A top-down view of a car chassis on a production line. Several yellow robotic arms are positioned around the chassis, with some actively welding, creating bright sparks. The background is a green-tinted wall with a diamond-patterned texture. The overall image has a green-to-teal color gradient.

The Automotive Industry

a PatSnap Report

patsnap

Introduction to the Automotive Industry

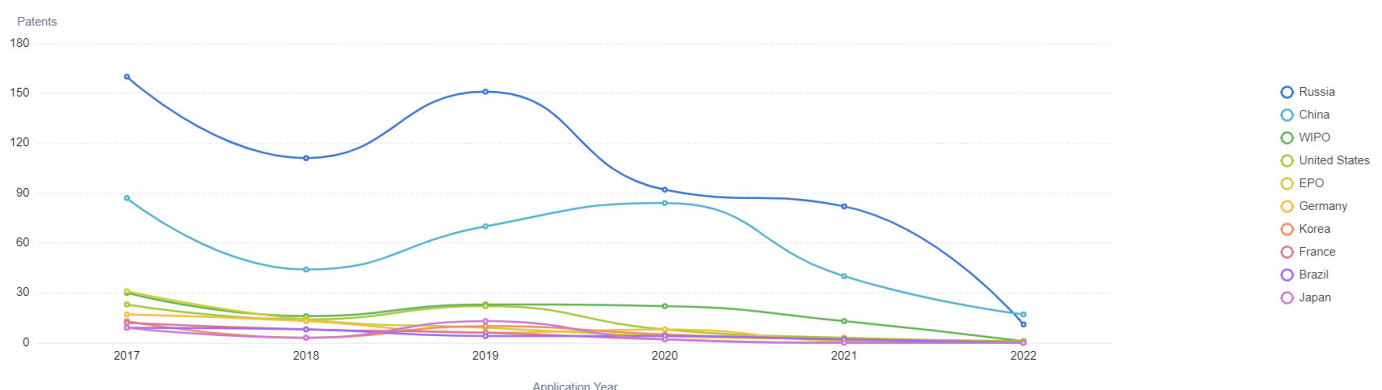
From autonomous driving to customized features, radical changes are taking the automotive industry by storm. A [recent study](#) shows consumer interest in automotives is shifting not only towards affordability, but also sustainability. Car manufacturers including BMW, Ford, Nissan, Honda, and Mazda (to name a few) are adding Electronic Vehicles (EVs) to their production lineups.

In this white paper, we'll examine the intellectual property (IP) in the automotive industry, including the historic and current business challenges, as well as related patent filings. At the conclusion of this paper, you'll have a deeper understanding of how current and past events are shaping the future of the entire industry.

Historical Context of the Automotive Industry

The modern day automotive has a deep history of peaks and troughs, in both design and business challenges, because of this, the industry has always been subject to intense innovation. A key aspect of this transformation was the formation of the manufacturing assembly line, started and led by Ford after World War I, with the company's famous Model T vehicle. By the time industrialization came into full swing, the automotive industry was propelled into a time of hyper-change, and operational optimization, to produce automobiles around the world.

The automotive industry played an essential role in WWI – supporting global military initiatives via transportation and supply on local and global levels. Learning from the manufacturing and fabrication processes of the industry's success, automotive manufacturing plants were often repurposed for the manufacturing of military equipment like aircrafts and tanks. In a post-World War II era, motor vehicle production increased almost 10-fold, notably outside of the United States market, specifically in Japan, China, and Europe, as industrialization encouraged an ideology of consumerism which ultimately meant higher demand for goods and services, and transportation needs.

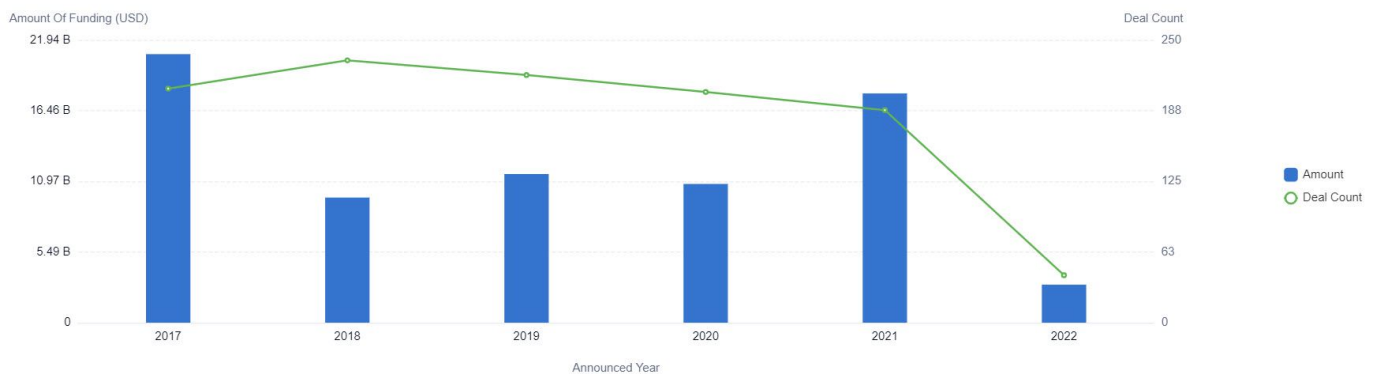


Application Trend in Top Countries, Last 5 Years, PatSnap Discovery

By the 1980s, as the manufacturing assembly line became common practice, four major automotive organizations dominated the United States market. These included General Motors, Ford, Chrysler, and AMC. At the same time, global competition emerged, namely with Honda Motors, Nissan Motors, and Toyota

Factors including globalization, increased knowledge transfers, and the need for low-cost supply chains encouraged local governments to incentivize innovation in the automotive industry. In the Japanese market, Honda Motors, Nissan Motors, and Toyota arose, and local Russian automotive companies such as AvtoVAZ and GAZ became prevalent through various government incentivization. Even though Germany and the United States were the highest patent filers in the early 2000s, Russia and China take the lead in 2022, while the United States remains the third highest patent filer (as shown in the graph on page 1).

Thanks to the efforts of Henry Ford, who revolutionized the car manufacturing process, cars became affordable for people from all walks of life. Plus, the global economy saw a massive boost, which continues to the present day. As it stands, the automotive industry supports approximately 4.25 million jobs. It also adds trillions to the global economy, accounting for roughly three percent of GDP.

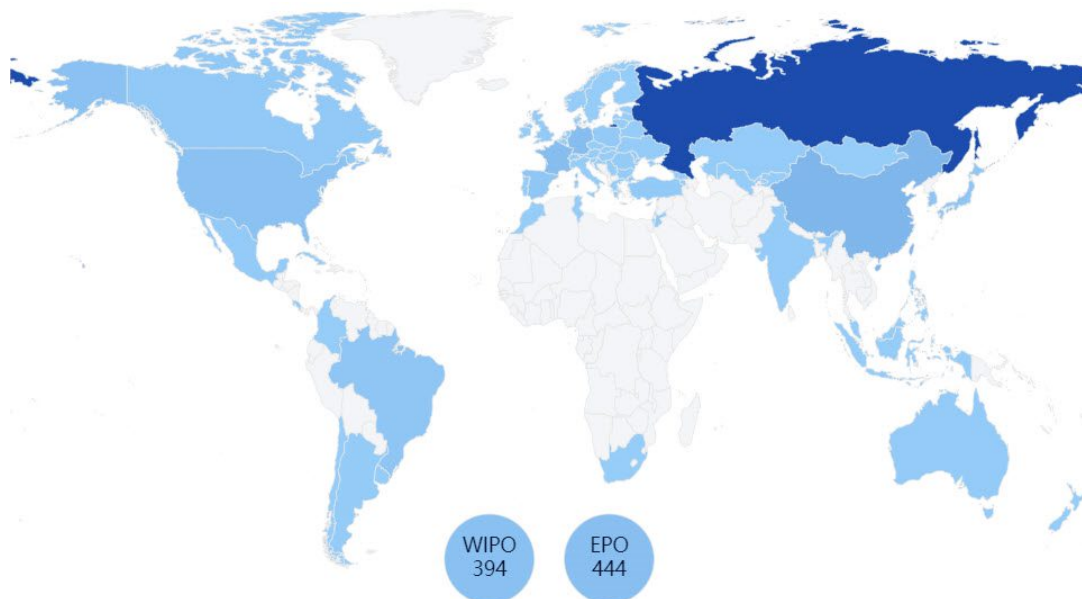


Investment Trends in Automotive Industry, PatSnap Discovery

In the United States, the automotive industry contributes 3 to 3.5% GDP. One of every six American businesses depend on the manufacturing, distribution, servicing, or use of motor vehicles. The chart above details investment trends in the US automotive industry. As you can see, several large investments happened over the past several years, including nearly \$20 billion in 2017, and \$18 billion in 2021.

There are plenty of non-conventional companies which are receiving funding to support their ventures into the automotive space. New technologies are being applied to the industry which may not be seen as typical. For example, small start-up Cognosos Inc, received \$7.1 million in Series A round from Cox Enterprises, Inc in 2017. Their patented RadioCloud technology, which was developed at the Smart Antenna Lab at Georgia Tech, has had successful deployments in the automotive sector. Their cloud-based wireless platform extends the physical layer of wireless networks into the cloud. This may come as a surprise that an IoT company is having success within the automotive sector, however this demonstrates the innovation around this industry. There are more applications to this type of technology as the innovations develop.

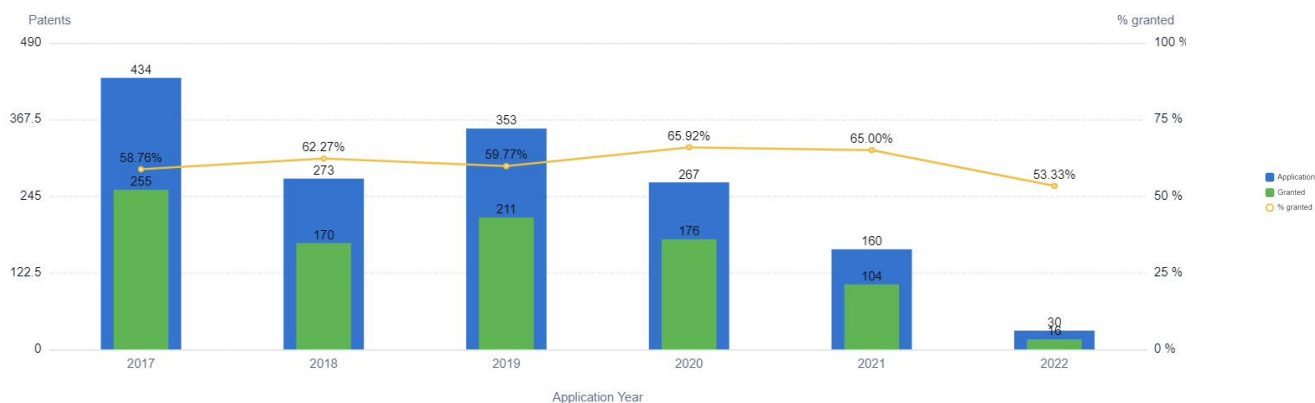
Staying on the theme of unexpected applications into the automotive sector, in 2021 Actnano Inc announced the close of an oversubscribed \$21.75 million Series B financing led by BMW iVentures. The nanotechnology company specializes in water and environmental resistant nanocoating technologies. Their nanoGUARD technologies are currently protecting 80% of Electric Vehicles (EVs) in North America, but also electronics on over 2 million production vehicles. Their CEO, Taymur Ahmad stated: “The strong automotive backing shown in this investment round confirms our belief that basic vehicle safety protections should not be overlooked. For ADAS and AV systems to operate without failure, they need 100% protection from salt, condensation, and humidity to protect the numerous sensors and processors that run that.” Automotive companies are investing in the most high-tech solutions to their problems, as they go into the area of EVs. This therefore explains the expansion of funding within this industry as there is high development that is happening in a short amount of time.



Patent Geographic Distribution, Automotive Industry, PatSnap Discovery

Today, patent literature illustrates that the automotive industry is shifting towards sustainable solutions and diversifying product lines, with a focus on electric vehicles. The increase in electric vehicle manufacturing ties closely to the pressing implications of climate change and changing consumer preferences. According to a recent report, 52% of car buyers indicate they intend to purchase an EV in 2022 – highlighting concerns related to climate change. As a result, large automotive players such as Ford and General Motors are diversifying their portfolios.

As the overall automotive industry grows to \$9 trillion by 2030, the number of patent filings will further increase. Unsurprisingly, China – which is also the leader of solar energy – is exceeding all other markets in automotive patent filings ([see our Perovskite report here](#)). The Chinese government seeks to compete both locally and globally in automobile manufacturing.



Patent Application and Grant Trend, Automotive Industry, PatSnap Insights


The automotive industry's IP is intricate and nuanced. There are many opportunities for patenting ideas and processes in this field. Manufacturing techniques related to engines, bodies, batteries, fuel, (excluding tires) hold an abundance of development opportunities.

In 2017, nearly 60,000 patents were filed in the automotive engineering area. The industry noted a dip in 2021, likely related to the semiconductor shortage and supply issues, with 39,000 patents filed. This year, we expect to see a filing uptick as the grant rates remain relatively the same, which suggests the industry is active and constantly innovating. With resources stretched thin, and economic volatility during the COVID-19 pandemic, new automobile sales dropped by 80 percent. However, sales are rebounding, and like other chip-driven industries, the automotive industry is competing for the supply. (To learn more about the impact of the semiconductor shortages on the automotive industry, [click here](#) to read our Semiconductor Deep Tech Report).

Based on current academic reports and research trends related to charging stations, battery packs, greenhouse gas, and fossil fuels, it's clear sustainable solutions will shape the future of the automotive industry. Specifically, we expect to see more automotive organizations researching, launching, and prioritizing EVs.



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