

Chapter 46

The Exploration of Autonomous Vehicles

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ABSTRACT

This chapter explores the world of autonomous vehicles. Starting from the beginning, it covers the history of the automobile dating back to 1769. It explains how the first production automobile came about in 1885. The chapter dives into the history of auto safety, ranging from seatbelts to full-on autonomous features. One of the main focuses is the creation and implementation of artificial intelligent (AI), neural networks, intelligent agents, and deep Learning Processes. Combining the hardware on the vehicle with the intelligence of AI creates what we know as autonomous vehicles today.

INTRODUCTION

As technology grows exponentially greater every day, it starts to seep more and more into our everyday lives. First, it started with computers, smartphones, and even home products like our fridge and coffee maker. Now, it is starting to become a staple in the automotive industry. It started out simple with the steam engine being the turn of the century technology. Soon technology became even more advanced with gasoline engines, electric engines, stability control, power steering, and even electric windows. In 2018, technology has advanced so much that our automobiles are assisting our driving and even driving for us. Self-driving vehicles have officially arrived and are available to the public.

The rest of the chapter is organized as follows. An overview of the background and previous history leading to technology and hardware in section 2. Section 3 discusses the software and AI used in autonomous vehicles. Section 4 discusses deep learning and how the AI is taught. Finally, we discuss the benefits and future endeavors of autonomous vehicles in section 5.

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BACKGROUND

In 1769, Nicolas-Joseph Cugnot built the first “automobile”. Cugnot was a military engineer who had experimented with many different steam engines. The French army wanted a faster and more efficient way to transport its cannons, so Cugnot built the “fardier à vapeur”. The vehicle had three wheels, weighed over 2.5 tons, and was powered by a boiler mounted above the front wheel. The weight distribution was so off, if there was not enough weight on the back it would tip forward. Add that the fire for the boiler had to be lit every 15 minutes, with the weight and slowness, the project was scrapped (The Library of Congress, n.d.).

Even though the first true automobile is up for debate, generally, Karl Friedrich Benz is credited for creating the first true automobile. In 1885 Benz built the “Benz Patent-Motorwagen” which was the first production automobile to be powered by a gasoline engine (Daimler, n.d.). The automobile was revolutionary for its time with a set of innovations never seen before. The two-stroke engine produced 2/3 horsepower which drove three wheels crafted out of steel and wood. No one had manufactured steel to be used for wheels before. The wheels even had solid rubber surrounding them, which was the turn of the century innovation that inspired tires today.

The car that truly revolutionized the industry, utilized technology, and became the best-selling car in American history: The Ford Model T. The Model T was produced from 1908 to 1927 by the Ford Motor Company (History.com Editors, 2010). It is known for its practicality and reliability. It was the car for the “common” people of America. It was able to be produced so widely due to Henry’s revolutionary idea for an assembly line (PBS, n.d.). Ford found out that to produce a low-cost car, there were 4 principals that needed to be followed: interchangeable parts, continuous flow, division of labor, and reduce wasted effort. Following these, Ford was able to reduce the cost of his model T down to less than \$300 from the original \$850. The simple motorized belt that moved parts along for people to assemble truly started the automotive industry.

Ever since the invention of the car and the production line, technology has not ceased its endeavor to grow in the automotive industry. In fact, automakers are creating new and exciting technology to make driving easier and more importantly safer. Besides the assembly line, one of the best “primitive” technologies integrated into vehicles was the electric ignition in 1911. Cranking the car to start posed somewhat of a safety hazard. Once the engine would start, sometimes the car would jump forward, injuring whoever cranked the car (Jardine Motors Group, n.d.).

It wasn’t until the 1950s that other safety-oriented technology arose. It started with power steering in 1951 (Riley, 2018). This technology used hydraulic power to increase the pressure on the wheels, making it a lot easier to turn a car. It is still used to this day with electronic integrated steering. In 1959, Nils Bohlin, a Volvo safety engineer invented the 3-point seatbelt we see today (Jardine Motors Group, n.d.). Anti-Lock Braking (ABS) was introduced in 1971 which prevents the wheels from locking up under harsh braking. That is why your brakes pulse when you “slam” on the brakes. Airbags made their debut to the public in 1988. They were very shoddy at first, but with technology have improved greatly. In 2018 we have airbags virtually all around the inside of the car for maximum safety.

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