



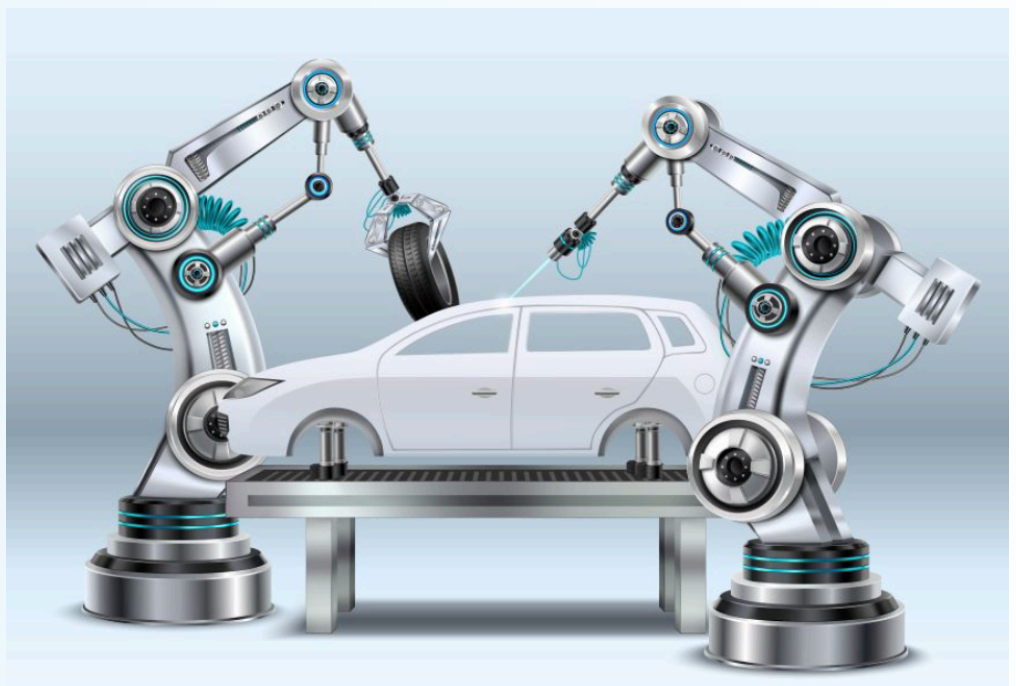
# Automobile Engineering: My Journey from Passion to Profession

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**C**ars and vehicles captivated me from a young age, their speed, complexity, and the sheer joy of understanding how they work. After completing my **12th standard**, I knew I would rather not pursue a traditional theoretical engineering degree. Instead, I sought a program that emphasized practical skills and real-world applications. [My B. Tech in Automobile Engineering](#) provided the perfect balance, with 30% theory and 70% practical learning. The program included summer internships and industry-oriented projects, which equipped me with essential skills and hands-on experience. This education helped me tackle industry challenges, innovate solutions, and grow professionally.

The program objectives focused on skill development, preparing us to address real-world problems with innovative solutions. Through hands-on projects and internships, I gained valuable insights into the industry's workings, which significantly contributed to my professional growth.

Imagine a world that operates by public transport in which your ride arrives the moment you need it. You travel directly to your destination — no stops, no transfers — at a fraction of the cost and environmental impact of both individual cars and high-speed trains! The future is here — **Vinod Khosla** on his 'X' handle @vkhosla



**Fig. 1 Automobile Manufacturing**





Fig. 2 Car Engine

This blend of passion and practical education truly transformed my career in **automotive engineering**, allowing me to turn my childhood fascination into a fulfilling and dynamic profession.

Automobile Engineering Degree

**Automobile Engineering** is a captivating branch of **STEM** that combines principles of mechanical, electrical, and materials science to design, manufacture, and maintain vehicles. Let's delve into the core technologies and subtopics that make this domain so exciting.

### Automobile Engineering Course

At the heart of automotive engineering lies the integration of various technologies. Modern vehicles are equipped with Electronic Control Units (ECUs) that manage everything from engine performance to safety features. These microcontrollers process data from numerous sensors and ensure optimal vehicle operation. Sensors play a crucial role in monitoring vehicle conditions and surroundings, contributing to vehicle dynamics, which involves the study of forces and motions in vehicles. This



Fig. 3 Communication systems in vehicles CAN (Controller Area Network) and LIN (Local Interconnect Network)

includes understanding how vehicles respond to inputs like steering, braking, and acceleration.

### Blending of Applied Electronics Subjects in Automobile Engineering

Communication systems in vehicles, such as **CAN** (Controller Area Network) and **LIN** (Local Interconnect Network), enable different parts of the vehicle to communicate with each other, ensuring coordinated and efficient operation. Mechatronics, an interdisciplinary field combining mechanical engineering, electronics, computer science, and control engineering, is essential for developing advanced systems like automated braking, adaptive cruise control, and electric power steering. Manufacturing engineering involves the design and operation of manufacturing processes to produce vehicles, including everything from assembly line design to quality control and the use of robotics in manufacturing.

### Powertrain Engineering

Powertrain Engineering focuses on the design and development of engines and transmission systems, encompassing both traditional internal combustion engines and modern electric and hybrid powertrains. **Chassis and Suspension Systems** involve the design of the vehicle's frame, suspension, and steering systems to ensure stability, comfort, and safety. Automotive Safety



encompasses the development of safety features such as airbags, anti-lock braking systems (ABS), and electronic stability control (ESC). Lastly, Sustainability and Green Technologies focus on developing eco-friendly vehicles, including electric and hydrogen fuel cell vehicles, in response to the growing emphasis on environmental sustainability.

Thus, **automotive** engineering is a dynamic and ever-evolving field that offers numerous opportunities for innovation and problem-solving. It combines theoretical knowledge with practical skills, making it an ideal choice for those passionate about technology and engineering.

## Education Opportunities

Pursuing a career in **automobile** engineering offers a range of formal and vocational educational opportunities. These programs aim to provide students with the essential knowledge and skills needed to thrive in this dynamic field.

## Formal Education

**Bachelor's Degree (B.Tech/B.E.):** Typically a 4-year program, this degree covers core subjects such as automotive electronics, vehicle dynamics, powertrain systems, and manufacturing processes. Students earn credits through coursework, lab sessions, and projects. Assessment methods include exams, assignments, and practical evaluations. Additionally, the internships and industry-oriented projects are integral parts of the curriculum, providing hands-on experience and exposure to real-world challenges.

**Master's Degree (M.Tech/M.E.):** A 2-year program that delves deeper into specialized areas like advanced vehicle systems, automotive safety, and sustainable technologies. The curriculum includes advanced coursework, research projects, and thesis work. Students often engage in sponsored projects and collaborative research with industry partners.

## Vocational Education

**Diploma and Certificate Programs:** These shorter programs, ranging from 6 months to 2 years, focus on specific skills such as automotive repair, diagnostics, and maintenance. They offer practical training and are ideal for those looking to enter the workforce quickly. Assessment is typically based on practical exams and hands-on projects.

## Essentials Skills to Acquire in Automobile Engineering

Students of this program acquire various skills, including proficiency in software tools like **MATLAB**, **Simulink**, and CAD software (e.g., AutoCAD, SolidWorks).

They also learn programming languages such as **C++** and **Python**, which are essential for developing and testing automotive systems.

## Certifications

Certifications from recognized bodies, such as the [Society of Automotive Engineers \(SAE\)](#) and Automotive Service Excellence (ASE), can enhance career prospects. These certifications validate expertise in areas like automotive design, diagnostics, and repair.

## Research and Internships

Research opportunities are abundant, with many programs offering access to state-of-the-art labs and facilities. Moreover, the internships with leading **automobile companies** provide valuable industry experience and networking opportunities.

**Actually, Electric cars are coal-powered cars.** Their carbon emissions can be worse than ICE cars — Shrikant Marathe, former director, ARAI

**Automotive engineering** education is comprehensive, blending theoretical knowledge with practical skills, and preparing students for a successful career in the automotive industry.

## Career Path for Automobile Engineering

A graduate of this program can get a diverse range of career opportunities, starting from entry-level positions to advanced roles in research and development. At the entry level, graduates can find positions as automotive engineers, design engineers, or test engineers. These roles typically involve working on vehicle design, development, and testing, with tasks such as creating **CAD** models, conducting simulations, and performing tests to ensure vehicle safety and performance.

The job market for automotive engineers is robust, with



Fig. 4 Automobile Designer



Fig. 5 Automobile Jobs

opportunities in both traditional automotive companies and emerging sectors like electric vehicles and autonomous driving. Likewise, career progression can lead to roles such as senior engineer, project manager, or technical lead. With experience, professionals can move into specialized areas like powertrain development, vehicle dynamics, or automotive electronics.

System engineers focus on integrating various subsystems within a vehicle to ensure they work together seamlessly, while requirement engineers work on defining and managing the requirements for automotive systems and components. Before building physical prototypes, model-based development engineers use software tools to create and test models of automotive systems. Furthermore, engineers who specialize in HIL (**Hardware-in-the-Loop**), SIL (**Software-in-the-Loop**), and MIL (**Model-in-the-Loop**) testing carry out tests to validate automotive systems. In addition, vehicle testing engineers conduct tests to evaluate the performance, safety, and durability of vehicles, while vehicle harness design engineers design and route the electrical wiring harnesses within vehicles. Finally, cybersecurity engineers ensure the security of automotive systems against cyber threats.

### Major Employers

Major employers in the automobile industry include OEMs like Tata, Volvo, Mercedes, Mahindra, Volkswagen, and Tesla, as well as suppliers such as Bosch, Magna, Valeo, Tata Elxsi, Tata Technologies, and Forvia. Moreover, the research opportunities are abundant, particularly in areas like electric vehicles, autonomous driving, and sustainable technologies. Many universities and research institutions offer funded projects that allow engineers to work on cutting-edge technologies and innovations.

Automotive engineering is a dynamic field with a wide range of career paths, offering opportunities for innovation and professional growth. Whether you're interested in design, testing, manufacturing, or research, there's a place for you in this exciting industry.

### Conclusion

To convert your passion for automotive engineering into a futuristic profession, a well-rounded career planning strategy is essential. Start by reading foundational books on automotive engineering, such as, "Automotive Engineering Fundamentals" by Richard Stone and Jeffrey K. Ball Stay updated with industry trends through journals like "Automotive Engineering" by SAE

International Engage in DIY projects to gain hands-on experience. Building a small-scale model car or working on a vehicle restoration project can provide practical insights. Participate in online courses and tutorials on platforms like Coursera and Udemy to learn about automotive electronics, vehicle dynamics, and CAD software.

Attend workshops and seminars to network with professionals and learn about the latest technologies. Events like the SAE World Congress and local automotive expos are great opportunities. Visiting automotive manufacturing plants and research labs can also provide valuable exposure.

Join student clubs and organizations related to **automobile engineering**, such as Formula SAE or Baja SAE, to collaborate on projects and participate in competitions. These experiences will enhance your skills and make your resume stand out.

By combining theoretical knowledge with practical experience and networking, you can effectively plan your career and turn your passion for **automotive engineering** into a successful profession.

### See Also

[Basics of Automobile Engineering: A Comprehensive Guide](#)