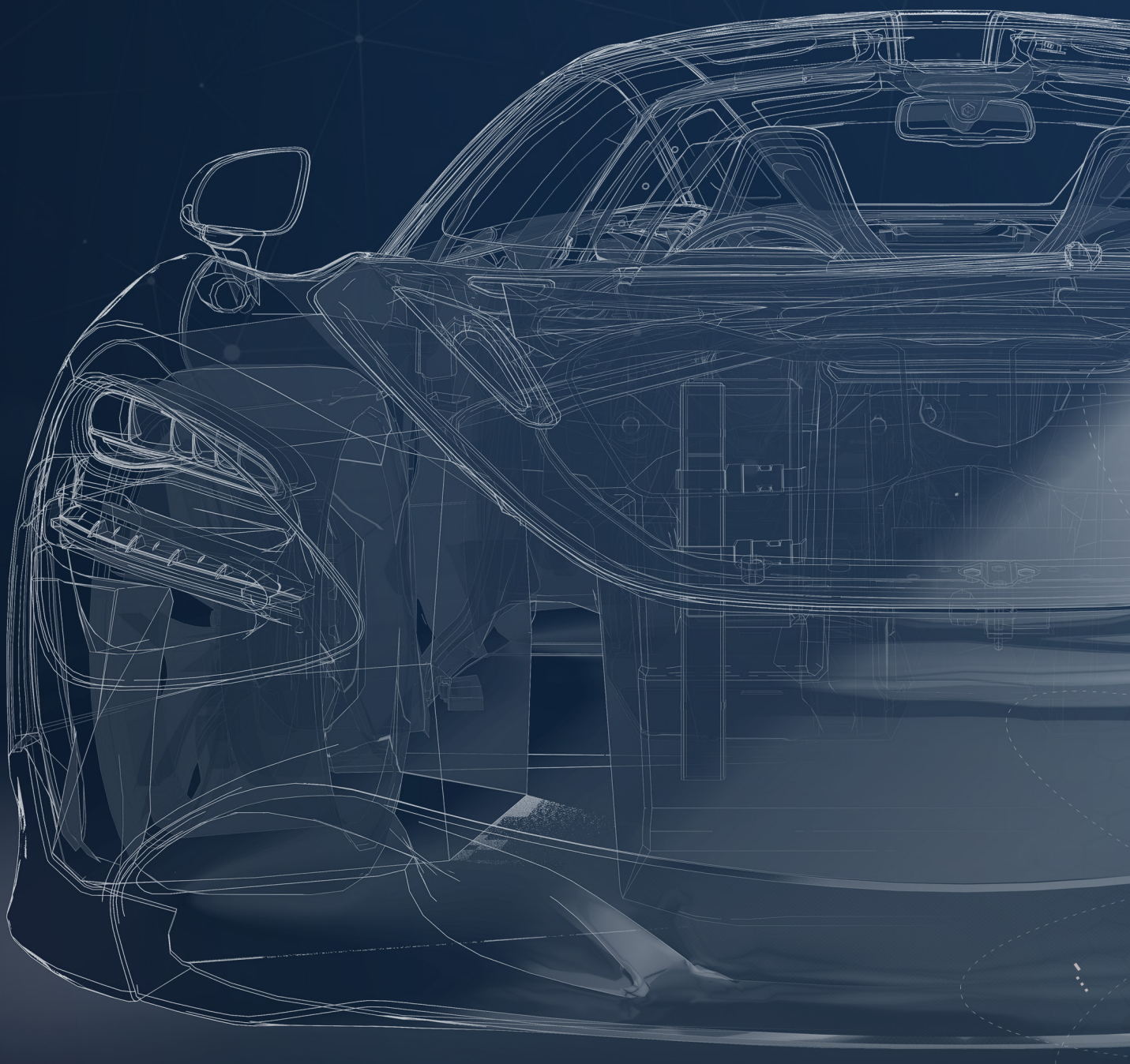
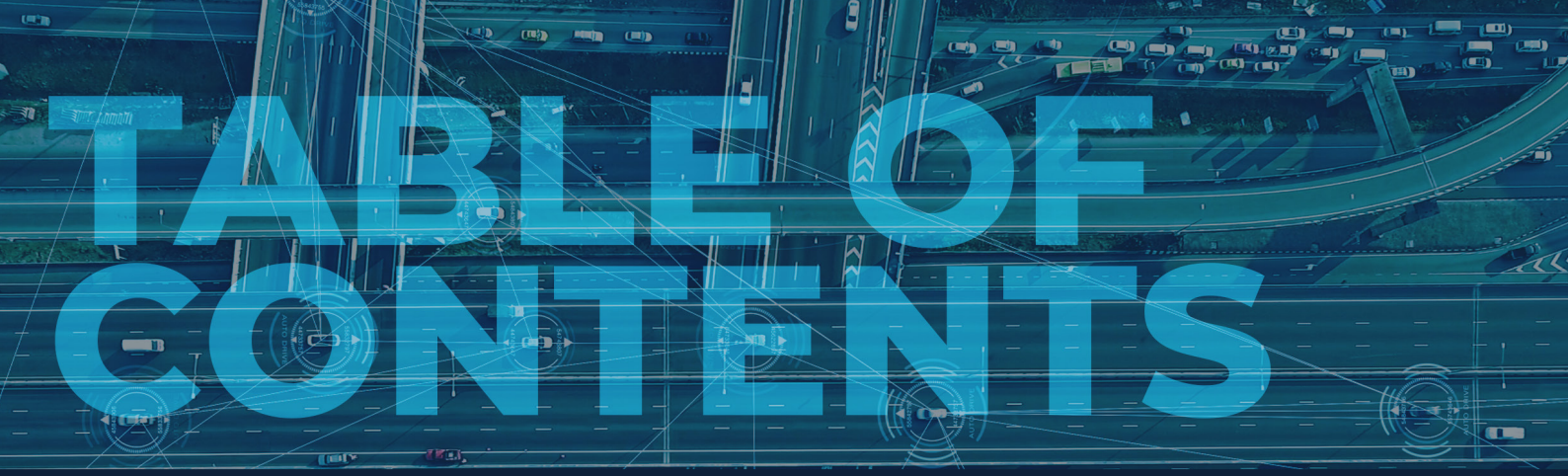
Mobilian

Securing the Path for Autonomous Cars

Whitepaper





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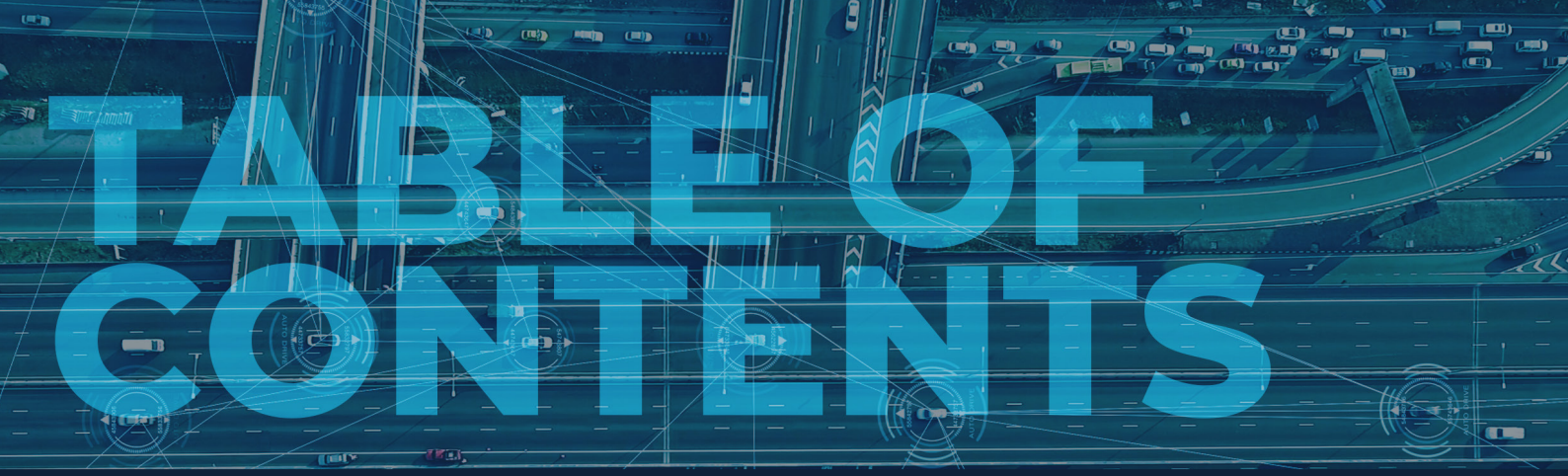

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1. Disclaimer

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2. Vision

Mobilian's vision is to respond to the concerns of the automobile market, particularly concerning autonomous vehicles. Resource and investment in autonomous cars is not an issue for the booming industry, there are already countless reputable automobile brands that are investing massively in this phenomenon. However, there still exist huge gaps in security and technology of autonomous transportation.

At Mobilian, we have four main offerings that aim to answer major problems experienced in the market. These problems have been delaying the circulation of autonomous vehicles in cities. With a considerable increase in smart cities around the world, we believe that there are already several countries ready to embrace the innovation we propose. Mobilian offers blockchain, Artificial Intelligence (AI) data storage, a MaaS application, and an open-source research library to top it off.

Our vision is mainly to mobilize the development progress on the fast track by offering blockchain-based solutions. That said, the Mobilian ecosystem is solely engineered for the autonomous vehicles industry. From an underlying secured network that supports AI-powered driverless cars to a research library for knowledge sharing, Mobilian instills decentralization and security within its ecosystem.

As autonomous cars are highly-dependent on big data, vehicles can now count on Mobilian to automatically save all information through our decentralized environment. We envision further securing technologically-dependent autonomous vehicles against cybercrimes, theft, and even DDoS attacks by integrating Overlay Block Management (OBM) on top of the Mobilian blockchain.

Finally, our product strongly considers the importance of sharing knowledge and information. In this way, we offer an open-source research library to work as a network where companies can collaborate and learn from their driverless car prototypes. With our exclusive library, automakers have the choice to selectively share the information they wish to share on the network.

3. Executive Summary

Intelligent automotive technology has been seen advancing in a rapid phase. As artificial intelligence (AI) development continues to progress, our society comes a little closer to the reality of having self-driving vehicles on the road in the near future.

By 2030, 1 out of 10 cars is expected to be self-driving on public city roads alongside conventional vehicles.[1]

The biggest difference between conventional vehicles and autonomous ones is that the latter is connected to a network. Instead of humans, technology serves as the vehicle's driver. For technologically-driven vehicles, data serves as an integral role in ensuring driverless cars can navigate around city roads efficiently and safely.

Autonomous vehicle technology will help accelerate the growth of Mobility-as-a-Service (MaaS). Through our existing MaaS applications, we observed that more people move away from owning vehicles to be commuters, signaling strong transportation demand will eventually increase.

MaaS allows the integration of transport modes that offer the convenience of getting picked up on their current location and getting to their final destination. Existing public transportation systems are not always able to get passengers from their starting point to their destination location Autonomous vehicles may help.

Furthermore, for some communities that experience a shortage of drivers, autonomous drivers, autonomous networks could provide a new and innovative transportation option other than traditional taxis and car-pooling services.

What is Mobilian?

Mobilian is a blockchain-based network that powers up an ecosystem dedicated to secure autonomous vehicles. Mobilian was established to accelerate and drive the development of autonomous vehicle innovation.

The robust security features Mobilian offers will be adequate to secure vehicle AI controls, data storage, along with other decentralized platforms that will be created on the same network. As data is vital for AI-driven vehicles, a reliable blockchain-based data storage will help guarantee the efficiency of automated cars.

Mobilian encourages decentralization within the autonomous automotive industry. We offer a safe environment where automakers and innovators can practice healthy exchange of knowledge regarding driverless car development. With collaboration and transparency among driverless car manufacturers, AI-driven cars can hit the public roads earlier.

In the future, we aim to develop Mobility-as-a-Service (MaaS) applications to see all driverless cars offering a ride on the network. Mobilian leverages the power of blockchain to support the autonomous vehicle industry from securing the vehicle's AI control panel to powering a robust interactive ecosystem.

4. Driverless Transportation Innovation

Currently, there are no legally operating and fully-autonomous vehicles in the world.[2] However, there are already partially-autonomous cars and trucks with different amounts of self-automation, from conventional cars with brake and lane assistance to highly-independent, self-driving prototypes.

Driverless technology is becoming increasingly common despite its embryonic phase. It is expected to radically transform the transportation system, considering economic and social matters. The autonomy of autonomous vehicles is discussed in five different layers (levels) from 0 to 5. Level 0 is being defined as found the level where all the major systems are controlled by humans and level 5 when the car is completely capable of self-driving in every situation.[3]

Presently, we can adequately say the technology walks between levels 2 and 3. We are already selling cars in level 2, which means the vehicles offer at least two simultaneous automated functions. We are rapidly growing into level 3 prototypes and ready-to-buy vehicles, where the car can manage all safety-critical services, although with the need for human intervention when alerted.[4]

4.1 Mobility-as-a-Service (MaaS)

Before proceeding to the existing concepts, it is necessary to understand one of the most successful technological implementations in the market. Although not directly linked to driverless vehicles, Mobility-as-a-Service (MaaS) promises to be one of the greatest allies of autonomous cars.

MaaS is a data-driven and user-centered paradigm that gives consumers the option of how they would like to travel (to and from).

This service involves most transportation options, including cars, buses, and bikes, already available to customers on demand. MaaS is expected to transform the transportation industry, especially in densely populated areas. It also connects transportation options from various providers, thereby controlling everything from travel planning to payments.[5]

To reach its maximum potential, MaaS would require conditions like the widespread penetration of smartphones on 3G/4G/5G networks, massive levels of connectivity, secure and up-to-date information on travel options, schedules, and constant upgrades, along with cashless payment systems preferentially.[6] In order to facilitate these conditions, a diverse spectrum of actors would need to cooperate. From mobility management players, telcos, payment processors, transportation providers, to local authorities, cities need to be detailed and planned to collaborate with MaaS on its full potential.[7]

Autonomous Vehicle Technology (AVT) is pushing the growth of MaaS. As more people step aside from owning vehicles, more reliable transportation options will be needed. Without the need for employed drivers, driverless networks could provide consumers with cheaper options than traditional taxis and other car-sharing services.

MaaS enables the integration of transport modes, allowing passengers to get to their final destinations with ease. Current public transportation systems are not continually able to get passengers from their starting point to their last location. Autonomous vehicles will significantly help.[8]

4.2 Existing Concepts

Tesla Motors, Inc. is an American electric vehicle and clean energy-based company.[9] Headquartered in Palo Alto, California, the company specializes in manufacturing electric vehicles, covering all the processes needed. Owned by Elon Musk, a well-known entrepreneur in the tech industry, the company developed a set of advanced driver-assistance system tools named **Tesla Autopilot.**

Leading the revolution on mobility autonomy, Tesla Autopilot offers lane centering, traffic-aware cruise control, self-parking, and semi-autonomous navigation on limited-access driveways, to name a few.[10] Covering the first three levels of autonomy, Tesla puts in the roads semi-autonomous cars. In all of the referred features, the driver is responsible and the car requires constant supervision. However, Elon Musk affirms that Tesla will introduce cars featuring all the five levels of autonomy before the end of 2020.[11]

The renowned brand **Volvo** created a semi-autonomous driving aid named **Volvo Pilot Assist.** It is already being offered across the Swedish automaker's lineup of sedans, SUVs, and wagons. This technology provides steering assistance to assure that the driver stays within the lane markings when riding, helps to maintain a set speed, and keeps the distance needed between two vehicles. This becomes possible through the camera and radar technology implemented, and it can be added to most of the Volvo cars. The first car incorporating this technology was the XC90 SUV in 2018.[12]

Headquartered in Modi'in, Center, **Percepto** is an aviation company founded in 2014 and led by Dor Abuhasira.[13] It provides an autonomous drone solution for flyless drones. Percepto's autonomous industrial drone station focuses on providing key personnel with a continuous stream of industrial site aerial data made available at critical moments. The company offers easy-to-use and invaluable real-time data from their autonomous industrial drones, also known as "drone in a box."

For **MaaS**, there are many important projects to be highlighted, such as **MaaS Global,** the American company that pioneered this technology to be sold, **Uber,** and **Lyft,** to name a few. Uber was considered a member of the MaaS Alliance and its Board of directors, along with Lyft, the second-largest American ridesharing company, thereby investing already in exploring driverless MaaS vehicles.[14]

4.3 Smart City Potential

Many industries are currently interested in the automation of routine tasks. With the rise of smart cities and multiple intelligent gadgets in our daily lives, there are increasing visions on the future of city infrastructure. Among the most revolutionary parts of it are autonomous vehicles.[15]

One of the main ideas to be applied in the future of smart cities are self-driving vehicles and shared mobility.[16] Set to increase security and reduce pollution, smart cities seem to be the perfect stage for autonomous cars. This concept demands entire cities to be smart by fundamentally changing their infrastructure to adequately adopt autonomous vehicles.

The current tremendous technological progress already gives us the possibility to look at all the advantages of future cities and autonomous driving and new smart infrastructure.[17] It is expected that thanks to the advanced 5G network, combined with the Internet-of-Things, the global market revenue of axtonomous vehicles will hit $556.67 billion by 2026.[18]

Cities of the future will be converted into actual digital hubs. The appropriation of connected autonomous vehicles will increase road capacity and reduce congestion, even in densely populatedareas. In this way, the emerging smart cities will empower the autonomous mobility market even more by contributing to it with roads that include right signage, sensors, and lining.[19]

5. The Market Overview

5.1 Innovation's Growth Rates

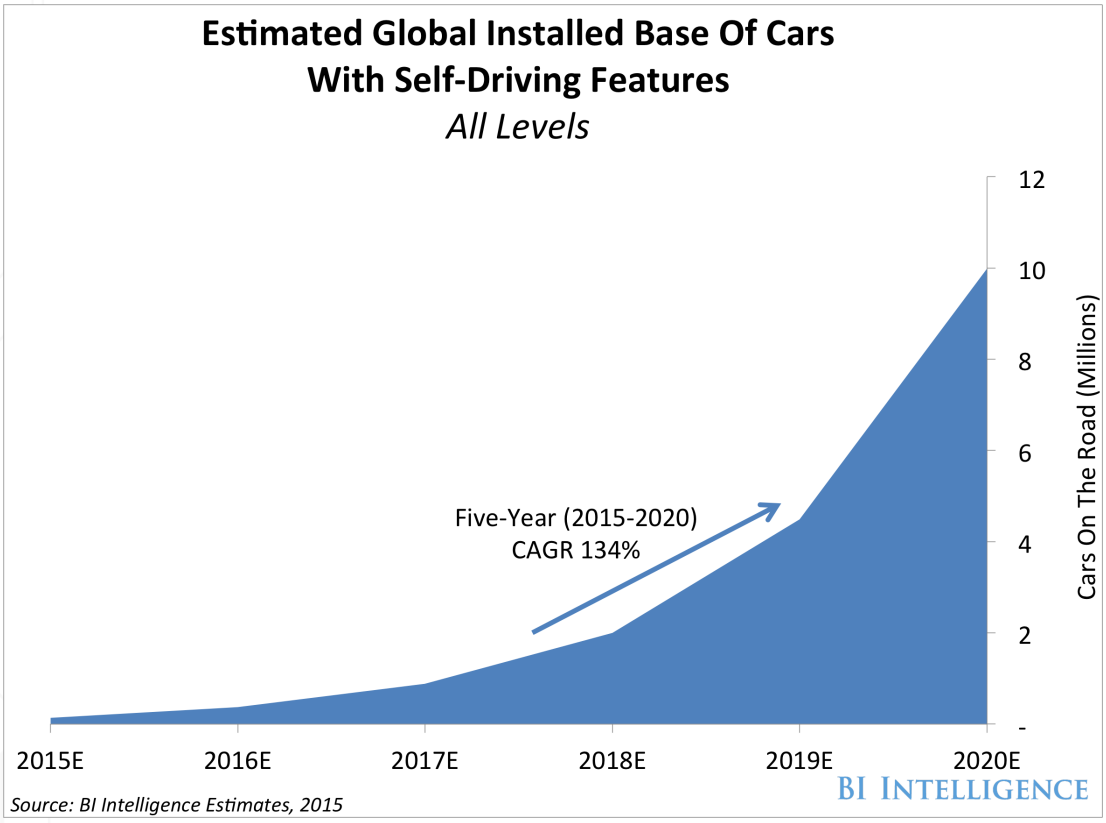
Driverless cars are automated cars featuring all the primary competencies of traditional vehicles. Prior to analyzing the market, it is essential to highlight that it is divided into two categories: semi-autonomous and autonomous vehicles.[20]

In terms of volume, the semi-autonomous and autonomous vehicles market is projected to grow at a CAGR of 21.36% from 2017 to 2022 and 68.94% from 2025 to 2030, respectively.[21]

Semi-autonomous cars are already circulating on global roads, mainly in the USA. However, regarding the lack of security and other hurdles, the fully-autonomous vehicle market is expected to grow to only 0.2 million units by 2022.

In a study published in the MarketsandMarkets website about semi-autonomous vehicles,[22] [2016] was considered the base year and 2017–2022 as the forecast period for estimating the market size. However, for autonomous vehicles, 2024 has been considered the base year and 2025–2030 as the forecast period for determining the market size.

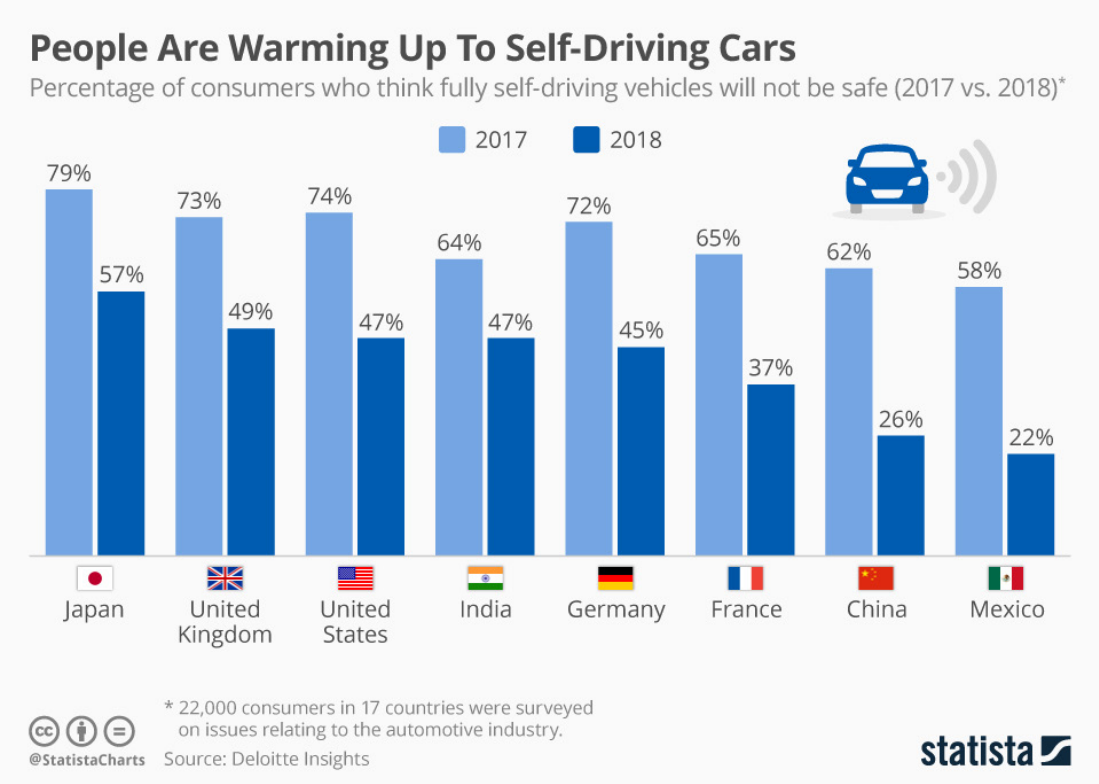
In fact, according to BI Intelligence, the mobility market was expected to see tremendous growth from 2015 to 2020 with a CAGR increasing 134%. The study considered the global installed base of cars with self-driving features at any level and showed that the largest increase would happen during the years of 2019 and 2020.[23] The study predicted around 10 million self-autonomous vehicles to be on the streets by 2020.



Source: BI Intelligence

Back in 2015, many predicted that we would be "backseat drivers," according to the Guardian.[24] As stated before, 10 million cars were expected to be self-driving on the road by 2020. Those statements were accompanied by several announcements from General Motors, Google's Waymo, Toyota, or Honda. Even Tesla failed with its commitment to launching a self-driving car on the roads by 2018.[25]

According to Vox, AI technology is absolutely necessary to facilitate the adoption of self-driving cars.[26] Despite the predictions' failure, AI has been evolving enough to enable the vehicle's autonomy to be possible. But when it came to autonomous cars, the limitations became very apparent. Despite the vast investment from specialists all over the world, AI wasn't able to answer the amount of reliability needed. In this way, 2020 isn't the year to see self-driving cars on the street since the cons — mainly security-wise — are not yet solved.



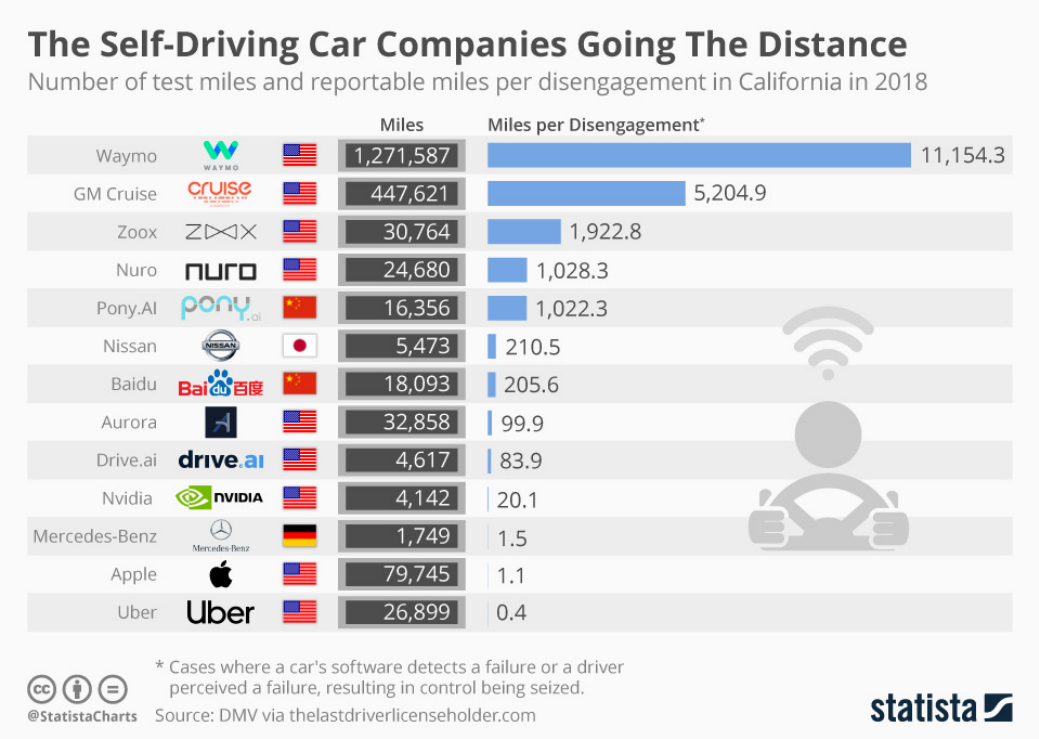
Source: Statista

Accordingly, the world population also continues to show its distrust in the safety of driverless cars, which may be a factor that affects the expansion of this market. As you can see in the image above from Statista,[27] there is a global distrust on the drivers' side regarding the safety of autonomous cars.

5.2 Industry Current Status

The current status of the driverless industry is limited by many factors. There are currently some issues slowing autonomous vehicle deployments, ranging from regulation limitations to the lack of technology itself. However, autonomous vehicles are gradually finding their way onto our roads. Earlier in 2020, some advancements were noticed in this field.

Google's Waymo, a ready self-driving unit, carried out successful trials of driverless taxis in California, transporting more than six thousand people in its first month of tests.[28] In fact, California is the emperor of testing driverless cars worldwide, presenting high numbers of trials since 2018. According to Statista, only in 2018, millions of miles were crossed by autonomous vehicles, led by over ten brands.[29]



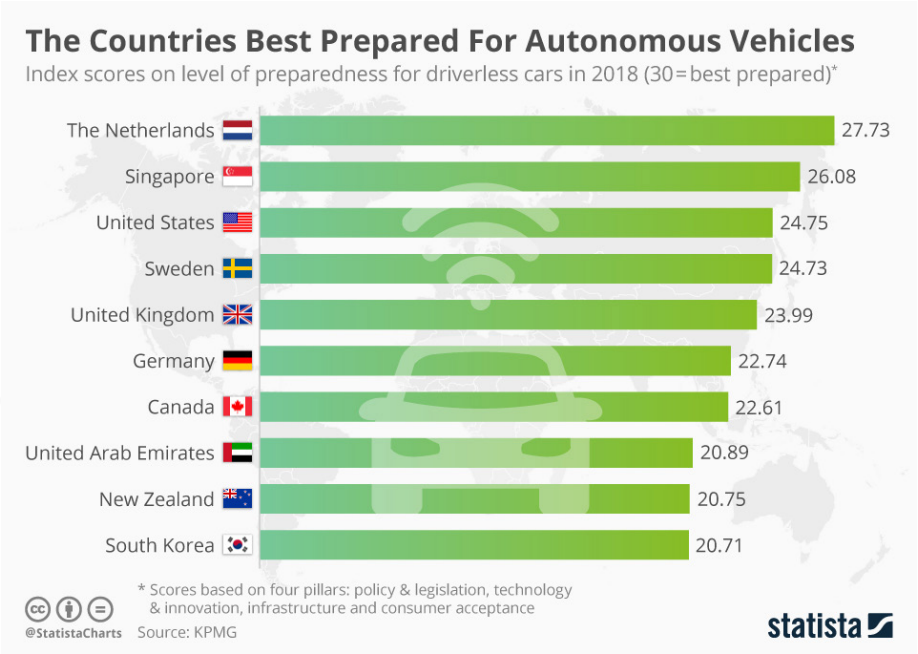
Source: Statista

In February 2020, in an interview given to the Portuguese reference newspaper Expresso, Maarten Sierhuis, general director of technology at the Nissan Innovation Lab, ensured that no autonomous car, no matter how perfect it is, can respond to unexpected traffic situations in the way that an experienced driver does it.[30] Therefore, the company used the technology used by NASA on Mars to improve the responsiveness of vehicles a driver.

Currently, Nissan has implemented these three modes of operation within the framework of the Seamless Autonomous Mobility (SAM) system, based on the Visual Environment for Remote Virtual Exploration (VERVE) used by NASA on Mars. Positioned in the top [30] of the best contributors to the industry, in a report published in the market research website GreyB, Nissan pairs with giants like Bosh, Honda, and Audi.[31] According to the same source, there are already several major companies engaging in research and development of both semi and fully autonomous vehicles.

Source: GreyB

Despite the hurdles with security and government approvals, there are several countries considered ready to embrace the autonomous cars' reality. The Netherlands tops all the charts in this domain.[32]



Source: Statista

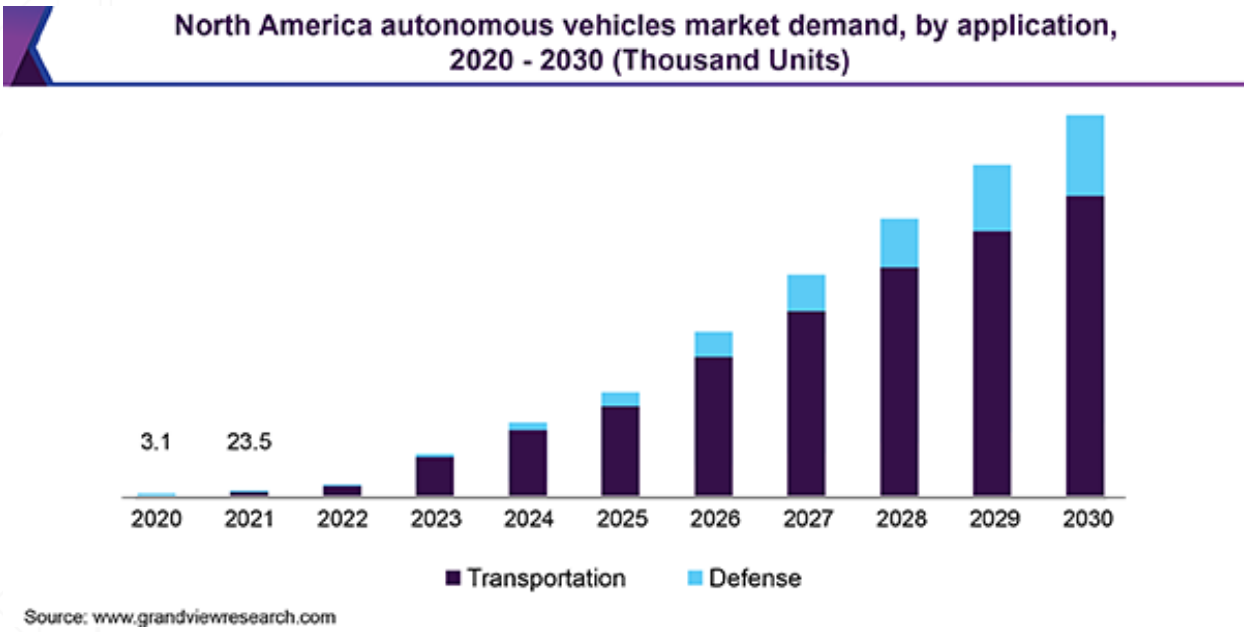
In conclusion, although in 2016 many industry leaders expected autonomous vehicles to be conventional on highways in the early 2020s, this ended up not happening. After massive amounts of venture capital in the space, autonomous car technology is still a long way off before it becomes available at a legitimate scale.[33] Along with the lack of AI technology, self-driving adoption timelines strongly depend on the next years' regulatory developments.

5.3 Market Demands for the Driverless Car Technology

Globally, many governments are already allowing driverless streets on their streets. Between California, Switzerland, and the UK, many countries have allowed trials on their roads since early 2020.

The industry has been segmented on the grounds of application into transportation and defense. The transportation division is expected to account for a significant share in the self-driving car market over the forecast period from 2020 to 2030.[34] The defense segment is expected to witness the highest growth over the forecast period.

North America accounted for the largest share of the overall revenue in 2020. Demand for self-driving vehicles is foreseen to grow over the forecast period in line with rising government regulations and increased acceptance of self-driving vehicles in the US.



Source: Grand View Research

According to a Grand View Research, the market demand is expected to expand approximately at a CAGR of 63.1% from 2021 to 2030. Despite all the vehicles, self-driving cars are the key innovation in the automotive industry by having massive growth potential.Autonomous cars act as a catalyst in the technological developments of automobiles.[35]

6. Autonomous Mobility Industry Issues

Automotive manufacturers and technology companies have invested billions in driving autonomous vehicle research and development (R&D). As seen in the last chapter, there has been significant progress. However, driverless cars are still far from perfection.

The industry has two big hurdles to overcome before self-driving vehicles boost widespread: (1) technology and (2) business model that can ensure revenues. This is according to Michelle Avary, head of autonomous mobility at the World Economic Forum.[36]

In this chapter we will discuss the specific challenges that hinders industry breakthroughs, in which the Mobilian project will give its solutions to.

#1 Lack of Collaboration in Development

Like in any innovation, automakers are in competition to perfect the pioneering vehicle set to navigate the road efficiently without a human driver. With billions of investment at stake, engineers cannot afford to lose any piece of information or advancement to other companies especially to other competitors in the automotive market.

Looking at the bigger picture, scattered development pushes this emerging technology progress at a slower pace. The lack of transparency and collaboration slows down the technological development of autonomous cars. When prototype autonomous vehicles start navigating on city roads today, these cars won't talk to one another and learn from each other's trip as they are under centralized control.

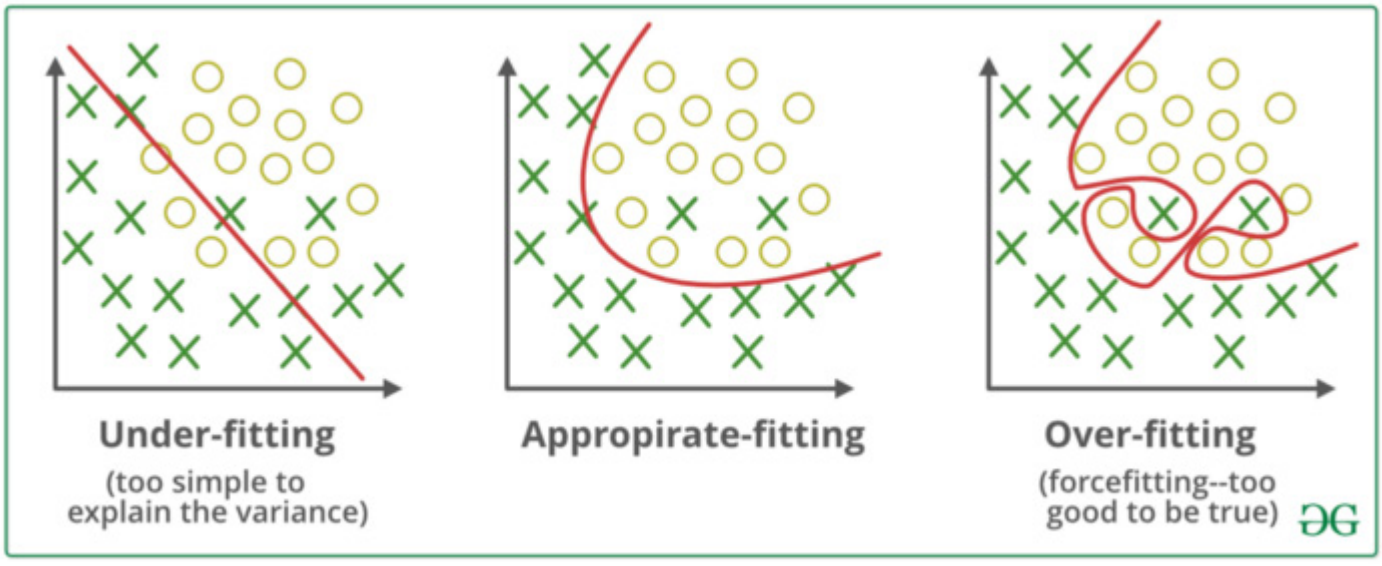
The problem with centralized networks is that public safety comes second in order to protect market data and patents. With Mobilian, we believe decentralization would be the right approach, as real-time changes can occur. If one car that is part of the network has been exposed to the accident, other cars would be able to refrain taking the same route — saving passengers from danger.

#2 Neural Network Challenges

From the name itself, **the neural network** pertains to a series of algorithms that works to recognize underlying relationships in a set of data through a process that is patterned to the way the human brain operates. Unlike the human brain that is hard to decode, technology can easily be hacked. That is the biggest risk and threat that exists to using technology-dependent tools and vehicles are not an exemption. In this sense, a self-driving car simply replaces its human driver to be technology-driven.

In machine learning, the cause of poor performance is usually a case of either overfitting or underfitting data. By definition, overfitting means a good performance on the training data, but poor generalization to other data. While underfitting means poor performance on the training data and poor generalization to other data.

Humans as drivers are effective because we have the human cognitive capabilities that can decide to take action. Ethics plays a big role in driving and the human factor is what machines are lacking. For example, a car has been instructed to refrain from stepping on solid lines on the road as a standard protocol, yet a drunk driver has swerved on the vehicle's path. Humans would take precaution by stepping on the solid line to maintain safe-distance from other vehicles. These kinds of calculations are supposed to be determined by neural network models.



Source: towardsdatascience.com

An efficient driverless car would be able to gauge this act and execute it in real-time situations. Neural networks include these clauses that allow the car to make decisions. This is why the appropriate-fitting would be the target model for optimum efficiency. However, this ideal model which lies in the right spot between underfitting and overfitting grid can be very difficult to attain in practice.

#3 Distributed Denial of Service (DDoS) attack

In computing, Distributed Denial-of-Service (DDoS) attacks are malicious attempts to disrupt normal traffic and operation, service or network by overwhelming the target or its surrounding infrastructure with a flood of internet traffic.

DDoS is a cyberattack capable of disabling a machine or a whole network to make it unavailable. Through this attack, cybercriminals can disrupt the flow of the ecosystem, its services, and networks which can lead to a platform's serious malfunction.

As this already exists as a known cyberattack strategy, the automotive technology, if server based, will not be exempted from these kinds of attacks. Moreover, smart applications are connected to the complex layers of a transport network through the internet.

#4 The Need for a Reliable Data Storage

AI is what drives autonomous cars highly-dependent on big data. Data serves as the bits of knowledge that the vehicle learns to be able to navigate on the roads. Depending on the vicinity, the further the distance the vehicle will need to navigate, the more data it needs to be programmed and learn beforehand.

Approximately, there are more than ^{4} terabytes of data received from the outside while driving per day. Such a large amount of data causes a serious problem as centralization reduces the operation speed of the CPU and eventually stops the system if the number of cars increases.

Furthermore, learning data to be gathered increases overtime as driverless cars, rerouting options, new obstructions, and other unprecedented barriers may arise to expose the machine to new experience. Just like how humans are expected to learn from more experience and exposure, AI-powered cars are the same, saving their learning on their memory bank.

Data is integral to the development that fuels the driverless car revolution. For every data we feed to the machine will correspond to a personality and an action. If data is erased, missed, or corrupted, it can get messy and cause someone's life on the road, may it be the vehicle's passenger or those people outside the car affected by the collision.

#5 Protection of Passenger's Information

With digitalization, it becomes easier to track and keep records of frequent places one has traveled with given exact location and time. A person's whereabouts are a private matter and the trip logs contain very detailed information about this. With big data, one's workplace, home address, family members' home address, school, and other places the person goes to are all captured.

With AI-powered vehicles driving passengers around, all the data stored about the car owner or passenger are vulnerable to cybercrimes. All valuable private information needs to be protected for the sake of the user's security. This is one of the pieces of information to be guarded within this ecosystem of driverless networks.

Furthermore, as MBN tokens will be used as payment within the platform car-sharing application, passenger's payment information would not be essential to pay for the car services. There would be lesser risk for credit card fraud and fund theft. It would also ensure your centralized bank account will have totally no track of your expenditure using the Mobilian app.

7. Solutions and Opportunities

Mobilian brings the power of blockchain technology to mobilize the autonomous vehicles industry. We lay down innovative solutions to the fundamental issues the industry faces to progress in launching efficient driverless vehicles in the future.

Through the blockchain, Mobilian can fill in the gaps in security to protect the network's efficiency as well as the users and owners of autonomous vehicles. Below are five solutions to the aforementioned industry issues in the last chapter.

Decentralized and Open-Source Network

In response to the individualistic approach in the automotive industry in perfecting the driverless car technology, we aim to create a decentralized network where these companies can collaborate and learn from each other's driverless car prototypes and the data collected during its test runs.

In respect to innovation patents, automakers have the choice to selectively share the information they wish to share on the network. Within the Mobilian network, developers can buy and sell data. We provide a decentralized research library that would collect the big data from test vehicles — its performance, the barriers, accident hotspots the car encountered, and vehicles simulations — are all recorded on the blockchain.

Driving Neural Network Solutions

Mobilian offers the Mobilian Research Library, an open-source library that allows developers, AI professionals, and big data experts to share information about automated vehicle innovation. As said before, data plays a big role in autonomous vehicle development and Mobilian gives automakers, passengers, and vehicle owners a secure environment to share their experiment finding and data.

Data such as real-life accident cases, accident-prone acts can be stored in the Mobilian library. On Mobilian, we reward knowledge sharing as it is our overall goal to push the progress of autonomous vehicles on the fast lane.

7. Solutions and Opportunities

Blockchain to Combat Denial of Service (DDoS) Attacks

In order to conduct a DDoS attack, it is necessary to compromise a large number of vehicles in the overlay. These vehicles are supposed to overwhelm a targeted overlay node by sending a large number of transactions. The recall of those transactions will be broadcasted to the OBM (Overlay Block Management).

To prevent these kinds of heavy-impact attacks, the integration of blockchain will be helpful to be set within the network. If this attack occurs on the blockchain, the OBM forwards a transaction to a cluster member only if the keys in the transaction match with a key pair in the key listed on the OBM.

The overlay nodes will verify the requesters to access them by uploading a key pair in the key list of the OBM. DDoS attack would not generate a match in the key list and would thus the transaction will be void, leaving targeted nodes unharmed.

Blockchain-Based Data Storage

Blockchain is a distributed digital ledger known for its immutable and highly-secured network. Mobilian aims to develop this technology into an unparalleled network designed to be highly-scalable and highly-secured to support big data, Internet-of-Things (IoT) and AI technologies.

Mobilian will have adequate data storage using blockchain to support a network of driverless cars. Mobilian will offer three kinds of main storage platform: a research database, a dedicated AI memory for deep learning, and a programmable learning-focused memory. Other platforms such as the MOBY app also have their own data storage supporting it. There will be two main databases for a driverless vehicle: one that contains neural networks programmed by the manufacturers and the continuous learning side that stores the experience.

Recording Passenger on a Tamper-Resistant System

Blockchain technology also guarantees the protection of user information. During the rise of MaaS applications, hackers were able to access passenger information such as their addresses, names, and payment details which are harmful and can be easily used against them.

For the Mobilian application that will offer pick up and drop off service, the underlying technology will be operating via blockchain. All the information of the passengers such as their names, pick-up and drop-off points can be stored and distributed on a secure decentralized ledger. Thus, offering a completely tamper-resistant system.

8. Technology

The Automobile Industry's Demand for Security

The $1.7 trillion automobile market has reached a significant turning point. Many newly manufactured cars in 2020 have been produced with built-in connectivity. Like in any connected device, there always exists a risk of hacking.

Similarly to how a computer gets into threats whenever it connects to the internet, autonomous vehicles also get susceptible to hacks when it connects to a network. With this trend pushing forward every year, it has surfaced the need for a highly-reliable network security.

In 2010, hackers were able to shut down and sound the horns of 100 cars in Austin, Texas, USA. In another case, two hackers remotely gained control of a Jeep Cherokee which eventually led to Fiat Chrysler recalling 1.4 million vehicles in 2015.

In 2017, Chinese security researchers from Tencent have shown how they were able to hack a Tesla Model X. They were successful in turning on the breaks and locking and unlocking the doors.[37]

Digital technology-enabled vehicles that are connected to the internet have been proven to be easy-to-control and be hacked over the internet. Connectivity opens vehicles to cyberattacks, this doesn't only hinders security but it can lead to a malicious nature that poses a real risk. Due to this, Mobilian prepared a blockchain powered network ecosystem to go along the rapidly changing vehicle market.

8.1 Mobilian Blockchain Network

Scalability issues have long-been a challenge for blockchain networks. To resolve these drawbacks, the Mobilian blockchain network will be expert-engineered for scalability. It will be designed to live with its goal to accommodate heavy data being gathered every second by the vehicles and rapidly record it on a digital distributed ledger. With blockchain's inherent characteristics, the Mobilian blockchain network will serve as the underlying technology that will support the whole Mobilian ecosystem.

The Mobilian blockchain resolves conventional blockchain loopholes to provide a robust network with enhanced security. With the integration of peer-to-peer hypermedia protocol, asymmetric encryption, and next-generation security services, Mobilian will be able to guarantee programmed systems on vehicles will be nearly-impossible to hack.

Blockchain's inherent characteristics are helpful for transparency and security-focused endeavors; this is why the Mobilian blockchain network was chosen to serve as the underlying technology to support the whole Mobilian ecosystem. By leveraging blockchain, Mobilian will be able to deliver a more transparent and reliable platform for the autonomous mobility industry.

8.2 Mobilian Security System

Security is the primary offering Mobilian brings unto the autonomous mobility community. In terms of safety, it is not just a matter if the car is programmed to drive safely, but it is important to also secure the program operating the cars. Mobilian leverages blockchain technology to ensure driverless cars are protected against malicious attacks and unwanted external controls.

Mobilian Security's main advantage is the implementation of blockchain, a highly-encrypted and highly-secure digital ledger technology. Though originally used in the financial industry, as blockchain is nearly-impossible to hack, many industries have slowly taken the technology into adoption. By integrating blockchain as the initial barrier, hackers will have a hard-time penetrate vehicle systems and data.

The Mobilian security system comprises three layers: the blockchain, an endpoint security, and a cloud security. The blockchain will be developed by the Mobilian team and will be upgraded alongside the automotive sector's overall demand and progress.

8.3 Machine Learning Data Storage

Since 1959, the term machine learning has already existed in the technology industry. The term was coined by Arthur Samuel, a prominent pioneer in the AI and computer games sector. He also defined machine learning as the "field of study that gives computers the ability to learn without being explicitly programmed."[38]

Machine learning is an application of AI that provides systems for machines to learn by themselves — without any human intervention or assistance. It is a branch of science that focuses on developing computer programs that can access data and use it to learn for themselves.[39]

To elaborate on the technologies, here is a comparison on how deep learning and machine learning works. For deep learning, a machine learns from its predictions based on the data it reads. There are several passes of a data set that could be carried out to make a decision. In comparison, machine learning is simpler as it relies on human-coded algorithms and human-guided training with aknown certain set of data to develop the ability in making predictions. . If the machine fails to give the right expected results, data scientists can change the algorithms and retrain the model.

According to Mike Leone, a senior analyst for data platforms, analytics, and AI in ESG Global:"Deep learning acts similarly to a human brain in that it consists of multiple interconnected layers similar to neurons in a brain," says Leone. "Based on the accuracy or inaccuracy of predictions, it can automatically re-learn or self-adjust how it learns from data."[40]

Two-Part AI Learning Data Storage

One of the main targets of the automotive industry today is to develop an AI-powered driving technology that can resemble humans in making road judgement and can independently learn from their own experience overtime. To support this goal, Mobilian's AI learning-focused data storage based on the blockchain will be a fitting innovation to drive the industry moving forward.

In pursuit to develop blockchain-based tools to make computers behave more intelligently, Mobilian aims to propose a pioneering data storage technology that can support variations in AI learning. There will be two main sdivisions under the Mobilian AI data storage: the Neural Network Memory and the Machine Learning Memory.

Neural Network Memory

The Neural Network memory will support the creation of the human factor through deep learning. This data storage will be dedicated to storing all data related to deep learning-enabled project developments for driverless cars.

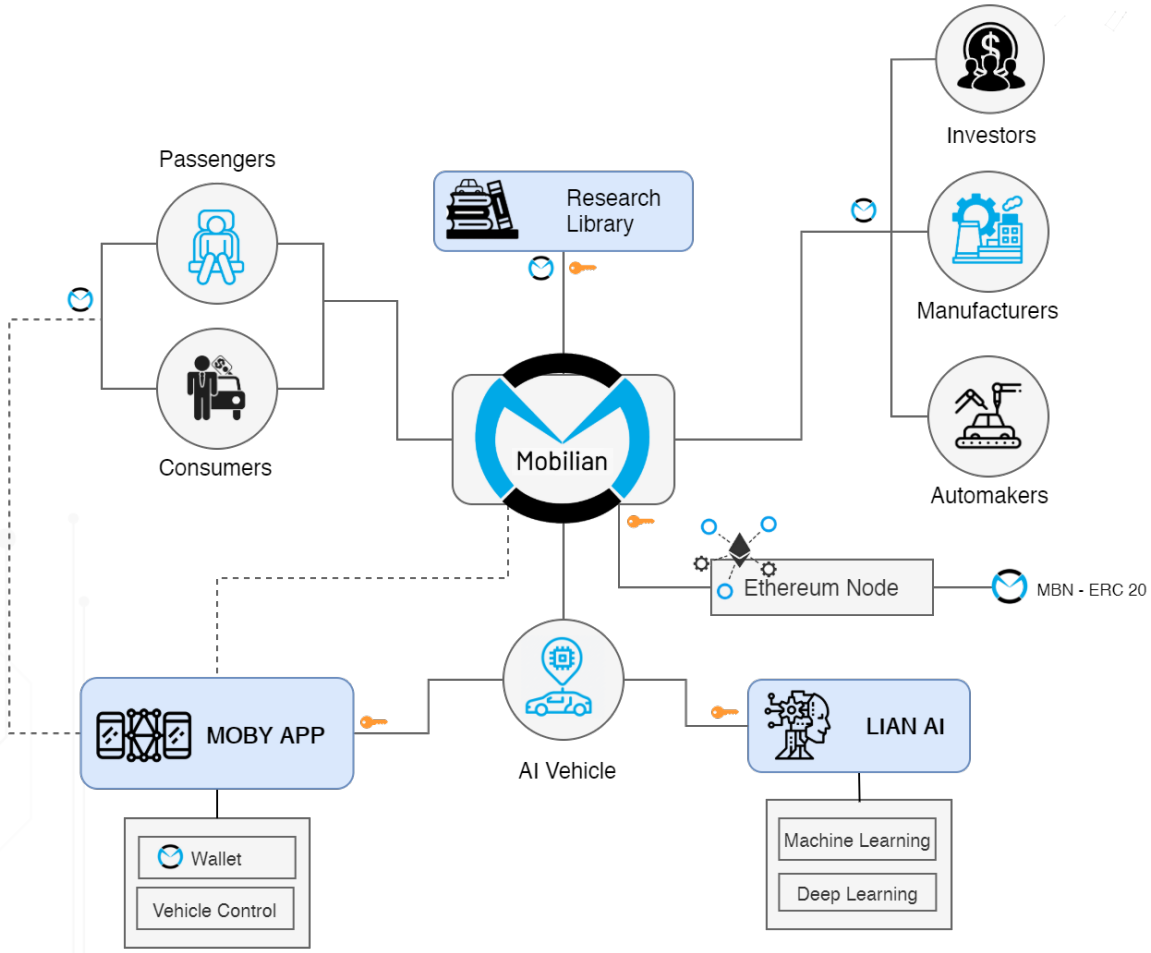
Engineered for autonomous vehicles, this part of the memory will best serve private cars with fewer masters or owners. The vehicle will grow efficient as the blockchain-powered memory will allow the car to learn and understand its owner more as time passes by. Moreover, all the data collected by the vehicle such as the owner's information, addresses, and trip records will be encrypted and secured on the blockchain.

Machine Learning Memory

On the other hand, the Machine learning memory will be the data storage for the human-assisted algorithms and programs. On this memory, data scientists can input their algorithms on car models to have a bunch of essential information to make efficient decisions and predictions on its own.

Like the neural network memory, the machine learning memory will also be developed as a data storage platfrom built on the Mobilian blockchain. With the capability to initially program algorithms for these models, this part of the memory is sufficient to be integrated to a great number of vehicles as an initial guide program. Data scientists can upgrade and improve this memory anytime they deem necessary.

9. Ecosystem



9.1 Decentralized Research Library

Looking at the current individualistic-approach in development, automakers and car technology developers have been making progress vehicles on their own. Without any unifying body that gathers varying progress, development goes scattered around the world. As mentioned earlier on the industry issues, the lack of transparency and collaboration in the automotive industry causes the driverless innovation to progress at a slow pace.

To mobilize the progress on the fast track, Mobilian offers a secure environment for all manufacturers, automakers, and AI professionals to share their findings with other innovators in the industry. On Mobilian's decentralized research library, studies and completed AI beta test programs can be uploaded and shared on a single platform. Hence, in pushing knowledge sharing to occur within the network of automakers, we can expect an impetus in driverless AI technology development.

9.2 LIAN AI

LIAN AI aims to be Mobilian's vehicle driving technology. Taken from the project name Mobilian, LIAN is the name of the AI-powered driver for the Mobilian network. It is a machine learning program which has a next-generation data storage secured on the blockchain. Mobilian combines emerging technologies such as AI and blockchain together to produce a next-generation AI that can drive vehicles as safe as human drivers.

The main goal of LIAN AI, like other machine learning machines, is for the technology to continuously improve to become reliable in doing its delegated purpose with less or minimal human supervision. AI will take a key role in engineering to build driverless vehicle technology that can compete or be better than a human driver. There are main subsections for LIAN's memory: (1) human-input programmed machine learning and (2) an independent deep learning memory.

9.3 MOBY Application

The MOBY application serves as an accessible platform where owners and passengers can interact with driverless vehicles. MOBY will function similarly to reputable MaaS applications today like Uber. However, it would be driverless cars that will provide the ride. The MOBY app is a decentralized application that will utilize MBN tokens, Mobilian network's native cryptocurrency to charge for its services and to reward loyalty points to passengers.

Like Uber and other MaaS applications, consumers can utilize driverless vehicles to pick-up and drop-off a passenger. Through the app, users will also be able to instruct their autonomous cars or publicly-available driverless cars for errands. As the application operates on the Mobilian blockchain, users can ensure their personal data, along with payment information, saved addresses, and recorded trips made, are securely stored on the blockchain.

10. Token Economy

The Mobilian platform will rely on its native currency, Mobilian Coin (MBN), to operate its blockchain-based automotive security network. Data consumers and data providers can benefit from the main offerings of Mobilian by utilizing MBN.

MBN has 10,000,000,000 tokens in total supply, all of which are premined in a single genesis block. These tokens will be available for purchase and trading via partner crypto exchanges upon listing. Any interested network participant can acquire MBN tokens and use it exclusively within Mobilian's blockchain and services.

Purchasing MBN tokens will empower the functionality of the Mobilian network as it will be used to secure autonomous vehicles, drive collaboration for driverless cars' research and development, enhance vehicle mobility and data sharing, and easily pay the necessary fees needed. Through Mobilian, car owners can connect their automobiles through the MOBY application for seamless onboarding and control, as well as revenue-generating opportunity.

Once the MBN token has been listed, cryptocurrency users can use it for trading and make more profits. This will sustain the market value and usability of the token.

Proliferating decentralization in the driverless car economy, as more individuals, companies, and other vehicle-oriented functioning bodies utilize the Mobilian services, the blockchain-based security for AI-controlled cars powered by cryptocurrency will dominate in the future.

10.1 MBN Token Usage

Token holders can harness the potential of MBN mainly through the following:

Data Access/Storage

Through the Mobilian Research Library, automotive companies and industry researchers can access and share their data and information for the benefit of technological advancements in terms of automation and mobility.

By paying a specified amount of MBN, the online portal can be maximized by all types of users. AI program data among others can be viewed and used as references for further research and development. This decentralized information gateway will enhance collaboration and transparency within the automotive industry.

10. Token Economy

Network Services and Fees

The main priority of Mobilian is to provide a robust blockchain-based security system for autonomous cars. With this in mind, other practical services such as ride-sharing and modern maintenance with authorized data scientists and mechanics are made available.

With MBN tokens, network participants can pay for the necessary fees required to maintain the operations of the Mobilian platform. Service fees can be used for a variety of purposes such as platform upgrades, partnerships, rewards, listing, etc.

Mileage Rewards

Integrated with AI technology, automated cars can benefit from MBN for its mileage journey. As the car travels more, the more MBN token rewards can be received by the car owner. In this manner, tokenized incentives are introduced in a decentralized manner.

Through the MOBY app, drivers and passengers alike can have control of the cars to ensure a hassle-free driving experience. Prioritizing safety, all registered cars within the Mobilian platform are secured by blockchain-based security and all data is stored on a public distributed ledger.

10. Token Economy

10.2 Architecture

Mobilian uses the Ethereum blockchain for its platform's smart contract deployment and cryptocurrency transactions. Once the need for a mainnet arises in the future, the Mobilian team will conduct a migration process involving MBN tokens.

As an ERC20 token, MBN has similar specifications as other tokens created under the same standard. This token will primarily be used as a means of payment for mobility data access and storage, tokenized rewards, and crypto trading.

Please refer below for the basis of MBN token's smart contract codes. Texts inside the brackets determine the functionality of each specification. Stated values are subject to be changed.

1. totalSupply() public view returns (uint256 totalSupply) [Get the total token supply]

2. balanceOf(address _owner) public view returns (uint256 balance) [Get the account balance of another account with address _owner]

3. transfer(address _to, uint256 _value) public returns (bool success) [Send _value amount of tokens to address _to]

4. transferFrom(address _from, address _to, uint256 _value) public returns (bool success) [Send _value amount of tokens from address _from to address _to]

5. approve(address _spender, uint256 _value) public returns (bool success) [Allow _spender to withdraw from your account, multiple times, up to the _value amount. If this function is called again it overwrites the current allowance with _value]

6. allowance(address _owner, address _spender) public view returns (uint256 remaining) [Returns the amount which _spender is still allowed to withdraw from _owner]

10. Token Economy

Moreover, MBN has additional functions for it to be feasible for crypto-powered automotive decentralized security services. Kindly refer below for the specifics:

function Transfer(address indexed from, address indexed to, uint256 value);

function Burn(address indexed from, uint256 value);

function _approve(address owner, address _spender, uint256 amount)

function burnFrom(address Account, uint256 _value) public returns (bool success)

function transferFrom(address _from, address _to, uint256 _value) public returns (bool success)

function approve(address _spender, uint256 _value)

function approveAndCall(address _spender, uint256 _value, bytes memory _extraData)

function allowance(address _owner,address _spender)

function UserLock(address Account, bool mode) function LockTokens(address Account, uint256 amount)

function UnLockTokens(address Account)

10.3 MBN Token Use Cases

The Mobilian platform is developed to cater to a wide range of customers and clients within the automotive industry, particularly those engaged with the production and control of autonomous cars. MBN tokens are deployed to empower this platform and serve its purpose for each network participant:

10. Token Economy

For Car Manufacturers

Car manufacturers of autonomous cars rely on sensors, complex algorithms, machine learning systems, and powerful processors to execute the car's functionalities. Nowadays, AI is being integrated for accuracy and increased efficiency.

But to enhance security and storage, Mobilian offers a blockchain-based platform that is decentralized in nature, making it well-protected and establishing a no single point of failure. In this manner, automakers can worry less about mobility data access and storage.

For Car Owners

Autonomous or driverless cars combine sensors and software to control, navigate, and drive the vehicle. Car owners who buy these cars do so for various reasons such as convenience, technology-first innovation, and increased mobility.

These owners can benefit the most from the MOBY app. When car owners associate their automated wheels into the app, they can have decentralized control over it. Whenever and wherever you are, you can just tell what you want your car to do via the mobile DApp.

To gather more information about your own car's model and other relevant data about autonomous cars, the open-source Mobilian Research Library is made available. This digital database allows the collection and sharing of reports and records to the public.

For Car IT System Developers

Car IT system developers that specialize in autonomous cars must have a comprehensive understanding of the main components of the software stack, program vehicle modeling and control, safety framework analysis, and current industry practices for vehicle development.

With Mobilian, developers can take advantage of the LIAN AI two-part database. Mainly maximizing the machine learning aspect, they can construct longitudinal and lateral dynamic models for a vehicle and create controllers that regulate speed and path tracking performance.

For Passengers

Self-driving cars need to give passengers a better and safer experience. This can be done by designing intelligent cars with the passenger's experience in mind. Continuous, instant, and on-demand communication should be there to remove any anxiety from the passenger's side.

10. Token Economy

Through the MOBY app, passengers can seamlessly pay MBN tokens for every ride and earn loyalty points, convertible to discounted rides or tokens. In this app, passengers can monitor their journey and give feedback regarding the car's performance.

For Local Transport Authorities

Various local roads and transport authorities facilitate the traffic rules, fines, licensing, public transport systems, and overall transport business of a specific area. In the near future, autonomous cars can significantly contribute to the economy, requiring close monitoring.

Through Mobilian, authorities can store, access, and share data to car owners, AI specialists, automation developers, etc. This can improve the results of safety protocols instilled per locale and enhance the transport mechanics concerning self-driving vehicles.

For Logistics Businesses

Auto logistics and transport services are prevalent. Many provide expertise in a wide range of areas such as logistics engineering, multimodal transport, customs and tax representation, storage and preparation of vehicles, as well as distribution to auto dealer networks.

These businesses can utilize the Mobilian platform for optimized transport and logistics solutions. No unnecessary paperwork and time-consuming process are needed as the decentralized network allows easy control and data access to autonomous cars.

10.4 Mobilian Network Revenue Model

Mobilian focuses on providing security, transparency, and competence among autonomous vehicles. In line with this, ensuring a sustainable and long-lasting revenue model is vital to keep the network up-and-running, particularly in its early stages.

Transaction Fees

The Mobilian network would take a percentage fee of all financial transactions (payments) on the blockchain. This is done for successful deliveries of transportation services provided to any concerned party. We aim to reach millions of transports per day through autonomous cars.

10. Token Economy

Data Access Fees

The Mobilian network would take a percentage of data fees paid to access the open-source Mobilian Research Library. This allows the successful exchange of real-time information for the benefit of local authorities, vehicle manufacturers, researchers, and customers in general.

Partnerships

If the need for more autonomous vehicles in an area arises, Mobilian can team up with other companies to provide car owners the ability to offer ride-sharing services to those in need. The owners will get paid and the Mobilian network will get a commission.

In-App Advertising

Within the MOBY app, we can serve relevant advertisements depending on the car owner or passenger's mobility data and experience. A fee will be paid for the recommended/ sponsored list of services within the app, with a commission automatically given to the Mobilian network.

11. Conclusion

The autonomous mobility industry is undergoing some serious developments. Though the progress is slowly taking place, we see a great potential for this technology to hit the public roads sooner or later. Automakers already have invested billions in R&D to perfect driverless technologies to release self-sufficient and fully-driverless vehicles in the automotive market.

We have observed the current situation of autonomous vehicle making, there are still a lot of challenges within industry concerning mainly the technologies capable of empowering a driverless vehicle such as AI and IoT.

Mobilian exists to accelerate the progress and fuel the development of autonomous vehicles around the world. We offer engineered solutions for selected industry problems. Through our built innovative ecosystem, we encourage auto manufacturers and IT companies big or small to utilize our offering.

12. Roadmap

Q3 2020

The Start of the Journey

- Launch the official company website
- Publish Mobilian whitepaper
- Start planning and development
- Set up company and headquarters

Q4 2020

Mobilian Hitting the Road

- Launch official social channels
- Reach out to automobile companies
- Advertise project to related institutions
- Form the blockchain development team

Q1 2021

Driving Innovation Forward

- Establish partnerships with universities and research institutes
- Launch the open-source library platform online
- Beta test Mobilian blockchain network
- Hire AI experts and data scientists

Q2 2021

Mobilian on the Blockchain Highway

- Launch Mobilian blockchain
- Launch decentralized Research Library
- Start the development of AI data storage
- Develop Mobilian security system for vehicles

13. Privacy Policy

Our (Mobilian) Privacy Policy gives an account of how we collect, use, and handle your personal data anytime you use our services. Using the Mobilian website, mobile applications, and other products and services mean that you consent to the collection, use, and storage of your data according to this Policy. Data security is of the uttermost significance to us. We will take all the required precautions to prevent unauthorized access, loss, misuse, or alter customer information.

Data Collection

We will collect data concerning your usage of our website and services. Data collected is used for administrative purposes, to operate the platform effectively, and to provide you with the best experiences on our website. We take the responsibility of protecting your personal data seriously. We will never use your information to profit in any way by sharing it with third party organizations and companies affiliated with Mobilian.

General Data Protection Regulation

If the user is a resident of a country located within the European Economic Area (EEA), we respect your right for the following, as stipulated in the General Data Protection Regulation (GDPR) — the right to be informed, the right to access, the right to rectification, the right to be forgotten, the right to restrict processing, the right to data portability, the right to object, and rights concerning automated decision making and profiling.

Service Providers

We may hire third-party companies and individuals to perform services or assist us in analyzing how our Service is used. These third parties may have access to your data only to perform these tasks on our behalf and are obligated not to disclose or use it for any other purpose.

Cookies

We use cookies to improve, analyze, and keep track of our services. You can either select to remove or reject cookies; however, some services may become dysfunctional if you do so.

13. Privacy Policy

Children

Our services are not intended for marketing or soliciting information from children under the age of 18. If you are a parent or guardian and your child provides us with your personal data or believes that we have collected information of a child under the said age, please notify us as quickly as possible so that we can perform the necessary action.

Amendments to This Privacy Policy

The privacy policy is subject to amendments at any given time without prior notice. We advise that you regularly visit our page and read the privacy policy regularly for any changes. Changes are immediately effective once posted.

Contact Us

If you have any doubts regarding this Privacy Policy, please contact us.

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