Experiential Learning

Report submitted to the

VIT Bhopal University

Bachlors of Technology

in

Computer Science and Engineering with Specialization in

Artificial Intelligence and Machine Learning

Submitted by

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Declaration

I, Priyanshu Ranjan, bearing the Registration Number *23BAI10691* hereby declare that this report of "*Experiential Learning*" represents my original work carried out as a undergraduate student at VIT Bhopal University. To the best of my knowledge, it contains no material previously published or written by another person, nor any material presented for the award of any other degree of VIT Bhopal University or any other institution. Any contribution made to this report by others, with whom I have worked at VIT Bhopal University or elsewhere, is explicitly acknowledged in the report.

Date: 19/11/2025 *Priyanshu Ranjan*

VIT Bhopal University

Acknowledgment

I would like to express my sincere gratitude to VIT Bhopal University for organizing the Experiential Learning programme and facilitating visits to a diverse set of industries and institutions in Chennai and Bangalore. My thanks to the faculty coordinators, Dr. Madhan Kumar Srinivasan (CEO & Co-founder @ Wise Work), Mr. Krishnav Dave (CEO @ PreProd Corp) and student coordinators the staff at the host organisations who generously shared time, resources, and expertise.

The programme gave me valuable practical exposure that complemented my academic learning and inspired ideas for future projects and career directions.

This experience has greatly enriched my academic and professional perspective, instilling valuable skills and insights that will continue to guide me in future endeavors. I remain indebted to everyone who contributed to making this program successful and memorable.

Priyanshu Ranjan
(23BAI10691)

Summary of Your Experential Learning

The VIT Bhopal Experiential Learning Programme (Chennai–Bangalore) offered rich industry exposure through technical visits, expert interactions, and hands-on activities.

Chennai Experential Learning Summary:

In **Chennai**, the programme began at VIT Chennai with the session *"Motivate to Innovate"* by Dr. Madhan Kumar Srinivasan, who shared valuable insights on innovation, entrepreneurship, and career growth. At **BSNL RGMTTC Meenambakkam**, we learned about telecom architecture, data centers, optical fiber systems, and power infrastructure. The visit to **TVS Training & Services (TTC1), Ambattur** covered Six Sigma quality management, DMAIC methodology, and Electric Vehicle architecture with real hardware demonstrations. At **AAVIN Sholinganallur Dairy**, we explored milk processing, quality testing, pasteurization, and automated packaging operations.

Bangalore Experential Learning Summary:

In **Bangalore**, we gained hands-on exposure at **Xnomous Systems Pvt. Ltd.**, working with defence robots, agricultural bots, commercial drones, and assembling a 4WD smart robot car. At **NeoSky India Ltd.**, we studied DGCA-certified drone systems, manufacturing processes, CNC cutting, and observed a live drone flight demonstration. The visit to **Visvesvaraya Industrial & Technological Museum (VITM)** enhanced our understanding of aviation, space, electronics, and applied science. The programme concluded with an insightful tech talk by **Mr. Krishnav Dave (CEO, PreProd Corp)** on "AI by Design," covering real-world AI challenges and industry trends.

Overall, the programme strengthened our engineering knowledge, practical skills, and understanding of real-world industrial technologies while providing meaningful professional exposure.

Keywords: -

AI by Design, Automation Systems, Drone Technology, Optical Fiber Communication, Robotics & Manufacturing, Embedded systems training, IoT workshop, Six Sigma process, electric vehicle testing, dairy plant tour, food safety lab.

Contents

City Choice – 1

Chennai

Day – 1 Report

1.1.1 Industry Name:

"Motivate to Innovate" Session at VIT Chennai Campus (MG Auditorium), Kelambakkam Chennai, Tamil Nadu 600127

[Location Link: https://maps.app.goo.gl/D9vu7Lm8GNLKKrVE9]

1.1.2 Objectives:

- To gain insights into innovation, entrepreneurship, and personal growth from an industry expert.
- To understand how real-life experiences shape professional success and technical thinking.
- To learn about the initiatives of the *Dr. Madhan Institute of Future (DMIF)* in guiding students toward careers, startups, and research.

1.1.3 Learning outcome:

- Understood the significance of aligning passion, skills, and consistency to achieve success.
- Learned about the importance of balancing hard work with smart strategies for growth.
- Gained awareness of the role of DMIF in developing future-ready professionals through training in jobs, entrepreneurship, and research writing.
- Recognized how personal experiences and failures can become strong learning foundations for career development.

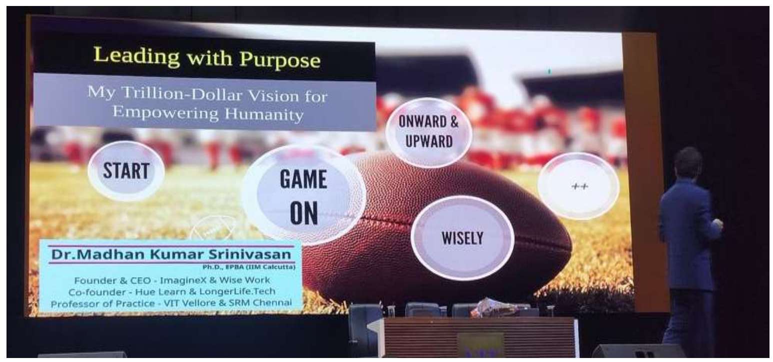
1.1.4 Photographs:

Experiential Learning 2025 Opening

This image captures the inaugural slide of the Experiential Learning 2025 programme at VIT Chennai, marking the beginning of a motivational session that set the tone for innovation-focused learning throughout the visit.

“Leading with Purpose” Slide

This image captures Dr. Madhan Kumar Srinivasan introducing his talk “Leading with Purpose,” where he shared his life journey and stressed the importance of vision, consistency, and purposeful innovation for long-term success.



All Patents Summary

This photo shows Dr. Madhan highlighting his patents, grants, and global industry experience, motivating students to pursue impactful innovation and understand how research and technology contribute to real-world transformation.

Dr. Madhan sir's Profile

This photo displays Dr. Madhan's professional profile, showcasing his achievements, credentials, and global recognition, emphasizing the importance of continuous learning and multidisciplinary expertise in shaping a successful career.

Guided Mentorship Program

This image shows Dr. Madhan presenting the "Guided Mentorship Program" under the Dr. Madhan Institute of Future, explaining how structured mentorship supports students in careers, entrepreneurship, and research development.

1.1.5 Feedback of the day – 1:

"The session by Dr. Madhan Kumar Srinivasan was truly inspiring and thought-provoking. His life experiences and motivational words gave me clarity on how determination and adaptability play vital roles in building a successful career. The talk also emphasized continuous learning and innovation as keys to future readiness."

The interactive environment, dynamic stage presence, and chance to learn from a mentor of such stature fostered a genuine sense of motivation and possibility. Students expressed that the event gave them not just technical direction, but also renewed confidence and ambition for their own academic and personal projects. Overall, the day set a high standard for the week ahead, acting as a powerful catalyst for self-driven learning and engagement throughout the experiential programme.

Day – 2 Report

1.2.1 Industry Name:

Rajiv Gandhi Memorial Telecom Training Centre (RGMTTC) – BSNL, Meenambakkam, GST Road, Chennai

[Location Link: https://maps.app.goo.gl/q8PPy3nGd9y9xiGr8]

1.2.2 Objectives:

- To understand the organizational structure, business model, and operational workflow of a leading telecom company.
- To gain practical exposure to telecom technologies, including fiber optics, power systems, and data communication equipment.
- To learn about the three-tier architecture of BSNL's network infrastructure and its functioning.

1.2.3 Learning outcome:

- Learned about BSNL's business model, various telecom services, and the overall functioning of the telecom ecosystem.
- Understood the three-layered architecture of BSNL's network—Access, Transmission, and Core—and how each contributes to connectivity.
- Gained knowledge about internet and intranet systems, key telecom equipment like DSLAM and OCLAN, and the concept of international connectivity.
- Observed and identified tools, materials, and components used in optical fiber setup, repair, and maintenance services.
- Acquired an understanding of the power supply systems for telecom equipment, including the working of UPS units and their backup mechanisms, demonstrated by *Anand Sir (Assistant General Manager, BSNL Chennai).*

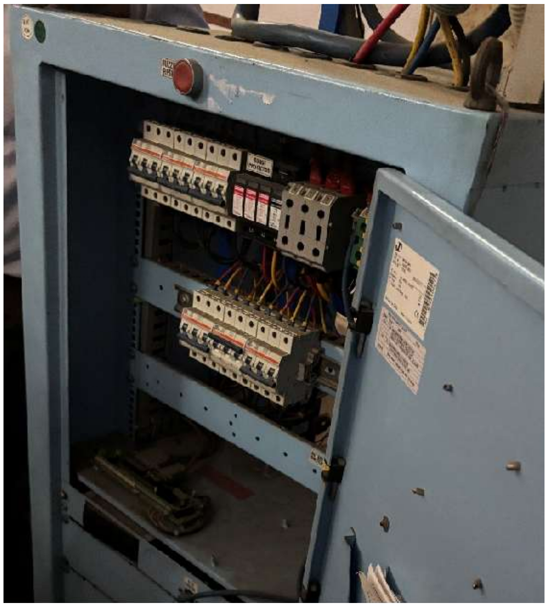
1.2.4 Photographs:

DSLAM, RPR & OCLAN Rack Setup

This image shows a live telecom equipment rack containing DSLAM, RPR, and OCLAN units, demonstrating how BSNL manages data routing, digital subscriber lines, and local network distribution within its infrastructure.

Telecom Power Backup Battery Bank

This photograph displays the high-capacity telecom battery bank used to ensure uninterrupted power supply for critical network equipment, supporting continuous communication during outages as explained in the Power Supply session.



MDF (Main Distribution Frame) Panel

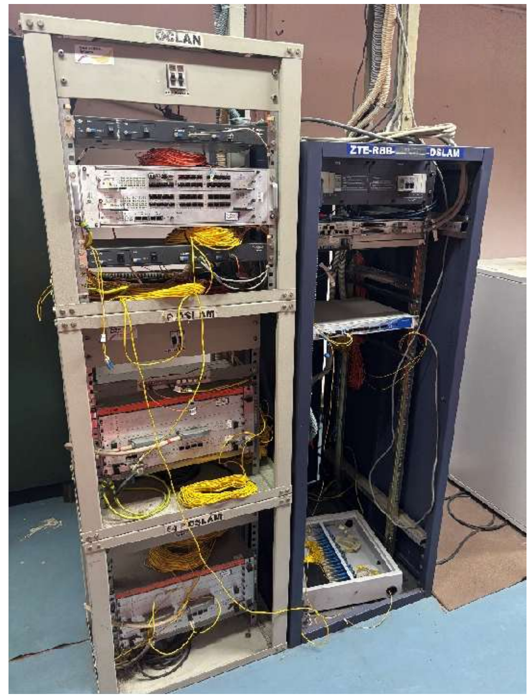
This photo shows the power distribution cabinet supplying stable and regulated electricity to BSNL equipment, reflecting the importance of proper protection, wiring, and circuit management in telecom installations.

OCLAN and DSLAM Equipment Stack

This image captures the MDF panel where numerous telecom copper lines are terminated and interconnected, illustrating how BSNL manages large-scale line distribution, switching, and network routing operations.

Telecom Power Distribution Cabinet

This rack shows multiple DSLAM and OCLAN modules connected through fiber and copper lines, providing a practical understanding of how broadband signals are multiplexed and managed inside telecom networks.



1.2.5 Feedback of the day – 2:

"The visit to RGMTTC-BSNL provided an excellent technical learning experience. The structured lab sessions gave me hands-on exposure to telecom infrastructure, fiber technology, and power backup systems. The practical demonstrations and detailed explanations by the instructors helped bridge the gap between theoretical knowledge and real-world applications."

Day – 3 Report

1.3.1 Industry Name:

TVS Training & Services – TTC1, Ambattur

[Location Link: https://maps.app.goo.gl/XdMoXgQmYHKKNvNk9]

1.3.2 Objectives:

- To gain an in-depth understanding of industrial quality improvement methods such as Six Sigma and its real-world applications.

- To explore the fundamentals of Electric Vehicles (EVs), their industry evolution, and internal system architecture.

- To observe practical demonstrations of EV components and their interconnections in a working model setup.

1.3.3 Learning outcome:

Lecture 1:

- Understood the Six Sigma Technique, a data-driven approach for process improvement and quality control.

- Learned the five key phases of the Six Sigma improvement methodology — DMAIC (Define, Measure, Analyze, Improve, Control).

- Gained clarity on SMART criteria (Specific, Measurable, Attainable, Relevant, Time-bound) used for evaluating performance goals.

- Understood various measures of defects such as DPU, TOP, DPO, and DPMO, which help quantify process performance.

- Studied cause-and-effect (fishbone) diagrams, GEMBA investigations, and brainstorming techniques for identifying root causes and improving quality.

Lecture 2:

- Learned about the evolution of Electric Vehicles (EVs) and their increasing importance in the automotive industry.
- Discussed leading EV competitors and major global manufacturers, understanding how innovation drives the EV market.
- Observed a detailed Electric Vehicle Architecture setup (as shown in the image) and explored its components and working.

Description of EV Architecture (from the setup):
The Electric Vehicle Architecture demonstrated at TVS TTC1 illustrated how multiple subsystems work together to power and control an EV. The key components observed included:

i. DC–DC Converter:
ii. Controller–Inverter Unit:
iii. Energy Storage System:
iv. Oscilloscope Display:
v. Brake Lever and Accelerator:
vi. Charging Port:
vii. Instrument Cluster:

The model clearly showed how energy flows from the battery to the controller, motor, and mechanical output (wheel), illustrating the seamless coordination of power electronics and control systems in modern EVs.

1.3.4 Photographs:

Embedded Systems Lab

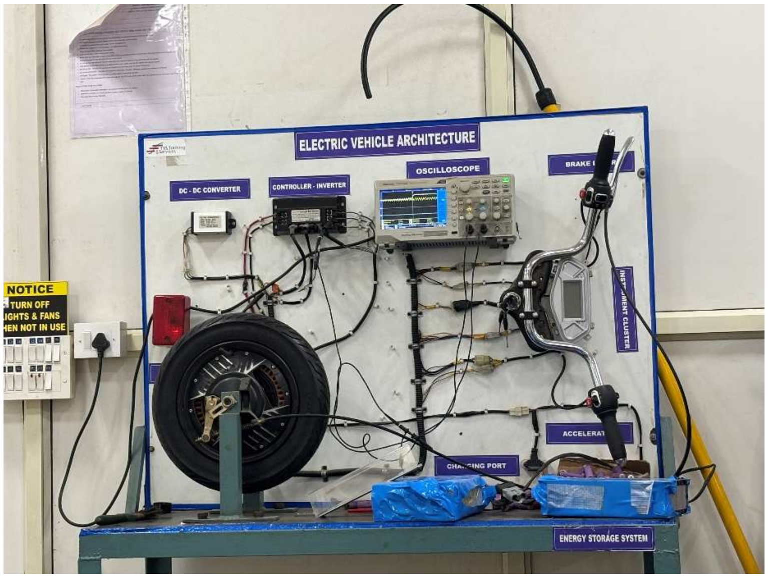
The embedded lab entrance signified the dedicated facility for electronics and automation, establishing the bridge between classroom learning and hands-on experimentation with controls and sensors.

Fitting Workshop Area

This image shows the TVS training workshop equipped with fitting tables and mechanical tools, providing students hands-on exposure to industrial practices, basic assembly skills, and machine operation in a real manufacturing environment.

Milling and Drilling Machine Section

This photo captures the milling and drilling machine section where trainees learn precision machining, material shaping, and component preparation, showcasing the technical infrastructure used for industrial skill development at TVS TTC1



Electric Vehicle Architecture Demonstrator

This image displays the Electric Vehicle Architecture setup used during the session, illustrating power flow, controller-inverter operation, sensor integration, and overall EV functionality through real-time demonstrations of key electrical components.

1.3.5 Feedback of the day – 3:

"The visit to TVS Training & Services was deeply insightful. The Six Sigma lecture clarified how industries maintain high-quality standards through structured problem-solving. The Electric Vehicle demonstration helped me visualize each subsystem's function, providing a strong understanding of EV mechanics, control, and energy flow. Overall, it was an enriching combination of quality management and emerging automotive technologies."

Day – 4 Report

1.4.1 Industry Name:

"Hands-on" at VIT Chennai, AB3-701 Lab Facility, Kelambakkam Chennai, Tamil Nadu 600127

[Location Link: https://maps.app.goo.gl/D9vu7Lm8GNLKKrVE9]

1.4.2 Objectives:

The objective of the training session was to immerse students in practical learning focused on embedded systems and the Internet of Things (IoT). The workshop aimed to bridge classroom theory with direct application, offering experience in hardware interfacing, microcontroller programming, and the deployment of IoT-based solutions.

1.4.3 Learning outcome:

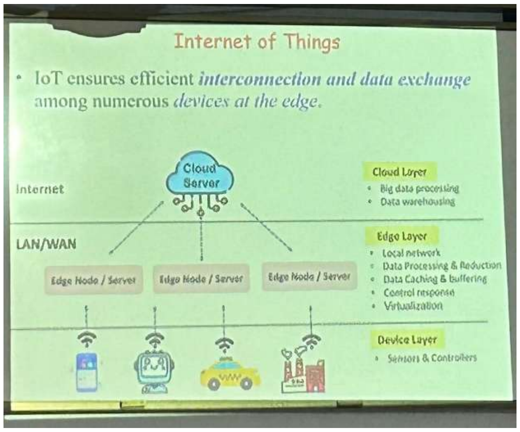
The day began with students organized into teams, each provided with a dedicated hardware kit containing microcontroller boards, sensors, and essential components.

- **Morning Session:** Led by *Dr. Rajasekar (PSG Tech, IIT, Anna University)* and his team, we learned the fundamentals of microcontroller architecture, built simple hardware circuits, and uploaded programs to control output devices. Our primary task was creating a digital output project—controlling LED flickering using microcontroller code.

- **Afternoon Session:** The focus shifted toward deeper embedded concepts such as sensor integration, serial communication, and IoT project design. Students implemented code to read sensor inputs, troubleshoot inconsistent signals, and control actuators, while experts provided real-time guidance.

- The workshop emphasized teamwork, debugging skills, and learning through hands-on experimentation. Connecting boards to laptops and observing immediate output gave us a strong understanding of how embedded devices are designed, programmed, tested, and optimized for real-world IoT applications.

1.4.4 Photographs:

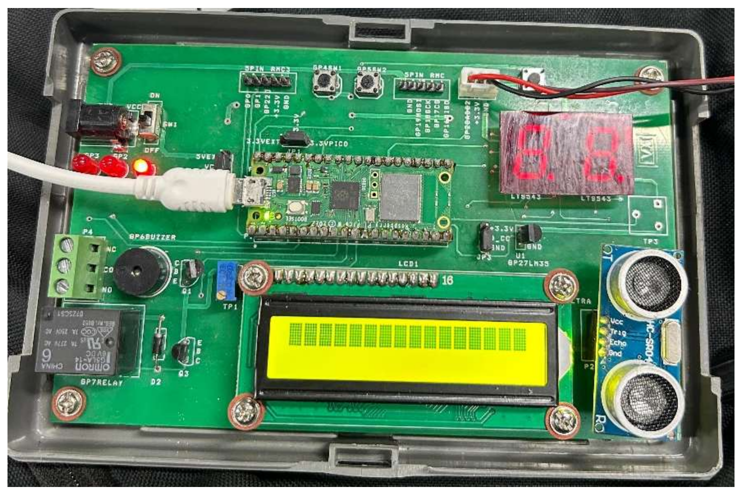


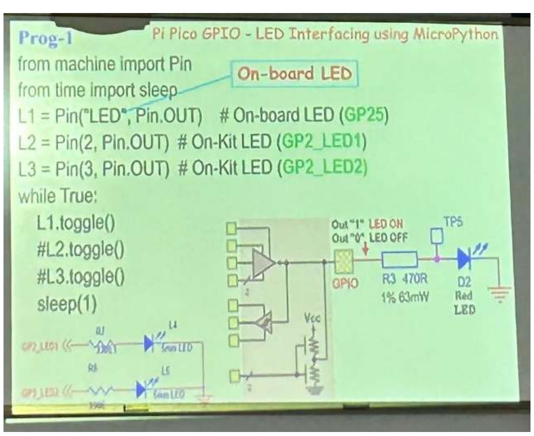
IoT Architecture Overview

This projector slide illustrates the multi-layered architecture of the Internet of Things, including device, edge, and cloud layers. Students learned how sensors, microcontrollers, edge servers, and cloud platforms communicate to form complete IoT ecosystems. This conceptual foundation was crucial for understanding real-world applications in home automation, smart cities, and industrial IoT.

Embedded System Training Kit (Raspberry Pi Pico + Sensors)

This image shows the complete embedded training kit provided during the workshop. It includes a Raspberry Pi Pico microcontroller, ultrasonic sensor, buzzer, relay, 7-segment display, push buttons, and an LCD interface. This kit was used for hands-on learning, enabling students to understand microcontroller GPIO operations, sensor integration, and hardware debugging in real time.





LED Interfacing Using GPIO Pins

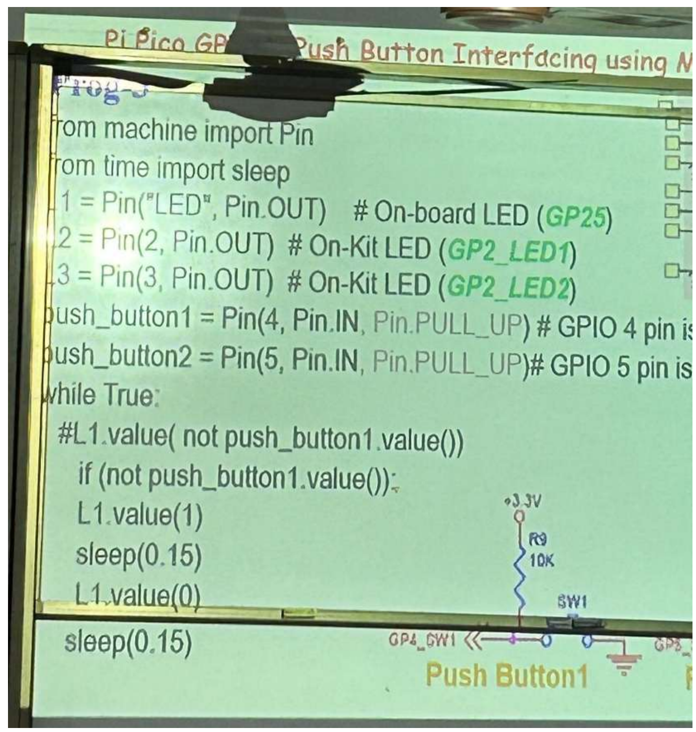
This image shows a classroom demonstration on LED toggling using GPIO pins through MicroPython. Students learned how microcontrollers interact with external components such as LEDs, resistors, and switches. The circuit diagram on the slide also helped deepen their understanding of current flow and protective components.

Powered-On IoT Development Board

The second image captures the development board fully powered and running with LEDs glowing, indicating active GPIO communication. Students performed live coding on this setup to trigger outputs, read sensor data, and test microcontroller responses. It reflects the practical environment where theory directly transformed into working hardware results.

MicroPython Push-Button Code Demonstration

This projector slide displays a MicroPython program for interfacing push buttons with the Raspberry Pi Pico. The code explains digital input reading, debounce handling, and conditional LED control. This session enabled students to understand how simple digital logic converts into functional embedded applications.



1.4.5 Feedback of the day – 4:

This hands-on workshop was one of the most impactful sessions of the entire trip. Transitioning from coding to real hardware enhanced our practical understanding of embedded systems and IoT. Students appreciated the experience of watching their programs interact with physical components, reinforcing how theoretical concepts translate into functional systems. The collaborative approach encouraged teamwork, communication, and resilience during troubleshooting. The session concluded with a renewed appreciation for embedded technologies and boosted confidence in pursuing future engineering innovations.

Day – 5 Report

1.5.1 Event/Industry Name –

AAVIN Hi-Tech Parlour & Dairy Processing Unit, Milk Production Dairy,
Rajiv Gandhi Salai, Sholinganallur, Chennai, Tamil Nadu 600119

[Location Link: https://maps.app.goo.gl/aiQWv7mbZHZrZiZG9]

1.5.2 Objectives

- To understand the end-to-end milk processing and packaging workflow at a large-scale cooperative dairy.

- To observe quality testing, filtration, pasteurization, and packaging processes in a real industrial environment.

- To learn how advanced automation and cold-chain systems maintain product safety and freshness.

1.5.3 Learning outcome

- Gained a clear understanding of AAVIN's milk purification and packaging process, starting from the collection of raw milk to the final dispatch.
- Observed the full production workflow including:
  - i. Collection → Grading → Sampling → Quality Control Clearance
  - ii. Filtration & Chilling (< 5 °C) to preserve freshness.
  - iii. Pre-heating and Filtration before standardisation.
  - iv. Standardisation of Fat and SNF (Solid-Not-Fat) values using skim milk powder (SMP) and melted butter.
  - v. Homogenisation (50–55 °C) to ensure uniform texture.
  - vi. Pasteurisation (76–78 °C) for microbial safety followed by chilling to ≤ 4 °C.
  - vii. Quality Clearance & Storage in Silos (< 4 °C).
  - viii. Automated pouch filling, weight checking, sealing, and coding.
  - ix. Cold-storage of sachets (< 4 °C) before loading into crates for dispatch.
- Witnessed real-time testing in the laboratory for fat content, SNF ratio, and microbial quality.
- Understood that the plant has a capacity of approximately **10,000 packets per hour** for each milk variant (toned, full cream, and standardized).
- Experienced how automation and strict hygiene standards ensure consistent product quality.

1.5.4 Photographs:

Tanker Reception Dock

This image shows the tanker reception dock where raw milk arrives at the dairy. Each tanker undergoes initial quality checks before unloading, marking the starting point of the milk processing workflow.

Aerial Layout of AAVIN Dairy Plant

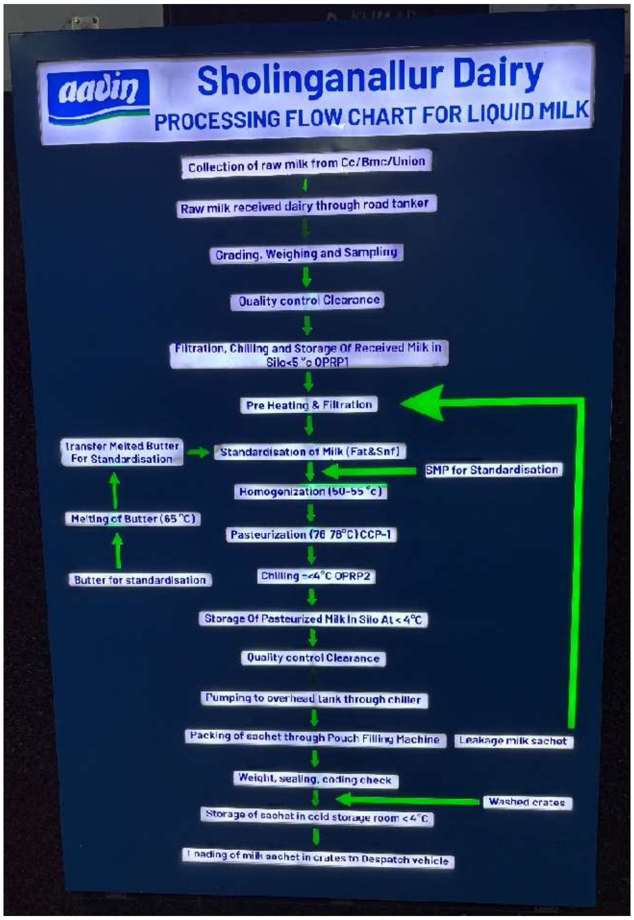
This image displays the aerial layout of the AAVIN Sholinganallur facility, highlighting its various processing, storage, and quality-control units that collectively support large-scale milk and dairy product production.

Milk Processing and CIP System

This photograph captures the stainless-steel processing tanks and CIP (Clean-In-Place) system used for pasteurization, chilling, and sanitizing pipelines, demonstrating the hygienic and automated operations inside the dairy plant.

Food Safety Management System Chart

This image shows AAVIN's Food Safety Management System framework, explaining HACCP, TACCP, and VACCP guidelines used to prevent hazards, threats, and adulteration, ensuring safe dairy production for consumers.



Milk Processing Flow Chart

This flow chart illustrates the complete liquid milk processing cycle—from collection and filtration to pasteurization, packaging, and cold storage—providing a clear visual representation of the plant's structured workflow.

1.5.5 Feedback of the day – 5

"The visit to AAVIN's Sholinganallur dairy unit was an eye-opening industrial experience. Observing the milk processing line, quality-testing lab, and automated packaging systems provided me with valuable insights into large-scale food production and safety management. The session combined theoretical understanding with practical exposure, ending on a delightful note with AAVIN's delicious biscuits and ice cream."

Choice – 2

Bangalore

Day – 1 Report

2.1.1 Industry Name:

Xnomous Systems Pvt. Ltd., Virgonagar, Aavalahalli, Bengaluru, Karnataka 560049

[Location Link: https://maps.app.goo.gl/1wzVcZbjPsJ8A58A9]

2.1.2 Objectives

- To gain exposure to real-world autonomous and robotic systems developed for defence, agriculture, and industrial applications.

- To understand the design, structure, functionality, and components of Xnomous's core B2B technology products.

- To observe how automation, robotics, 3D printing, and embedded systems are used to build mission-critical solutions.

2.1.3 Learning outcome

- Learned about Xnomous Systems, a funded B2B automation company established in 2022, providing high-end robotics solutions for the Army, Navy, and private industries.

- Understood the design and working of **ThrowBot**, a 3D-printed, two-wheeled surveillance robot equipped with transmitter, receiver, gas vent, front camera, and impact-resistant wings—capable of surviving 10–12 feet drops.

- Explored **MAYABOT X1**, an agricultural multipurpose load-carrying and field-maintenance robot used for sprinkling, grass cutting, and transporting seeds or crops up to 250–300 kg.

- Gained insights into the features of their **Multipurpose Drone**, designed for applications such as building-glass cleaning, advertisement shoots, load carrying, and potentially naval operations.

- Observed components like motors, transmitters, gearboxes, cutters, tyres, and drone materials, understanding how these systems are engineered and tested.

- Learned about the manufacturing environment and equipment used by Xnomous for building these autonomous platforms.

2.1.4 Photographs:

ThrowBot (Army BOT Prototype)

This photo captures the ThrowBot, a compact two-wheeled surveillance robot built using 3D-printed materials. Designed for defence, it includes sensors, a camera, and impact-resistant wheels for rugged field deployment.

MAYABOT X1 (Agriculture Bot)

This photo features the MAYABOT X1 agricultural robot, designed for load carrying, grass cutting, and field operations. It integrates heavy-duty motors, cutters, and a robust chassis for agricultural automation.

Multipurpose Industrial Drone

This image shows the multipurpose drone developed for industrial and defence applications, featuring a carbon-fiber frame, modular payload support, and high-lift motors suitable for cleaning, deliveries, and aerial surveillance tasks.

Mechanical Shearing Machine

This image shows the mechanical shearing machine used at Xnomous for cutting metal sheets with precision, forming the base structure and components required for robot and drone fabrication.

Vertical Milling Machine

This image displays the vertical milling machine used for shaping metal components, enabling precise machining of robot frames, mounts, gear attachments, and mechanical parts for Xnomous automation systems.

CNC Mini Mill System

This image shows the CNC mini milling system used for fabricating small parts, custom brackets, and precision components essential for assembling robots, drones, and embedded hardware modules.

2.1.5 Feedback of the day – 1

"The visit to Xnomous Systems provided deep insights into practical robotics and automation. Learning about defence-grade robots, agricultural bots, and modular industrial drones expanded my understanding of real-world engineering and innovative problem-solving in emerging industries."

Day – 2 Report

2.2.1 Industry Name –

Xnomous Systems Pvt. Ltd., Virgonagar, Aavalahalli, Bengaluru, Karnataka 560049

[Location Link: https://maps.app.goo.gl/1wzVcZbjPsJ8A58A9]

2.2.2 Objectives

- To engage in hands-on construction of a functional 4WD Smart Robot Car using embedded systems and IoT components.

- To understand the architecture, wiring, and programming workflow involved in building autonomous robotic platforms.

- To gain practical experience with microcontrollers, sensors, drivers, and wireless modules used in modern automation projects.

2.2.3 Learning outcome

- Successfully assembled a 4WD Smart Robot Car**,** using components such as the Raspberry Pi Pico**,** ESP8266 Wi-Fi module**,** HC-SR04 ultrasonic sensor**,** L298N motor driver**,** 4 DC motors**,** Bluetooth module**,** and other electronic accessories provided in the kit.

- Developed a clear understanding of the robot architecture, including motor connections, sensor placement, power distribution, and communication modules.

- Learned critical wiring techniques, interfacing methods, and coding practices for controlling the BOT through Wi-Fi on Thonny IDE.

- Understood how microcontrollers interact with motor drivers and sensors to enable automated movement, obstacle detection, and wireless control.

- Gained experience in debugging connection errors and optimizing hardware placement for stable performance.

- Received guidance and corrections from the instructor, who appreciated the team's structured approach and successful execution of the BOT.

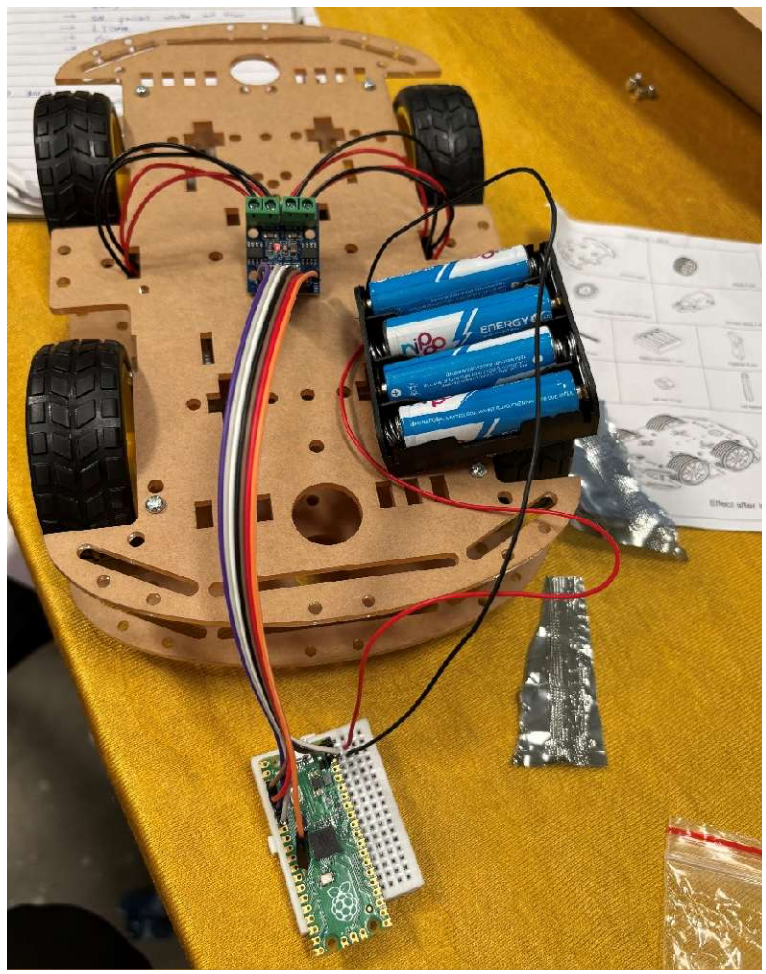
2.2.4 Photographs:

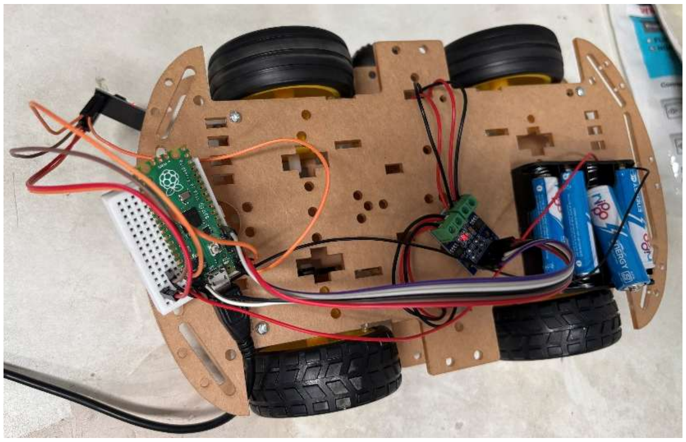
Assembling the 4WD Chassis

This image shows the initial assembly of the 4WD robot car chassis, where the wheels, frame, and motor holders were mounted to form the base structure of the smart BOT.

Wiring Motor Driver and Power Module

This photo captures the wiring stage, where the L298N motor driver, battery pack, and motors were connected on the chassis, along with the Raspberry Pi Pico for control operations.





Completed Wiring and Microcontroller Setup

This image shows the nearly completed 4WD robot with all major connections—motors, power supply, motor driver, and Raspberry Pi Pico—integrated for testing and code upload.

2.2.5 Feedback of the day – 2

“The practical session of assembling the 4WD Smart Robot Car was highly enriching. It improved my hands-on skills in embedded systems, wiring, and programming. The instructor’s feedback boosted our confidence, reinforcing the importance of teamwork and systematic troubleshooting in robotics.”

Day – 3 Report

2.3.1 Industry Name –

NeoSky India Ltd., MVS Arcade, B.Channasandra, Bengaluru, Karnataka 560043

[Location Link: https://maps.app.goo.gl/m3BGjy5QCoGfDaRE6]

2.3.2 Objectives

- To understand the commercial drone ecosystem, DGCA regulations, and the technical landscape of drone manufacturing in India.
- To explore NeoSky's drone portfolio, applications, and the technology behind autonomous aerial systems.
- To observe real manufacturing processes, CNC cutting methods, and testing procedures involved in drone production.
- To learn about flight operations, licensing norms, airspace regulations, and real-time drone demonstration procedures.

2.3.3 Learning outcome

- Understood the corporate profile of NeoSky India Ltd, owned by RattanIndia Group, a major enterprise with $1.2 Bn revenue, $2.4 Bn valuation, and nearly 3000 employees, with investments in brands like Cocoblu and Revolt Motors.
- Learned about NeoSky's achievement as India's first DGCA-approved drone manufacturer, and one of the earliest companies to conduct BVLOS (Beyond Visual Line of Sight) trials, a key milestone in Indian drone operations.
- Explored their product portfolio, which includes:

I. SWAT Drone – Small surveillance drone for tactical operations and real-time reconnaissance.

II. TAVAS – Medium-class enterprise drone for mapping, inspection, agriculture, and delivery use-cases.

III. DOPO – Logistics and delivery-oriented drone designed for safe payload transport.

IV. Wireless Charger Dock – Automated charging platform enabling 24/7 remote drone missions without human intervention.

- Learned how NeoSky integrates AI/ML applications such as:
  I. Vehicle and human detection
  II. Crop inspection and seeding analysis
  III. Automated mapping
  IV. Delivery assistance (similar to Zipline's medical-delivery drones)
- Traveled to NeoSky's Drone Manufacturing Plant, where we had two detailed sessions:
  I. Session 1: Introduction to industrial and police-grade drones, including Karnataka Police surveillance drones built for rapid deployment and crime-scene monitoring.
  II. Session 2: Demonstration of CNC composite material cutting, showcasing how carbon fiber and polymer panels are precisely shaped for drone frames, arms, and structural components.
- Learned about the step-by-step manufacturing pipeline—cutting, molding, assembly, calibration, and rotor balancing.
- After lunch, we visited the Drone Flying Field, where we observed the live demonstration of the TAS Drone used for industrial scouting, mapping, and agricultural monitoring.
- Learned about:
  I. DGCA Drone Rules 2021
  II. Requirements for Drone Pilot Certification (Remote Pilot License)
  III. Operational guidelines for flight takeoff, safety checks, geofencing, and telemetry
  IV. Indian Airspace Zones (Green, Yellow, Red), along with no-fly areas, controlled airspaces, and mandatory UIN/UTM requirements
- The outdoor flying demo helped us understand real-world drone control, battery safety, GPS locking, altitude management, and return-to-home (RTH) procedures.

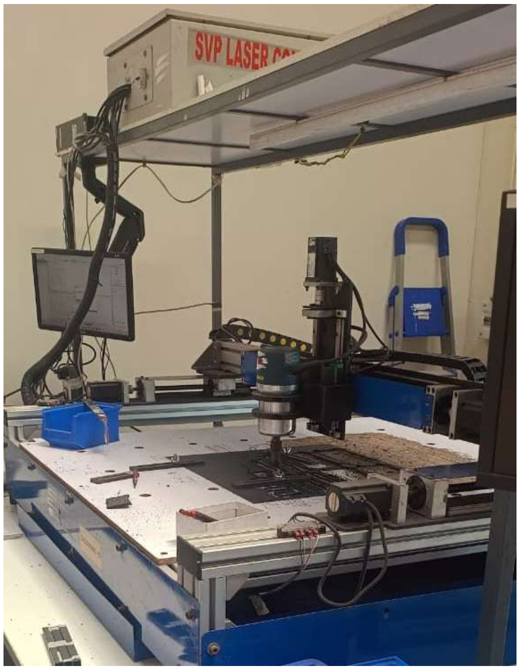
2.3.4 Photographs:

CNC Material Cutting Machine

This image shows a high-precision CNC cutting machine used to shape carbon-fiber sheets for drone frames, ensuring accuracy and uniformity in manufacturing.

Drone Assembly Bay

A large industrial drone is seen undergoing assembly and testing, highlighting the advanced engineering and robust design used for surveillance and commercial applications.



CNC Fabrication Setup

The picture captures a CNC laser-guided cutter used for designing complex drone components, demonstrating the role of automation in rapid prototyping and production.

TAS Drone in Flight Demo

The drone flying over the open field showcases NeoSky's flight-testing process, where stability, altitude control, and BVLOS capabilities are demonstrated by expert pilots.

TAS Drone Ground Setup

This image features the TAS heavy-lift drone on the ground before the flight demonstration, displaying its sturdy frame, landing gear, and mounted payload box.

2.3.5 Feedback of the day – 3

"The visit to NeoSky India Ltd. offered deep insights into India's fast-growing drone ecosystem. From manufacturing, CNC-based fabrication, and AI-driven drone applications to airspace regulations and live flying demos, the day strengthened my understanding of aerospace technology and real-world drone operations."

Day – 4 Report

2.4.1 Industry Name –
Visvesvaraya Industrial and Technological Museum (VITM), Ambedkar Veedhi, Bengaluru, Karnataka.
[Location Link: https://maps.app.goo.gl/jeDRAbCNxuRcpHf16]

2.4.2 Objectives

- To explore and understand various engineering principles demonstrated through interactive exhibits at VITM.
- To analyze real-world industrial applications of concepts displayed in galleries such as the Engine Hall, Electrotechnic Gallery, Space Technology Gallery, BEL-Hall of Electronics, and others.
- To relate museum exhibits with practical engineering mechanisms such as aerodynamics, robotics, thermodynamics, electromagnetism, and material science.
- To observe how engineering visualization enhances conceptual clarity and encourages innovation.

2.4.3 Learning outcome

- Understood the working principles of engines, turbines, IC engines, and mechanical transmission systems in the Engine Hall.
- Gained insights on electrical circuits, motors, generators, transformers, and electromagnetic applications in the ElectroTechnic Gallery.
- Observed the evolution of space technology, satellite structure, launch mechanisms, and communication principles in the Space Gallery.
- Learned about early aviation engineering through the Wright Brothers' Aeroplane model, understanding lift, thrust, and basic aerodynamics.
- Explored electronics fundamentals in the BEL-Hall of Electronics, including sensors, communication chips, coding principles, and PCB systems.
- Experienced hands-on learning through Fun Science exhibits, demonstrating concepts of optics, sound, motion, forces, and human perception.
- Recognized the importance of museum-based learning in visualizing industrial-scale systems in a simplified and engaging way.

2.4.4 Photographs:

Dinosaur Enclave

This exhibit showcases a life-sized animatronic dinosaur set in a prehistoric habitat, giving visitors an immersive experience of how these ancient creatures might have lived millions of years ago.

Wright Brothers' Aeroplane Panel

This panel highlights the specifications and historic achievement of the 1903 Wright Flyer, explaining how Orville and Wilbur Wright revolutionized aviation with the world's first successful powered flight.

Wright Brothers' Aeroplane Replica

This full-scale replica of the Wright Brothers' Flyer demonstrates the early principles of flight, allowing visitors to appreciate the pioneering aerodynamics and craftsmanship that marked the birth of aviation.

Chandrayaan-3 Vikram Lander Model

The detailed model of the Vikram Lander displays India's remarkable lunar engineering, showcasing ISRO's design, instruments, and the technological framework behind Chandrayaan-3's successful soft landing.

My Weight on Different Planets

This interactive display lets visitors check their weight across various planets, explaining how gravitational differences affect body weight and providing an engaging introduction to planetary science.

Launch Complex Model

The miniature launch complex shows the stages involved in rocket preparation and launch, providing insight into India's space missions and the engineering behind satellite deployment.

Rakesh Sharma Sculpture

This statue of Rakesh Sharma honors India's first astronaut, showcasing his iconic space suit and celebrating the nation's achievements and aspirations in human space exploration.

2.4.5 Feedback of the day – 4

Day 4 at VITM was one of the most interactive and enriching experiences of the entire industrial visit. Unlike typical company visits, this museum allowed us to freely explore multiple engineering domains, observe mechanisms closely, and learn at our own pace. The displays were clear, well-explained, and highly relevant to our coursework. The Engine Hall and Electronics Gallery especially helped bridge the gap between theoretical study and practical visualization. Overall, the visit enhanced our curiosity, boosted conceptual clarity, and inspired us to think more creatively about technology and innovation.

Mini- Case Study Report:-

- **Exhibit Name and Gallery**

Wright Brothers' Aeroplane – Wright Brothers Gallery / Aviation Section (VITM Bengaluru) A detailed model showcasing the world's first successful powered aircraft invented by the Wright Brothers in 1903.

- **Observations**

The exhibit displays a full structural model of the Wright Flyer, highlighting its wooden framework, twin propellers, chain-drive mechanism, fabric-covered wings, and the pilot's prone position. It clearly illustrates early aviation engineering with simple yet effective mechanical control systems.

Wright Brothers' Aeroplane Replica

Wright Brothers' Aeroplane Panel

- **Core Engineering Concept Explained**

The key engineering concepts demonstrated are:

- Aerodynamics of Lift & Drag – Understanding how curved wings generate lift.
- Three-Axis Control – Roll (wing-warping), pitch (elevator), and yaw (rudder), forming the foundation of modern aircraft control.
- Propulsion System – A lightweight 12 HP internal combustion engine driving counter-rotating propellers through a chain mechanism.
- Structural Engineering – Use of lightweight materials and tension wires to balance strength and weight.

- **Industrial Correlation and Possible Innovations**

The Wrights' principles still guide modern aviation, drones, UAVs, and even autonomous air mobility vehicles. Aircraft control laws, stability augmentation, and propeller efficiency originate from their work.

Possible innovations include:

- Improved ultralight UAV frameworks inspired by the Flyer's structure.
- Advanced control algorithms replacing mechanical wing-warping with modern actuators.
- Bio-inspired aerodynamics for higher efficiency.

- **Personal Reflection**

Visiting this exhibit helped me understand how a simple idea, backed by experimentation and perseverance, can change the world. The Wright Flyer model inspired me to appreciate the fundamentals of flight and how they connect to today's advanced aerospace systems. It was both educational and motivating.

Day – 5 Report

2.5.1 Industry Name:

Tech Talk by *Mr. Krishnav Dave, CEO of PreProd Corp*
Vijaykiran Convention Centre, Varsova Layout, Kaggadasapura, Bengaluru, Karnataka 560093

[Location Link: https://maps.app.goo.gl/9KpGgt4pHV95v5bU9]

2.5.2 Objectives:

- To understand real-world challenges in modern AI development and deployment.
- To gain insights into "AI by Design" and how companies structure scalable, ethical, and efficient AI systems.
- To learn from the founder's industry experience regarding product thinking, business strategy, and emerging AI risks.
- To expose students to practical viewpoints on current AI trends, limitations, and future directions.

2.5.3 Learning outcome:

- Students learned about the importance of designing AI systems with clear architecture, functional requirements, constraints, and measurable success criteria.
- They gained awareness of risks such as recursive AI learning, model degradation, and issues arising when AI systems train on their own outputs.
- The session enhanced understanding of industry workflows, including product development life cycles, stakeholder roles, and decision-making in tech companies.
- Learners understood how companies like PreProd Corp approach innovation, validation (POC), and deployment in fast-growing AI markets.

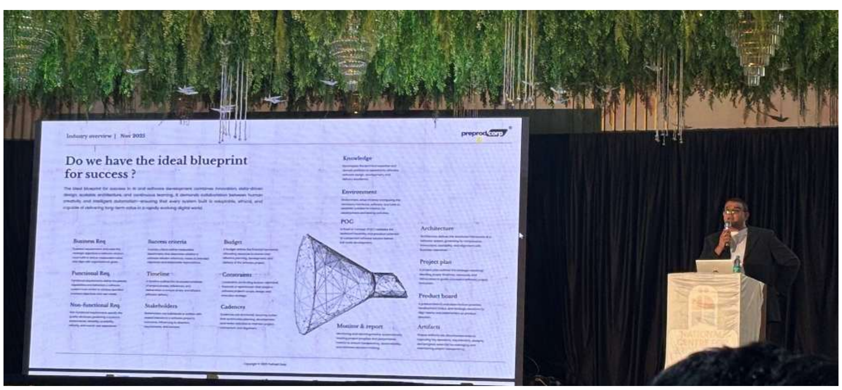
2.5.4 Photographs:

Event Stage

This image captures the grand setup of the VIT Bhopal Experiential Learning 2025 event, with a vibrant digital backdrop and students settling in for the tech talk and felicitation ceremony.

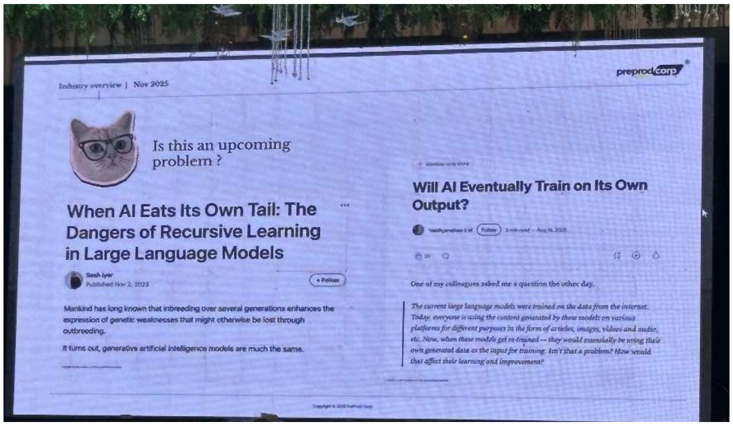
Speaker Presentation (Slide 1)

The speaker begins his session by explaining the distinction between service-based and product-based tech companies, emphasizing how both sectors contribute to modern digital delivery and scalable innovation.



Speaker Presentation (Slide 2)

The slide highlights the essential blueprint for successful tech projects, discussing requirements, constraints, stakeholder roles, and architectural planning—giving students a practical understanding of real-world product development.



Speaker Presentation (AI Risks)

This slide introduces concerns about recursive AI learning, showing headlines on how large language models risk degrading when trained on their own generated data—one of the session's key thought-provoking discussions.

2.5.5 Feedback of the day – 5

The session was highly insightful and engaging, providing valuable exposure to real industry problems and modern AI practices. The speaker's clarity, practical examples, and experience-based explanations made complex concepts easy to understand. The event offered strong motivation for students aspiring to build careers in AI, product engineering, and innovation-driven technology fields.

Conclusions

Chennai – Problem Statements Identified

1. Limited Awareness of Industry - Grade Telecom Infrastructure Among Students
During the BSNL RGMTTC sessions, many students realized they had insufficient understanding of real telecom architectures such as Access–Transmission–Core layers, DSLAM configuration, and power backup ecosystems. This indicates a gap between academic learning and practical telecom exposure.

2. Lack of Hands - On Experience With Optical Fiber Tools and Maintenance Procedures
Although students study communication systems theoretically, the visit showed that most were unfamiliar with fiber splicing tools, repair kits, connectors, and real-world OFC damage/maintenance workflows. This highlights a need for more lab-based fiber training in curriculum.

3. Minimal Exposure to Entrepreneurship and Innovation Pathways
Dr. Madhan's "Motivate to Innovate" session revealed that students have limited clarity on career paths like research, entrepreneurship, and industry-focused innovation. Students often lack structured mentorship to convert ideas into viable solutions, business models, or research contributions.

Bangalore – Problem Statements Identified

1. Insufficient Practical Understanding of Robotics, Drone Manufacturing, and System Integration

The visits to Xnomous Systems and NeoSky showed that students have strong theoretical knowledge but limited practical exposure to robotics assembly, drone design, sensor integration, and CNC fabrication processes. A structured project-based approach is needed to bridge this gap.

2. Limited Industry Readiness in Emerging Technologies like AI/ML and Autonomous Systems

During the "AI by Design" session at Tech Talk, it became clear that students lack comprehensive understanding about AI risks (recursive learning, model drift, bias), data pipelines, and production-grade AI deployment. There is a need to align academic AI learning with real industry expectations.

3. Low Exposure to Interdisciplinary Engineering Applications

The visit to VITM showcased multiple fields—aviation (Wright Flyer), space tech (Chandrayaan), mechanical systems, electronics, and life sciences. Students realized that interdisciplinary thinking is essential for problem-solving, yet it is often missing in their day-to-day academic workflow.