



APSIT

Department of
Information
Technology

Bits & Bytes

MAGAZINE

2025-26

Industry Collaborations

Oracle Academy, DellEMC, Blockchain
Academy, NVIDIA Deep Learning, Palo Alto
Cybersecurity Academy, VMware Academy,
Unity Academic Alliance.

Academic Initiatives

Expression Club, GATE Training, NPTEL,
PBL and more



Student Articles

Firebase, Li-Fi, Blockchain,
Quantum Computing and
more!



Department of Information Technology



PCT's

A. P. Shah Institute Of Technology
Survey No. 12, Ghodbunder Rd,
KasarvadaVali, Thane West - 400615

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EDITORIAL BOARD



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Principal's Desk



I am delighted to announce the release of our institute's Department of Information Technology magazine, "Bits & Bytes," now in its seventh consecutive year. This publication is dedicated to realizing our primary vision: transforming students into globally competent IT professionals.

"Bits & Bytes" serves as an inspiration for both students and faculty to remain ambitious and aim for higher goals. By showcasing the achievements and innovations within our department, the magazine highlights the continuous pursuit of excellence that defines our community. We eagerly anticipate the successful journeys of our young aspiring engineers as they embark on their professional paths.

The dedicated efforts of the Editorial Board in producing this magazine are highly commendable. Their hard work and commitment have resulted in a publication that truly reflects the dynamic and forward-thinking nature of our department. I extend my heartfelt congratulations to the students and faculty on their accomplishments and wish them the best in their future endeavors.

We invite you to explore the latest edition of "Bits & Bytes" and join us in celebrating the achievements and aspirations of our vibrant IT community. Together, we look forward to a future filled with innovation, excellence, and success.

Dr. Uttam D. Kolekar
Principal

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HOD's Desk



With great pride, we present the latest edition of our IT Department magazine, “Bits & Bytes,” highlighting the remarkable achievements of our students and faculty during the 2025–2026 academic year. Our students have made excellent use of academic initiatives, industry collaborations, and internships to enhance their skills. Their innovation is evident through notable successes like earning recognition in the IBM Hack Challenge and registering 8 copyrights for their BE projects.

Alongside technical excellence, we remain committed to nurturing moral values, ensuring our graduates are both skilled professionals and responsible citizens. The strong bond between students and faculty drives our department’s progress and success.

I sincerely congratulate the Editorial Team for their dedication in bringing this edition to life and wish them continued success. We invite you to explore “Bits & Bytes” and celebrate our community’s accomplishments as we move forward with confidence and inspiration.

Dr. Kiran Deshpande

HOD,

Department of Information Technology.

04

Institute's

VISION

APSIT aspires to be a premier institute producing globally competent engineering professionals to contribute towards socio-economic growth of India.

MISSION

To provide conducive and collaborative environment to meet contemporary & future Engineering challenges by project based and value-added education with the support of trained faculty.

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Department's

VISION

To be a prime center of excellence by transforming students into globally competent IT Professionals.

MISSION

M1: To develop, support and maintain state-of-art infrastructure to serve as a potent resource hub for the IT industries.

M2: To inculcate the problem solving, analytical, logical skills and to promote the culture of creativity and innovation among the students.

M3: To adapt with the transformation of the technology emphasizing on interdisciplinary studies, exposure to emerging technologies and imbibing high standards of professional ethics and social responsibilities in all endeavors.

Department Program Educational Objectives

PEO 1 PREPARATION: To make students competent for higher studies and employable, to meet industrial requirements.

PEO 2 CORE COMPETENCE: To develop students having core competence in science, mathematics and fundamentals of Information Technology to address everchanging industrial requirements globally.

PEO 3 BREADTH: To create academically conducive environment to learn engineering skills in the domains such as Database, Data Analytics, Application Development and Allied Technologies.

PEO 4 PROFESSIONALISM: To enrich students with professional ethics, leadership qualities, and entrepreneurial skills.

PEO 5 LIFE LONG LEARNING: An ability to engage in lifelong learning for effective adaptation to technological developments.

Department Program Specific Outcomes

Program Specific Outcomes

PSO1 To use modern computer languages, environments and platforms in creating innovative Carrier paths in the areas of database, data analysis and application development.

PSO2 To apply theoretical foundations of Information technology in developing solutions for engineering problems that meet automation needs of industry and society.

PSO3 To design and implement efficient real-time solutions using evolving knowledge of information technology by demonstrating the practices of professional ethics and the concern for societal and environment well being.



DEPARTMENT INFRASTRUCTURE

Academic Infrastructure

- Air-Conditioned Classrooms and Tutorial Rooms equipped with touch interactive projection system
- Well-equipped Air-Conditioned Laboratories connected to Centralized Server Room.
- Media-Equipped Air -Conditioned Seminar hall.
- Online Departmental Library Management System.

Computational Facility

- Number of Computational Nodes available in Department: 300
- Number of Blade Server Systems: 05
- PC to Student ratio: 1:1.
- Dedicated leased line of Internet
- Wi-Fi Access & CCTV Surveillance.
- NVIDIA DGX workstation for AI & Data Science research.
- iOS Lab for cross platform application development

Highlights

- Use & accessibility of remote servers during laboratory sessions.
- E-Learning Facility with Moodle.
- Online Tests for Self Assessment.
- Virtual Classroom & Web Conferencing facility for Query Sessions.
- Authentication based Internet access and printing facility for students.
- Cloud Storage for Students.
- Online Lab assignments submission & assessment with feedback. (E-assessment).
- Online Academic Feedback Facility for Students.
- Lab availability for students after academic hours.
- Expert Talks, Value addition Programs & Project Based Learning.
- Student Technical Clubs like Cybersecurity, AI & ML, DevOps for collaborative learning.
- Online Mentoring Portal.
- Free GATE, GRE and Pre-Placement Training.
- E-books through Pearson, Tata Mcgraw Hill, Online Library.

STUDENT ACHIEVEMENTS

A Year of Achievement

A.Y. 2025–26

A P SHAH INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

Semester-wise Academic Toppers

RESULTS FOR A.Y. 2025-26 • ODD SEMESTER

SEM III

STUDENT NAME

CGPA

KHILARI ATHARVA YOGESH VANITA	9.73
GUPTA SALONEE SHITLA PRASAD RADHA DEVI	9.64
RANE SALONI SUBODH ANJALI	9.64
SOLANKI MAHIPALSINGH DALPATSINGH	
SHOBHAKAWAR	9.64
RANE SAVARI RAJESH SNEHA	9.59
MOHAPATRA BISHNUPRIYA PRASANNA BINDU	9.50
MORE DRISHTI PRAMOD RATNAPRABHA	9.50
MUQADAM AYYAN IQBAL ZEENAT	9.50
ATHARVA ANUPKUMAR ROOPITHA	9.45

Semester-wise Academic Toppers

RESULTS FOR A.Y. 2025-26 • ODD SEMESTER

SEM V

STUDENT NAME	CGPA
BOREKAR VAIDEHI AVINASH	10.00
RANE SHREYA SANJAY	10.00
BUBERE HUZAIFA SHADAB SUMANA	10.00
DESHPANDE OM AJIT	9.87
DHOBLE MRUNMAI VIKAS	9.87
MANE HRUGVEDA NITIN	9.87
SURYARAO VINAY NARENDRA SEEMA	9.87
BHOIR SANKET BHARAT NANDA	9.87
SAHU RUDRANARAYAN NILANCHAL	9.74
SONIKA AVADHUT SAWANT	9.74
NEHA MANOJ CHAUHAN	9.74
SHAIKH ISMAEEL MO MANZAR	9.74
MASKARE POOJA DASHRATH REKHA	9.74
VARKUTE DEEP SADANAND VAISHALI	9.74
SAHIL DEEPAK KAJARE	9.61
PANKAR SRUSHTI SUBODH	9.61
SINGH ISHITA JASWANT	9.61
GOURI MOHAMMED AMAAN	
MOHAMMED ASLAM SAHIDA	9.61
SHAH NISHI SHAILESH	9.48
PATIL HARSHAL DEEPAK	9.48
BHOIR PRATHAMESH RATNAKAR	9.48
PAWASKAR SHUBHAM JAYANT	9.48
JADHAV SIDDHI ARVIND PALLAVI	9.48

Semester-wise Academic Toppers

RESULTS FOR A.Y. 2025-26 • ODD SEMESTER

SEM VII

STUDENT NAME

CGPA

SAWANT OMKAR SHANKAR	9.86
CHINMAYEE KEDAR SADALGEKAR	9.86
SURVE ZAHRA FEROZ SHARIFA	9.86
LAKHANI RADHIKA SANJAY	9.73
CHALKE MAITHILI SURESH	9.59
PATIL SANIKA ANANDA	9.45
MISHRA ANANYA YOGESH	9.45
DHRUV NILESH MAHYAVANSHI	9.32
OJAS PATRIKAR	9.32
NACHARE RUSHIKESH MAHESH	9.32
SINGH ANJALI LAL	9.32
PURANIK MAITREYEE MUKUND	9.32
NAGDA SHREY SANJAY	9.32
DALVI DNYANESHWARI NILESH SMITA	9.32

Semester-wise Academic Toppers

RESULTS FOR A.Y. 2025-26 • EVEN SEMESTER

SEM IV

STUDENT NAME	CGPA
SOLANKI MAHIPALSINGH	
DALPATSINGH SHOBHAKAWAR	9.78
GUPTA SALONEE SHITLA PRASAD RADHA DEVI	9.52
MOHAPATRA BISHNUPRIYA PRASANNA BINDU	9.52
ATHARVA ANUPKUMAR ROOPITHA	9.48
RANE SALONI SUBODH ANJALI	9.48
JAIN PRISHA SANTOSH HEMLATA	9.43
RAO JYOTIKA NILESH SWATI	9.43
CHALWADI DISHA HANUMANATHA LAXMI	9.39
KHILARI ATHARVA YOGESH VANITA	9.39
MORE DRISHTI PRAMOD RATNAPRABHA	9.39
PALANKAR SAKSHI NAGARAJ NEHA	9.39
SHAH JAINAM SANJAYKUMAR PARULBEN	9.39

ACADEMIC EXCELLENCE

Semester-wise Academic Toppers

RESULTS FOR A.Y. 2025-26 • EVEN SEMESTER

SEM VI

STUDENT NAME

CGPA

PANDHARE BHUMIKA SHARAD YOGITA	10.00
BUBERE HUZAIFA SHADAB SUMANA	9.86
MASKARE POOJA DASHRATH REKHA	9.86
SHAIKH ISMAEEL MO MANZAR UMEKUL	9.86
DESHPANDE OM AJIT ANUPAMA	9.73
KAJARE SAHIL DEEPAK DIPTI	9.73
MANE HRUGVEDA NITIN ANITA	9.73
SHAH NISHI SHAILESH LEENA	9.73
GOURI MOHAMMED AMAAN	
MOHAMMED ASLAM SAHIDA	9.68
JADHAV SIDDHI ARVIND PALLAVI	9.59
SAWANT SONIKA AVADHUT ANUSHKA	9.59
BOREKAR VAIDEHI AVINASH SHEETAL	9.55

Semester-wise Academic Toppers

RESULTS FOR A.Y. 2025-26 • EVEN SEMESTER

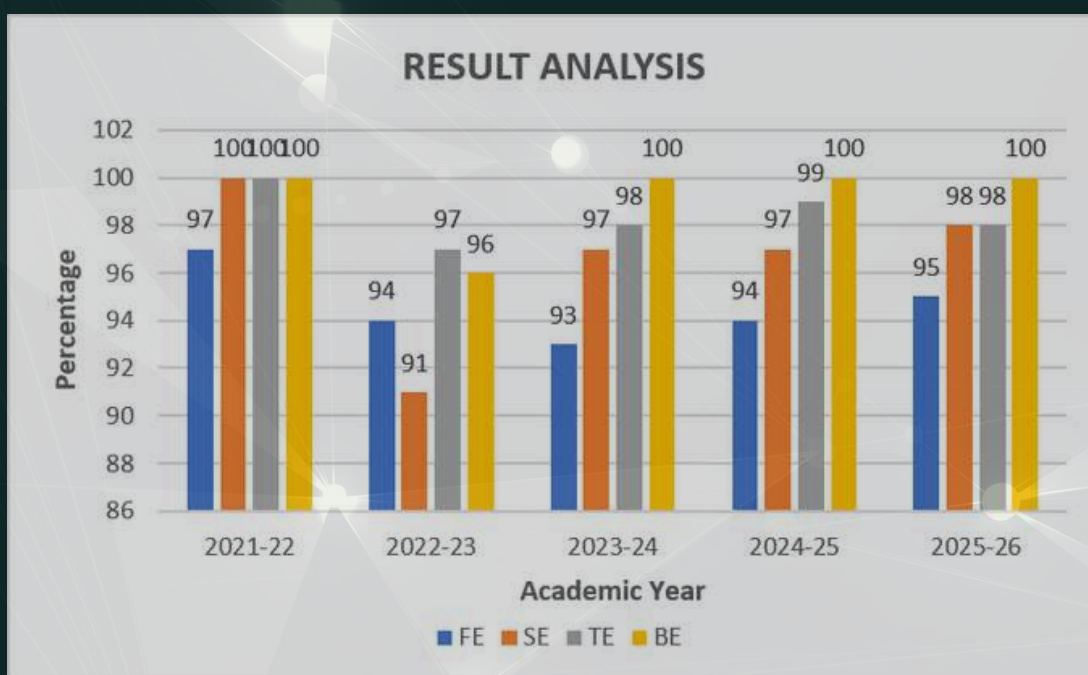
SEM VIII

STUDENT NAME	CGPA
NARVEKAR SHREYASH PRASHANT PRACHI	10.00
CHANDGAONKAR OMKAR VILAS VARSHA	9.85
PATIL SANIKA ANANDA SHOBHA	9.85
DALVI DNYANESHWARI NILESH SMITA	9.70
JAGTAP ANSHUTA BHAGAWAN JAYASHREE	9.70
MANORE RUTUJA KIRAN MANSI	9.70
LAKHANI RADHIKA SANJAY REENA	9.70
SINGH ANJALI LAL BHARATI	9.70
SAWANT OMKAR SHANKAR SWATI	9.70
NAIK HARSH DIGAMBER MRUNAL	9.55
RANE GANDHAR VIJAY VAIBHAVI	9.55
NACHARE RUSHIKESH MAHESH MANJIRI	9.55
URADE SANIKA SANJAY ARCHANA	9.55
BHANDARI SHAILESH RAMA RAMANJINAMMA	9.40
CHALKE MAITHILI SURESH RANJANA	9.40
BORSE YASH PRAFUL KALPANA	9.40
SADALGEKAR CHINMAYEE KEDAR MAYURI	9.40
NAGVEKAR PRATHAM ASHSIH SARITA	9.40
PARADKAR KINJAL ASHOK ADITI	9.40
SONI NITESH RAKESH USHA	9.40
TALAKOKKULA TRISHA SATYANARAYANA KAVITA	9.40
WALKE PAWAN NAMDEV TARA	9.40
MADIWAL VIJAY BABU SUJATHA	9.40
WADYEKAR PRASHANT UMESH MITALI	9.40
YADAV PRINCE JITESH KUMAR ASHA	9.40

RESULTS

Academic Year Result Analysis

Academic Year	Study Year			
	FE	SE	TE	BE
2021-22	97%	100%	100%	100%
2022-23	94%	91%	97%	96%
2023-24	93%	97%	98%	100%
2024-25	94%	97%	99%	100%
2025-26	95%	98%	98%	100%



Testimony

Academic success is attributed to innovative teaching, planning, continuous enhancement and faculty-student efforts.

- Dr. Sonia Aneesh, Exam Coordinator.

Research & Innovation

Sr. No	Name of the Student	Title of Paper	Name of the Journal
1	Gandhar Rane Mayank Salvi Aniruddha Sangle Pawan Walke	AssetIQ: Comprehensive AI-Enabled Framework for Asset Management in Educational Institutes	2nd Congress on Intelligent Machine and Algorithms (CIMA-2026)
2	Vivek Thorat Shubham Vichare Aditya Wadekar Prashant Wadyekar	RiskVision: An AI-Driven Financial Risk Assessment Framework For SMEs	2nd Congress on Intelligent Machine and Algorithms (CIMA-2026)
3	Vandan Dalvi Yajat Deshpande Sana Khan Raashi Gada	AI Powered Real Time Interview Simulator with Behavioural Analysis	2nd Congress on Intelligent Machine and Algorithms (CIMA-2026)

Research & Innovation

Sr. No	Name of the Student	Title of Paper	Name of the Journal
4	Nikhil Patil Dnyaneshwari Dalvi Nitin Vishwakarma Ritesh Zambare	CyberShield: A Dual Layer AI Framework for Cyber Bullying Detection and Network Anotomy Response	4th International Conference on Power Engineering and Intelligent Systems (PEIS2026)
5	Neha Khorne Janvi Kadam Abhirami Kalathil Divya Keni	SwasthyaSuraksha: An AI based Predictive Health & Crime Awareness System for Women	2nd Congress on Intelligent Machine and Algorithms (CIMA-2026)
6	Shailesh Bhandari Yash Borse Imran Khan Rahul Dickonda	UniFlow: Intelligent Academic Scheduling and Resource Management Using a Hybrid Optimization Approach	2nd Congress on Intelligent Machine and Algorithms (CIMA-2026)

Research & Innovation

Sr. No	Name of the Student	Title of Paper	Name of the Journal
7	Mayank Mishra Abhishek Kumbhar Ganesh Lale Arvind Mandal	EcoMiles:AI and Blockchain-Enabled Platform for Sustainable Travel, Carbon Tracking & Eco Campaigns	International Conference on Information Technology and Artificial Intelligence (ITAI 2026)
8	Aryan Pardeshi Pratham Nagvekar Sahil Ninawe Chirag Malde	AI-Based Framework for Comprehensive Monitoring of Forest Degradation in the Sundarban Region Using Multi-Temporal Remote Sensing Data	2026 IEEE Mediterranean and Middle-East Geoscience and Remote Sensing Symposium (M2-GRSS 2026)
9	Urvija Sawant Purav Shah Swayam Shah Zahra Surve	MentorConnect - A Modular Web Framework Supporting Inclusive Mentorship and Knowledge Continuity	11th International Conference on ICT for Sustainable Development (ICT4SD 2026)

Research & Innovation

Sr. No	Name of the Student	Title of Paper	Name of the Journal
10	Amit Rajegore Atharva Shibe Parth Talele Shubham Rane	Xgeno - A Genetic Risk Scoring System and Explainable AI - driven Clinical Decision Support System	International Conference on Next Generation Data Engineering & Analytics (INDEA 2026)
11	Omkar Chandgaonkar Aditya Chaudhari Aaryan Ghawali Paresh Gupta	ASCENT: AI-Powered Student Lifecycle Intelligence Platform	11th International Conference on ICT for Sustainable Development (ICT4SD 2026)
12	Dipesh Sahani Mohd. Hamza Shaikh Rahul Sharma Harshal Sakpal	UrbanEye: AI-Powered Satellite-Based Urban Encroachment Monitoring	6th International Conference on Paradigms of Communication, Computing and Data Analytics (PCCDA 2026)

Research & Innovation

Sr. No	Name of the Student	Title of Paper	Name of the Journal
13	Siddhi Girkar Sonal Chaturvedi Komal Dalvi Sanika Ghorad	NeuroWeb: ML-Driven Alzheimer's Diagnosis, Tracking and Recommendations	7th International Conference on Data Science and Applications (ICDSA 2026)
14	Pranav Jadhav Shivam Sharma Shubham Shelke Anubhav Singh	ARNav: Marker Assisted Augmented Reality Navigation System for Complex Indoor Environment	International Conference on Advances in Green, Net-Zero Innovation - Sustainability (AGNI-S 2026)

Hackstreak 1.0_ITSA 2025-26

ACHIEVEMENT

Our students participated in Hackstreak 1.0, showcasing their technical skills, creativity, problem-solving abilities, and enthusiasm for innovation. Their participation reflects the spirit of learning, collaboration, and technological excellence.

PARTICIPATED STUDENTS

**Akshat Madheshiya, Alok Gupta, Aditya Singh, Kartika Thite,
Raj Kadam, Sahil Kajare, Sridevi Karampuri, Jotika Rao,
Pujeet Shahu, Adesh Gavhane**



STUDENT ACHIEVEMENT

HACKATHON 6.0

STUDENT ACHIEVEMENTS

Our students participated in Hackathon 6.0, demonstrating their technical knowledge, creativity, teamwork, and problem-solving skills. Their participation highlights their enthusiasm for technology and their commitment to developing innovative solutions.



PARSHVANATH CHARITABLE TRUST'S
A. P. SHAH INSTITUTE OF TECHNOLOGY



Certificate of Participation

THIS CERTIFICATE IS PROUDLY PRESENTED TO

Adesh Dhiraj Gawhane

This certificate proudly acknowledges the participation in the Hackscript 6.0. By engaging in this immersive experience of creativity, coding, and collaboration, you have demonstrated a commitment to exploration, learning, and pushing the boundaries of technological innovation.



PROF. ATUL DESHPANDE
VICE-PRINCIPAL

DR. UTTAM KOLEKAR
PRINCIPAL

Sponsored by



STUDENT ACHIEVEMENT

HACKATHON 6.0



Congratulations!

Heartiest Congratulations to our talented students on their participation in the Hackathon 6.0!

Your dedication, creativity, teamwork, and passion for technology are truly commendable. May this achievement inspire you to take on new challenges, explore innovative ideas, and continue reaching greater heights.

Keep innovating. Keep learning. Keep achieving! 🚀



PARSHVANATH CHARITABLE TRUST'S
A. P. SHAH INSTITUTE OF TECHNOLOGY



Certificate of Participation

THIS CERTIFICATE IS PROUDLY PRESENTED TO

Kartika Thite

This certificate proudly acknowledges the participation in the Hackscrip 6.0. By engaging in this immersive experience of creativity, coding, and collaboration, you have demonstrated a commitment to exploration, learning, and pushing the boundaries of technological innovation.



PROF. ATUL DESHPANDE
VICE-PRINCIPAL

DR. UTTAM KOLEKAR
PRINCIPAL

Sponsored by



STUDENT ACHIEVEMENT

NEED FOR CODE 4.0

Organized by: TSEC

Year: 2025

Level: Within State

Congratulations!

Heartiest Congratulations to Kartika Thite on participating in Need for Code 4.0!

Your dedication, technical skills, and enthusiasm for innovation are truly commendable. May this experience inspire you to keep learning, building, and achieving new milestones in technology.

Keep coding. Keep creating. Keep achieving! 🚀



x



TSEC HACKATHON 2025

CERTIFICATE OF APPRECIATION

This certificate is awarded to

Kartika Thite

the finalist of **Web/App Dev** Domain in **NEED FOR CODE 4.0** organized by **TSEC CodeTantra** on 5th - 7th, August 2025

Dr. G. T. Thampi
PRINCIPAL & CONVENER

Dr. Madhuri Rao
HOD & CO-CONVENER

Prof. Sanobar Shaikh
CO-ORDINATOR

Dr. Monica G. Tolani
CO-ORDINATOR

Celebrating Innovation • Coding Skills • Creativity

A P SHAH INSTITUTE OF TECHNOLOGY • INFORMATION TECHNOLOGY

HACKWARTS MUMBAI KA MAGIC

Heartiest Congratulations to **Mayank Mishra, Dhruv Mahavanshi, and Abhishek Kumbhar** on their participation in Hackwarts Mumbai Ka Magic! Their creativity, teamwork, technical skills, and dedication are truly commendable. We wish them continued success and many more achievements in the field of technology. Keep innovating and achieving! 🚀



Certificate of Participation

This is to certify that Mayank Mishra from AP Shah institute of Technology as Team Govinda has participated in Hackwarts : Mumbai ka Magic organized by the Shree L R Tiwari College of Engineering.



Keep innovating. Keep collaborating. Keep achieving! 🚀

SOLUTION CHALLENGE — GDG_HACK2SKILL

Celebrating innovation, creativity, and teamwork! Our students participated in the Solution Challenge, showcasing their technical skills, problem-solving abilities, and passion for creating meaningful solutions. Their dedication and enthusiasm towards technology are truly commendable. Keep exploring, innovating, and achieving! 🚀

PARTICIPATED STUDENTS

*Shravani Sawna , Pratikumar Mauryat,
Ismael Shaikh , Shrey Nagda,
Amit Rajegore , Alok Gupta,
Chinmayee Sadalgekar, Mayank Mishra,
Ishita Singh*

Keep innovating. Keep collaborating. Keep achieving! 🚀

WEBATHON 2.0

Celebrating creativity, collaboration, and technical excellence! Our students participated in Webathon 2.0, demonstrating their web development skills, innovative thinking, and enthusiasm for technology. Their dedication and teamwork are truly inspiring. Keep building, learning, and achieving! 🚀

PARTICIPATED STUDENTS

Om Deshpande, Anupras Davane, Ishita Singh



HACKSCRIPT 6.0

Celebrating technical skills, creativity, and problem-solving! Our students participated in Hackscript 6.0, showcasing their coding abilities, innovative thinking, and enthusiasm for technology.

Students:

- *Druvil Panchal*
- *Vijay Madival*



IEEE SUMMER OF CODE

Congratulations to ***Omkar Chandgaonkar*** on being part of IEEE Summer of Code! Your dedication to coding, curiosity to learn, and passion for technology turned an opportunity into a meaningful achievement. May this experience be another step towards building bigger ideas and creating an impact through technology. Code with purpose. Create with passion. 🚀



Keep coding, keep creating, and keep achieving!

IBM SKILLBUILD

Congratulations to **Amit Rajegore** and **Ismael Shaikh** on their participation in IBM SkillBuild! Your commitment to learning, exploring new technologies, and strengthening your skills is truly inspiring. May this experience open doors to new opportunities and encourage you to keep growing, building, and achieving. Learn today. Lead tomorrow. 🚀



Keep coding, keep creating, and keep achieving!

20TH AAVISHKAR

Heartiest congratulations to **Ananya Mishra** on participating in the 20th Aavishkar! Your enthusiasm for innovation, dedication to learning, and courage to explore new ideas are truly inspiring. May this experience be a stepping stone towards bigger opportunities, greater discoveries, and continued success. Dream. Discover. Achieve. ✨



ADOBE INDIA HACKATHON

A moment worth celebrating! **Ananya Mishra** took part in the Adobe India Hackathon, embracing the opportunity to challenge her skills, think creatively, and explore new possibilities in technology. Her participation reflects curiosity, determination, and a spirit of innovation. May every challenge become a new milestone on the journey ahead! ✨



TVS CREDIT EPIC 7.0 – ANALYTICS CHALLENGE

A national-level analytics challenge focused on data-driven thinking, analytical problem-solving, and real-world business insights. The event provided an opportunity to work with data, identify meaningful patterns, develop practical solutions, and apply analytical skills to business challenges.



CINE AI HACKFEST

Raksha Poojari and **Om Bhojane** participated in the Cine AI Hackfest, a national-level platform focused on Artificial Intelligence, innovation, and technology-driven problem-solving. The event encouraged participants to explore creative ideas, apply AI concepts, and develop practical solutions to real-world challenges, with their team securing a place in the Top 10%.

Organized by: HackCulture | 25 January 2026 | National



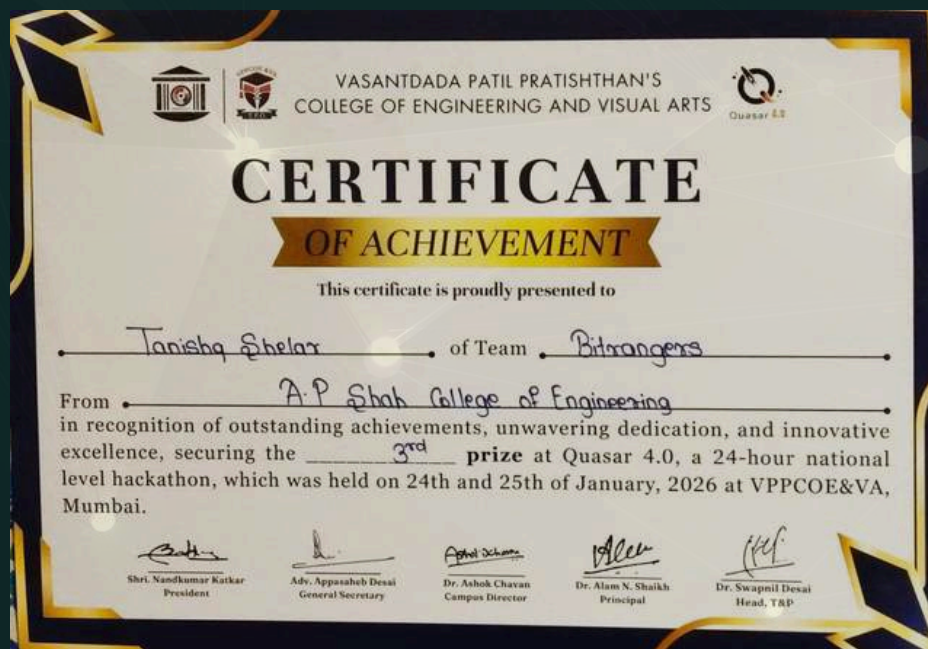
STUDENT ACHIEVEMENT

QUASAR 4.0

Organized by VPP COEVA on 24–25 January 2026, Quasar 4.0 was a national-level technical event focused on innovation, problem-solving, and technology-driven challenges. The event provided an opportunity to apply technical knowledge, develop creative solutions, and compete at a national level, with the team securing the 3rd Prize.

Students:

- *Arav Patsule*
- *Tanisq Shelar*



ODOO SPIT MUMBAI HACKATHON 25

A competitive hackathon that brought together aspiring developers to turn ideas into practical technology solutions. The event emphasized innovation, rapid development, teamwork, and problem-solving, giving participants an opportunity to build and present solutions within a challenging hackathon environment. Held on 20–21 December 2025, the team secured the Winner position.



ODOO SPIT MUMBAI HACKATHON 25

A moment capturing the spirit of collaboration, innovation, and teamwork at Odoo SPIT Mumbai Hackathon 25. The event brought together passionate tech enthusiasts who worked together to transform ideas into impactful solutions.



HACKDECK 2.0 – IEEE HACKATHON 2026 CYBER SECURITY CTF HACKATHON

HackDeck 2.0 was a cybersecurity-focused hackathon that encouraged participants to explore ethical hacking, cyber defence, problem-solving, and innovative security solutions. The event provided a practical environment to tackle cybersecurity challenges and apply technical knowledge to real-world scenarios.

Rudranarayan Sahu, Raj Patil, and Alok Sahoo showcased their technical expertise, teamwork, analytical thinking, and cybersecurity skills while tackling challenging tasks during the hackathon. Their performance earned them the 1st Winner position.



OPSSTORM

Oppstorm was a competitive technical event focused on innovation, strategic thinking, problem-solving, and teamwork. It provided participants with an opportunity to apply their technical and analytical abilities while tackling challenging tasks in a competitive environment.



HACKATHON NMIMS

Hackathon NMIMS was a national-level technical event that encouraged participants to develop innovative solutions through coding, creativity, problem-solving, and teamwork. The hackathon provided a platform to transform ideas into practical solutions while addressing technical challenges in a competitive environment.

Mahipal, Raksha, and Dhruv showcased their technical skills, collaborative approach, creative thinking, and problem-solving abilities during the hackathon. Their performance earned the team the 3rd Winner position.

HACKCRYPT 26

HackCrypt 26 was a national-level technical event focused on cybersecurity, innovation, coding, and problem-solving. It provided participants with a platform to explore security challenges, develop creative solutions, and apply their technical knowledge in a competitive environment.

Bhavesh Jalabhist, Abhik Jalau, Rasika Yadav, and Meet Jain demonstrated teamwork, technical skills, analytical thinking, and problem-solving abilities while participating in the event. Their participation reflected their interest in exploring emerging areas of technology and cybersecurity.



BATTLE OF PIVOT

Soham Pawar participated in Battle of Pivot, a national-level technical event that focused on strategic thinking, adaptability, problem-solving, and decision-making. The event provided a competitive platform to apply technical knowledge, tackle challenging situations, and develop effective solutions through analytical thinking and innovation.



ACHIEVEMENT SPOTLIGHT

Heartiest congratulations to Alok Gupta for his remarkable participation in multiple technical events and hackathons. His journey across diverse platforms reflects his passion for technology, problem-solving skills, creativity, and willingness to take on new challenges. These achievements showcase his continuous learning and dedication towards innovation. We wish him many more milestones and greater success ahead!

TECHNICAL ACHIEVEMENTS

Build with India
Google • 2025

Incuverse 1.0

Riidl Somaiya Vidyavihar
University • 4–5 October 2025

nigma 4.0 Chronix
Hackathon
SIES • 20 September 2025

HackCelestial 2.0
Pillai College of Engineering

HackOdisha 5.0
Webwiz, NIT Rourkela
• 6–7 September 2025

Hackathon Aswamvedh
Vasantdada Patil Pratishthan
College of Engineering & Visual
Arts

One journey, six achievements, countless possibilities.

HACKWINS – TECHSPRINT HACKATHON

Hackwins – TechSprint Hackathon provided a platform for participants to transform innovative ideas into practical technology solutions. **Aditya Singh, Purjeet Shahu, and Mahipal Solanki** participated in this national-level event, applying their technical knowledge, creative thinking, and collaborative problem-solving skills to tackle challenges and explore new possibilities in technology.



HACK WITH INDIA – VIBE HACKS

Hack With India – Vibe Hacks was a national-level technology event that encouraged participants to explore innovative ideas and develop creative, technology-driven solutions. **Mahipal Solanki** participated in the event, demonstrating his interest in emerging technologies, software development, and practical problem-solving. His team secured a place among the Top 1000 Teams, reflecting their efforts and technical engagement in the competition.



CODEFORGE HACKATHON

CodeForge Hackathon was a technical event that encouraged participants to apply their programming knowledge, creativity, and problem-solving abilities to develop practical solutions. ***Mahipal Solanki, Durva waykole, Meeti Doshi*** participated in this event, exploring innovative ideas and strengthening their coding and collaborative development skills through hands-on challenges.



Certificate of Participation

This is to certify that
Durva Waykole

from A P Shah Institute of Technology (APSIT), Thane,
Maharashtra has participated in CodeForge – The Open
Innovation Gauntlet organised by Mukesh Patel School of
Technology Management and Engineering (NMIMS),
Mumbai.



CIPHERIUM 26

Cipherium 26 offered a competitive platform for students to showcase their technical abilities, exchange ideas, and collaborate on innovative challenges. **Om Babar, Alok Gupta, and teammates from other departments** brought together diverse perspectives and technical knowledge to approach problems creatively. Their teamwork and performance earned them the Runner-Up position at the event organized by A. P. Shah Institute of Technology.



NAKSHATRA

Nakshatra provided a competitive platform for students to showcase their technical knowledge, creative thinking, and collaborative skills. **Aditya Vishmitra Singh**, **Om Deshpande**, and **Atharva Gangavane** participated in this national-level event organized by CSE-AIML APSIT, gaining experience in tackling challenges, exchanging ideas, and developing innovative approaches. Their team secured the Runner-Up position.



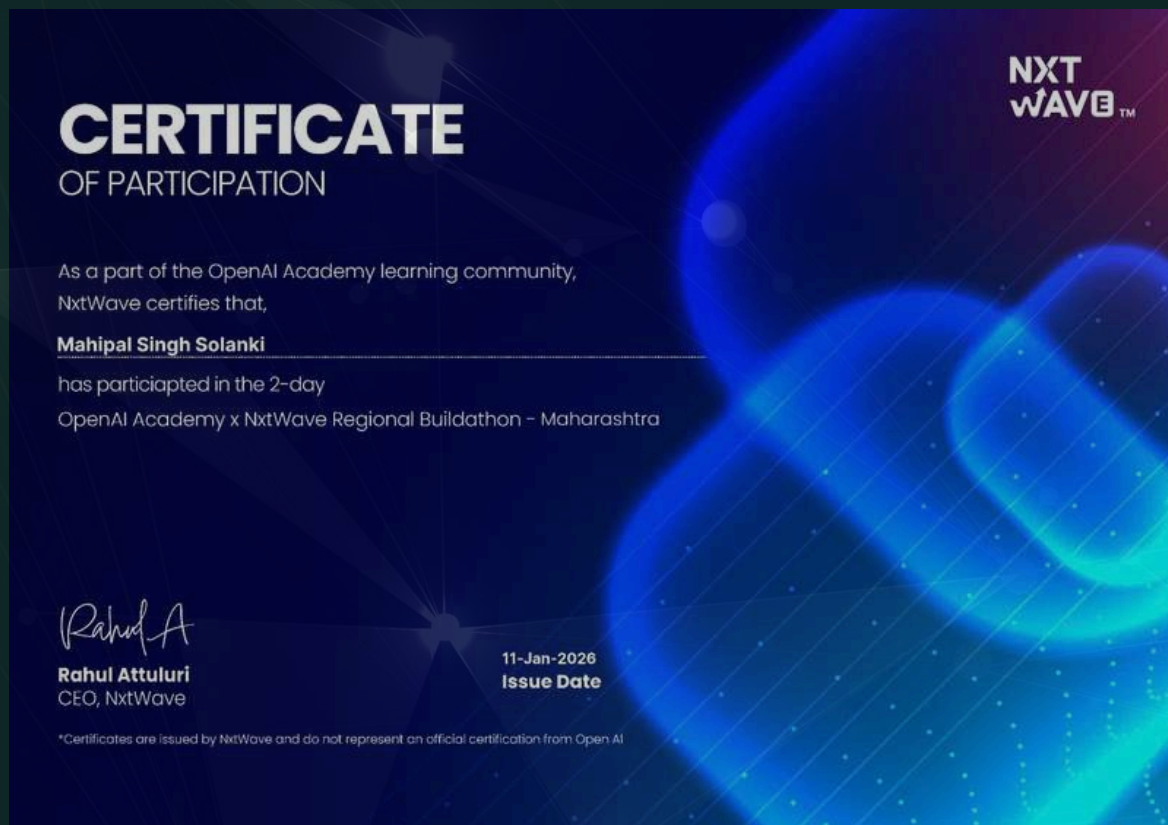
DATA WEB

Data Web was a national-level technical event organized by A. P. Shah Institute of Technology, providing a platform for students to explore data-driven technologies, strengthen technical knowledge, and develop innovative solutions. ***Soham Pawar secured the Winner position, while Rudranarayan Sahoo, Alok Sahu, Raj Patil, and Shubham Pawaskar achieved Runner-Up.*** Their participation highlighted the importance of analytical thinking, teamwork, and problem-solving in technology-driven challenges.



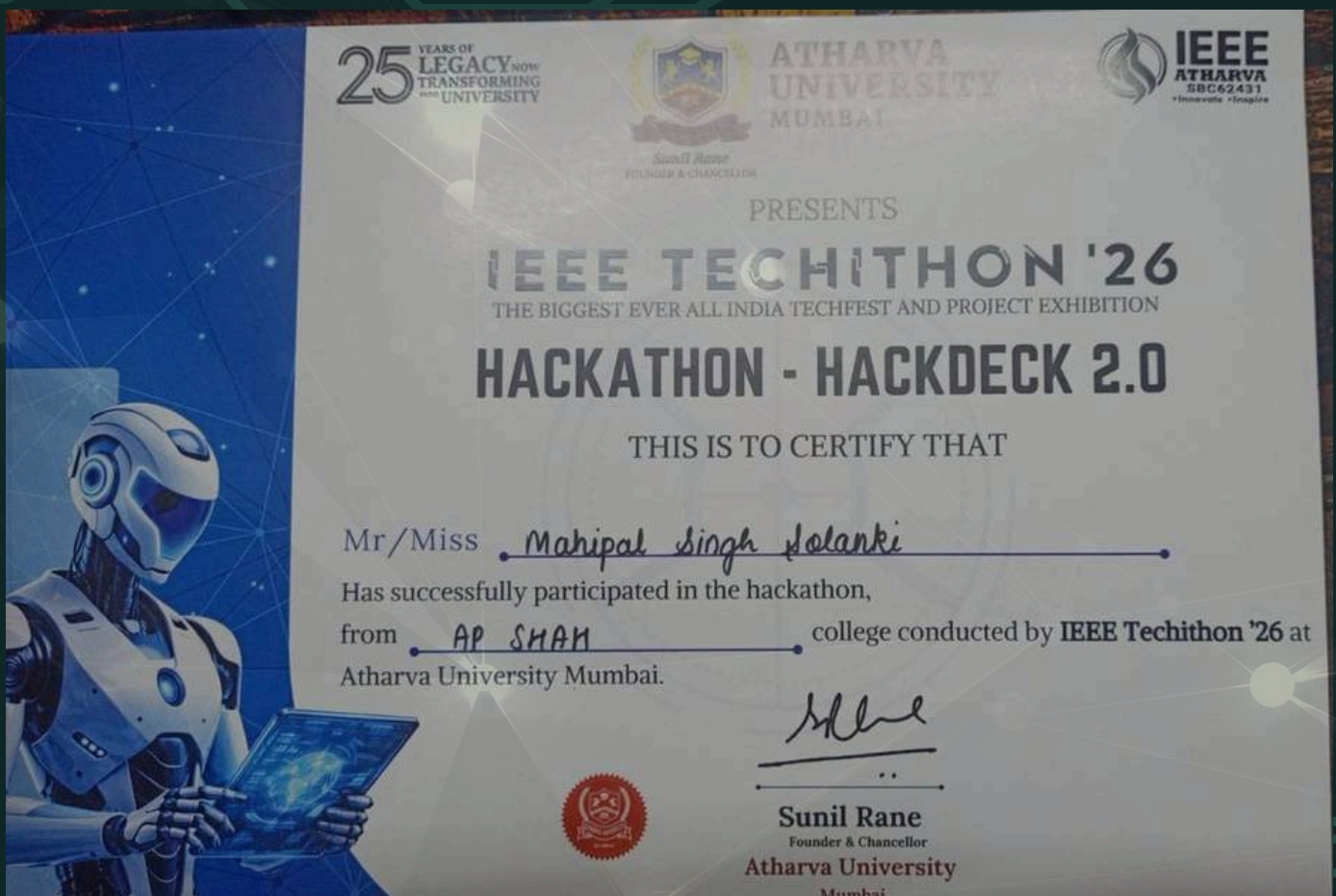
OPEN AI ACADEMY × NXTWAVE REGIONAL BUILDATHON MAHARASHTRA

The OpenAI Academy × NxtWave Regional Buildathon Maharashtra brought together technology enthusiasts to explore innovative ideas and create practical solutions. **Mahipal Solanki** participated in this national-level buildathon held on 11 January 2026, gaining valuable experience in collaborative development, creative problem-solving, and transforming ideas into technology-driven applications.



HACKATHON HACKDECK 2.0 – IEEE TECH

Hackathon HackDeck 2.0, organized by Atharva University, offered a platform for participants to explore emerging technologies, experiment with innovative ideas, and develop practical solutions. **Mahipal Solanki** participated in this national-level event, gaining exposure to collaborative development, technical experimentation, and creative problem-solving while exploring new possibilities in technology.



HACK4INNOVATION

Hack4Innovation was a national-level technical event organized by VESIT, encouraging participants to explore creative ideas and develop innovative technology-based solutions. **Purjeet Shahu** and **Aditya Singh** participated in the event held on 28–29 March 2026, applying their technical knowledge, collaborative thinking, and problem-solving skills while gaining experience in innovation and practical development.



S.P.I.T. HACKATHON 2026

S.P.I.T. Hackathon 2026 provided a platform for technology enthusiasts to explore innovative concepts, collaborate on technical challenges, and develop creative solutions. **Jyotika Rao** and **Kanksha Vanjare** participated in this national-level event organized by S.P.I.T., gaining valuable experience in teamwork, analytical thinking, and practical problem-solving through technology.



META HACKATHON X SCALER • ARTPARK CODEFORGE HACKATHON • DATA SPRINT 2026

Jyotika Rao participated in three national-level technical events: Meta Hackathon X Scaler, ArtPark CodeForge Hackathon at IISc Bangalore, and Data Sprint 2026 organized by the Data Science Club. These experiences provided opportunities to explore emerging technologies, software development, and data-driven problem-solving. Through participation in diverse technical challenges, she gained valuable exposure to innovation, analytical thinking, and practical applications of technology.



INNOVEX & NATIONAL-LEVEL WOMAN COMPETITION

Kanksha Vanjare participated in two national-level events: INNOVEX, organized by MPSTME on 28 February 2026, and the National-Level Woman Competition, organized by Star Union Dai-ichi. These experiences provided opportunities to showcase her abilities, explore new ideas, and strengthen her confidence through competitive participation. Her involvement reflects a commitment to continuous learning, personal growth, and active engagement in technical and competitive platforms.



PRAKALP 2026

Prakalp 2026 was a national-level technical event organized by K. J. Somaiya Institute of Technology on 25 March 2026. It provided a platform for participants to showcase innovative ideas, apply technical knowledge, and develop practical solutions to challenging problems. ***Ishita Singh, Rehan Shaikh, and Anisha Yadav*** secured 2nd Position, demonstrating their teamwork, creativity, and problem-solving abilities.



HACKSTREAK 2.0 – ITSA 2025–26

Hackstreak 2.0 – ITSA 2025–26 served as a platform for exploring new possibilities in software development and technology. Organized by APSIT, Thane, on 12 March 2026, the event challenged participants to think beyond conventional approaches, experiment with ideas, and apply their technical knowledge to practical problems. **Aditya Singh** participated in the event, gaining exposure to collaborative innovation and the evolving world of technology.



SUMMER HACKS 2026

Summer Hacks 2026 provided a platform for students to explore software development, experiment with new technologies, and transform creative ideas into practical solutions. Organized by Notion, the national-level event encouraged participants to strengthen their coding abilities, think critically, and explore innovative approaches to real-world challenges. **Shruti Rowlo and Vaishnavi Pednekar** participated in the event, gaining valuable experience in collaboration and technology-driven innovation.



BEYOND THE CODE

Beyond the Code was a national-level technical event organized by A. P. Shah Institute of Technology on 6 April 2026. The event encouraged participants to go beyond conventional programming by applying logical reasoning, creative thinking, and technical expertise to solve challenges. **Purjeet Shahu** and **Aditya Singh** demonstrated their collaborative skills and innovative approach, securing the Winner position.



CISCO NETACAD RIDERS 2026

Cisco NetAcad Riders 2026 was a national-level technical event organized by Cisco Networking Academy, held from 26 March to 3 April 2026. The event provided an opportunity to explore networking technologies, strengthen knowledge of network infrastructure, and develop practical skills in connectivity and digital communication. **Rudranarayan Sahu** participated in the event, gaining valuable exposure to networking concepts and industry-relevant technologies.



CODETHON 2026: SOLOSprint

Codethon 2026: Solosprint was a national-level technical competition organized by A. P. Shah Institute of Technology on 11 March 2026. The event challenged participants to apply programming knowledge, logical reasoning, and efficient problem-solving techniques to coding challenges. **Purjeet Shahu** demonstrated strong technical abilities and innovative thinking, securing the Runner-Up position.



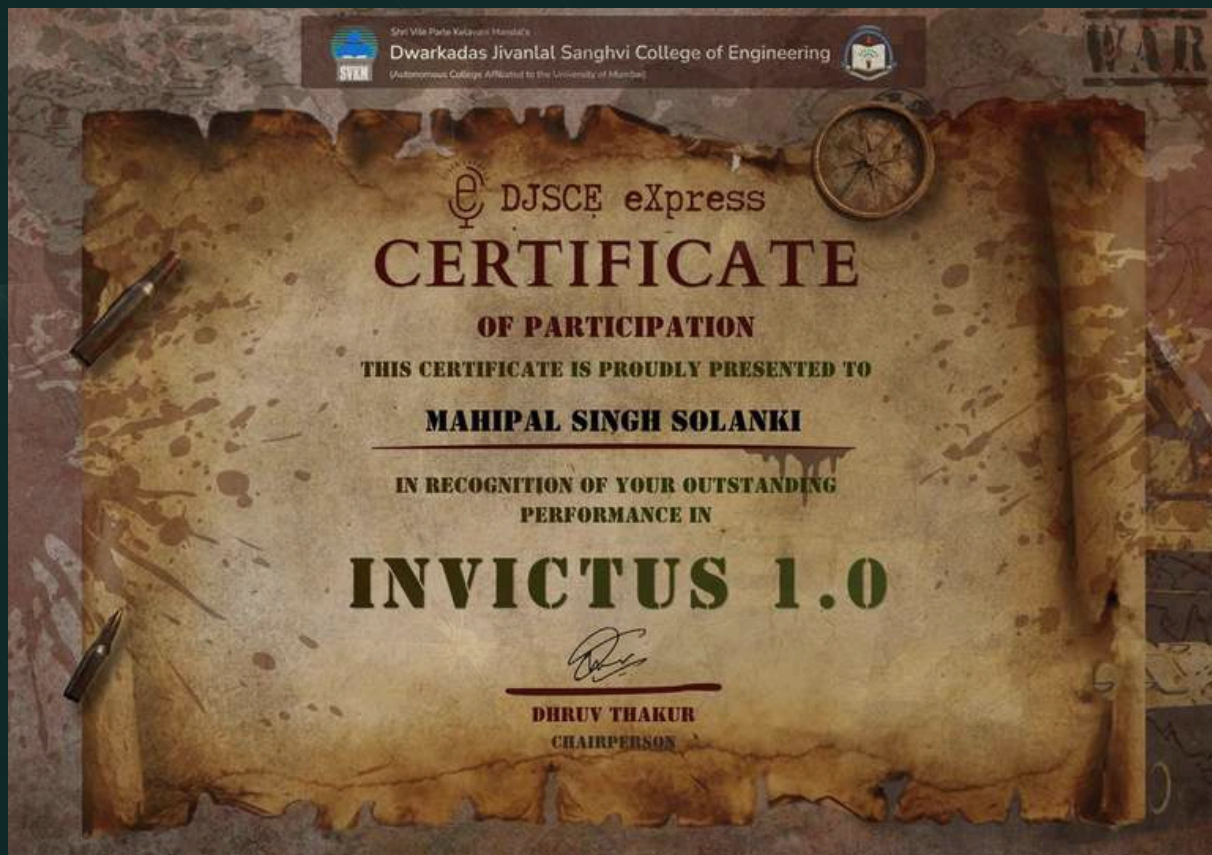
HACKNOVA 2026

HackNova 2026, organized by Bharati Vidyapeeth, was a national-level technical event held on 10–11 January. The event offered a platform for students to explore emerging technologies, experiment with innovative ideas, and apply their technical knowledge to practical challenges. **Tanishq Shelar** participated in the event, gaining valuable experience in collaborative problem-solving, creative thinking, and technology-driven innovation.



INVICTUS 1.0

Invictus 1.0 was a national-level technical event organized by D. J. Sanghavi College of Engineering, bringing together students to explore technology, exchange ideas, and tackle technical challenges. **Kanksha Vanjare, Gandhar Marathe, and Mahipal Singh** participated in the event, gaining experience in teamwork, analytical thinking, and creative problem-solving while exploring new possibilities in technology.



AROHAN 1.0 HACKATHON

Arohan 1.0 Hackathon, organized by the Computer Society of India, provided a platform for students to explore innovative concepts, collaborate on technical projects, and develop solutions to real-world challenges. **Rohan Pednekar, Miraj Jamadar, Rehan Vadraiwalla, and Maaz Mukadam** participated in the event, applying their technical knowledge, creative thinking, and teamwork to explore new possibilities in technology.



PERISCOPE HACKATHON

Periscope Hackathon, organized by PSCOPE Technology Pvt. Ltd. on 1 December 2025, provided a platform for participants to transform creative ideas into practical technology solutions. **Sunny Gupta** showcased his technical knowledge, innovative thinking, and problem-solving abilities while tackling challenges in a competitive environment. His performance earned him the Runner-Up position, reflecting his ability to approach technical problems with creativity and determination.



AUTONOMOUS HACKS 2026

Autonomous Hacks 2026 was a national-level technical event organized by GDG and GDG Cloud Gandhinagar, bringing together technology enthusiasts to explore innovative ideas and build practical solutions. **Alok Gupta** participated in the event, gaining exposure to emerging technologies, collaborative development, and creative problem-solving. The experience provided an opportunity to explore new technical approaches and strengthen skills in developing technology-driven solutions.



Cybersecurity & Technical Excellence

Aditya Chaudhari strengthened his expertise in cybersecurity through three professional certifications: **Zscaler Zero Trust Associate, Cybersecurity Essentials, and Ethical Hacking**. These certifications reflect his commitment to understanding modern security practices, identifying potential cyber threats, and exploring ethical hacking techniques. His learning journey highlights the importance of continuous skill development and building practical knowledge to address evolving cybersecurity challenges.



Cybersecurity & Technical Excellence



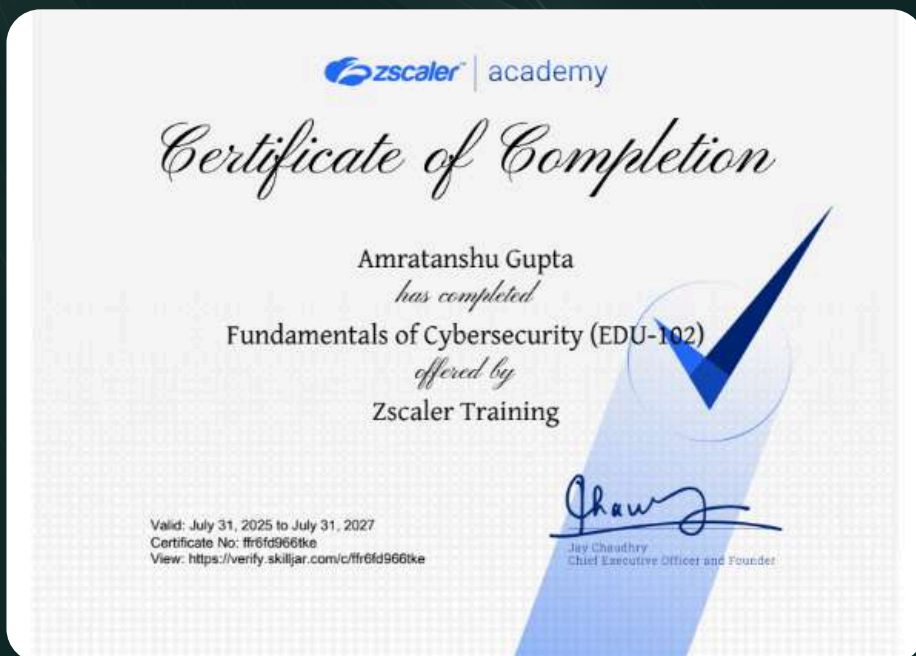
Cybersecurity & Digital Protection

Amratanshu has developed knowledge in cybersecurity and network protection through eight certifications covering Cisco, Palo Alto Networks, Zscaler, and Fortinet. The certifications explore key areas such as cybersecurity fundamentals, ethical hacking, network security, and digital threat awareness. This learning journey reflects a commitment to understanding evolving cyber threats, strengthening security knowledge, and building a foundation for future opportunities in cybersecurity.



STUDENT ACHIEVEMENT

Cybersecurity & Digital Protection



Professional Certifications

Kunal Suvarna continues to strengthen his technical skills through certifications in networking, Generative AI, cloud computing, and data analytics, building a strong foundation for a future in technology.



Certificate of Course Completion

Kunal Suvarna

has successfully achieved student level credential for completing the CCNA: Introduction to Networks course.

The student was able to proficiently:

- Configure switches and end devices to provide access to local and remote network resources.
- Explain how physical and data link layer protocols support the operation of Ethernet in a switched network.
- Configure routers to enable end-to-end connectivity between remote devices.
- Create IPv4 and IPv6 addressing schemes and verify network connectivity between devices.
- Explain how the upper layers of the OSI model support network applications.
- Configure a small network with security best practices.
- Troubleshoot connectivity in a small network.



Lynn Bloomer

Lynn Bloomer
Director, Cisco Networking Academy

Issued on: Mar 18, 2024



9 Courses



Jun 10, 2026

KUNAL SUVARNA

has successfully completed the online Professional Certificate

Google Cybersecurity

Those who earn the Google Cybersecurity Certificate have completed nine courses, developed by Google, that include hands-on, practical-based assessments and are designed to prepare them for entry-level roles in cybersecurity. They are competent in beginner-level Python, Linux, SQL, Security Information and Event Management (SIEM) tools, and Intrusion Detection Systems (IDS). They know how to identify common cybersecurity risks, threats, and vulnerabilities, as well as the techniques to mitigate.

Foundations of Cybersecurity

Play It Safe: Manage Security Risks

Connect and Protect: Networks and Network Security

Tools of the Trade: Linux and SQL

Assets, Threats, and Vulnerabilities

Sound the Alarm: Detection and Response

Automate Cybersecurity Tasks with Python

Put It to Work: Prepare for Cybersecurity Jobs

Accelerate Your Job Search with AI

Amara Brophy
Global Director of
Google Career
Certificates

This certificate attests to the learner's completion of an online program delivered via Coursera. It does not constitute formal enrollment at any university or entity and does not confer academic credit, grade, or a degree. Institutions or organizations may, at their discretion, recognize the learning toward their own programs or credentials.

Verify this certificate at:
<https://coursera.org/certificates/google/cybersecurity>



3 Courses



Jun 14, 2026

KUNAL SUVARNA

has successfully completed the online Specialization

IBM Generative AI for Cybersecurity Professionals

By completing this specialization, the learner has demonstrated that they can differentiate generative AI from discriminative AI, describe real-world generative uses, and identify and use popular generative AI models and tools for text, code, image, audio, and video generation. The learner can explain generative AI prompt engineering concepts, provide examples, and apply prompt engineering techniques that create demonstrably useful outcomes. The learner can identify useful, appropriate generative AI tools for cybersecurity and apply generative AI prompt techniques to generate and augment datasets and to develop and refine machine learning models.

Verify this certificate at:
<https://coursera.org/certificates/specialization/ibm-generative-ai-for-cybersecurity-professionals>

Ravi Ahuja
Global Program
Director,
Skills Network

Antonio Cangiano
Director, IBM Skills
Network

Generative AI: Introduction and Applications
Generative AI: Prompt Engineering Basics
Generative AI: Boost Your Cybersecurity Career



9 Courses



Jun 14, 2026

KUNAL SUVARNA

has successfully completed the online Professional Certificate

Microsoft Cybersecurity Analyst

Learners will prepare for a new career in the high-demand field of cybersecurity with professional-level training from Microsoft — an industry-recognized leader. Through a mix of videos, assessments, and hands-on activities, you'll learn cybersecurity concepts and how they apply to a business environment, discuss threat mitigation strategies from an enterprise perspective, apply effective cybersecurity policy measures within an Azure environment, and practice on tools like MS defender, Azure Active Directory & more. For your final project, you'll create a cybersecurity proposal detailing the creation and protection of a business network and infrastructure. When you finish, you'll have tangible examples to talk about in job interviews and be prepared to take the Microsoft SC-900 Exam.

Introduction to Computers and Operating Systems and Security

Introduction to Networking and Cloud Computing

Cybersecurity Identity and Access Solutions using Azure AD

Cybersecurity Solutions and Microsoft Defender

Cybersecurity Tools and Technologies

Cybersecurity Management and Compliance

Advanced Cybersecurity Concepts and Capstone Project

Microsoft SC-900 Exam Preparation and Practice

Marni Baker-Stein
Chief Content Officer

This certificate attests to the learner's completion of an online program delivered via Coursera. It does not constitute formal enrollment at any university or entity and does not confer academic credit, grade, or a degree. Institutions or organizations may, at their discretion, recognize the learning toward their own programs or credentials.

Verify this certificate at:
<https://coursera.org/certificates/microsoft/cybersecurity-analyst>

Certifications & Learning

Raashi Gada has expanded her knowledge and skills through eight certifications, reflecting her dedication to continuous learning and professional growth across diverse areas of technology.



STUDENT ACHIEVEMENT

Certifications & Learning

Networking
CISCO Academy

This certificate is awarded to

Raashi Gada

for successfully completing

Ethical Hacker

offered by A.P. Shah Institute of Technology
through the Cisco Networking Academy program.

Prof. Kiran Deshpande
Instructor
A.P. Shah Institute of Technology

29 Apr 2025
Completion Date

zscaler academy

Certificate of Completion

Raashi Gada
has earned the
Zscaler Zero Trust Associate (ZTCA) Certification
offered by
Zscaler Academy

CPE Credits: 6
Valid: Nov. 2, 2025 to Nov. 2, 2028
Certificate No: 7rfx3uqfn24
View: <https://verify.skilljar.com/c/7rfx3uqfn24>

Chaw
Jay Chaudhry
Chief Executive Officer and Founder

Networking
CISCO Academy

This certificate is awarded to

Raashi Gada

for successfully completing

Cybersecurity Essentials

through the Cisco Networking Academy program.

Laura Quintana
Laura Quintana
Vice President and General Manager
Cisco Networking Academy

10 Jun 2024
Completion Date

Networking
CISCO Academy

This certificate is awarded to

Raashi Gada

for successfully completing

Introduction to Cybersecurity

through the Cisco Networking Academy program.

Lynn Bloomer
Lynn Bloomer
Director
Cisco Networking Academy

12 Jun 2024
Completion Date

N-E-A-T
National Educational Alliance for Technology



EduSkills
Nation Building Through Skills

एन ई ए टी
All India Council for Technical Education



Certificate of Virtual Internship

This is to certify that

Raashi Gada

A. P. Shah Institute of Technology

has successfully completed 10 weeks

Cybersecurity Virtual Internship

During April - June 2024

Supported By **paloalto**
NETWORKS

Saravanan Rajagopal
Saravanan Rajagopal
Training Partner Manager, APAC
Palo Alto Networks

Shri Buddha Chandrasekhar
Shri Buddha Chandrasekhar
Chief Coordinating Officer (CCO)
NEAT Cell, AICTE

Dr. Satya Ranjan Biswal
Dr. Satya Ranjan Biswal
Chief Technology Officer (CTO)
EduSkills



Certificate ID : cc26d38bd13cdfa2ed0b942ad80bc7
Student ID : STU6436477a359291681278842



GRADE: O (Outstanding) 80-100 | S (Satisfactory) 60-80 | A (Very Good) 40-70 | B (Good) 30-60 | C (Fair) 20-30 | D (Average) 10-20 | F (Fail) Below 10

Certifications & Learning

Sahil Ghag continues to enhance his technical expertise through certifications in cybersecurity, network security, and professional learning, demonstrating his commitment to developing industry-relevant skills and staying updated with evolving technologies.



Professional Certification

Sujal Daryapurkar has earned the Zscaler Zero Trust Associate (ZTCA) certification, demonstrating his knowledge of modern cybersecurity principles and Zero Trust security practices. This achievement reflects his commitment to developing skills in digital security and network protection.



Kho-Kho Final ✨

IT VS COMPS



Winner : IT 🥳

Industry Course Achievements

Red Hat Academy	600+
Oracle Academy	335+
Cisco Networking Academy	820+
IBM Cognitive Class	650+
HackRank	150+
EC-Council Learning	97
Great Learning	57
IIT Bombay Spoken Tutorials	1,335

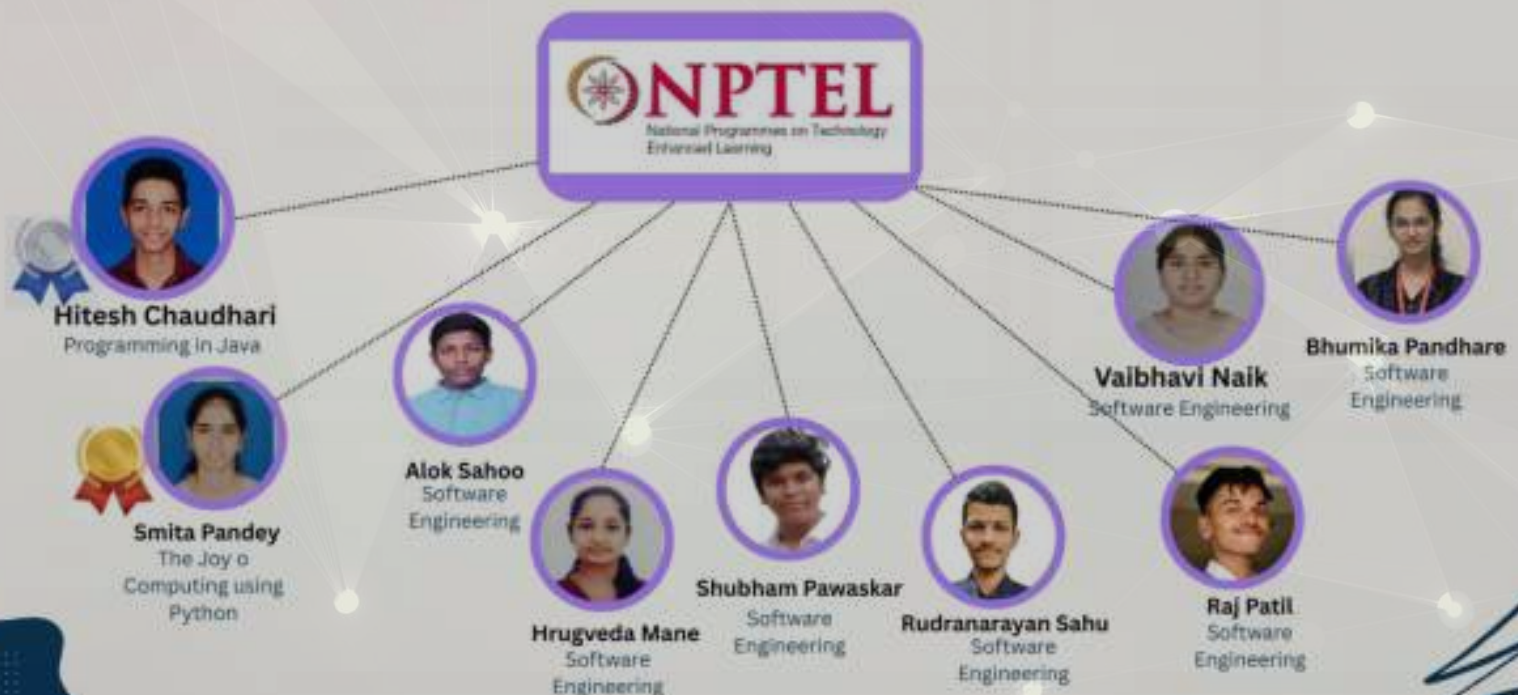
STUDENT ACHIEVEMENT

NPTEL Gold, Silver & Elite

Our students showcased their dedication to continuous learning by earning prestigious NPTEL certifications in Python, Java, and Software Engineering. Their achievements reflect strong technical knowledge, consistent effort, and a commitment to academic growth.

Learning with Excellence. Achieving with Pride.
Course Session: July–October 2025

NPTEL GOLD+SILVER+ELITE



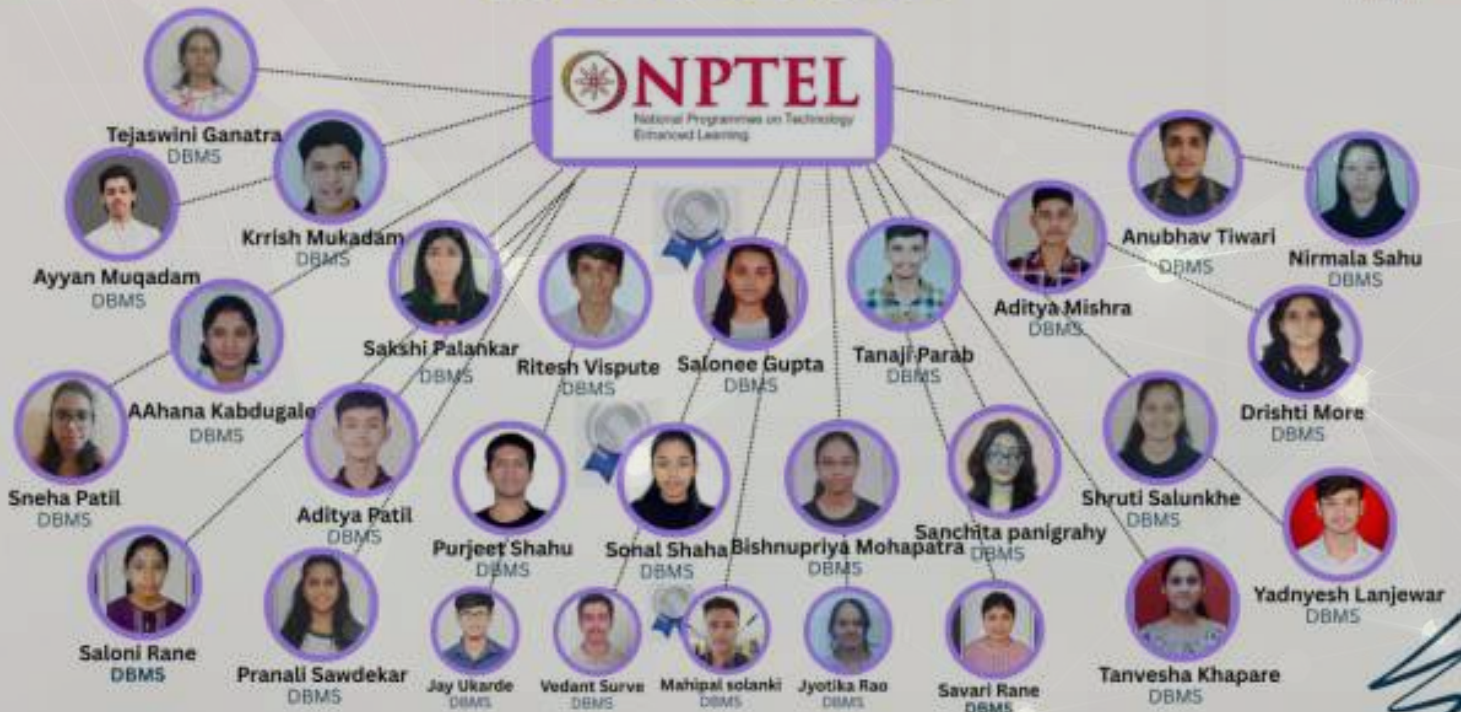
NPTEL Elite

Students strengthened their technical expertise through NPTEL courses in Database Management Systems (DBMS) and other computing disciplines. These accomplishments highlight their enthusiasm for learning, skill development, and professional excellence.

Building Skills. Shaping Futures.

Course Session: July–October 2025

NPTEL ELITE





Parshvanath Charitable Trust's

A.P.SHAH INSTITUTE OF TECHNOLOGY

Department of Information Technology

14

NPTEL ELITE



Sonal Shaha
Design Thinking



Mahipal Solanki
Introduction to
Machine Learning



Aditya Patil
Computer Network
& Internet Protocol



Sujal Salvi
Business Develop



Neha Pandey
Business Development



Krrish Mukadam
Business Development



Pranali Sawdekar
Design Thinking



Tanaji Parab
Introduction To
Machine Learning

NPTEL Successfully Completed



Yash Pandey
Introduction To Machine Learning



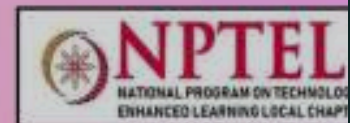
Prajwal Naik
Introduction To Machine Learning



Parshvanath's Charitable Trust's

A.P.SHAH INSTITUTE OF TECHNOLOGY

Department of Information Technology



NPTEL Gold+Silver+Elite



Nirmala Sahu
Design Thinking



Aahana K.
Design Thinking



Tejaswini G.
Programming
In Java



Tanusha Algeti
Programming
In Java



Jainam Shah
Programming
In Java



Nirmala S.
Business
Development



Shravani P.
Business
Development



Narayani B.
DataBasse
Management
System



Nisha Bauskar
DataBasse
Management
System



Krrish M.
Design
Thinking



Anushka M.
Business
Development



Khyati Pawar
Business
Development



Saloni Rane
Design
Thinking



Pranali S.
Business
Development



Harshita P.
Business
Development



Shivam P.
Design
Thinking



Saloni R.
Computer Net
& Internet Pro

Research & Innovation

Research That Makes a Difference

Our students continue to contribute to innovation through research, publications, and intellectual property development. The recognition received at DoSCI-2025 highlights their efforts to explore meaningful technological solutions.

Research Highlights

- 13 project groups published their work in Scopus-indexed conferences, including IEEE, Springer, and Elsevier.
- 14 project topics received copyright registration.
- 2 project-topic patents have been published.



DevOps Club

Building Industry-Ready Skills

The DevOps Club at A. P. Shah Institute of Technology encourages students to gain practical experience and develop industry-relevant skills. A total of 15 students successfully completed impactful DevOps internships at RegelX.

This achievement reflects the club's commitment to hands-on learning, professional development, and industry collaboration.



Internship Certificate

Celebrating Professional Growth

Rutuja More

Recognising the successful completion of an internship in the field of Artificial Intelligence, reflecting a commitment to practical learning, technical development, and professional growth.



Faculty Achievement





Dr. Kiran Deshpande

APSIT secured the Most Impactful Centre of Excellence Program Award (2025) at the Eduskills Educonnect Conclave at Shimla.



APSIT Thane has achieved outstanding recognition at the Eduskills Educonnect Conclave at Shimla. The institute's Juniper Network & Automation Academy and Microchip Academy were awarded Best performing Academies (All India) 2025.





Dr. Kiran Deshpande

APSIT secured the 1st position in the West region, the AI Skilling.



Award for Most impactful & Best Performing Academies (All India) for Zscaler and Celonis Academy at Eduskills Educonnect Conclave at Shimla.

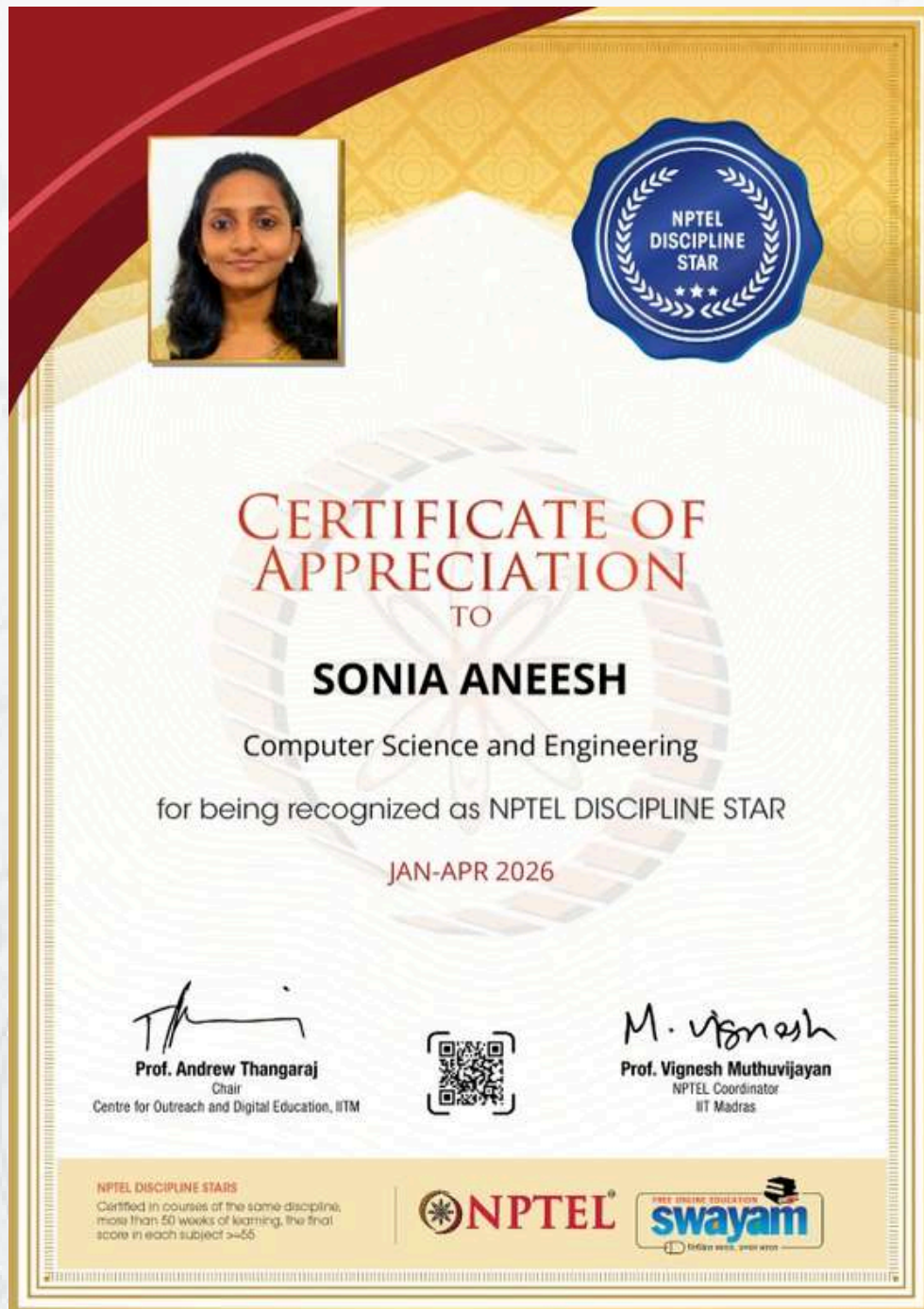




Dr. Sonia Aneesh

Dr. Sonia Aneesh Completed her PhD in Electronics and Telecommunication Engineering from Mumbai University in June 2025.

Recognized by NPTEL as an **NPTEL Discipline Star** in Computer Science & Engineering for Jan-Apr 2026 for successfully completing 72 weeks of courses under the discipline.





Ms. Anagha Aher

Prof. Anagha was honored to be among the selected recipients of the IEEE GRSS Travel Grant (USD \$1550) to attend and present her research at the IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2025), scheduled in Brisbane, Australia (3rd – 8th August 2025).



Prof. Anagha was honored to be among the selected recipients of the IEEE GRSS IDEA Professional Development Microgrant of USD \$500) for her research work.

Technical



Mr. Vishal Badgujar

Mr. Vishal Badgujar was presented the 2025 Red Hat Academy-Program Educator in recognition of the commitment to achieve professional excellence.



Ms. Sonal Balpande

Ms. Sonal Balpande completed the NPTEL course on OBE and Accreditation with Elite+Gold, July to October, 2025.



Technical



Mr. Vishal Badgujar

Mr. Vishal Badgujar successfully published a utility patent entitled “Risk Level Analysis For AI Based Open Source Architecture”



Ms. Manjusha Kashilkar

- Ms. Manjusha Kashilkar successfully published a Software patent entitled “A Deep Learning Based an Autonomous Waste Segregation Humanoid Sorter System”.
- Ms. Manjusha Kashilkar has contributed as an Author for the Book entitled “ MASTERING NETWORK SECURITY ADVANCED TECHNIQUES AND TECHNOLOGIES “ published in Scicrafthub International Publication.

A banner for the Department of Information Technology announcing patent publications. It features three logos at the top: a university crest, the Computer Society of India logo (founded 1980), and a shield logo with a code symbol. Below the logos, the text reads "Department of Information Technology" and "PATENT PUBLISHED" in a stylized font. At the bottom, there are two portraits: Mr. Vishal Badgujar on the left and Ms. Manjusha Kashilkar on the right. Below each portrait is their name and title.

Department of Information Technology

PATENT PUBLISHED

Mr. Vishal Badgujar
Assistant Professor-IT, APSIT
Published Utility Patent

Ms. Manjusha Kashilkar
Assistant Professor-IT, APSIT
Published Software Patent

Technical

Research Publications

To inculcate research culture among-est students, Department has develop ecosystem to ensure publication of their BE project work in reputed International conference and Journals

Paper Tittle	Faculty Name	Name of Conference
Medilink: AI and Blockchain Based Comprehensive Webframework for Maintaining Health Records	Mr. Mandar Ganjapurkar	Scopus
Modelling Comprehensive Webframework for Enhancing Administrative Efficiency in An Educational Institute	Ms. Rujata Chaudhari & Ms. Saylee Lapalikar	Scopus
MindMetrics: Advanced Mental Health Diagnosis and Tailored Recommendations through Multimodal AI	Ms. Sonal Balpande & Ms. Rucha Kulkarni	Scopus
EduFlex: ML Driven Crossplatform Application for Displaying and Acknowledging Students's Achievements	Ms. Sonal Jain	Scopus
ProjectSpace: A Comprehensive Webframework to Manage Academic Projects by using Genetic Algorithms and Machine Learning	Mr. Vishal Badgujar & Ms. Seema Jadhav	Scopus
Elderly: Developing Cross Platform Application for Addressing Requirements of Senior Citizens	Ms. Roshna Sangale	Scopus
AarogyaMarg: ML-Driven Application for Improved Healthcare Access and Experience	Ms. Shafaque Syed	Scopus

Technical

Research Publications

Paper Tittle	Faculty Name	Name of Conference
Smart Diagnosis : A Machine Learning-Driven Web Framework for Enhanced Diagnosis of ADHD	Ms. Apeksha Mohite	Scopus
Designing and Developing Comprehensive Framework with Improved Insights for Optimizing Talent Acquisition Process of Engineering Graduates	Dr. Uttam Kolekar & Ms. Sonal Balpande	Scopus
ElevateEats: ML- Based Food Ordering System For Health-Conscious Diners	Dr. Sameer Nanivadekar & Ms. Sheetal Agrawal	Scopus
Orchestrating Use of ML for Developing Data-Driven Training and Placement Management System.	Ms. Manjusha Kashilkar & Ms. Shweta Mahajan	Scopus
SpeakFree: An AI Based Application for People with Speech Impairments	Ms. Sonia Aneesh & Ms. Rucha Kulkarni	Scopus
HappyMind : An Advanced and Insightful E-Learning Platform to Address the Needs of students with Autism	Ms. Sujata Oak	Scopus
Blockchain-Enabled Smart EV Charging Framework for Commuters	Ms. Sujata Oak	Scopus
DermiQ: An Intelligent Skin Disease Detection System using Machine Learning	Ms. Geetanjali Kalme	Scopus
VSecureSphere: Developing Virtual Lab for Simulating Safe Enviornment for Multiple Cyber Attacks Patterns	Mr. Vishal Badgujar & Ms. Sneha Dalvi	Scopus

Technical

Research Publications

Paper Tittle	Faculty Name	Name of Conference
Deep Learning-Based Hierarchical Attention Mechanism for Risk Prediction	Mr. Vishal Badgujar	ICTCS 2024
Modelling Comprehensive Web framework for Enhancing Administrative Efficiency in An Educational Institute	Saylee Lapalikar	ICT4SD 2025
Smart Farming with YOLO: Predicting the Density of Weeds and Crops for Precision Agriculture	Mr.Ganesh Gourshete	Advances in Data-driven Computing and Intelligent Systems
An Application-Based Ai Fitness Trainer Integrating Multilayer Perceptron Network & Computer Vision	Ms. Anagha Aher	2025 3rd International Conference on Communication, Security, and Artificial Intelligence (ICCSAI)
An Application-Based Ai Fitness Trainer Integrating Multilayer Perceptron Network & Computer Vision	Ms. Anagha Aher	2025 3rd International Conference on Communication, Security, and Artificial Intelligence (ICCSAI)
C3 – Code Commit Collab - A Collaborative Code Editor using Repository Level LLM	Ms. Anagha Aher	2025 3rd International Conference on Communication, Security, and Artificial Intelligence (ICCSAI)
Risk Assessment and Prediction of Floods and Droughts using Attention-LSTM	Ms. Anagha Aher	2025 3rd International Conference on Communication, Security, and Artificial Intelligence (ICCSAI)
Mindscape: An AI-Powered Study Companion Integrating Natural Language Processing Algorithms	Ms. Anagha Aher	2025 3rd International Conference on Communication, Security, and Artificial Intelligence (ICCSAI)
ProjectSpace: A Comprehensive Framework for Automated Project Guide Allocation in Academic Institutions	Ms.Seema Jadhav	Doctoral Symposium on Computational Intelligence

Technical

Research Publications

Paper Tittle	Faculty Name	Name of Conference
AI-Enhanced Platform for Doctor Appointment Management, Real-Time Availability, and Precise Disease Diagnosis	Ms. Shafaque Fatma Syed	Doctoral Symposium on Computational Intelligence
MediLink: Blockchain Based Comprehensive Web Framework for Maintaining Health Records	Mr. Mandar Ganjapurkar	International Conference on ICT for Sustainable Development
Artificial Intelligence-Based Application for Individuals with Speech Impairments	Dr. Sonia Aneesh	Doctoral Symposium on Computational Intelligence
A Machine Learning Framework for Personalized Fashion: Body Shape Recognition, Seasonal Color Palette Matching, and Contextual Outfit Suggestions	Ms. Shafaque Fatma Syed	2026 6th Biennial International Conference on Nascent Technologies in Engineering (ICNTE)

Technical

Journal Paper Publications

Paper Tittle	Faculty Name	Name of Journal
The Evolution Of Large Language Models: A Comparative Survey Of Leading Approaches	Saylee Ameya Lapalikar	International Journal of Environmental Sciences
MAOMLB: Advancing Malware Analysis with AI-Based Open-Source Architecture Integrating Machine Learning and Behavioral Techniques	Dr. Vishal Badgujar	Journal of Applied Research and Technology (JART)
Protecting location privacy: An approach with error-based transformation and mercator projection-based transformation for geospatial vector data	Ms. Anagha Aher	Earth Science Informatics

Technical

Patent

Paper Tittle	Faculty Name	Granting authority
SmartGaze-An AI-powered Energy Conservation System	Shafaque Fatma Syed	Indian Patent Office

Technical

Copyright

Tittle	Faculty Name	Granting Authority
Performance Based Appraisal System for Educators	Mr. Vishal Badgujar	GOI
RiskVision	Dr. Vishal Badgujar	GOI
AssetIQ	Dr. Vishal Badgujar	GOI
"Rakshasetu	Geetanjali Kalme	GOI
"ExamEase:	Geetanjali Kalme	GOI
Sentiment-Track	Sujata Oak	GOI
Legal Ease	Randeep Kaur Kahlon	GOI
Ascent An AI driven Saas platform for engineering institutes to optimize student growth and power a unified student ecosystem	Sonal Jain	GOI

Technical

Book Published

Tittle	Faculty Name	ISSN/ISBN Number
HappyMind: A Comprehensive Platform For Addressing The E-Learning Needs Of Students With Autism	Mr.Ganesh Gourshete, Mrs.Sujata Oak	International Conference on Artificial Intelligence and Sustainable Innovation-2025 (ICAISI-2025)
ChargeMate: Blockchain-Enabled Smart EV Charging Framework for Commuters	Mrs. Sujata Oak	International Conference on Artificial Intelligence and Sustainable Innovation-2025 (ICAISI-2025)

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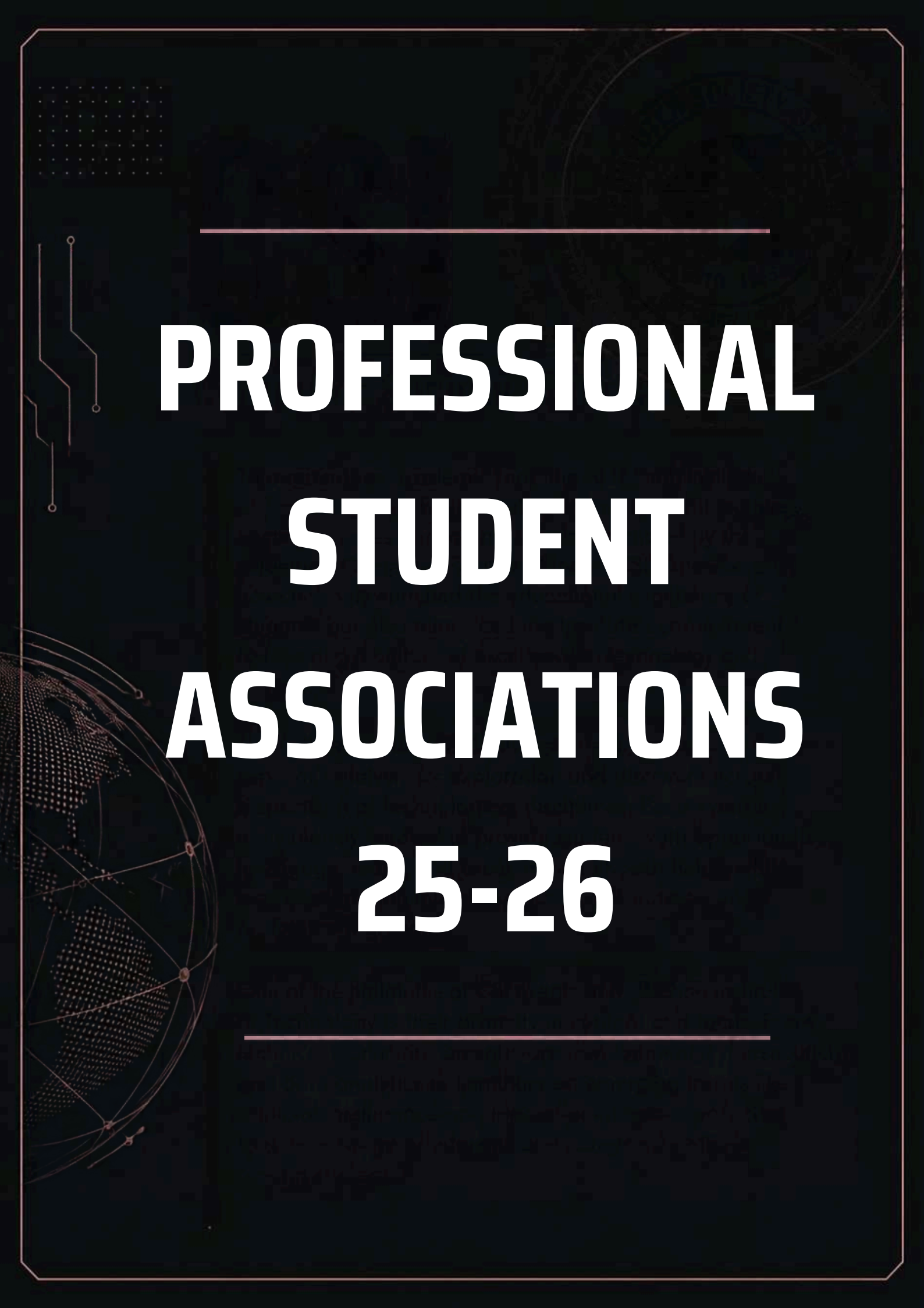
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NPTEL DISCIPLINE STAR





PROFESSIONAL STUDENT ASSOCIATIONS 25-26

CSI



Computer Society of India

Throughout the academic year, the A. P. Shah Institute of Technology has been a hub of innovation and learning, hosting a series of dynamic events organized by the esteemed Computer Society of India (CSI). These events have not only enriched the educational experience of students but also reinforced the Institute's commitment to fostering a culture of excellence in technology and beyond.

The CSI events at A. P. Shah Institute of Technology serve as catalysts for exploration and discovery across a spectrum of technological disciplines. Each event is meticulously curated to provide students with opportunities to engage, learn, and excel in their chosen fields, while also encouraging interdisciplinary collaboration and professional growth.

One of the hallmarks of CSI events at A. P. Shah Institute of Technology is their diversity in content and focus. From technical workshops on software development, cybersecurity, and data analytics to seminars on emerging trends like artificial intelligence and blockchain, these events cater to a wide range of interests and career aspirations among students.

ITSA



Information Technology Student Association



WHAT IS ITSA?

THE INFORMATION TECHNOLOGY STUDENTS ASSOCIATION (ITSA) IS THE OFFICIAL STUDENT BODY OF THE IT DEPARTMENT AT APSIT. WE ARE A VIBRANT COMMUNITY OF TECH ENTHUSIASTS DEDICATED TO FOSTERING INNOVATION, COLLABORATION, AND

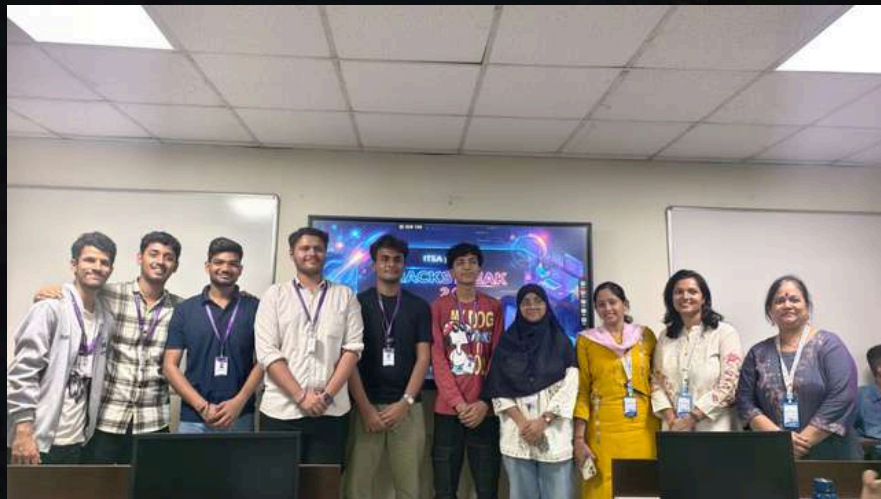
PROFESSIONAL GROWTH AMONG IT STUDENTS.

THROUGH WORKSHOPS, HACKATHONS, GUEST LECTURES, AND CULTURAL EVENTS, WE CREATE OPPORTUNITIES FOR STUDENTS TO LEARN BEYOND THE CLASSROOM, NETWORK WITH INDUSTRY PROFESSIONALS, AND DEVELOP ESSENTIAL SOFT SKILLS.

DEVOPS



APSIT'S DEVOPs club



The DevOps Club is a collaborative space where technology meets innovation, bringing together students passionate about streamlining software development and deployment. Our goal is to bridge the gap between development and operations by exploring modern tools, practices, and technologies. Through hands-on workshops, interactive sessions, and expert talks, we encourage members to gain practical experience, strengthen their technical skills, and stay updated with industry trends. By focusing on automation, continuous integration, continuous delivery, and system reliability, we aim to build a community of innovative thinkers ready to tackle real-world challenges and shape the future of software engineering.

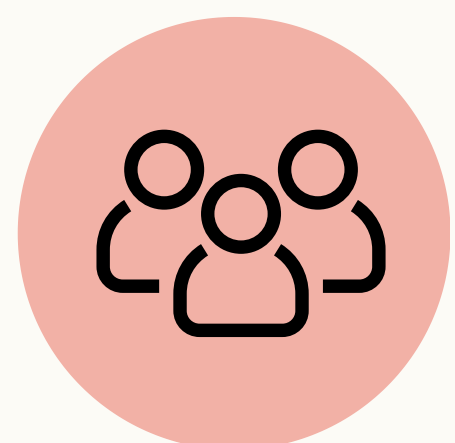
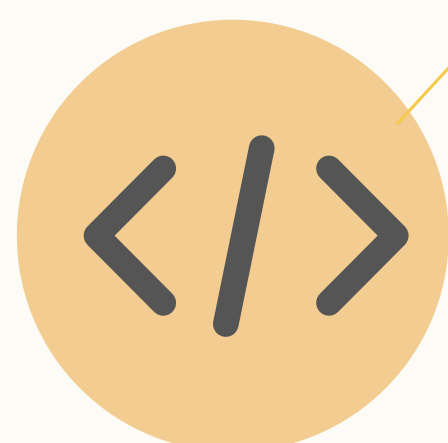
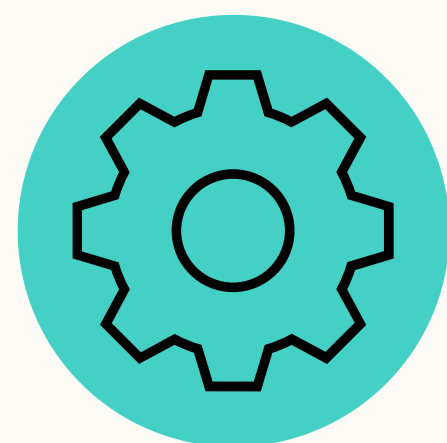
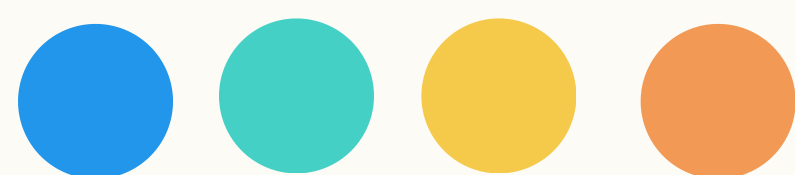
CYBERSECURITY

APSIT'S cybersecurity club



The APSIT Cyber Security Students Expert Club is a community for students passionate about cybersecurity, ethical hacking, and digital security. The club encourages collaboration, knowledge sharing, and technical growth through workshops, interactive sessions, and hands-on learning experiences. It provides a platform for students to explore cybersecurity concepts, learn about emerging threats, and gain practical exposure to security tools and technologies. By fostering curiosity, innovation, and teamwork, the club aims to develop cybersecurity skills and promote awareness of digital safety among students.

INTERNSHIP



INTERNSHIP DETAILS OF

A.Y.2025-26

SR NO	Name of Student	Name of the Internship	Name of Organization	Internship Domain	Duration of Internship
1.	Sanika Urade	Data Analytics Intern	InLighnX Global Private Limited	Data Analytics	1 Month
2.	Prakhar Asthana	Information security intern	Superhumanrace	Cyber Security	6 Weeks
3.	Shravani Sawant	Web development internship	Dataventics software solutions	Web Development	3 Months
4.	Radhika Lakhani	Web development internship	Dataventics Software Solutions Pvt.Ltd.	Content writing and event management	3 Months
5.	Aniruddha Patre	World green line	World green line	Web Development	2 Months
6.	Anisha Gaur	Junior Game developer	Bellulona gaming studio	Game Development	4 Months
7.	Anmol Shah	customer engineer	Gupshup	Software Development	3 Months
8.	Aditya Chaudhari	Data science intern	Inlightentech	Data Science	1 Month
9.	Sapna Mishra	Design & Social media	DataVentics Software solution	Business Intelligence	3 Months
10.	Chinmayee Sadalgekar	Brand Designing Internship	Dataventics Software Solutions	Business Intelligence	3 Months
11.	Harsh Naik	Cybersecurity Analyst	Redynox	Cyber Security	1 Month

INTERNSHIP DETAILS OF

A.Y.2025-26

SR NO	Name of Student	Name of the Internship	Name of Organization	Internship Domain	Duration of Internship
12.	Dhruv Pawar	Data Analyst Internship	TopDataWorks	Data Analytics	1 Month
13.	Harsh Koladkar	Web development Intern	Dataventics Software Solution	Web Development	3 Months
14.	Ojas Patrikar	Web and Business Dev Intern	Dataventics Software Solutions Pvt. Ltd.	Business Intelligence, Web Development	3 Months
15.	Aadesh Gavhane	Backend & Gen AI Developer	BrandLabs	Web Development, OpenAI	3 Months
16.	Rimi Gandhi	Data engineering	ICICI Prudential	Data engineering	1 Months
17.	Paresh Gupta	Full Stack Developer	Ervon Technology Pvt. Ltd.	Web Developemnt	6 Months
18.	Imran Ahmed Khan	Software engineer intern	Godrej Infotech Limited	Web Developemnt	2 Months
19.	Tanishka Ratnani	Business Development Executive- Job	Falcon Cargo	Business Development	6 Months
20.	Pranjal Kapse	Data analyst internship	Unified mentor	Data Analytics	6 Months
21.	Rudranarayan Sahu	Intern	IPLit	Web Developemnt	8 Months

INTERNSHIP DETAILS OF

A.Y.2025-26

SR NO	Name of Student	Name of the Internship	Name of Organization	Internship Domain	Duration of Internship
22.	Mayank Mishra	Software Developer Intern	L & T Precision Engineering & System	Machine Learning, Artificial Intelligence, Web Development	6 months
23.	Omkar Chandgaonkar	Software Developer Intern	L& T Precision Engineering & System		
24.	Harshal Sapkal	Software Developer Intern	L& T Precision Engineering & System		
25.	Shrey Nagda	Software Developer Intern	L& T Precision Engineering & System		
26.	Anubhav Singh	Software Developer Intern	L& T Precision Engineering & System		
27.	Pawan Walke	Data Science Intern / Open-Source Engineer Intern	DSW	DevOps	3 Months
28.	Maitreyee Puranik	Front-End Developer	IntelliconnectQ Analytics Inc.	Web Development	4 Months
29.	Gandhar Marathe	Software Engineer Intern	ADVUMAN	Software Development	6 Months
30.	Atharva Khilari	Software QA Intern	One XL Info LLP	Software Testing	2 Months

INTERNSHIP DETAILS OF

A.Y.2025-26

SR NO	Name of Student	Name of the Internship	Name of Organization	Internship Domain	Duration of Internship
31.	Vaibhav Burad	Data Science Intern	Digital Nexus AI	Digital Nexus AI	6 Months
32.	Annirudh Patre	IT-ATG Intern	CDSL		6 Months
33.	Ankita Semwal	ERPWave ImplemterIntern	Rajlaxmi Solutions	Software Development	2 Months
34.	Dhruvil Panchal	Software Developer Intern	Mahity	Software Development	3 Months
35.	Mustaqeem Masuldar	Design & Operations Intern	Exploria Technologies Private Limited	Design & Operation	1 Month
36.	Omkar Sawant	Software Development Intern	EnverseIQ Solutions	Software Development	3 Months
37.	Sahil Gada	Intern	Inventorize Technologies Private Limited	Software Development	3 Months
38.	Bhavesh Marathe	Internship as a Software Test Engineer	Vector	Software Testing	6 Months
39.	Raj Mehta	Internship as a Software Test Engineer	Vector	Software Testing	6 Months
40.	Harsh Naik	Offensive Cyber Security Intern	InLighnX Global Pvt.Ltd.	Cyber Security	1 Month

INTERNSHIP DETAILS OF

A.Y.2025-26

SR NO	Name of Student	Name of the Internship	Name of Organization	Internship Domain	Duration of Internship
41	Satvik Pedamallu	IT Operations Intern	BSE Technologies	IT Operations	3 Months
42	Yash Apte	Software Development Intern	TCS	Software Development	3 Months
43	Amit Rajegore	Software Engineering Intern	RigelX Infotech Private Limited	Software Engineering	1 Month
44	Shlok Chandankar				1 Month
45	Aditya Chaudhari				1 Month
46	Gandhar Rane				1 Month
47	Mayank Salvi				1 Month
48	Chinmayee Sadalgekar				1 Month
49	Anjali Singh	Software Development Intern	RigelX Infotech Private Limited	Software Development	1 year
50	Rutuja More	Product Manager			1 year
51	Sanket Kurle	Software Development Intern			1 year

AICTE VIRTUAL INTERNSHIP COHORT 10

The AICTE-EduSkills Virtual Internship Cohort 10 is a program designed to provide students with practical, industry-oriented skills through online training and projects. It offers domains such as Google Cloud, Android Development, Generative AI, AI/ML, AWS Cloud, Cybersecurity, Networking, and RPA, helping students enhance their technical knowledge and career opportunities.

Sr.No.	Domain	Industrial Collaboration	No of.
1.	Altair Data Science Master Virtual Internship	Altair RapidMiner Academy	4
2.	Alteryx Data Analytics Process Automation Virtual Internship	Alteryx Academy	1
3.	Aws Cloud Virtual Internship	AWS Academy	12
4.	Aws Data Engineering Virtual Internship	AWS Academy	3
5.	Celonis Business Analyst Virtual Internship	Celonis Academy	18
6.	Celonis Business Mining Virtual Internship	Celonis Academy	1
7.	Ethical Hacking Virtual Internship	EduSkill Foundation	35
8.	Fortinet Network Security Associate Virtual Internship	Fortinet Training Institute	13
9.	Google Ai-ML Virtual Internship	Google For Developers	34

AICTE VIRTUAL INTERNSHIP COHORT 10

Sr.No.	Domain	Industrial Collaboration	No of. completion
10.	Google Android Developer Virtual Internship	Google For Developers	34
11.	Google Cloud Generative-Ai Virtual Internship	Google For Developers	1
12.	Java Full Stack Developer Virtual Internship	EduSkill Foundation	27
13.	Juniper Networking Cloud Virtual Internship	Juniper Networks Cloud and Automation Academy	4
14.	Juniper Networking Virtual Internship	Juniper Networks Cloud and Automation Academy	4
15.	Microchip Embedded System Developer Virtual Internship	Microchip Academy	13
16.	Palo Alto Cybersecurity Virtual Internship	Palo Alto Networks Cybersecurity Academy	55
17.	Python Fullstack Developer Virtual Internship	EduSkill Foundation	10
18.	Web Full Stack Developer Virtual Internship	EduSkill Foundation	46
19.	Zscaler Networking Virtual Internship	Zscaler Cyber Academy	3
20.	Zscaler Zero Trust Cloud Security Virtual Internship	Zscaler Cyber Academy	2
	Total		320

AICTE VIRTUAL INTERNSHIP COHORT 11

The **AICTE–EduSkills Virtual Internship Cohort 11** is a skill-development program that provides students with practical, industry-oriented training through online learning and projects. It covers domains such as **AI/ML, AWS Data Engineering, Google Android Development, Generative AI, Cybersecurity, Networking, Data Science, RPA, and Embedded Systems**, helping students improve their technical skills and career readiness

Sr.No.	Domain	Industrial Collaboration	No of. completion
1.	AWS Data Engineering Virtual Internship	AWS Academy	17
2.	AWS Cloud Virtual Internship	AWS Academy	4
3.	AWS AIML Virtual Internship	ALTERYX	9
4.	ALTERYX Data Analytics Process Automation Virtual Internship	ALTERYX	2
5.	ALTAIR Data Science Virtual	ALTAIR	9
6.	CyberSecurity Virtual Internship Program	Palo Alto Networks Cybersecurity Academy	8
7.	Networking Cloud Virtual Internship Program	Juniper Networks Cloud and Automation Academy	1
8.	Networking Virtual Internship Program	Juniper Networks Cloud and Automation Academy	16
9.	Celonis Process Mining Virtual Internship	CELONIS	45

AICTE VIRTUAL INTERNSHIP COHORT 11

Sr.No.	Domain	Industrial Collaboration	No of. completion
10.	Celonis Buisness Analyst Virtual Internship	CELONIS	8
11.	Fortinet Network Security Associate Virtual Internship	FORTINET	10
12.	Google AI-ML Virtual Internship	GOOGLE	8
13.	Google Android Developer Virtual Internship	GOOGLE	29
14.	Google Cloud Generative AI Virtual Internship	GOOGLE	2
15.	Embedded System Developer Virtual Internship	Microchip Academy	36
16.	Web Full-Stack Developer Virtual Internship	EDUSKILLS	1
17.	Python Full-Stack Developer Virtual Internship	EDUSKILLS	13
18.	ZSCALER Networking Virtual Internship	ZSCALER	34
19.	ZSCALER Zero Trust Cloud Security Virtual Internship	ZSCALER	6
	Total		258

AICTE VIRTUAL INTERNSHIP COHORT 12

The **AICTE–EduSkills Virtual Internship Cohort 12** is a program designed to provide students with practical, industry-oriented training through online courses, assessments, and projects. It offers domains such as **AI/ML, AWS Cloud, Android Development, Cybersecurity, Networking, RPA, Data Analytics, and Embedded Systems**, helping students develop technical skills and improve career readiness.

Sr.No.	Domain	Industrial Collaboration	No of. completion
1.	AI-ML Virtual Internship Program	AWS Academy	8
2.	Cloud Virtual Internship	AWS Academy	7
3.	CyberSecurity Virtual Internship Program	Palo Alto Networks Cybersecurity Academy	1
4.	Data Engineering Virtual Internship	AWS Academy	2
5.	Networking Cloud Virtual Internship Program	Juniper Networks Cloud and Automation Academy	3
6.	ALTAIR Data Science Master Virtual Internship	Altair	8
7.	Celonis Buisness Analyst Virtual Internship	CELONIS	3
8.	Celonis Process Mining Virtual Internship	CELONIS	1
9.	Employability Skill Job Ready Virtual Internship	Eduskill Academy	1

AICTE VIRTUAL INTERNSHIP COHORT 12

Sr.No.	Domain	Industrial Collaboration	No of. completion
10.	Ethical Hacking Virtual Internship	Eduskill Academy	4
11.	Fortinet Network Security Associate Virtual Internship	FORTINET	8
12.	Google AI-ML Virtual Internship	GOOGLE	12
13.	Google Android Developer Virtual Internship	GOOGLE	11
14.	Google Cloud Generative AI Virtual Internship	GOOGLE	7
15.	Google Cloud CyberSecurity Virtual Internship	GOOGLE	7
16.	JAVA Full-Stack Developer Virtual Internship	Eduskills Academy	7
17.	Microchip Embedded System Developer Virtual Internship	MICROCHIP	3
18.	Python Full-Stack Developer Virtual Internship	EDUSKILLS	55
19.	WEB Full-Stack Developer Virtual Internship	EDUSKILLS	10
20.	ZSCALER Networking Virtual Internship	ZSCALER	5

AICTE VIRTUAL INTERNSHIP COHORT 11

Sr.No.	Domain	Industrial Collaboration	No of. completion
21.	ZSCALER Zero Trust Cloud Security Virtual Internship	ZSCALER	6
	Total		169

AICTE VIRTUAL INTERNSHIP COHORT 13

The AICTE–EduSkills Virtual Internship Cohort 13 is a skill-development program that provides students with practical, industry-oriented training through online learning and projects. Its domains include Data Science (Altair), Networking and Zero Trust Cloud Security (Zscaler), AWS IoT Cloud Engineering, and RPA (UiPath), along with other technology tracks, helping students enhance their technical skills and career readiness.

Sr.No.	Domain	Industrial Collaboration	No of. completion
1.	AWS Data Engineering Virtual Internship	AWS Academy	2
2.	AWS Cloud Virtual Internship	AWS Academy	1
3.	AWS IoT Cloud Engineer Virtual Internship	AWS Academy	3
4.	AWS GEN AI Virtual Internship	AWS Academy	5
5.	AWS For Game Development Virtual Internship	AWS Academy	2
6.	CyberSecurity Virtual Internship Program	Palo Alto Networks Cybersecurity Academy	7
7.	Networking Cloud Virtual Internship Program	Juniper Networks Cloud and Automation Academy	2
8.	Celonis Process Mining Virtual Internship	CELONIS	3
9.	Ethical Hacking Virtual Internship	Eduskill Academy	26

AICTE VIRTUAL INTERNSHIP COHORT 13

Sr.No.	Domain	Industrial Collaboration	No of. completion
10.	Fortinet Network Security Associate Virtual Internship	FORTINET	5
11.	Google AI-ML Virtual Internship	GOOGLE	6
12.	Google Android Developer Virtual Internship	GOOGLE	2
13.	Google Cloud CyberSecurity Virtual Internship	GOOGLE	1
14.	JAVA Full-Stack Developer Virtual Internship	Eduskills Academy	90
15.	Python Full-Stack Developer Virtual Internship	EDUSKILLS	3
16.	ZSCALER Networking Virtual Internship	ZSCALER	2
17.	ZSCALER Zero Trust Cloud Security Virtual Internship	ZSCALER	42
	Total		202

AICTE VIRTUAL INTERNSHIP COHORT 14

The **AICTE–EduSkills Virtual Internship Cohort 14** is a program that helps students gain practical, industry-oriented knowledge through online training and projects. It offers **41 emerging technology domains**, including **Artificial Intelligence, Cloud Computing, Cybersecurity, Data Analytics, IoT, and Automation**, helping students enhance their technical skills and career opportunities.

Sr.No.	Domain	Industrial Collaboration	No of. completion
1.	Altair Data Science Master Virtual Internship	Altair RapidMiner Academy	4
2.	Alteryx Data Analytics Process Automation Virtual Internship	Alteryx Academy	1
3.	Aws Cloud Virtual Internship	AWS Academy	12
4.	Aws Data Engineering Virtual Internship	AWS Academy	3
5.	Celonis Business Analyst Virtual Internship	Celonis Academy	18
6.	Celonis Process Mining Virtual Internship	Celonis Academy	1
7.	Ethical Hacking Virtual Internship	EduSkill Foundation	35
8.	Fortinet Network Security Associate Virtual Internship	Fortinet Training Institute	13
9.	Google AI-Ml Virtual Internship	Google For Developers	34

AICTE VIRTUAL INTERNSHIP COHORT 14

Sr.No.	Domain	Industrial Collaboration	No of. completion
10.	Google Android Developer Virtual Internship	Google For Developers	34
11.	Google Cloud Generative-Ai Virtual Internship	Google For Developers	1
12.	JAVA Full-Stack Developer Virtual Internship	EduSkill Foundation	27
13.	Juniper Networking Cloud Virtual Internship	Juniper Networks Cloud and Automation Academy	4
14.	Juniper Networking Virtual Internship	Juniper Networks Cloud and Automation Academy	4
15.	Microchip Embedded System Developer Virtual Internship	Microchip Academy	13
16.	Palo Alto Cybersecurity Virtual Internship	Palo Alto Networks Cybersecurity Academy	55
17.	Python Fullstack Developer Virtual Internship	EduSkill Foundation	10
18.	Web Full Stack Developer Virtual Internship	EduSkill Foundation	46
19.	Zscaler Networking Virtual Internship	Zscaler Cyber Academy	3

AICTE VIRTUAL INTERNSHIP COHORT 14

Sr.No.	Domain	Industrial Collaboration	No of. completion
20.	ZSCALER Zero Trust Cloud Security Virtual Internship	Zscaler Cyber Academy	2
	Total		320

AICTE VIRTUAL INTERNSHIP COHORT 15

The **AICTE–EduSkills Virtual Internship Cohort 15** is a program that helps students gain practical, industry-relevant knowledge through online training, assessments, and projects. It covers domains such as **AI/ML, Cloud Computing (AWS, Azure, and Google Cloud), Cybersecurity, Data Analytics, RPA, Data Science, and Full-Stack Development**, helping students enhance their technical skills and career readiness

Sr.No.	Domain	Industrial Collaboration	No of. completion
1.	Advanced Robotics Using AI And IoT	IBM	2
2.	AI in Cyber Security	IBM	2
3.	AWS AI-Powered Cloud Engineer	AWS	1
4.	AWS Cloud	AWS	14
5.	AWS Cloud Business Application	AWS	1
6.	AWS Data Engineering	AWS	2
7.	Celonis Business Analyst	Celonis	1
8.	DevOps & Cloud Automation	RedHat	1
9.	Ethical Hacking (english Language)	Palo Alto Networks	2

AICTE VIRTUAL INTERNSHIP COHORT 15

Sr.No.	Domain	Industrial Collaboration	No of. completion
10.	Full Stack PHP Development	Oracle	1
11.	Google AI-ML	Google	7
12.	Google Android Developer	Google	3
13.	Java Full Stack Developer	Oracle	1
14.	Java Full Stack Development + Project	Oracle	1
15.	Juniper Networking Cloud	Juniper Networks	1
16.	Machine Learning & Data Science	IBM	1
17.	MERN full Stack Development + Project	MongoDB	2
18.	Palo Alto Cybersecurity	Palo Alto Networks	6
19.	Python Fullstack Developer	IBM	21
20.	SQL and Database Management Systems	Oracle	1
21.	Zscaler Networking	Zscaler	2
22.	Zscaler Zero Trust Cloud Security	Zscaler	21
	Total		94

AICTE VIRTUAL INTERNSHIP COHORT 16

The AICTE–EduSkills Virtual Internship Cohort 16 is a skill-development program that provides students with industry-oriented online training, assessments, and practical projects. It offers **100+ technology domains**, including **AI/ML, Generative AI, Cloud Computing (AWS, Azure, Google Cloud), Cybersecurity, Data Science, Networking, DevOps, and Full-Stack Development**, helping students build technical skills and improve career readiness.

Sr.No.	Domain	Industrial Collaboration	No of. completion
1.	AWS Cloud	AWS	1
2.	AWS Gen AI	AWS	1
3.	Celonis AI In Process Intelligence	Celonis	5
4.	Celonis Business Analyst	Celonis	3
5.	Data Structures and Algorithms in C + Project	EduSkill Foundation	2
6.	DevOps & Cloud Automation	RedHat	1
7.	Fortinet Network Security Associate	Fortinet	2
8.	Google Cloud Cybersecurity	Google Cloud	2
9.	Google Cloud Generative - AI	Google Cloud	1
10.	Juniper Networking	Juniper Networks	1

AICTE VIRTUAL INTERNSHIP COHORT 16

Sr.No.	Domain	Industrial Collaboration	No of. completion
11.	Juniper Networking Cloud	Juniper Networks	1
12.	Microchip Embedded System Developer	Microchip	1
13.	Palo Alto Cybersecurity	Palo Alto Networks	6
14.	Python Full Stack Development + Project	EduSkill Foundation	1
15.	Python Full Stack Development + Project(Hindi)	EduSkill Foundation	2
16.	Siemens Data Science Master	Siemens	2
17.	Zscaler Fundamental of Cybersecurity in Gen AI	Zscaler	1
18.	Zscaler Networking	Zscaler	1
19.	Zscaler Zero Trust Cloud Security	Zscaler	2
	Total		36

AICTE VIRTUAL INTERNSHIP COHORT 17

The AICTE–EduSkills Virtual Internship Cohort 17 is a program that helps students gain practical, industry-relevant skills through online training, assessments, and projects. It offers domains such as **AI/ML, Generative AI, Cloud Computing (AWS, Azure, Google Cloud), Cybersecurity, Data Science, DevOps, Full-Stack Development, and IoT**, helping students improve their technical knowledge and career readiness.

Sr.No.	Domain	Industrial Collaboration	No of. completion
1.	AI in Cyber Security	EduSkills	5
2.	AWS Cloud	AWS	2
3.	AWS Data Engineering	AWS	2
4.	AWS For Cloud Game Development	AWS	1
5.	AWS Gen AI	AWS	5
6.	Advanced Robotics Using AI And IoT	EduSkills	1
7.	Blockchain Technology	EduSkills	1
8.	Business Analytics and Data Visualization	EduSkills	1
9.	Celonis AI In Process Intelligence	Celonis	6

AICTE VIRTUAL INTERNSHIP COHORT 17

Sr.No.	Domain	Industrial Collaboration	No of. completion
10.	Data Analytics with Python & Power BI	EduSkills	3
11.	Data Structures and Algorithms in C + Project(Hindi)	EduSkills	1
12.	Ethical Hacking (english Language)	EduSkills	1
13.	Generative AI, Deep Learning & Language Models	EduSkills	1
14.	Google AI-ML	Google	4
15.	Google Android Developer	Google	1
16.	Java Full Stack Development + Project	EduSkills	4
17.	Juniper Networking	Juniper Networks	1
18.	Juniper Networking Cloud	Juniper Networks	3
19.	MERN full Stack Development + Project	EduSkills	3
20.	Machine Learning & Data Science	EduSkills	1
21.	Palo Alto Cybersecurity	Palo Alto Networks	7

AICTE VIRTUAL INTERNSHIP COHORT 17

Sr.No.	Domain	Industrial Collaboration	No of completion
22.	Professional UI/UX Design & Web Prototyping	EduSkills	2
23.	Prompt Engineering for AI	EduSkills	1
24.	Python Full Stack Development + Project	EduSkills	4
25.	Python Fullstack Developer	EduSkills	5
26.	SQL and Database Management Systems	EduSkills	2
27.	SQL and Database Management Systems + Project(Hindi)	EduSkills	1
28.	Siemens Data Science Master	Siemens	4
29.	Zscaler Fundamental of Cybersecurity in Gen AI	Zscaler	7
30.	Zscaler Zero Trust Cloud Security	Zscaler	11
	Total		91

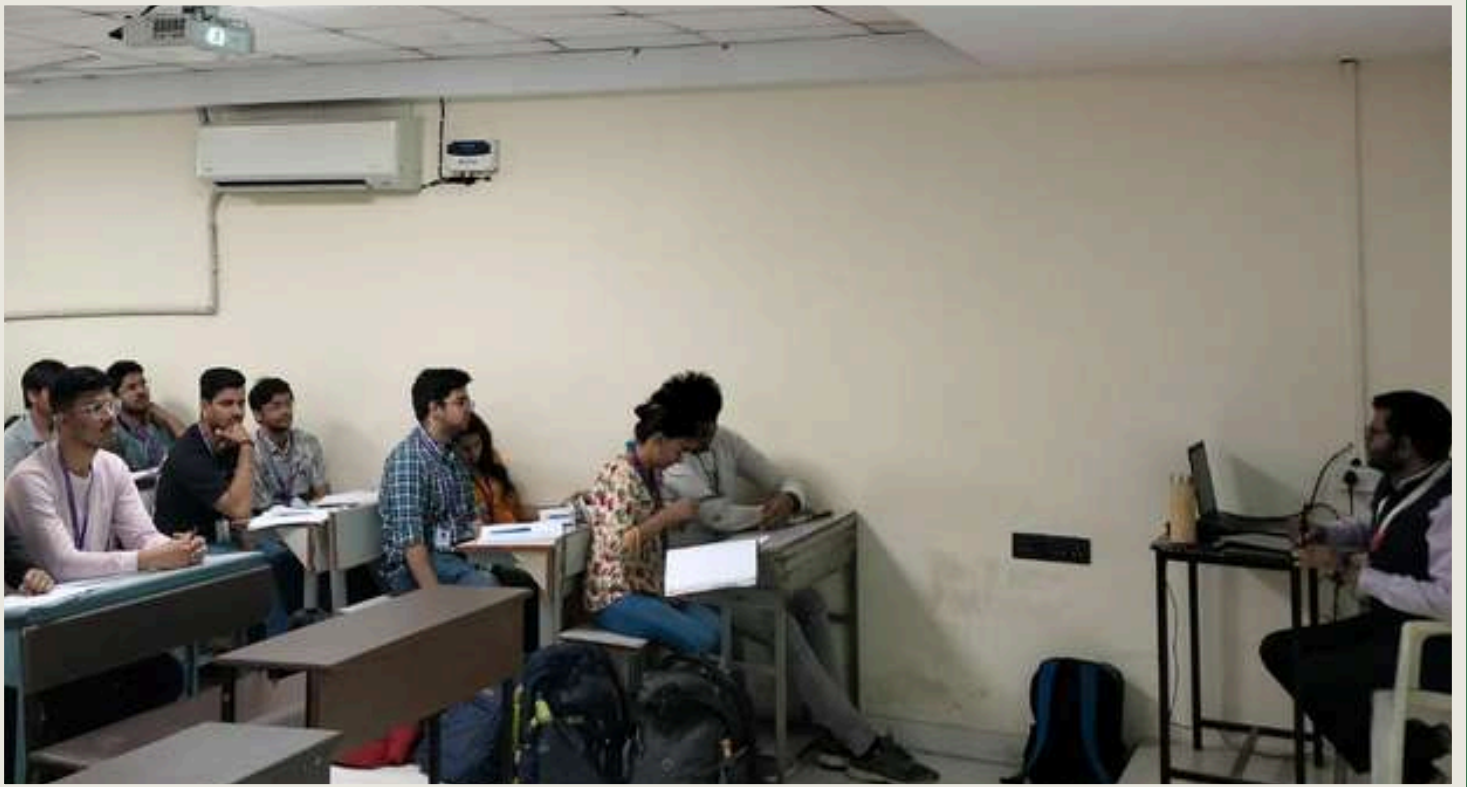
AICTE VIRTUAL INTERNSHIP COHORT 18

The AICTE–EduSkills Virtual Internship Cohort 18 is a skill-development program that helps students gain practical, industry-relevant knowledge through online training, assessments, and projects. It includes technology domains such as **AI/ML, Generative AI, Cloud Computing (AWS, Azure, Google Cloud), Cybersecurity, Data Science, DevOps, and Android Development**, helping students strengthen their technical skills and career readiness.

Sr.No.	Domain	Industrial Collaboration	No of. completion
1.	AI Deployment & Automation	Artificial Intelligence & Automation	1
2.	AI in Cyber Security	Artificial Intelligence & Cybersecurity	2
3.	Algorithmic Trading & Quantitative Finance with Python	Financial Technology (FinTech)	1
4.	AWS Data Engineering	Cloud Computing & Data Engineering	1
5.	AWS Gen AI	Cloud Computing & Generative AI	1
6.	Celonis AI In Process Intelligence	Celonis	3
7.	Data Structures and Algorithms in C + Project	Data Structures & Algorithms	3
8.	Ethical Hacking (English Language)	Cybersecurity & Ethical Hacking	1

AICTE VIRTUAL INTERNSHIP COHORT 18

Sr.No.	Domain	Industrial Collaboration	No of. completion
9.	Generative AI, Deep Learning & Language Models	Artificial Intelligence & Machine Learning	3
10.	Java Full Stack Development + Project	Full Stack Web Development	6
11.	Palo Alto Cybersecurity	Palo Alto Network Cybersecurity	1
12.	Python Full Stack Development + Project (Hindi)	Eduskills	2
13.	Zscaler Networking	Zscaler Academy	1
	Total		26



*Workshops &
Training*



Pre Placement Training

The pre-placement training sessions, held from 14th to 18th July, focused on improving students' aptitude, communication, and interview skills. Topics included logical reasoning, quantitative aptitude, verbal ability, resume verification, personal interviews, and group discussions. Company-specific practice sessions helped students enhance their problem-solving abilities & readiness for placement drives.



Pre Placement Training

The Pre-Placement Training Program aimed to improve students' aptitude skills for campus recruitment through Quantitative Aptitude, Logical Reasoning, and Data Interpretation. It included topic-wise practice sessions and mock tests to enhance problem-solving abilities, speed, accuracy, time management, and confidence for placement assessments.




A. P. SHAH INSTITUTE OF TECHNOLOGY


PRE-PLACEMENT TRAINING PROGRAM


DATE
 23 FEB 2026 TO 27 FEB 2026


LOCATION
 CLASSROOM-213


TIME
 9:30 AM TO 4.30 PM



PRE-PLACEMENT TRAINING





Pre Placement Training



The pre-placement training sessions, held from 11th to 15th September 2025, focused on improving students' logical reasoning, quantitative aptitude, and problem-solving skills. Topics included syllogisms, puzzles, coding-decoding, number systems, averages, ratios, and data interpretation. Through company-specific practice, shortcut techniques, and interactive exercises, students enhanced their speed, accuracy, and confidence for placement examinations.



EVENTS

One Campus , Countless Opportunities

2025-26

Some moments teach us. Some challenge us. Some simply stay with us. This year gave us all three. Through expert talks, hackathons, workshops, industry interactions and countless opportunities to showcase our skills, we discovered new interests and new possibilities. BITS & BYTES celebrates these experiences and the people who made them meaningful



Sr No.	CLUBS
1.	ITSA (Information Technology Students' Association)
2.	DEVOPS
3.	CYBER SECURITY
4.	CSI (Computer Society of India)

ITSA

The Information Technology Students' Association (ITSA) at APSIT aims to build a vibrant community of IT enthusiasts by fostering innovation, collaboration, and technical excellence. The club focuses on enhancing students' technical knowledge, leadership qualities, and teamwork through a variety of activities including workshops, competitions, guest lectures, and community initiatives.

DEVOPS

The DevOps Club, dedicated to fostering knowledge in software development, operations, automation, and industry-oriented technologies, continued its academic and technical activities during AY 2025–26. As documented in the supplied event schedule, the club organized seven events covering Linux, Bash scripting, LaTeX, OpenShift AI, DevOps and Data Science careers, problem statements, and hackathon-based innovation. These activities provided students with opportunities for practical learning, technical interaction, career awareness, and collaborative problem solving.

CYBER SECURITY

The Cybersecurity Club at A. P. Shah Institute of Technology (APSIT) exists to cultivate a community of emerging cybersecurity professionals skilled in defending modern digital ecosystems. The club bridges academic theory and industry application through immersive training in ethical hacking, network security, forensics, and proactive cyber defence.

CSI

The Computer Society of India (CSI) is dedicated to fostering technical knowledge, innovation, and excellence among students. It provides a platform to explore emerging technologies, develop practical skills, and enhance problem-solving abilities. Through workshops, seminars, competitions, and collaborative activities, CSI encourages students to learn, create, and grow.

ITSA'S EVENT GALLERY

01

Diverse Career Paths in AIML & Generative AI

12/01/2026



02

Hackstreak 1.0

17/9/25



03

Crafting Your Path: A Guided Career Roadmap in AI and Cybersecurity

17/9/25



04

Roadmap to React and Tailwind Mastery

18/9/25 , 9/9/25, 22/9/25



05 From Basics to React Pro: Your Web Dev Roadmap

11/9/25 , 12/9/25, 22/9/25



06 Breaking Barriers: Women in IT

9/3/26



07

Sparkathon

10/03/2026



08

Codeathon 2026: SoloSprint

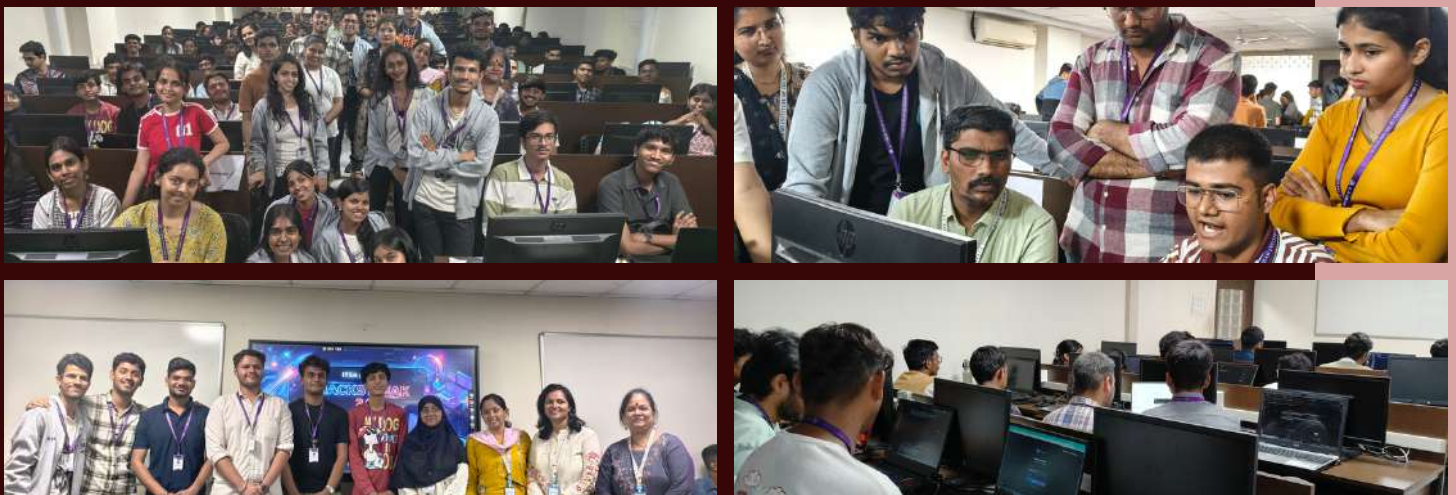
11/03/2026



09

Hackstreak 2.0

12/03/2026



DevOps in Focus

01

Devtalk and Problem Statement Reveal

23/01/2026



02

OpsStorm hackathon file

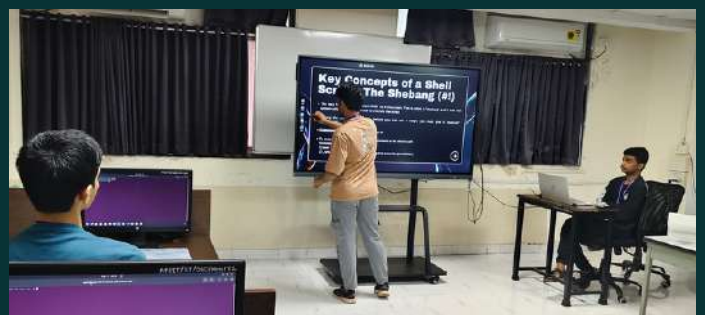
23/01/ 2026



03

Introduction to Linux Editors and Shell Scripting

17/09/2025



04

From Campus to Cloud: Alumni Insights on DevOps and Data Science Careers

08/10/2025



05

Linux Basic & Bash Scripting

13/08/2025



06

Introduction to RedHat OpenShift AI- Course and Career Opportunities

05/08/2025



CYBER SECURITY COLLECTIVE

01 Cipherium: Capture the flag competition

16/3/2026



02 CIPHERIUM: Cyber Security hackathon

16/03/2026



03 Deep Dive into firewall log analyzer detecting threats from logs

25/7/2025



04

Cyber Security Bootcamp-From zero to network hero

13/8/2026



05

Protocols theory and burp suite tool, OSI model theory and nmap tool

17/9/2026



06

Cyber Carnival Where fun meets cyber power

18/9/2026



The CSI Annual

01

Alumni Meet

04/01/2026



02

Employability Softskills for campus placement

30/01/2026



03

Start your Zero Trust Cybersecurity Journey: Career paths through Zscaler Cyber Academy

17/01/2026



04

Bootcamp on : DevFusion: Web App Development & AI Integration

23 Feb 2026 to 26 Feb 2026



05

SE Alumni Talk :AI Adoption: Innovation, Opportunities, and Security Lacunas

9/ 3/ 2026



06

Building a Sustainable IT Career: Staying Relevant through Skill Upgradation

30/3/2026



07

Transforming Data into Insights: SAS & the Future of BI

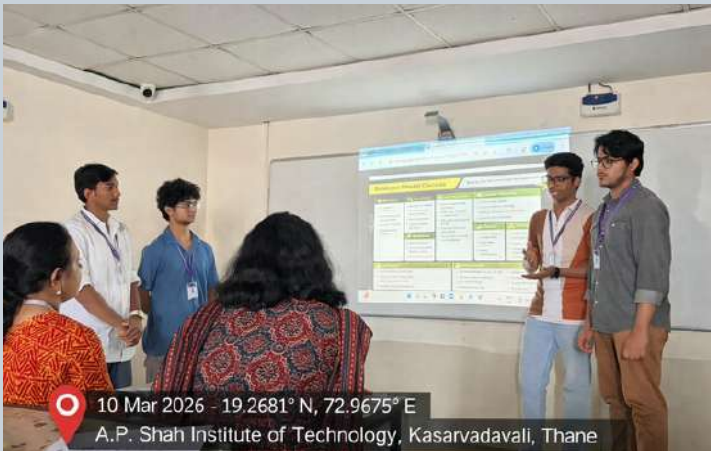
30/03/2026



08

Business Model Canvas Competition

10/03/2026





ARTICLES

AttackIQ Watchtower:

Transforming Cyber Threat Intelligence with AI

👤 Rudranarayan Sahu | TE-IT

Cyber Threat Intelligence (CTI) is the practice of collecting and analyzing data about adversaries to inform defensive decisions. Traditional CTI is often delivered as broad, industry-wide feeds and reports that security teams must manually read, interpret, and map to their own environment. A slow process that frequently produces generic, non-actionable guidance. On August 5, 2025, AttackIQ announced Watchtower, an AI-powered CTI Analyzer designed to address this gap by continuously analyzing the adversary activity specific to a customer's own environment and auto-generating tailored adversary emulation scenarios for security testing. This article explains what Watchtower is, why it was introduced, how it works, and how AI-assisted analysis can help convert raw threat intelligence into actionable, environment-specific security validation, while noting that such tools support rather than replace human analysts.



Keywords:

Cyber Threat Intelligence, AttackIQ Watchtower, Adversarial Exposure Validation, AI-Powered Security, Threat-Informed Defense, Adversary Emulation.

1 Introduction



Cyber Threat Intelligence (CTI) refers to information about adversaries, their tactics, techniques, and infrastructure, collected and analyzed to help organizations anticipate and defend against attacks. Security teams traditionally consume CTI through vendor feeds, industry reports and advisories, then manually assess relevance to their own systems. As published threat data has grown, this process has become difficult: feeds are often noisy, region-dependent, and have analysts unsure where to focus testing effort. Many organizations also lack the staff or budget to continuously translate this intelligence into concrete tests. What is needed is intelligence reflecting what is actually happening to a specific organization, not general industry trends. AttackIQ, a vendor of Adversarial Exposure Validation (AEV) solutions and founding research partner of the MITRE Center for Threat-Informed Defense, announced AttackIQ Watchtower on August 5, 2025, at Black Hat USA, as an AI-powered CTI Analyzer built to address this problem.

2 What is AttackIQ Watchtower?

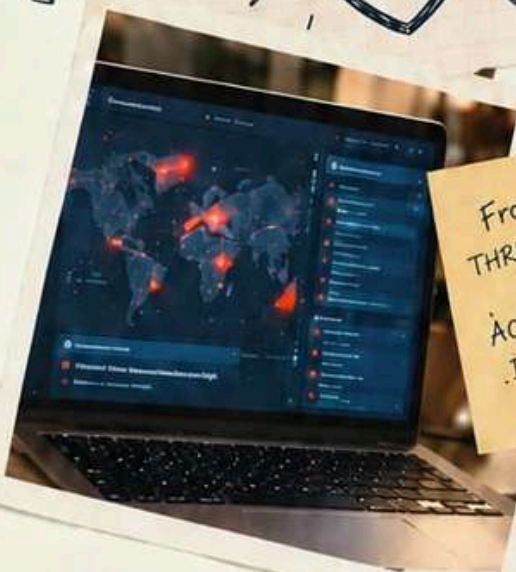


Watchtower was developed by AttackIQ and publicly announced on August 5, 2025. It is stated purpose is to provide "hyperlocal" threat intelligence, visibility into adversaries actively targeting specific customers' own environment, rather than generic, industry-wide data. AttackIQ describes it as a "fully automated AI CTI Analyzer" that uses AI to continuously monitor and adversary behavior relevant to each customer and automatically generate corresponding emulation scenarios for testing existing defenses. Watchtower works with AttackIQ Virtual Advisor (AVA), an AI-powered assistant, once relevant attacker behavior is observed, recommends the most applicable emulation scenarios to validate an organization's controls. AttackIQ positions this as different from reading a traditional feed because the output is meant to be immediately actionable: rather than a report on analysts must interpret, Watchtower is designed to translate identified adversary behavior directly into specific, runnable tests.

REAL THREATS.
REAL ENVIRONMENTS.
ACTIONABLE INTELLIGENCE.



AI
+
THREAT DATA
=
SMARTER
DEFENSES



From
THREAT DATA
+
ACTIONABLE
DEFENSES.

AttackIQ Watchtower



Detect
Analyze adversary activity



Understand
Map to your environment



Recommend
Generate emulation scenarios



Validate
Test your defenses

Smarter intelligence.
Stronger defenses.



When AI Stopped Talking and Started Doing

A look at the rise of Agentic AI (March 2026)

Ismaeel Mo Manzar Shaikh | TE-IT

Not very long ago, if you asked an AI chatbot to book a train ticket, it would happily give you a neat list of steps: open the IRCTC app, log in, pick your train, pay. Helpful, sure. But you still had to do all of it yourself. Over the past year, that started to change. AI tools began doing the work instead of only describing it, and the tech world settled on a name for this shift: agentic AI.

So what is an AI agent, really?

A normal chatbot works in a simple loop. You ask, it answers, and it waits. An agent is given a goal instead of a question. It breaks that goal into smaller steps, uses tools to carry them out (a web browser, a code terminal, a calendar, a payment app), checks whether each step actually worked, and changes its plan when something goes wrong. It keeps going until the job is done or until it genuinely needs a human to decide something.

Three things make this possible. The first is a language model that can reason well enough to plan multi-step work. The second is access to real tools through APIs. The third is some kind of memory, so the agent knows what it has already done. None of these ideas is new on its own. What changed this past year is that all three finally became reliable enough for ordinary people to use.

The year it got real

The first big moment came on 17 July 2025, when OpenAI launched ChatGPT agent. It combined two earlier tools, one that could click around websites and one that could do deep research, and gave them their own virtual computer to work on. You could ask it to compare laptops within a budget and put the results in a spreadsheet, and it would go off and actually do it.

Coding agents grew up even faster. On 29 September 2025, Anthropic released Claude Sonnet 4.5 and reported that it had worked on its own for more than 30 hours while building a piece of software, compared with about seven hours for Claude Opus 4 just a few months earlier. For those of us studying IT, that number is hard to ignore. Something that can stay focused longer than most of us manage during exam week is clearly more than a fancy autocomplete.

There was progress on the boring but important plumbing as well. An agent is only as useful as the tools it can reach, and every company used to connect them differently. The Model Context Protocol (MCP), an open standard Anthropic released in late 2024, became the common plug, a bit like USB-C for chargers. By December 2025 there were more than 10,000 public MCP servers, and it was supported in ChatGPT, Gemini, Microsoft Copilot and VS Code. On 9 December 2025, Anthropic handed MCP over to a new Agentic AI Foundation under the Linux Foundation, co-founded with OpenAI and Block. When rival companies agree to share a standard, you know it is not a passing trend.



Then, in January 2026, an open-source project called OpenClaw went viral. It runs on your own machine, talks to you through apps like WhatsApp and Telegram, and can manage your files and messages. Within weeks it had collected well over a hundred thousand stars on GitHub.

India is not sitting on the sidelines

The development I found most exciting was closer to home. In October 2025, at the Global Fintech Fest in Mumbai, NPCI, Razorpay and OpenAI announced a pilot for “agentic payments” on UPI. Using features called UPI Circle and UPI Reserve Pay, a user can allow an AI agent to make purchases within a spending limit they set in advance, and BigBasket was one of the first merchants on board. Picture asking an assistant for a recipe, and having it order the ingredients and pay for them in the same chat. Since UPI already works at a scale few countries can match, India could become one of the first places where agents handle everyday payments for millions of people.

The flip side

Giving software the power to act also gives it the power to act wrongly. The biggest technical headache is prompt injection. Agents read web pages, emails and documents, and an attacker can hide instructions inside that content. When OpenAI released its Atlas browser in October 2025, researchers quickly showed that a few hidden words in a Google Doc could change what its agent did. By December, OpenAI admitted that prompt injection is “unlikely to ever be fully ‘solved’.”

Misuse is not just theory either. In November 2025, Anthropic reported that a Chinese state-sponsored group had tricked its coding agent into attacking around 30 organisations by pretending to be a security firm running tests. The AI handled an estimated 80 to 90 percent of the tactical work by itself. OpenClaw had its own scare when malicious add-ons turned up in its community skill store. The more freedom we give an agent, the more carefully its limits need to be designed.

What this means for us

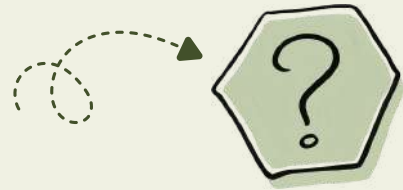
In August 2025, Gartner predicted that 40 percent of enterprise applications would include task-specific AI agents by the end of 2026, up from less than 5 percent in 2025. Whether or not that exact figure comes true, the direction is obvious. As future engineers, our job is slowly moving from writing every line ourselves to designing systems where people and agents work together safely. That means understanding APIs and protocols like MCP, thinking about permissions and security from day one, and knowing which actions should still wait for a human to say yes.

A year ago, AI answered our questions. Now it can finish our tasks. The question that is left is ours to answer: how much should we let it do?



Your Phone Doesn't Need a Mic to Hear You

Shruti Thakur | TE-IT



You mention something once in a conversation: "I wanna learn guitar." Minutes later, Instagram shows you a reel about beginner guitar lessons. Your first thought instantly is:

"Wait. Is my phone listening to me?"

The microphone gets the blame. We check permissions, eye the green indicator, and move on. But what if a phone could learn about its surroundings without using its microphone at all? It sounds like a spy thriller, yet the idea has appeared in real security research. And the story begins with a wooden eagle on a wall in Moscow.

The Bug That Didn't Need a Battery

On August 4, 1945, Soviet schoolchildren presented U.S. Ambassador Averell Harriman with a carved wooden replica of the Great Seal of the United States. Hidden inside was a listening device nicknamed "The Thing." It had no battery. A radio signal sent from outside activated it, and when someone spoke, a tiny diaphragm inside vibrated and changed how the signal was reflected, letting the conversation be detected remotely. It stayed undiscovered until 1952.

The lesson: nobody guards against an object they don't think of as a listening device. That idea feels surprisingly modern. Your smartphone is packed with sensors never designed to be microphones: accelerometers measure acceleration and gyroscopes measure rotation. But physics does not care what a sensor was intended to measure.

Is my phone listening to me?



The Side Door

Sound is vibration, and it can make nearby objects shake, however slightly. So researchers asked: could a phone's motion sensors accidentally pick up information carried by sound, or by touching the phone? Sometimes, yes.

Think of the microphone permission as the front door: you know it is there, and operating systems guard it. Motion sensors are a different doorway. They are not perfect audio recorders, but their readings can carry information never meant to be available. That makes this a side-channel problem: the attacker is not breaking through the main door, but looking for information leaking through the walls.

When Researchers Made the Phone "Listen"

In 2011, Liang Cai and Hao Chen presented TouchLogger, showing that vibrations from tapping a touchscreen could reveal keystrokes. It correctly inferred over 70% of keys on a number-only keyboard in their setup.

In 2014, Stanford researchers Yan Michalevsky and Dan Boneh, with Gabi Nakibly, asked whether motion sensors could detect speech too. Their study, Gyrophone, found that gyroscopes capture acoustic information, though only below 200 Hz, and that it could help identify speakers and parse certain speech information.

The phone was not secretly recording a clear conversation. The sensor simply held enough information to reveal certain characteristics of speech. That is scientifically more interesting: information can leak through a sensor never designed to collect it.

So, Should We Panic?

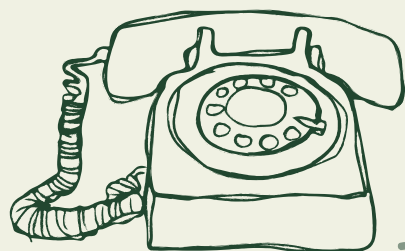
Probably not. Android 12 and later limit accelerometer and gyroscope refresh rates to 200 Hz unless an app requests the `HIGH_SAMPLING_RATE_SENSORS` permission. Apple also treats motion data as protected. The real lesson is more subtle:

A permission system can protect the obvious sensor while information continues to leak through another one.

The Sensor Problem Is Only Getting Bigger

Smartwatches, earbuds, fitness trackers and smart speakers all add more sensors, and AI makes weak, noisy signals more useful than they once were. Privacy is not only about what a sensor was designed to measure, but about what can be inferred from its data.

The Great Seal taught this nearly eighty years ago: a device did not need its own battery to listen. So the better question is not "Does my phone have permission to use the microphone?" but: "What else can my phone's sensors tell someone about me?"



AI Agents and the Future of Cybersecurity: Securing the Next Generation of Intelligent Systems



Prof. Randeep Kaur Kahlon

Artificial Intelligence (AI) has become one of the most transformative technologies in the field of Information Technology. During the period from July 2025 to June 2026, AI continued to evolve beyond conventional chatbots and generative AI systems towards more capable and autonomous systems known as AI agents. Unlike traditional software applications that operate mainly according to predefined instructions, AI agents can understand objectives, plan multiple steps, use external tools, access authorized data, interact with applications and perform tasks with limited human intervention. This development is creating new opportunities in software engineering, cybersecurity, education, healthcare, business and cloud computing. At the same time, the increasing ability of AI systems to take actions has introduced new cybersecurity and privacy challenges, making secure AI development an important area of research and practice.

An AI agent can be considered an intelligent software system that combines a large language model with memory, tools, data sources and decision-making capabilities. When a user provides a task, the agent can understand the objective, divide it into smaller activities, select suitable tools and execute the required operations. For example, instead of simply answering a cybersecurity question, an authorized security agent could examine security logs, identify suspicious patterns, retrieve relevant information and prepare an incident report. Similarly, a software-development agent could analyze a programming requirement, generate code, perform testing and suggest corrections. This ability to move from simply generating information to performing a sequence of actions represents an important step in the evolution of AI.

The growth of AI agents also changes the way cybersecurity needs to be approached. In a conventional chatbot, an incorrect response may primarily result in misinformation. However, an AI agent connected to email systems, databases, cloud services or enterprise applications may have the ability to perform actual operations.



. If such an agent is incorrectly configured or manipulated by an attacker, the consequences could be more significant. For this reason, security must not be limited to the AI model itself. It must also include the data, APIs, tools, user identities, permissions and infrastructure used by the agent. In February 2026, the National Institute of Standards and Technology (NIST) announced its AI Agent Standards Initiative, highlighting the importance of secure, interoperable and trustworthy AI agents, including areas such as security, identity and authorization.

One of the major security challenges associated with generative AI and AI agents is prompt injection. Prompt injection occurs when specially crafted instructions cause an AI system to ignore or modify its intended behavior. For example, an AI assistant processing an external document could encounter hidden instructions designed to make it reveal information or perform an unauthorized action. The OWASP Top 10 for Large Language Model Applications, updated in 2025, identifies prompt injection as a major risk for applications based on large language models. This highlights the need for developers to treat information received from users, documents and external sources carefully rather than assuming that all instructions are trustworthy.

Another important concern is excessive agency. An AI agent should have only the permissions necessary to complete its assigned task. Providing an agent with unrestricted access to databases, files, financial systems or administrative functions can increase the impact of an error or security attack. The principle of least privilege is therefore highly relevant to agentic AI. For example, an educational AI assistant may need permission to read course material but should not automatically have permission to modify examination records. Similarly, a customer-support agent may need access to customer information but should require additional authorization before making sensitive account changes. Human approval can also be introduced for high-risk actions.

AI applications increasingly use Retrieval-Augmented Generation (RAG) to obtain information from organizational documents and databases. In a RAG-based system, relevant information is retrieved from a knowledge base and provided to the AI model before generating a response. This approach can improve the usefulness of AI systems because the model can work with organization-specific information. on and monitoring.



However, it also introduces security concerns related to document access, data leakage, malicious content and vector databases. Proper authentication, authorization and data classification are therefore essential when implementing RAG-based applications.

The security of AI systems is also becoming a continuous process. Traditional software security often involves testing an application before deployment and applying security patches when vulnerabilities are discovered. AI systems require additional attention because attackers can continuously develop new prompts and techniques to influence model behavior. In June 2026, NIST highlighted research supporting a continuous approach to monitoring and updating AI defenses against adaptive attacks. This approach can be represented as a cycle of testing, detecting, improving, monitoring and retesting. Continuous red-teaming and security evaluation can help organizations identify weaknesses before they are exploited in real-world environments.

Another emerging technology relevant to secure AI is confidential computing. Modern organizations increasingly use cloud infrastructure to process sensitive information and run AI workloads. Encryption traditionally protects data while it is stored and while it is transmitted, but confidential computing aims to protect sensitive information while it is being processed through hardware-based trusted execution environments. In 2026, NIST published work addressing hardware-enabled security and confidential computing for cloud workloads, including applications involving AI. This technology can help organizations process sensitive data while reducing the exposure of information during computation.

At the same time, the cybersecurity industry is preparing for the potential impact of quantum computing through Post-Quantum Cryptography (PQC). Powerful quantum computers could eventually threaten some of the cryptographic techniques used by current digital systems. NIST has developed post-quantum cryptographic standards, including ML-KEM for key establishment and ML-DSA for digital signatures. Organizations are beginning to consider migration towards quantum-resistant cryptography as part of long-term cybersecurity planning. Although large-scale quantum attacks are not an everyday threat for most organizations today, preparing cryptographic infrastructure in advance is becoming an important aspect of future security planning.



The combination of AI agents with cybersecurity technologies can provide significant benefits. AI systems can assist security professionals in analyzing large volumes of logs, identifying unusual patterns, summarizing security incidents and supporting vulnerability management. AI can also help automate repetitive security operations and provide faster assistance during incident response. However, automation should not eliminate human responsibility. High-impact actions such as disabling critical systems, modifying security policies or accessing sensitive information should be subject to appropriate authorization and monitoring. AI should therefore be viewed as a tool that supports cybersecurity professionals rather than as a complete replacement for human expertise.

The influence of these technologies is not limited to cybersecurity. AI agents can assist software developers in writing and testing code, help students with personalized learning, support businesses in customer service and data analysis, and assist organizations in automating repetitive workflows. Cloud computing, AI, cybersecurity and data analytics are increasingly becoming interconnected. As a result, IT professionals need to understand not only how to use AI tools but also how to evaluate their security, privacy, reliability and ethical implications.

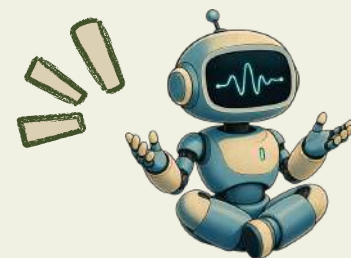
AI is moving from systems that primarily generate content towards systems that can understand objectives, interact with tools and perform multi-step tasks. This transition provides considerable opportunities but also creates new responsibilities for developers, cybersecurity professionals and organizations. Secure identity management, least-privilege access, continuous monitoring, prompt-injection protection, secure APIs, data protection, AI red-teaming, confidential computing and post-quantum cryptography are becoming important components of the evolving technology landscape.

The future of Artificial Intelligence will not depend only on making machines more capable; it will also depend on making them secure, controlled, transparent and trustworthy. AI agents have the potential to transform the way people interact with software and digital services, but their capabilities must be accompanied by strong security mechanisms and responsible human oversight. For students and professionals in Information Technology, understanding this changing landscape provides an opportunity to participate in the development of the next generation of intelligent and secure digital systems. The future of IT will increasingly require professionals who can build systems that are not only intelligent, but also reliable, secure and responsible



Can AI Fight AI? The Future of Cybersecurity

Dr. Sonia Aneesh



Imagine receiving an email from your bank that looks completely genuine. The logo is correct, the language is perfect, and the message asks you to verify your account. You click the link—and within seconds, your credentials are stolen. Now imagine that the email was not written by a human hacker, but generated by Artificial Intelligence (AI). This is the emerging reality of cybersecurity: AI is becoming both a weapon for attackers and a shield for defenders.

Artificial Intelligence has transformed cybersecurity by enabling systems to analyse enormous volumes of data, identify unusual behaviour and respond to threats much faster than humans. Traditional security systems often depend on predefined rules or known attack signatures. However, modern cyberattacks can change rapidly. AI-based security systems can instead learn patterns of normal behaviour and identify deviations that may indicate an attack.



When AI Becomes the Attacker

Cybercriminals are increasingly using AI to automate and improve their attacks. Generative AI can produce convincing phishing emails, fake websites, malicious messages and even realistic audio or video content. AI can also help attackers identify potential targets, automate repetitive tasks and modify attacks to avoid traditional detection mechanisms.

For example, a conventional phishing email may contain obvious spelling mistakes and suspicious links. An AI-generated message, however, can be grammatically perfect and personalised using publicly available information about the victim. This makes distinguishing between genuine and malicious communication increasingly difficult.

When AI Becomes the Defender

The same technology can be used to strengthen cybersecurity. AI-powered systems can continuously monitor network traffic, user activity, system logs and device behaviour. Machine Learning algorithms can detect anomalies that may indicate malware, account compromise, data theft or unusual network activity.

A simplified AI-powered cybersecurity process can be represented as:

Data Collection → Feature Extraction → AI/ML Analysis → Threat Detection → Risk Assessment → Automated Response

AI can also support Intrusion Detection Systems (IDS), malware classification, fraud detection, vulnerability analysis and Security Operations Centres (SOCs). Instead of waiting for a security analyst to examine thousands of alerts, an AI system can prioritise suspicious events and help security teams respond quickly.

The AI vs AI Cybersecurity Arms Race

The future of cybersecurity may therefore become an **AI-versus-AI battle**. Attackers will use AI to create faster, smarter and more adaptive attacks, while defenders will use AI to detect and stop them.

However, AI is not a magic solution. Attackers can deliberately manipulate data used to train AI models, creating adversarial attacks that cause the system to make incorrect decisions. AI models can also generate false alarms or fail when they encounter previously unseen attack patterns. Therefore, human expertise, secure AI design, continuous monitoring and strong cybersecurity practices remain essential.

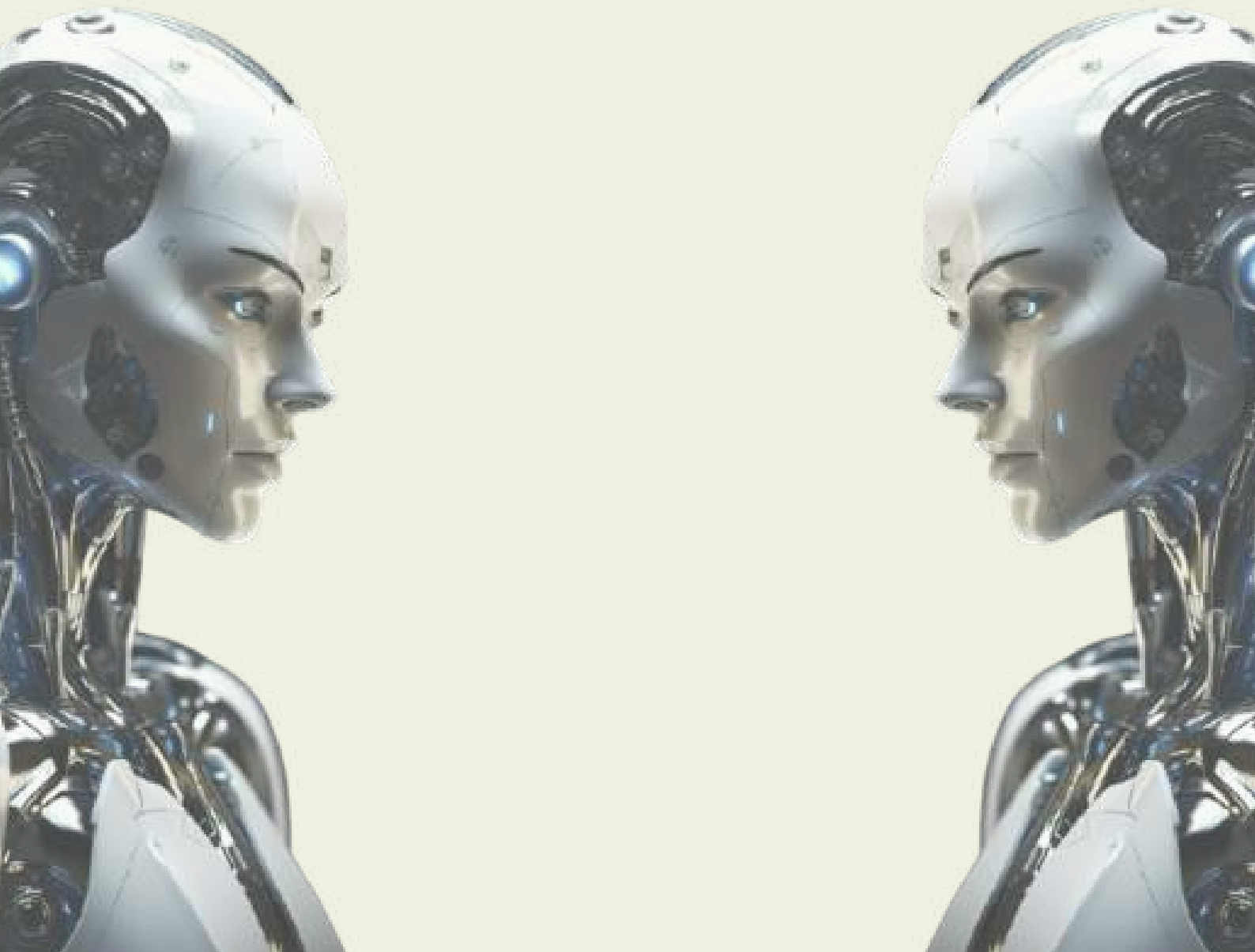
What Does the Future Hold?

The next generation of cybersecurity will increasingly combine AI, Machine Learning, behavioural analytics, zero-trust security, automation and human expertise. Rather than replacing cybersecurity professionals, AI is likely to become an intelligent assistant that helps them analyse threats and make faster decisions.

The central question is no longer simply “Can AI be used for hacking?” It is:

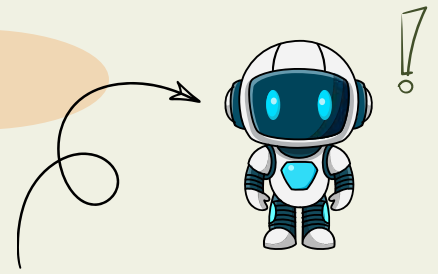
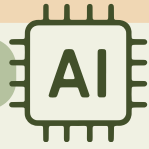
“Who will use AI more effectively—the attacker or the defender?”

The answer will depend not only on the intelligence of the algorithms, but also on how responsibly they are designed, deployed and controlled. In the coming years, cybersecurity may not be a battle between humans and machines—it may be a battle where machines fight machines, guided by humans.



AI in the Future: A 360° Perspective

Dr. Vishal Badgajar



We do not treat artificial intelligence like it will arrive later. It is already around us. We see it in schools, Colleges. We see it at work. We find it on phones. We notice it in hospitals. We spot it in labs. We also see it where people make art. Still, what we are seeing now might be only the start of a larger shift.

The next shift may not be about machines improving on their own. It may be about people doing their tasks with stronger tools close by. In that case, AI may become a normal part of daily life. It could support learning in class and at home. It may aid in making designs. It might help people pass ideas to one another. It could also be used to spot medical issues. It can support writing and building software as well. It may even assist with business plans and choices. Of course, big changes bring real doubts too. When computers can do tasks that once took long human training, education will have to change. When systems can draft code, create images and video, or suggest ideas for science, what counts as creativity. And if an AI tool helps with major decisions, then who should take the blame if it fails.

So, the road ahead is not just about tech. It is about people.

From AI Tools to Intelligent Partners

AI is moving past the old view that software only follows orders. New generative systems can already make written text, images, code, and other kinds of material. Some people say the next step is smarter systems that can grasp what someone is trying to achieve. They would split a tough issue into smaller jobs, then use tools to get work done in bigger flows.

If this keeps going, how people work could shift. Developers may ask AI to draft code and also propose test cases. A researcher could rely on it to scan large sets of papers and pull-out patterns. A designer might generate many concepts and then pick the best one. A business user could have it review data and suggest different plans.

Overall, the shift is from AI doing one narrow job to teams of people working alongside capable machines.

This does not mean people matter less. In many cases, human work would focus on stating the real problem, adding the right background, checking the outputs, choosing what to do next, and owning the final decisions.





Education: From Memorization to Intelligent Learning

Education may be about to change in a big way.

AI is able to act as a tutor that can adapt to the learner. It can explain hard subjects in many different ways. It can also generate practice items and other examples. It can tailor the content to fit what every learner needs.

"AI is able to help educators do certain tasks faster. It can help with checking, support curriculum, and help with grading, for example. It may also give better feedback and find patterns in data from students.

Still, one big worry remains. A machine could give students immediate answers." That's a tough problem. If the answer is, "Right now," then what's the value of a grade?

Ideally, schools, colleges should not lean so hard on simple recall tasks. Assessments could be more about student thinking. Tests can test critical thinking, trying alternatives, dealing with real-life issues, and applying key ideas in new ways.

Next few years engineering education may merge solid basics plus AI skills. Learning might involve more lab-like work, more exploration, more trial and error, and projects that deal with real people and their needs. "The goal is not just to teach students how to use AI. It should also encourage them to question, challenge and judge how they use it.

Jobs and the Future of Work

Asking, "Will AI replace humans?" may be less useful than asking:

"Which jobs will AI change?"

There are many professions with repetitive, data-heavy tasks that can be helped or automated. Simultaneously, new responsibilities are emerging around integration, validation, security, governance and human-AI collaboration.

The future workplace might therefore look less like:

Human OR Machine more like:

Human + AI + Automation + Specialized Tools

Professionals will increasingly need to blend domain expertise, AI literacy, critical thinking, communication, and continuous learning.

AI may alter the nature of expertise itself. Knowing how to create an answer won't be enough. Professionals have to know when to trust an AI-generated result, when to question it, and when not to use it.

Healthcare, Science and Discovery

Healthcare and science are full of useful chances.

AI can be used in medical-image review. It can also support drug discovery. Another area is reading and sorting research papers. It can aid patient monitoring too, and help forecast risk. Some teams use it to tailor care to each person.

Scientists can also use AI to sift through large collections of data. It can highlight trends. It can help them look at possible next ideas.

Strong results are not only about doing well on a test set. When AI is used in choices that affect people, privacy matters. It also helps to understand how the system works. The system should earn trust. It needs checks for unfair bias. And people, not the software alone, should be in charge. The same is true of discovery in science. AI can speed up parts of the search. But researchers need to read what it produces. They decide if the output makes scientific sense or if it should be questioned.

Software, Robotics and the Physical World

AI-assisted coding and automated tests are already changing how software is built. Teams are using tools that help with implementation and checks.

In time, AI may be involved in the whole workflow. That could mean support from early requirements and design all the way to coding, testing, release, and day to day monitoring.

AI is also moving past the screen. It can work “in the real world,” not just in apps.

With sensors, robots, and autonomous systems, it can respond to what is happening around it. This shows up in factories, transport, farming, delivery, healthcare, and other areas.

This shift from digital intelligence to body-based intelligence could reshape automation in a big way.

At the same time, physical systems call for stronger safety steps. If something goes wrong in the physical world, the results can be more serious than a simple bad display or wrong data.

Creativity, Business and Human Potential

AI is shaking up our traditional notions of creativity.

Computers can now write text, draw pictures, make music, write software and video. But the story of creativity isn't just about getting something out of. It includes intention, experience, context, judgment and meaning.

So, AI could be a creative accelerator, helping humans to explore more possibilities, while humans are still responsible for choosing, refining and giving meaning to the final result.

AI will probably be used in marketing, finance, customer service, operations, software development, research and decision making.

Competitive advantage increasingly is likely to be about the combination of AI with proprietary knowledge, quality data, good processes and human expertise, not the AI itself.



The Challenges: Ethics, Energy and Trust

AI progress does not happen for free.

Large learning systems need heavy computing. That setup drives up power use, cooling needs, and the cost of special chips. Data centers also utilise space and money.

It's hard to make the models fast and less wasteful, even if we can build them. It calls for careful engineering and ongoing trade-offs. There are other hard points too. People are concerned about privacy. Results can be unfairly biased. Some outputs may be misinformation. There are also questions from teams about ownership over data and code. We also need to be able to articulate how a model gets to a result in a clear way. And we have to decide who responds when something goes wrong.

If an AI tool makes a crucial decision and it is incorrect, who is to blame?

How do you fix a biased output?

How do you keep that information private if the system needs to work with private information?

These questions demonstrate that AI is not just a technology issue. It is tied to society too. So engineers, teachers, researchers, firms, lawmakers and the public need to work together."

The Human Skills That Will Matter

As machines get better and better at generating information, some human skills may become even more valuable.

Critical thinking will help people to assess the outputs of AI.

New ideas can be generated by creativity.

Communication will continue to be critical to collaboration.

Domain expertise will be key in determining if AI-generated results make sense.

The ethical judgment will help us distinguish between what technology can do and what it should do.

And perhaps most important of all, curiosity and lifelong learning will help people adapt as technology continues to evolve.

The Road Ahead

The future of AI [1] cannot be predicted with certainty, but its influence is clear. AI will increasingly shape how humans learn, work, create, make decisions and interact with technology.

The goal should not simply be to build more powerful AI, but useful, trustworthy, secure, sustainable and human-centered AI.

The future is unlikely to be humans versus machines. It will be humans working with intelligent systems, combining different strengths:



AI provides information and possibilities; humans provide context, judgment and purpose.

AI can automate tasks, but humans remain responsible for deciding what should be automated and why.

The future of AI is therefore not only about artificial intelligence—it is about augmented human intelligence.

The key question is no longer just:

“How intelligent will AI become?”

but:

“How intelligently will humanity use AI?”

The answer will shape the future of technology, education, work, science, business and society.

The future is not artificial - it is human.

Reference: [1] <https://hai.stanford.edu/ai-index/2026-ai-index-report> Accessed on 25/09/2026 at 5.26pm



RAG Is Not Magic

Mahipal Singh Solanki SE-IT



Large Language Models (LLMs) have changed the way we interact with information. From answering questions and summarizing documents to generating code, modern AI systems can perform tasks that once required significant human effort. However, LLMs have an important limitation: they do not automatically know everything that happened after their training, nor do they necessarily have access to an organization's private or specialized information. This is where Retrieval-Augmented Generation (RAG) becomes useful. RAG allows an LLM to retrieve relevant information from an external knowledge source before generating an answer. Instead of relying entirely on what the model learned during training, the system first searches a collection of documents and provides relevant information to the LLM as context. However, there is a common misconception: giving an LLM access to more data does not automatically make it more accurate. A RAG system is only as good as the information it retrieves and the way that information is presented to the model. So now the question is How Does RAG Work?

A typical RAG pipeline can be represented as: Documents → Chunking → Embeddings → Retrieval → Reranking → LLM → Answer

The process begins with documents such as PDFs, websites, manuals, research papers, or company documentation. These documents are divided into smaller sections called chunks. Chunking is important because sending an entire large document to an LLM may introduce unnecessary information, while extremely small chunks can lose important context. The chunks are then converted into numerical representations called embeddings. Embeddings capture the semantic meaning of text, allowing a system to identify pieces of information that are conceptually similar even when they do not contain the exact same words. For example, if a student asks: **"How many classes can I miss?"**. So if we use a semantic search system may retrieve a document containing: **"Students are required to maintain a minimum attendance of 75%."** The question and document use different words, but their meanings are related. These embeddings are commonly stored in a vector database, which allows the system to search for relevant information



T. The retrieved results can then be reranked so that the most useful pieces of information are placed at the top before being passed to the LLM. More Data Does Not Mean Better Answers, This is where RAG becomes an engineering problem rather than simply an AI problem. Suppose a system retrieves ten pieces of information for a question, but only two are actually relevant. The LLM now has to process eight unnecessary pieces of information along with the useful ones. The result can be a less focused or even incorrect answer. This leads to a simple principle: Bad retrieval → Bad context → Bad answer. Even a highly capable LLM cannot reliably produce a correct answer if the relevant information was never retrieved. Reranking can help solve part of this problem. An initial retrieval stage may find several potentially relevant documents, while a reranker evaluates those results more carefully and places the most relevant information first. In simple terms, retrieval is like finding books in a library, while reranking is deciding which books are actually worth putting on your desk. Another misconception is that an LLM will always perform better when given more context. LLMs have finite context windows, and excessive or irrelevant information can make it harder for the model to identify what actually matters. RAG also does not completely eliminate hallucinations. An LLM can still misunderstand retrieved information, combine unrelated pieces of context, or generate information that is not supported by the retrieved documents. Therefore, a reliable RAG system should not only retrieve information but also encourage the model to base its answer on that evidence and acknowledge when sufficient information is unavailable. Building a RAG system is not complete when it produces a convincing answer. It must be evaluated. Evaluation can be divided into two major questions: “1.Did the system retrieve the right information?” This concerns retrieval quality and can involve measures such as Precision and Recall. “2.Did the LLM use that information correctly?” This concerns properties such as answer relevance and faithfulness to the retrieved context. This distinction is important because an answer can sound extremely convincing while still being unsupported by the source material. In other words, “fluency is not the same as correctness”.

Application of RAG:

RAG has applications across a wide range of fields. In education, students can interact with textbooks, lecture notes, university regulations, and course materials through intelligent questionanswering systems. In enterprise environments, organizations can build internal AI assistants that retrieve information from company policies, technical documentation, reports, and knowledge bases.



In customer support, companies can connect AI assistants to product manuals, FAQs, and support documentation to provide more relevant and context-aware responses. Legal research is another potential application, where RAG systems can retrieve relevant laws, regulations, contracts, and case documents to assist with information discovery. Similarly, in academic and scientific research, researchers can search large collections of papers and retrieve relevant passages, helping them navigate extensive literature more efficiently. RAG should not be viewed as a magic technique that suddenly makes an LLM intelligent. It is better understood as an information pipeline that connects an LLM to external knowledge. Better chunking creates better information units, better embeddings improve semantic matching, and better retrieval and reranking provide more relevant context. Careful context management reduces unnecessary information, while evaluation helps determine whether the final system is actually reliable. The real goal of RAG is therefore not to give an AI more information, but to give it the right information at the right time. This is what allows a language model to move beyond simply generating plausible answers and instead produce responses grounded in a specific body of knowledge.



One Typo. ¥40 Billion. Zero Undo Button.

Harshada Savkare | TE-IT



How a single “fat-finger” mistake shook the Tokyo stock market — and what it teaches every engineer.

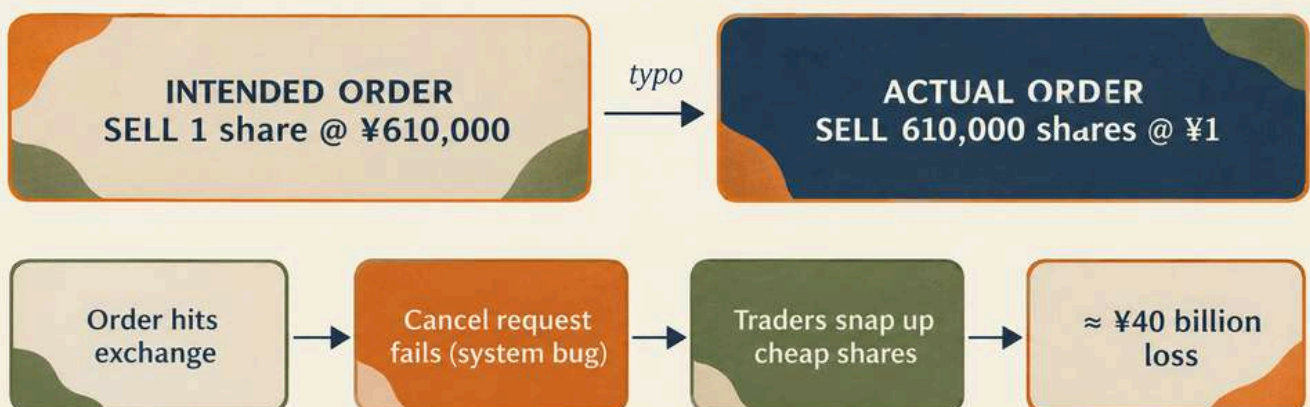
Imagine you want to sell one share of a company for ¥610,000. You type the order, hit Enter, and go for coffee. Now imagine you accidentally typed the numbers in the wrong boxes. Instead of 1 share at ¥610,000, you have just offered 610,000 shares at ¥1. That is exactly what happened on 8 December 2005 — and it is one of the most expensive typing errors in history.



The Day Everything Went Wrong

It was the debut day of J-Com, a Japanese telecom firm, on the Tokyo Stock Exchange (TSE). A trader at Mizuho Securities was asked to sell a single share. Instead, the order that entered the system was for 610,000 shares at just one yen each. The catch? J-Com had only around 14,500 shares in existence — the order was roughly 42 times the entire company. Traders across the market spotted the absurdly cheap stock and started buying instantly.

8 December 2005 — one keystroke slip on the Tokyo Stock Exchange



J-Com had only ~14,500 shares in existence — the order was about 42 times that.

Fig. 1: From a tiny slip to a massive loss — the chain of events.

Why Couldn't They Just Cancel It?

Mizuho noticed the error within minutes and tried to cancel. But a software bug in the exchange's own trading system rejected the cancellation requests. So the mistake stayed live while the market feasted on it. Mizuho ended up losing about ¥40 billion (over US\$300 million). Confidence in the exchange took a hit, the Nikkei index slid, and the TSE's president later stepped down. A court eventually held the exchange partly responsible for the system flaw.

To be clear: this typo did not crash every market on Earth. But it shook one of the world's largest exchanges and showed how a single human slip, combined with a hidden software flaw, can ripple through finance in minutes.

Not an Isolated Incident

Technology has only made markets faster, which means mistakes now travel at machine speed:

- Knight Capital (2012): a faulty software deployment sent a flood of unintended orders and cost the firm about \$440 million in roughly 45 minutes.
- The Flash Crash (2010): the US Dow Jones dropped nearly 1,000 points within minutes before rebounding. It was triggered by a huge automated sell order, not a typo, but it revealed how fragile fast markets can be.

Lessons for Future Engineers

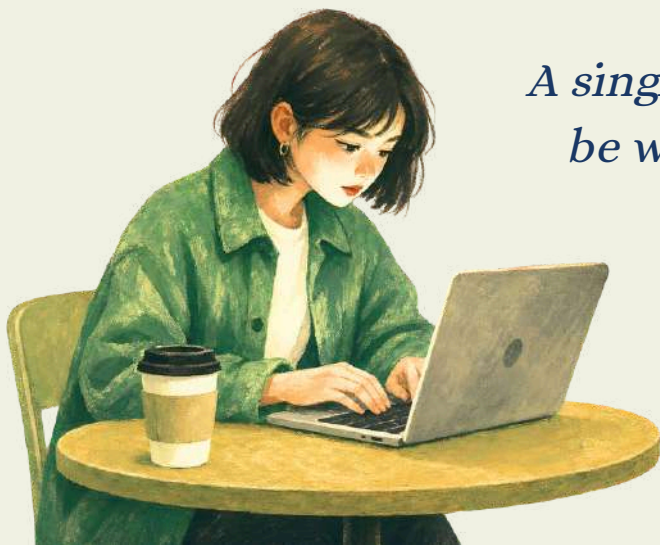
Every system that trusts a human with a keyboard needs a safety net. Modern exchanges and brokers now rely on:

- Input validation: flag orders whose size or price is wildly different from normal.
- Price collars & circuit breakers: automatically block or pause trades that move too far, too fast.
- Kill switches: let firms and exchanges instantly cancel runaway orders.
- Testing & fail-safes: the cancel button must work even on the worst day.

The Takeaway

Great software is not just about making things work when everything goes right; it is about making sure a tiny mistake cannot become a giant disaster. The next time you write a form, an API, or a program, remember the trader who swapped two numbers. In a world run by code, a single keystroke can be worth billions — so design as if someone will make that mistake. Because someone always does.

*A single keystroke can
be worth billions!*



Digital Provenance: Establishing Trust in the Age of AI-Generated Content



Nishi Shah | TE-IT

Tracing where digital content comes from, what happens to it, and why its history matters

A photograph may pass through several rounds of editing, a video may be stitched together from multiple sources, and much of today's images, audio, and text is generated by AI. The question is no longer just whether content looks real, but whether we can trace where it came from and what happened to it along the way.

Introduction

Digital content is rarely just captured and shared unchanged. Generative AI can now produce synthetic images nearly indistinguishable from photographs, while AI-edited media can subtly alter meaning without obvious signs of manipulation. Newsrooms need to know whether a viral image is authentic; courts need to establish whether evidence has been altered; ordinary users need to know whether what they see was captured, edited, or machine-made. Digital provenance addresses this not by declaring content "true" or "false," but by making its origin and history traceable and verifiable.

Understanding Digital Provenance

Provenance refers to the documented history of an object: where it came from, who handled it, and what was done to it. Digital provenance applies this idea to images, video, audio, and documents using structured, machine-readable records that travel with the content a chain of custody for data. Each time a file is created or modified (cropped, colour-corrected, combined, or AI-generated), a new entry can be added to its provenance record, identifying who or what performed the action, which tool was used, and when.

Digital Provenance Lifecycle



Figure 1: A simplified digital provenance lifecycle: creation → editing → credentialing → verification → distribution.

Building Blocks of Provenance

- Metadata / EXIF: camera model, timestamp, GPS, editing software easily stripped or falsified, so not proof on its own.
- Cryptographic hashes: a fixed-length digest that changes if the file changes, useful for detecting alteration.
- Digital signatures: public-key cryptography lets a creator sign a file's hash; the public key verifies later changes.
- Content credentials: tamper-evident signed manifests bundling an asset's origin, edits, and tools used.
- Watermarking: visible/invisible marks that can recover origin information even if metadata is lost.
- C2PA standard: an open, interoperable standard for attaching, signing, and verifying content credentials across tools.

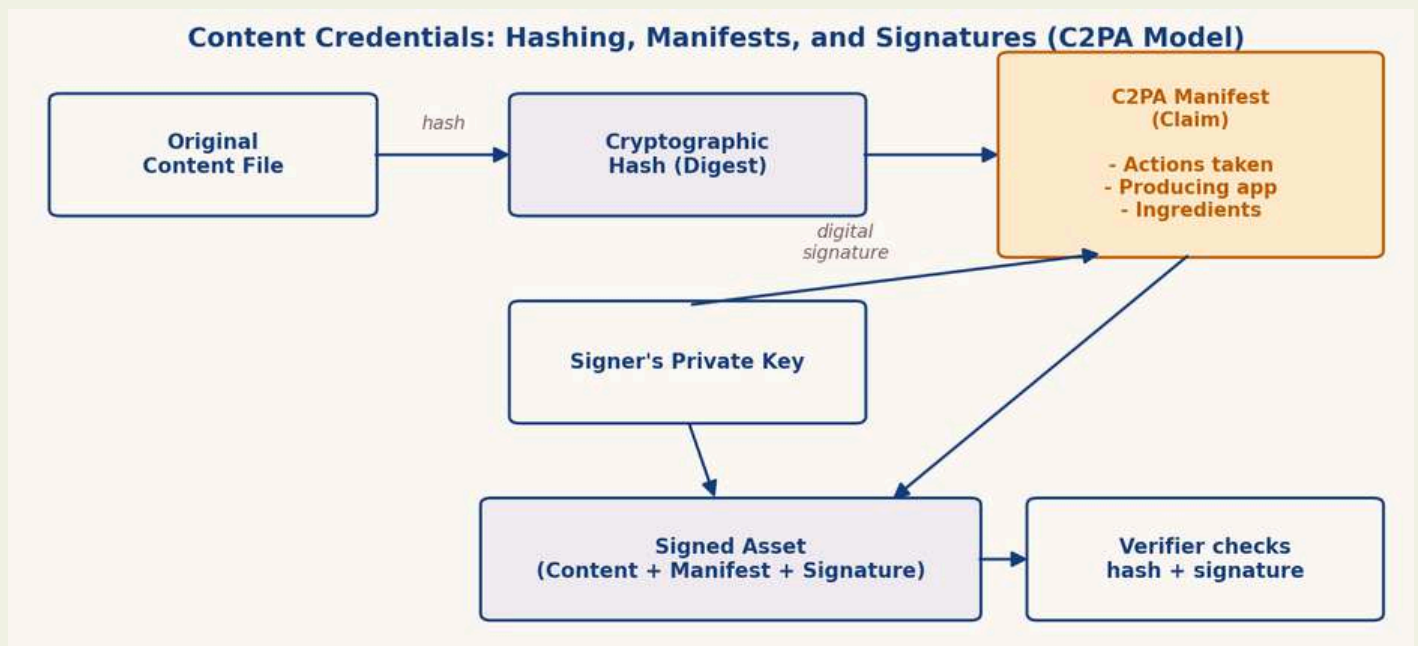


Figure 2. Simplified content-credentials model: an asset bound to a signed manifest describing origin and edit history.

How C2PA Records History

Rather than a single "authentic" stamp, C2PA organizes provenance as structured, cryptographically protected data: (1) the asset and its metadata; (2) assertions describing creation or edits; (3) a claim grouping assertions, protected by a signature; (4) a C2PA Manifest combining these into a verifiable record; and (5) additional manifests recorded as content moves through capture, editing, compression, and publication building a traceable history.

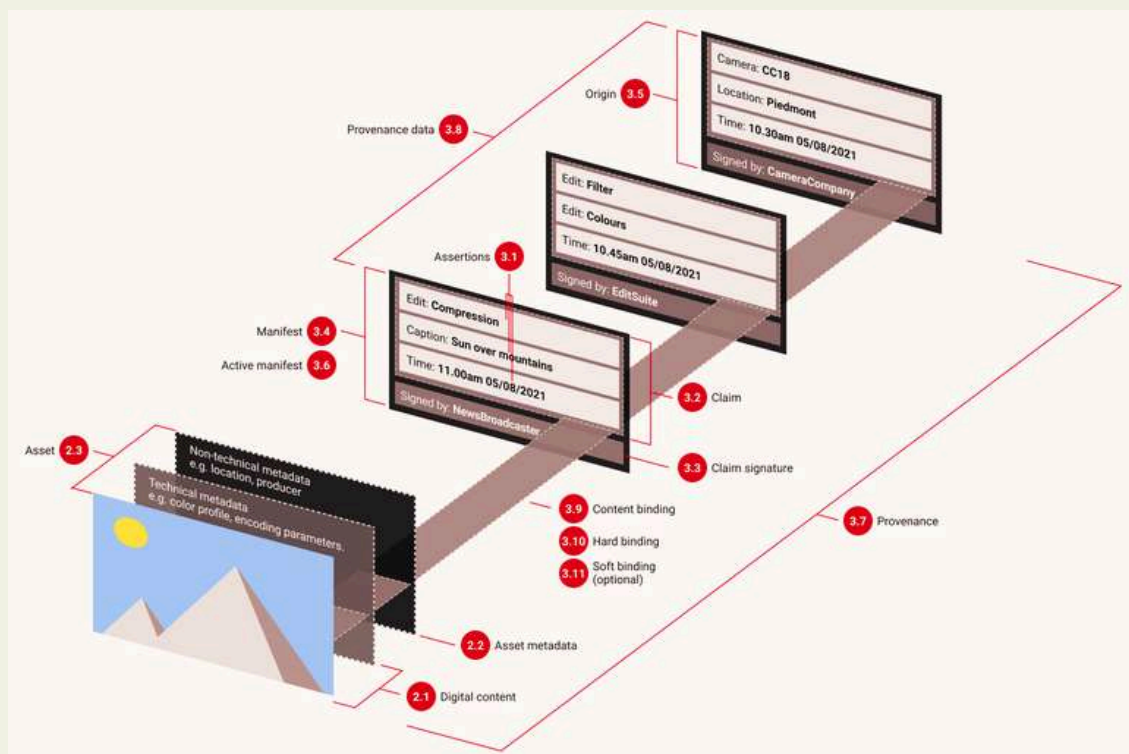


Figure 3. Elements of C2PA provenance architecture (Source: C2PA Technical Specification).

Digital Provenance and Generative AI

Detection tools analyse a finished file to guess whether it is synthetic; provenance instead asks creation and editing tools to disclose, at the moment of action, what they did an AI model can attach a credential stating an asset was generated, and an editing tool can record a retouch rather than a fabrication. Provenance is not a verdict on authenticity but a transparent record of how content came to exist, supporting the judgment of viewers, journalists, and investigators.

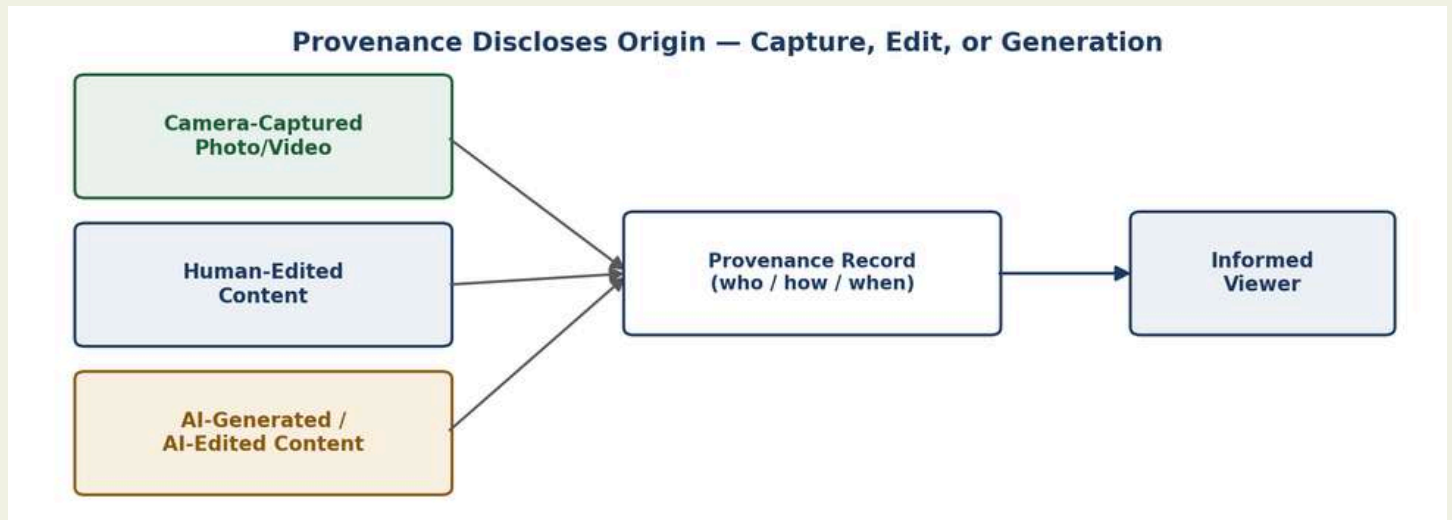


Figure 4. Content can originate from a camera, human editing, or an AI model; provenance discloses which path was taken.

Where It Can Be Used

- Journalism: verify submitted media and disclose AI-assisted illustrations.
- Digital forensics: hashes and signed records show evidence remained unaltered.
- Social media: surface credentials so users know if content was captured, edited, or AI-generated.
- Cybersecurity: identify tampered artifacts and manipulated media in attacks.
- Software supply chains: signed attestations (e.g., SLSA) verify build and deployment artifacts.

Challenges and Limitations

Provenance is not a complete solution. Metadata is often stripped by platforms; re-encoding, screenshotting, or re-uploading can break the chain without malicious intent. Watermarks can be degraded by cropping or compression, and a clean record does not guarantee truthful content a genuine photo can still be staged or misleadingly captioned. Adoption and interoperability remain key hurdles: provenance works best when tools, platforms, and viewers support compatible standards, and partial adoption leaves gaps.

Conclusion

Digital provenance will not settle every question about trust, and it is not designed to. It offers transparency: a verifiable record of where content came from and what happened to it. Rather than chasing every new generation technique with a detector, it asks the ecosystem to disclose itself honestly at creation, shifting the burden from after-the-fact guesswork to upfront accountability. As adoption widens across cameras, editing tools, and AI generators, standards such as C2PA can become as ordinary a part of digital content as metadata itself quietly present, and increasingly relied upon to make dishonesty harder to hide.

The Evolution of SDLC Automation: A Deep Dive into IBM Bob

Kaushik Gurudas Naik TE IT



Between July 2025 and June 2026, the software development ecosystem experienced a significant architectural shift. Industry practices transitioned past the era of AI serving merely as augmented completion tools into a phase defined by agentic software development lifecycle (SDLC) orchestration. Among the pivotal releases in this timeframe is IBM Bob, launched in April 2026. An evaluation of its command-line interface (Bob Shell) demonstrates that IBM Bob is designed not only to generate code, but to systematically manage the entire software engineering pipeline.

A Developer's Perspective

From an engineering standpoint, an automation tool's value depends on its seamless integration into existing developer environments. While the primary Bob IDE is tailored for standard enterprise operating systems, the inclusion of Bob Shell—a standalone command-line interface—provides significant utility for developers utilizing Arch Linux or headless environments. This enables direct piping of terminal outputs, shell scripts, and build execution errors into the language model. For instance, redirecting a stack trace directly into the CLI via standard input allows developers to diagnose build issues rapidly without leaving the terminal environment, effectively bridging the gap between development and DevOps operations.

Core Capabilities

IBM Bob introduces several structural innovations that expand upon standard code completion assistants: Multi-Model Orchestration: Rather than relying on a single monolithic model, IBM Bob dynamically routes requests based on task complexity. Routine code completion tasks are dispatched to lightweight, open-source models, whereas complex architectural reasoning is directed to larger models such as Granite or Claude. Persona-Based Operational Modes: The system operates under specialized execution contexts. "Plan Mode" analyzes and scopes complex feature requirements prior to implementation, while "Agent Mode" autonomously applies and persists changes across the workspace filesystem. Parallel Execution via Subagents: To execute extensive tasks efficiently, Bob can spawn dedicated subagents. This allows concurrent workflows—such as generating unit tests in parallel with core logic refactoring—thereby reducing overall execution latency. Model Context Protocol (MCP) Integration: Full support for MCP allows development teams to connect proprietary enterprise tools, internal databases, and external APIs directly into the agent's contextual window.



Enterprise Applications

The operational value of IBM Bob manifests across several crucial phases of the software development lifecycle:

- **Legacy System Modernization:** The platform ingests monolithic enterprise codebases—such as legacy Java or COBOL architectures—and refactors them into contemporary software stacks while preserving critical business logic.
- **Automated CI/CD Workflows:** Executing non-interactively via Bob Shell, the system integrates into continuous integration pipelines to autonomously submit pull requests that resolve failing build jobs.
- **System Documentation:** By analyzing project structure and directory trees, Bob automatically compiles comprehensive architectural summaries, visual Mermaid UML diagrams, and technical onboarding documentation.

The Challenge of Non-Deterministic Output

Deploying autonomous software agents within automated build infrastructure requires engineering teams to re-evaluate conventional error mitigation strategies. Traditional CLI utilities produce predictable output streams, allowing scripts to evaluate failure states through simple pattern matching. Conversely, generative AI development agents append conversational commentary alongside code modifications. For example, requesting Bob to construct rate-limiting functionality might yield explanatory prose containing the string "returns a 429 Rate Limit response." If downstream CI/CD tooling scans stdout strings to detect operational failure, this standard dialogue triggers false positives and halts deployment pipelines. Consequently, robust pipeline automation demands strict reliance on standard system return codes rather than output text parsing.

Conclusion

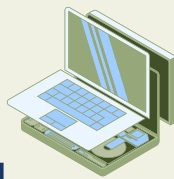
The advancements made between late 2025 and mid-2026 demonstrate that AI-driven orchestration is prepared for enterprise-scale adoption. By pairing security controls with flexible command-line integration, IBM Bob illustrates the trajectory of automated, agentic software engineering..



THE AI THAT FITS IN YOUR LAPTOP

What actually happens inside your laptop once a language model starts running?

ALOK KUMAR NIRANJAN SAHOO TE B



FROM CLOUD INTELLIGENCE TO PERSONAL AI

Ask most people how AI works and they'll shrug. You type a question into a website, wait a few seconds, and an answer shows up. Somewhere out there, a data centre full of GPUs does the actual thinking, but nobody sees it happen. The machine doing the work stays completely hidden behind the screen.

That's starting to change. Models like Gemma, Qwen and Llama are now released as open weights, meaning anyone can download them and run them on their own machine. Tools like Ollama and LM Studio have made this surprisingly approachable for someone with no background in machine learning. LM Studio can even run a downloaded model fully offline, and it can expose that model through a local API, so an app never has to send a single prompt to the cloud. [1][2]

This raises a far more interesting question than which model happens to be the best one. What is actually going on inside a laptop the moment it starts generating text? The answer touches weights, tokens, memory, GPUs, context windows and quantization, and the jump from Gemma 3 and Qwen3 to the newly launched Gemma 4 shows just how much capability can now be packed onto hardware people already own. [3][4][5]



Fig. 1. Gemma 4 brings capable AI closer to personal and edge devices..

What's Actually Inside a Model?

Download an 8-billion-parameter model and it's tempting to assume your laptop now holds a database of eight billion facts. That isn't how it works. A model is really a huge set of numbers, called parameters or weights, adjusted again and again during training as the system picks up patterns from data. The file you download stores those numbers. It is not a library of pre-written answers sitting in storage.

Parameter count is also a weak way to judge how capable a model is. A 30-billion-parameter model isn't automatically twice as good as a 15-billion one. Training data, architecture and inference efficiency all matter just as much. Qwen3 makes this obvious: its 30B-A3B model carries about 30 billion parameters in total, yet only activates around 3 billion of them for any single token, thanks to expert routing. [4]

What's Actually Inside a Model?

Download an 8-billion-parameter model and it's tempting to assume your laptop now holds a database of eight billion facts. That isn't how it works. A model is really a huge set of numbers, called parameters or weights, adjusted again and again during training as the system picks up patterns from data. The file you download stores those numbers. It is not a library of pre-written answers sitting in storage.

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RAM, VRAM and the Hidden Load

A model needs memory to store its weights, but that's only part of what it actually uses. Running inference also eats memory for calculations in progress, for the active context, and for the runtime itself. RAM is the laptop's general memory. VRAM sits on the GPU, and GPUs matter for AI because they can run huge numbers of similar calculations at the same time.

When a model is too big to fit in VRAM on its own, part of it can spill over into system memory instead. This is called GPU offloading, and it lets larger models run on machines that couldn't otherwise handle them. The catch is that shuttling data back and forth between CPU and GPU memory takes time. Two laptops with identical RAM can end up performing very differently for exactly this reason. [2]

Eight gigabytes of VRAM doesn't tell the whole story. How fast that memory moves matters just as much as how much of it you have.

The Number People Forget: Memory Bandwidth

A laptop can have plenty of memory and still struggle with local AI, because capacity and speed are two separate things. Picture a warehouse big enough to hold everything you need, but with only one narrow door for getting anything in or out. Plenty of room, painfully slow to use. Running a model has the same problem: huge amounts of numerical data get read, processed and moved every single second.

That's why "8GB of VRAM" on a spec sheet tells you almost nothing by itself. GPU architecture, compute capability, memory bandwidth and even thermal limits all shape the final result. A laptop running AI locally isn't just a box holding a certain amount of memory. It's a whole pipeline, and performance depends on how efficiently data moves between storage, memory and the chip doing the work.

Why a Long Chat Makes AI Heavier

Context is whatever the model can currently see: the prompt, the earlier messages, any documents or code pasted in. Gemma 3 can handle up to 128K tokens of context on its 4B, 12B and 27B models. Gemma 4 pushes this further, offering 128K on its edge models and up to 256K on the larger ones. [3][5]

None of that comes free, though. To keep track of everything said so far, the system stores something called a KV cache, and as the context grows, so does that cache. This is why a model can feel instant during a short chat and noticeably slower once handed a long document or a conversation that's gone on for a while.

Benchmark	Gemma 4 31B IT Thinking	Gemma 4 26B A4B IT Thinking	Gemma 4 E4B IT Thinking	Gemma 4 E2B IT Thinking	Gemma 3 27B IT
Arena AI (text) As of 4/12/26	1452	1441	-	-	1365
MMMLU Multilingual QA No tools	85.2%	82.6%	69.4%	60.0%	67.6%
MMMLU Pro Multimodal reasoning	76.9%	73.8%	52.6%	44.2%	49.7%
AIME 2026 Mathematics No tools	89.2%	88.3%	42.5%	37.5%	20.8%
LiveCodeBench v6 Competitive coding problems	80.0%	77.1%	52.0%	44.0%	29.1%
GPQA Diamond Scientific knowledge No tools	84.3%	82.3%	58.6%	43.4%	42.4%
t2-bench Agentic tool use Retrieval	86.4%	85.5%	57.5%	29.4%	6.6%

Fig. 2. Official Gemma 4 benchmark results across reasoning, multimodal and coding tasks.

Suddenly Seeing, Hearing and Reasoning

Text in, text out used to be the whole story with language models. The real world isn't just text, though. It has images, audio and video in it. Gemma 3 added image understanding, and Gemma 4 goes further still, handling images and video across its entire lineup, with audio support on the E2B and E4B models. [3][5] That opens up some genuinely useful cases. A student can photograph handwritten notes instead of typing them out. A developer can share a screenshot of an error instead of describing it in words. A researcher can hand over a chart rather than explain it line by line. Reasoning adds another layer here: Qwen3 introduced separate thinking and non-thinking modes, letting people spend extra time and computation on harder problems only when it's actually needed. [4]

The Secret Behind Smaller Models: Quantization

Quantization is the other big reason AI now fits on ordinary hardware. Model weights are just numbers, and lowering the precision used to store them can shrink memory requirements a lot. That's why local models are usually offered in versions labelled FP16, Q8, Q6, Q5 or Q4.

Higher precision keeps more of the original detail but takes up more space. Lower precision makes a model smaller and faster to run, though it can chip away at output quality. Quantization isn't just a shortcut to save space; it's a deliberate trade-off between what hardware can hold and how much capability gets kept.

From Gemma 3 and Qwen3 to Gemma 4

Gemma 3 came out in March 2025 as a lightweight family, with 1B, 4B, 12B and 27B sizes, image understanding, and a 128K context window on the larger models. Qwen3 followed a month later, in April 2025, adding both dense and Mixture-of-Experts variants along with optional deep reasoning. [3][4]

Then on 2 April 2026, Google released Gemma 4, with E2B, E4B, a 26B Mixture-of-Experts model and a 31B dense model. Google describes the family as built for everything from small edge devices to larger developer setups, with reasoning, coding, multimodal input, long context and agentic workflows included. The 26B model only activates around 3.8 billion parameters per token, a good reminder that total size and actual computation per token are not the same thing. [5]

Why Run AI Locally at All?

If the cloud has almost unlimited compute, why bother running anything locally? The first reason is control. Once downloaded, LM Studio can run entirely offline for chats and document processing, so nothing has to leave the machine. That matters for privacy-sensitive work, for offline use, and simply for experimenting without worrying about limits. [1]

The second reason is flexibility. A developer can pick a model, choose a quantization level, adjust the context window, expose it through a local API, and build around it however they want. That said, local AI isn't automatically better than the cloud version. Laptops have limited memory, compute and battery life, and a smaller local model usually won't match a much larger cloud model on hard tasks. It's a trade-off, not a straightforward upgrade.

The Laptop Is Becoming an AI Computer

The most interesting part of all this probably isn't any single model release. It's how thin the line between "an AI service" and "your own computer" is getting. Behind a simple chat box now sits a full pipeline: the model file, memory, the CPU or GPU, tokenization, transformer computation, attention, the KV cache, and finally a predicted next token, repeated quietly dozens of times for every reply.

AI hasn't just gotten smaller. It has become practical enough to run on hardware most people already own. Data centres aren't going anywhere soon, but next to them there's now another option: AI that lives on your laptop, works directly with the files already sitting on it, and starts to feel like part of the computer rather than something reached through it.

DevOps in Today's Era: Engineering Software for Continuous Change

Suyash Yuvraj Mane TE C



• Automation • Cloud • Security • Observability • AI

Introduction

Modern software is expected to change continuously while remaining reliable. DevOps connects development and operations through shared responsibility, automation and rapid feedback. It is an engineering approach that makes software delivery repeatable, measurable and easier to improve.

Why DevOps Matters Today

Cloud applications and digital services operate at a scale where manual handoffs can introduce delay and inconsistency. DevOps reduces these gaps by automating repetitive tasks, testing changes early and feeding production information back into engineering. This shortens the distance between an idea, a validated change and useful operational feedback.

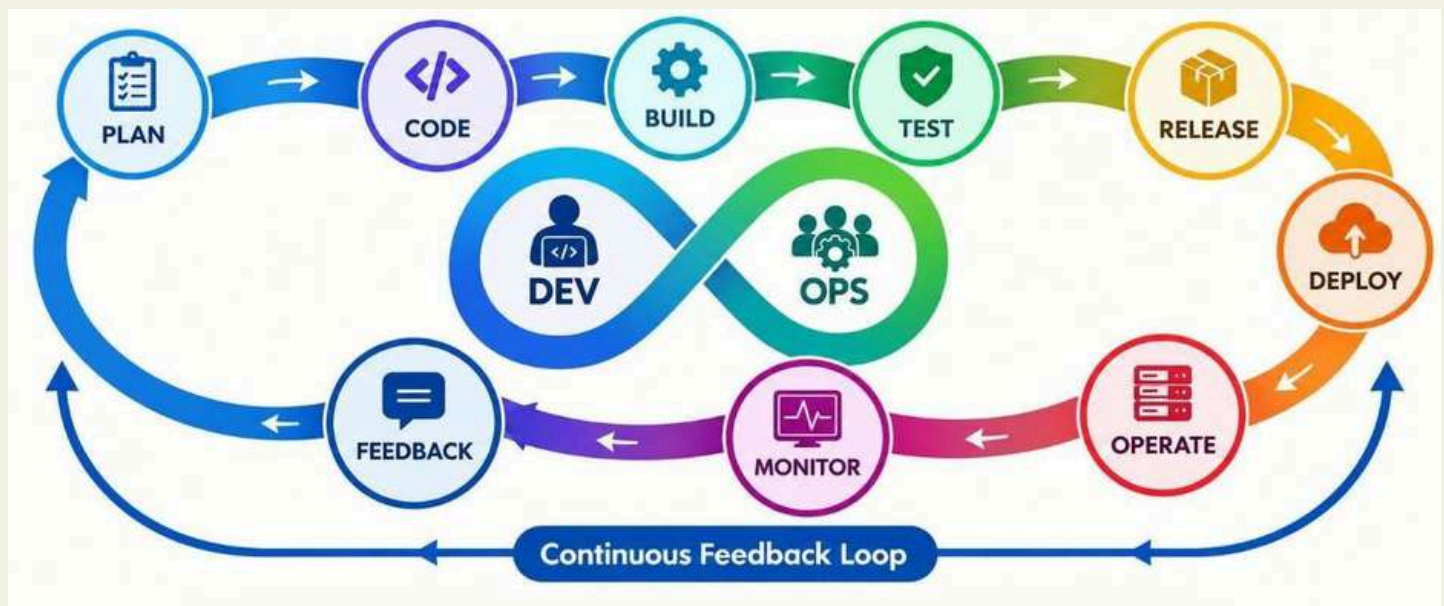


Figure 1. The DevOps lifecycle connects development, delivery and operations through continuous feedback.

Core Practices

Continuous Integration and Delivery: CI automatically builds and tests frequent code changes. CD moves validated changes through controlled release stages. Infrastructure as Code: infrastructure is described through version-controlled configuration so environments can be reproduced. Containers: applications are packaged with dependencies for consistent execution.

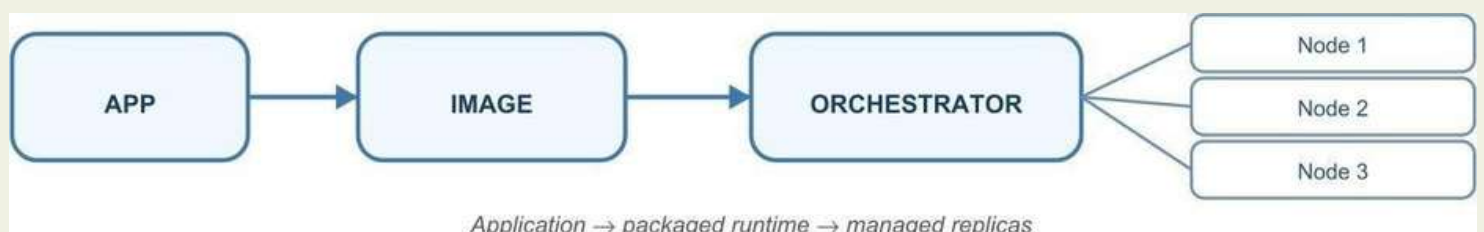


Figure 2 Container packaging followed by orchestration across multiple nodes.

Cloud-Native Engineering

Cloud platforms provide elastic compute, storage, networking and managed services. Container orchestration distributes workloads and maintains desired capacity. Together with automation, these technologies allow systems to respond to changing demand without relying entirely on manual operations.

Infrastructure as Code in Practice

Infrastructure as Code (IaC) represents infrastructure settings as versioned files. Engineers can review changes, validate them before deployment and reproduce environments with less configuration drift. A typical workflow is: edit configuration → validate and plan → review → apply → verify. This makes infrastructure changes auditable and repeatable.

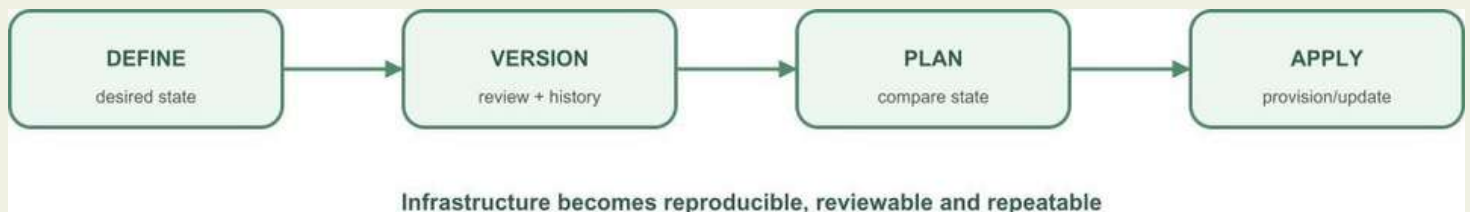


Figure 3. Infrastructure-as-Code workflow

Observability and DevSecOps

Observability combines logs, metrics and traces to help engineers understand system behaviour. Monitoring can identify abnormal conditions, while deeper telemetry helps explain their causes. DevSecOps applies the same automation principle to security: code analysis, dependency checks, secrets detection and deployment controls can run as part of the delivery workflow.



Figure 4. Observability and DevSecOps feedback path

Platform Engineering and AI

Platform engineering provides reusable internal services, templates and workflows so development teams do not repeatedly solve the same infrastructure problems. AI-assisted tools can support code generation, testing, documentation and troubleshooting. Generated output still requires human review, validation and security controls.

Measuring DevOps Performance

Useful delivery indicators include change lead time, deployment frequency, change failure rate and time required to recover from failed deployments. These measures help teams identify bottlenecks and check whether process changes improve delivery.

Conclusion

DevOps has evolved into a broad engineering approach for delivering and operating reliable digital products. Automation, cloud infrastructure, containers, IaC, observability, DevSecOps, platform engineering and AI-assisted development are reshaping modern workflows. The central principle remains continuous improvement: release changes safely, observe their effects and use feedback to improve the next change.

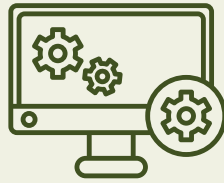
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How Data Science Turns Data into Intelligence

From raw records to patterns, predictions, and decisions

Ismail Riyaz Shaikh TE C



ABSTRACT

Data Science combines statistics, computing, and domain knowledge to turn raw data into useful intelligence. The process starts with collecting and cleaning data, continues through exploration and machine learning, and ends with insights that support real decisions. Its impact now spans healthcare, finance, retail, agriculture, education, transport, and cybersecurity.

1. From Data to Intelligence

Raw data is valuable only after it is organized and interpreted. A useful way to view the transformation is the DIKW chain: data becomes information when context is added, knowledge when patterns and relationships are understood, and intelligence when that knowledge guides an actionable decision. This is the core promise of Data Science: converting scale and complexity into clarity.

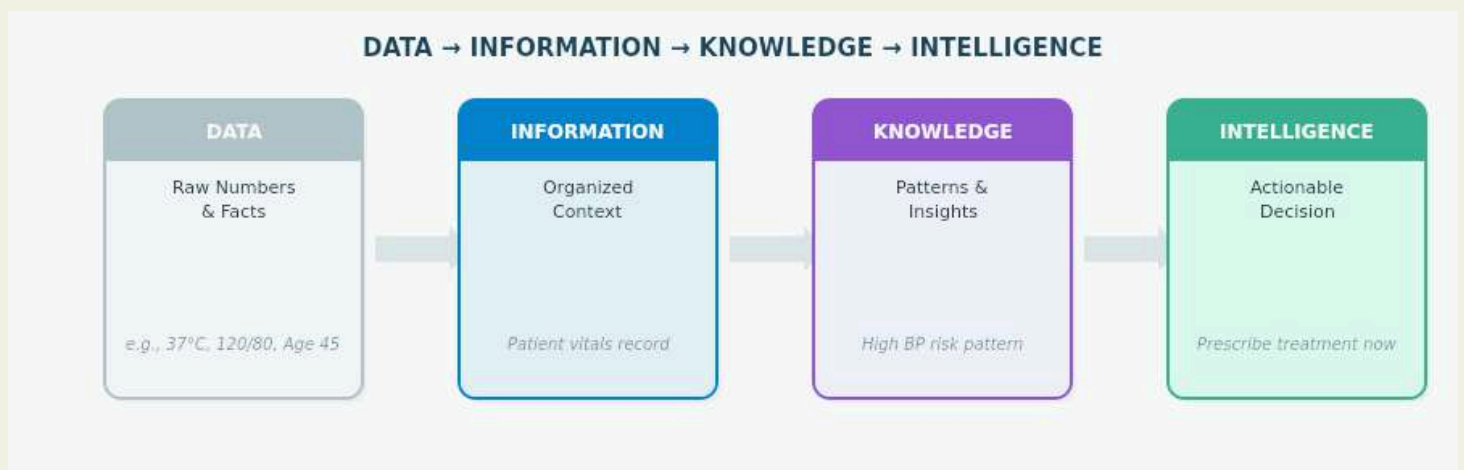


Figure 1. Data → Information → Knowledge → Intelligence

2. The Data Science Pipeline

A practical Data Science workflow follows five connected stages. Each stage reduces uncertainty and increases the value of the data until the result can be used in the real world.

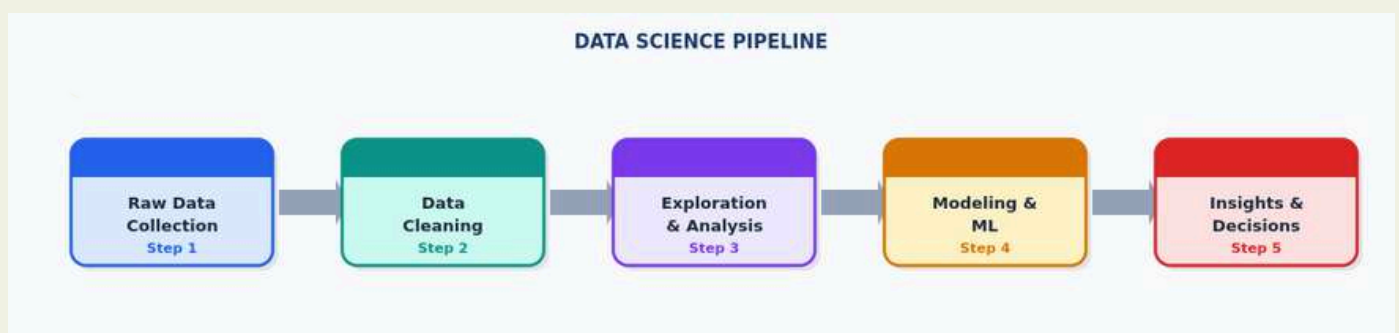


Figure 2. The 5-stage Data Science pipeline

STAGES AT A GLANCE 1Collect → 2 Clean → 3 Explore → 4 Model → 5 Decide

Collection gathers diverse sources; cleaning fixes quality problems; EDA reveals structure; modeling learns patterns; deployment turns results into decisions through dashboards, APIs, or alerts.

3. Machine Learning: The Engine of Pattern Discovery

Machine Learning (ML) extends the pipeline by learning patterns from examples rather than relying only on fixed rules. Three broad paradigms highlighted in the source are supervised, unsupervised, and reinforcement learning. Supervised learning uses labeled data for tasks such as classification and regression; unsupervised learning discovers structure through clustering, dimensionality reduction, anomaly detection, or association; reinforcement learning improves a policy through feedback.

PARADIGM	CORE IDEA	EXAMPLES
Supervised	Predict a labeled outcome	Classification, Regression, SVM
Unsupervised	Discover hidden structure	K-Means, PCA, DBSCAN
Reinforcement	Learn through feedback	Q-Learning, Actor-Critic, Multi-Agent

4. Deep Learning and Real-World Impact

Deep Learning uses multi-layer neural networks to learn hierarchical representations. Convolutional Neural Networks (CNNs) are effective for image recognition, while Recurrent Neural Networks (RNNs) and Transformers support natural-language processing. At scale, these techniques form the foundation of modern intelligent systems, including large language models.

HEALTHCARE Cancer detection from MRI scans CNN, Transfer Learning	FINANCE Real-time fraud detection Random Forest, XGBoost
E-COMMERCE Personalized recommendations Collaborative Filtering	AGRICULTURE Crop-yield prediction LSTM, satellite imaging

5. The Ecosystem That Makes It Possible

The modern stack combines programming, data tools, visualization, machine learning, deployment, and cloud infrastructure. Common technologies from the source include Python, R, SQL, Pandas, NumPy, Matplotlib, Plotly, Tableau, Scikit-learn, XGBoost, TensorFlow, PyTorch, Apache Spark, Kafka, Docker, Kubernetes, AWS SageMaker, and GCP Vertex.

6. Ethics, Challenges, and Responsible Intelligence

- Bias: Models can reproduce or amplify historical bias in training data.
- Privacy: Personal data must be collected and used responsibly; the source cites GDPR and India's PDPB.
- Explainability: Techniques such as SHAP and LIME help interpret complex, black-box models.
- Data Sovereignty: Ownership and control of citizen-generated data remain important policy questions.
- Environmental Cost: Large-model training can require substantial computational resources and energy.

7. What Comes Next

The field is moving toward Federated Learning for privacy-preserving collaboration, AutoML and AI-assisted analysis, Edge AI for low-latency inference, Quantum Machine Learning, and increasingly capable Large Language Models (LLMs). Together, these directions point toward intelligence that is more automated, distributed, and embedded in everyday systems.

CONCLUSION

Data Science is the bridge between the world's growing volume of data and the decisions that shape what happens next. By collecting, cleaning, exploring, modeling, and communicating evidence, it converts complexity into actionable understanding. For Information Technology students, the opportunity is not only to build intelligent systems, but to build them with fairness, transparency, and human purpose in mind.

Selected references: Provost & Fawcett (2013), Data Science for Business; Géron (2019), Hands-On Machine Learning; Donoho (2017), 50 Years of Data Science; Goodfellow, Bengio & Courville (2016), Deep Learning.

