

# Automobile Technology A Study of Past, Present and Future

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**Abstract** - This paper highlights the journey of automobile technology since the very beginning of invention to the present, also discuss the future development of this technology. Automobile technology is always of interest to those people who like to know and get touched with new invention of engineering. This paper can help one to recognize the development in vehicle technology for the past, present, and future. Lot of changes happened in automobile technology since 19th century, when the first radio controlled vehicles were designed. In the subsequent decades, automotive electric cars appeared which were powered by battery and embedded circuits in the roads. By the middle of last century, automotive cars were having approximately same electronic systems shown one by one. Various semi-autonomous type set up in modern cars such as lane keeping, automatic braking and adaptive cruise manage are based on such systems. It is forecasted that most companies will start fully autonomous vehicles by the coming of next decade. The future of autonomous vehicles is an ambitious era of safe and comfortable transportation.

**Keywords** - History, inventions, future predictions.

## I. INTRODUCTION

Automotive Technology is a division of vehicle engineering, included fundamentals of mechanical, electrical, electronic, software, and safety engineering as applied to the design, construct and operation of motorcycles, automobiles, and trucks and their relevant engineering subsystems. It in addition comprises various transformation of vehicles. Manufacturing domain contracts with the formation and gathering the entire parts of automobiles is also incorporated in it. The automotive engineering ground comprises direct application of mathematical models and formulas. The learning of automotive engineering is to design, expand, fabricate, and test vehicles or vehicle module from the concept phase to production phase. In addition this engineering calculated fuel competence of the vehicle in miles per gallon or kilometers per liter.

## II. HISTORY

In 1834, the primary vehicle, actually a tricycle, powered by battery, was developed. 1886 - The first car was invented. Austrian Karl Benz created the first true automobile in the 19th century. That automotive machine was powered by an IC engine. It had three wheels which were very light weight. Before him, any earlier attempts to invent cars used steam power - and didn't have much success.

- Ford's Model T was the world's primary car invented by assembly line. This great jump in technology made the car much cheaper and therefore more commonly affordable. Its 20 horsepower petrol engine could reach speeds of 45mph, which was still time-consuming than the galloping horses of the day.
- Electric explosion starters were launched to swap manual hand cranks and to start the engine with a button

instead. Hand crank were measured to be dangerous because the engine could jump as the car started, infrequently injuring the driver.

- The first electric starter was utilized on a Cadillac in 1912 and they were rapidly commonly adopted. Wireless cigarette lighters had a detachable section that was heated by electricity. By 1925 they were standard in most American cars.
- Several carmakers started to look at ways to formulate driving more relaxing, and they landed on coil spring suspension. Each wheel (at first just the front two) was given its own metal coil spring, which compact itself to absorb the shock you sense when driving over bumps in the way. This suspension system was made for a much soft, soothing ride.
- Looking for a improved way to get the car running, Chrysler launched a technology to begin both the electric starter and the ignition. It placed this power within a key and soon everybody was using one.
- Power steering technology uses hydraulic power to intensify the force on the wheels as the driver turn the steering wheel, saving so much elbow grease. Power steering primary appeared on a Chrysler Imperial and then in a Cadillac a year afterwards.
- The Chrysler Imperial was the first invented car to have air conditioning as an alternative. It came out with three functions: low, medium and high. The subsequent year, the Nash Integrated system presented front end heating, ventilation and air conditioning, making driving a lot extra pleasing experience in the summer.
- Cruise organizes a method invented to permit the driver to keep a stable speed without applying the accelerator. The system made stable driving trouble-free, especially on motorways.

- It was first utilized in another Chrysler Imperial and by 1960 it was a benchmarked characteristic on all Cadillac's too.
- The modern three-pin seatbelt was developed by Nils Bohlin, Volvo's first safety engineer. Volvo decided to offer the patent to other carmakers free of charge, knowing it would save lives. It was obligatory for carmakers to fit seatbelts in the UK from 1965, but just obligatory to wear them in the front seats from 1983.
- Wearing a seatbelt became required for all children from 1989 and for back seat passengers from 1991. The smooth buzz of rolling down an electric window was initially simply accessible on luxury models, and it was generally an optional added on most cars until quite recently. But finally winding down your car windows became a thing of the past. talking about the Automobile Technology at present: Since Henry Ford (founder of the Ford Motor Company) unlock the doors of Ford at the starting of the 20th century, technology has redefined the way cars are produced, functioned and preserved.
- Technology has already redefined the way cars consume fuel, with electric, hybrid and solar energy systems commenced to relocate the internal combustion engine and gas-fed engines as the driving force of the upcoming. The automotive industry is in a actual conversion stage that will redesign the industry and culture forever. Micro Masters Program on Emerging Automotive Technologies will offer you with a good quality opening point. The major alteration that has previously occurred in the automotive industry as an outcome of technology is that of autonomy. Manufacturers are in the course of developing self-driving cars on a larger extent.
- The majority modern cars characteristic autonomous systems like Autonomous Emergency Braking (AEB). AEB systems use radar, cameras .Technology to measure the way in advance and work out possible collisions. These systems usually notify the driver that action is essential to evade a future collision, and then if no act is taken, AEB will slow down on behalf of the driver. One more autonomous system that freshly featured in the Google Car is road-user interpretive software that has been programmed to understand the common road actions of other drivers. Shape and movement descriptors permit the cars central processing unit to create intelligent choice in comeback to the movements of other road users.
- Automobile technology has altered a lot since the 1990's, let alone the starting of 20th Century. Some fresh discovery of current automobile world is specified .They actually helped to illustrate just how far the technology has come since the starting in the 20th Century. The subsequent list is far from extensive and is in no particular order.

**1. The Steam Engine Kicked Things Off** - The steam engine was, unquestionably, the very significant

innovation in automobile engineering. Even if it initially it was produced to pump water out of mines, enhancement over time would significantly shrink the size of the technology. Steam engines would at first lead to the expansion of locomotives. The steam car became well-liked at earlier 1900s, chiefly as roads improved. Fuel was comparatively inexpensive as well. The fortune of the steam engine car was sealed when Henry Ford fully invented his mass production process. Electrical starters for internal combustion engines also removed the want for hand crank engine starting but internal combustion engine driven cars would eventually win out as they were much cheaper to buy.

**2. The Starter Engine Rendered Hand Cranks Obsolete-** Internal combustion engines are feedback system that relies on inertia from each cycle to start the next. For this cause, cars require a way to revolve (crank) the engine so it can run on its own power. Early on engines used various means from gunpowder cylinders to springs to pure manpower using the iconic crank handle to do this. Even though effectually these methods were not convenient, sometimes hard, and could be risky. Engines would often 'kick back' meaning the procedure was less than expected. What was needed was a less lengthy, more suitable, and predictable means of starting the engine. So the discovery of electric starter motor was the immense solution of engine starting system. The first electric starter was developed in England by H. J. Dowsing in 1896. Starter motors have now come to control the automobile market.

**3. The Diesel Engine Is Pretty Efficient** -The Diesel engine, or compression-ignition (CI Engine), was developed by Rudolf Diesel and is still today the chief thermal efficiency of any realistic internal combustion engine. In few cases, low-speed diesel engines can have a thermal efficiency of just over 50%. As the name suggests, ignition of the fuel is accomplished by mechanical compression of the air in the combustion chamber to such a degree that injected atomized diesel ignites instantaneously (adiabatic compression). This is dissimilar with the spark ignition of petrol or gas engines. Rudolf Diesel, after approximately being killed by an earlier ammonia vapor fueled steam engine, determined to base his new engine on the Carnot Cycle instead. Diesel published his groundbreaking treatise "Theory and Construction of a Rational Heat-engine to swap the Steam Engine and The Combustion Engines Known Today. The Diesel engine was born.

**4. Anti-lock Brakes Has Helped to Save Lives** -Anti-lock brakes or anti-skid barking systems (ABS) are in fact a pretty old piece of automobile engineering. Modern systems permit the car to keep the attractive contact with the road during braking, thus avoiding the wheels from locking or stopping to rotate and therefore causing the vehicle to slip. The system is automated and takes benefit of the principles of entrance and cadence braking practiced by skilled drivers using the previous generation

of braking systems. A truly modern system, named "Sure brake" was introduced by Chrysler and was a computerized, three channel, four-sensor all-wheel ABS.

It came as standard on 1971. Other car manufacturers go after suit over the following decades with ABS being initiated in the 1990's on motorcycles.

**5. Automatic Transmission Made Driving Easier -** Automatic transmission, auto or self-shifting transmission is one more great innovation in automobile engineering. The automatic system frees the driver from the necessity to change gear ratios manually as the vehicle is on the move. This innovation, in a pinch, instantly reduced the amount of controls that a driver needs to utilize the control of the automobile.

It has had clear pros for individuals with disabilities but also means the driver can keep two hands on the wheel more often than in manual cars.

**6. Power Steering Made Driving More Pleasurable -** Power Steering or power-assisted steering (PAS) is one more amazing innovation in automobile engineering that helps drivers steer their cars. Using hydraulic or electric actuators, drivers require exercising much less effort when turning the steering wheel than in not PAS fitted vehicles, chiefly at low speeds or when stationary. Chrysler Corporation was the foremost to make power steering commercially accessible in a passenger car.

**7. Airbags: Saving Lives with the Power of Air-** Airbags are one of the mainly significant innovations in vehicle safety and automobile engineering. They are intended to inflate extremely quickly and deflate equally as fast during collisions, impact or unexpected rapid deceleration. This technology has factually saved thousands of lives since their mass acceptance in the automobile industry. The system utilizes compressed air that was generated using a spring, bumper contact or physically by the driver. It would take the expansion of crash sensors in the 1960's for the technology to turn out to be widely adopted.

**8. Electric Car Engines Are a Thing of the Past and Future**

Electric car engines have been around for a lot more than you might think. The previous electrical cars were trendy in the late 1800's and early 1900's as they presented a level of simplicity and ease of use not attained by opponent technology at the time. It is estimated around 30,000 such vehicles have been created by the turn of the 20th Century. The internal combustion engine would in the end win out, shunting electrical cars into the darkness until the electric cars rebirth in the late 20th Century.

**9. GPS-GPS,** or Global Positioning System, was initially developed by the United States Government for use by their equipped forces. The first system utilized 24 satellites and became completely operational in 1995. Credit for its creation is often given to Roger L. Easton, Ivan A. Getting and Bradford Parkinson from various agencies. Civilian use was authorized from as early as the 1980's. GPS systems have since become incorporated

into many modern technologies from your Smartphone to your car and have revolutionized the way we all find the way.

**10. Catalytic converter: Improving Air Quality-**The catalytic converter is one of the main significant automobile engineering innovations of all time. Its capability is to change toxic and other pollutants into less-hazardous forms has enhanced the air quality of our cities significantly. The fundamental concept is to pass weaken gases through the converter, catalyzing it in a red ox reaction. They have become a valid necessity on diesel and gasoline engines but can also be built-in to lean-burn engines and kerosene heaters and stoves. It took stricter environmental policy around the world for the mass acceptance of them into cars.

**11. Saving Lives with the Three-point Seat Belt-**The now ubiquitous three-point seatbelt is intended to disperse deceleration energy throughout a collision over the chest pelvis and shoulders of the passenger. It was first set up by Volvo in 1959 and it was produced by Nils Bohlin? who had earlier worked for SAAB developing ejection seats. Previous to this innovation, the two-point seat belt was the standard. These strapped across the body with a buckle located over the abdomen. These were known to cause serious injuries during high-speed crashes. According to the U.S. National Highway Traffic Safety Administration these belts save around 11,000 lives every year.

**12. Improved Fuel Efficiency with the Hybridized Drive-train-** When Toyota released the Prius in 1998, though invention started in 1997, few would be grateful for the impact it would have on the auto industry. It included a hybrid drive-train that significantly enhanced fuel competence forcing other car manufacturers to follow suit. The Prius was the first mass-produced hybrid that came with a tiny 1.5-liter gas engine, electric motor, and nickel-metal hydride battery. Even though uptake was slow at first today most car brands have some form of hybrid vehicle in their catalog.

**13. Stability Control Helped Stop Skids -** ESC or Electronic stability control helps correct a slide if your car starts to slide. It is, in result, an enhancement on the anti-lock brake systems that preceded it. ESC had a marked development in car safety, especially during emergency situations. As ESC yaw sensors detect a slide, the system applies the brakes on individual wheels to help correct the skid, and straighten the car. Some ESC systems also take control of the throttle to manage power to each wheel as well. Mercedes-Benz and BMW brought ESC to their luxury market in the mid-1990s. As the technology improved over time it became a legal obligation in many countries in passenger cars from 2011.

**14. On-board diagnostics II (OBD II) Improved Engine Management-** On-board diagnostics II, OBD II for short, was the natural progression from the first onboard diagnostics systems. Normally it helps the mechanics and professional technicians to find out what

precisely is wrong with a vehicle in the course of troubleshooting codes. OBD II also allowed for a significantly more complicated method of controlling the engine, improve fuel efficiency etc. It was at first hated by car enthusiasts and mechanics it has sparked a new industry of scan tools and other aftermarket devices ranging from fuel economy meters to engine performance tuners.

**15. Dual-Clutch Transmission Made Gear Shifts Seamless-** Dual-Clutch Transmission (DCT) permit for a driver to switch between gears and enhanced and seamless speed compared to more traditional transmissions. It has resulted in a procedure that is as easy as an automatic transmission but quicker than a manual transmission. On a typical six-speed DCT gearbox, one clutch will handle odd gears whilst the other will shifts even gears. Gear changes are managed by a series of computers. DCT was first invented in the 1980s in racing cars but was first brought to the general public by Volkswagen. Their first dual clutch transmission, DSG, was launched in 2003. It has since become extensively accessible in many other car brands from Lamborghini to Mercedes-Benz.

**16. Smart Key (Fob): Effortless Engine Ignition** The traditional car key is fast becoming a living fossil in the auto industry. Smart keys are fast becoming the standard with many meaning engine ignition is started with the press of a button not the turning of a key. Some even open the car you as you move towards. These were once just a innovation with some early designs resembling a credit card. As suitable as key fobs are, they could leave your car open to car hacking.

**17. Turbochargers Increased Energy Power and Fuel Efficiency-** Turbochargers, Turbos, have been used in developing cars since the 1960's.

They are well compressor that is determined by the cars exhaust gasses, forcing more air into the engine's cylinders. More fuel and more air leads to more power and can make a smaller engine perform outside of its class. They are usually used with Otto and Diesel cycle engines. Nowadays, car manufacturers now in general downsize their engine sizes to comprise turbocharged options. This at the same time boosts act and increases fuel efficiency.

**18. Flashing Turn Signals Lets Others Drivers Know Your Intentions-** Another important automobile engineering novelty was the flashing turn signals (indicators). Cars are necessary to blink on and off at a rate between 60 and 120 "blinks per minute". Older models used a thermal interrupter switch to offer the 'blink' but these have been replaced with transistor circuits.

**19. Cruise Control Paved the Way for Driverless Cars-** Cruise control was first developed by one Ralph Teeter. He developed it in response to his idea that uneven speeds caused accidents. And so Ralph succeeded in initial a servomechanism to help manage a

car's speed by taking control of the throttle from the driver. The addition of radar to cruise control in the early 2000's has since taken the technology to the next level. It has also paved the way for driverless cars.

### III. FUTURE AUTOMOBILE TECHNOLOGY

**1. Hybrid-Electric Vehicles-** Hybrids are vehicles that unite two energy sources (for example, an IC engine and a battery) in a single vehicle, and use electric motors to provide some or all of the vehicle's motive force. The hybrid drive train offers some advantages: limited range becomes less of a trouble, or no problem; a portion of inertia losses can be recovered through regenerative braking; and the engine can be operated near its optimum (most efficient) point.<sup>43</sup> A key drawback can be the added weight, cost, and complexity of the hybrid's numerous components. A number of proponents have claimed that a hybrid arrangement can yield fuel economy improvements of as much as 100 percent over an otherwise-identical conventional vehicle, and a number of experimental vehicles, including winners of DOE's Hybrid Challenge college competition, have claimed very high levels of fuel economy, up to 80 mpg. An examination of the real vehicle results indicates, however, that the conditions under which high fuel economies were achieved are conditions that typically lead to high levels of fuel economy with conventional vehicles, and the test vehicles classically had inadequate performance capability.

**2. More Fuel-Efficient Vehicle-** Fuel competence means the ratio from attempt to result of a process that converts chemical potential energy restricted in a fuel carrier into kinetic energy. Basically fuel economy is the energy competence of a particular vehicle, given as a ratio of distance travelled per unit of fuel consumed. It is dependent on engine competence, design of transmission, and aim of tire. Fuel consumption is a really exact measurement of a vehicle's performance because it is a graphical relationship while fuel economy leads to distortions in competence improvements.

#### 3. Predictive Vehicle Technology:

With the help of Predictive automobile technology identifies vehicle preservation issues prior to their occurrences. By leveraging data from guarantee repairs with current vehicle sensor data, predictive automobile technology can find important connections that would be hard for a human to discover in a short period of time. So the engineers are working on development of this technology. More manufacturers are submit an application of algorithms that use data to computerize the procedure of setting up a vehicle, including a car's infotainment system and its application preferences. Vehicles are becoming IoT devices which can connect to smart phones and take voice commands, changing the user interface. This technology can also be utilized in the form of sensors in a car that notify the user whether or not

the vehicle needs service from a technician. According to car's mileage and condition, this technology will assess its performance, set up appointments in real time and notify users of any safety hazards.

**4. Self-Driving Technology-**A self-driving car, also known as an autonomous car, driverless car, or robotic car, is a vehicle that is able of sensing its environment and moving safely with small or no human input.

**5. Cars-as-a-Service (CaaS)-**Car as a Service (CaaS) model is being advertise to be an enhancement over the existing car leasing model. The present model is heavily focused on assets. The contracts bind the customers with vehicles for long periods of time. The lease period agreed upon at the commencement of the lease is inflexible. Any changes made to the lease attract severe penalties and financial losses from the customer's point of view. On the other hand, Car as a Service (CaaS) program provides elasticity in the hands of the customers. They can modify and upgrade their vehicles as and when they want. Like lease contracts, subscription to a car does not bind the customer for many years. Simply put, the Car as a Service (CaaS) program works like a Netflix subscription. Customers can pledge to cars on a month-to-month basis.

**6. Weight Reduction Materials-** Because it gets less energy to accelerate a lighter object than a heavier one, lightweight materials offer great potential for rising vehicle efficiency. Replacing cast iron and traditional steel components with lightweight materials such as high strength steel, magnesium (Mg) alloys, aluminium (Al) alloys, carbon fiber, and polymer composites can openly reduce the weight of a vehicle's body and chassis by up to 50 percent and therefore decrease a vehicle's fuel consumption. We'll dive into each technology I'm most anticipating, but here's the overview:

1. Level 3/4 Autonomy
2. Micro mobility
3. Smaller, More Efficient Electric Motors
4. Solid State Batteries
5. Electric Charging Technology
6. Sensors for Perception
7. Wireless Technology
8. Automotive Materials and Manufacturing Processes
9. Fully-Active Suspension
10. Purpose-Built Enabling Technologies

#### IV. PROBLEMS

It is informed that vehicles production accounts for 39.2% of the total emission in 2007. The scientific basis of this attempt is the pioneering atmospheric chemistry research showed that photochemical reactions among hydrocarbons (HC) and nitrogen oxides (NO<sub>x</sub>) produce the many secondary pollutants that reduce visibility and cause eye and nose irritation. Solutions: our current knowledge of automotive emissions, including standards, control technology, fuel economy, fuels and additives, in-use emissions, dimension methods for unregulated pollutants, and models for predicting future automotive emissions. Fuel economy is built-in because

achieving high fuel economy and low emissions together makes the engineering effort more difficult. Emissions and fuel economy are interrelated because both are influenced by the engine combustion system design. In practice, the stringency of emanation standards determines the significance of this interrelationship. After current knowledge in each area has been reviewed, important gaps in our knowledge are identified and research needed to fill these gaps is described.

#### V. CONCLUSION

There have been much improvement in technology over the last 50 years, but questionably none as drastic as the advancements made in the auto industry. An impossible amount of improvements to automotive technology have been made, making cars easier to drive and operate, safer, and perform better. The result being cars have become a very valuable part of human's lives, and cars will continue to get better with technology. Cars don't just get the passenger from one place to another, also offer a lot more with growing technology, cars are fun to drive, offer music, field phone calls, are our navigators, and keep safe. Cars have changed lives in the whole world, and it is significant that people utilize the technology cars can offer. Different future technologies were studied and their benefits were presented along with their working. Once these technologies become fully functional it will not only make the travelling part of human comfortable but also reduce the reliance on conventional fuels. It has been observed that these technologies are also surroundings and user friendly.

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#### Note:

1. Tense must be one. In a same Para, there mustn't a mixture of past and present tense together.
2. Person must be used carefully, using of 3rd person are strictly prohibited.
3. Must maintain THE SPACE after one sentence is finished.
4. Key words must be added.
5. Abstract is expected to be modified for a better quality.