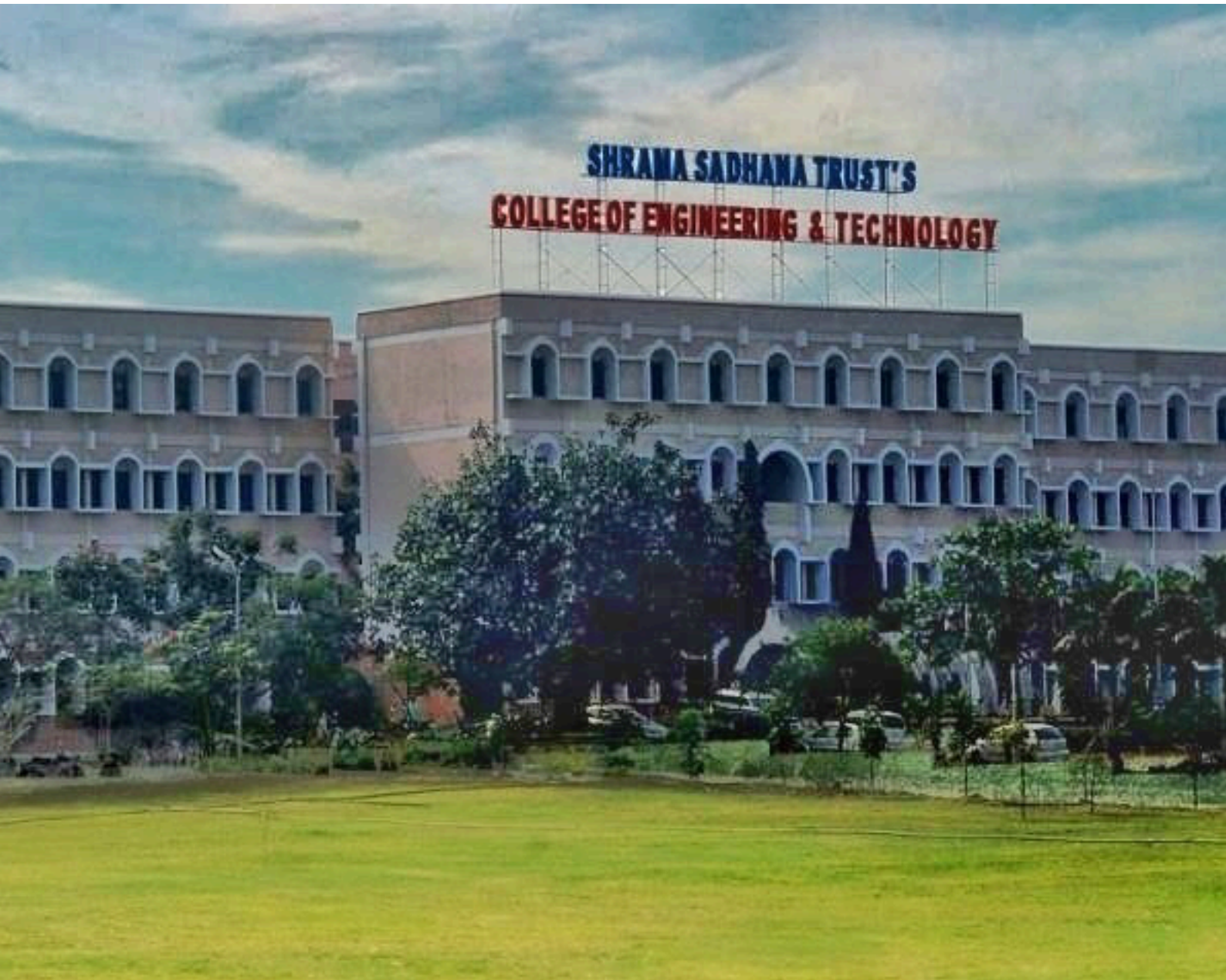
# Feedback

Overall, how satisfied are you with the Capacity Building Program 2026?



# Sample Certificates

	<p>SSBT's College of Engineering &amp; Technology, Bambhori, Jalgaon - 425001 Included under section 2(f) and 12(B) of the UGC Act, 1956 Grade A (3.14) NAAC Accredited</p>	
<h2>Certificate of Participation</h2>		
<p><i>This is to certify that «Name_of_Faculty» has attended Capacity Building Programme held between 24 January to 28 March 2026 organized by SSBT's College of Engineering &amp; Technology, Bambhori, Jalgaon (MS), India.</i></p>		
		
<p>Mr. M. M. Ansari Coordinator Electrical Engineering Dept</p>	<p>Dr. S.P. Ramteke Coordinator Computer Engineering Dept</p>	<p>Dr. G. K. Patnaik Principal</p>



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BAMBHORI, JALGAON - 425001, MS, INDIA  
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[sscoetjal@gmail.com](mailto:sscoetjal@gmail.com)



[sscoetjalgaon.ac.in](http://sscoetjalgaon.ac.in)



+91 - 257 - 2258393