

NO MORE DRIVERS AFTER 2040

THE AUTONOMOUS VEHICLES AND THEIR REVOLUTION

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According to the World Health Organization (WHO), traffic accidents kill more than 3,400 people and injure between 54,000 and 136,000 every day. This shocking number could be reduced by up to 90% thanks to the technology developed by Mobileye, the startup that created the leading Advanced Driving Assistance System (ADAS), which is being used in over 140 million vehicles and dominates 70% of the global market.

This technology gained fame in 2017 when Intel paid \$15.3 billion for it — the largest high-tech sale in the history of Israel and the second largest purchase in Intel's history. Mobileye is committed to what is known as "Vision Zero," meaning no deaths or serious injuries due to traffic accidents. To

truly achieve this goal, autonomous vehicles technology will have to obtain full autonomy - i.e., level V (five) autonomy. Reaching level V would not only mean zero road casualties but also the elimination of all the costs associated with traffic accidents - a number the WHO puts at 3% of national GDP.

According to the engineer Mois Navon, founder of Mobileye, fully autonomous cars will take over city life in no more than 25 years. In his lectures, he talks about the effects that the automation he helped design will have on the future of cities. This research, which took him years and is based on countless sources, shows how this disruption will have a great impact on urban life as we know it today.



Close your eyes and imagine that you no longer need to sit behind the wheel of your car. An app will allow you to request transportation when needed; a driverless car will arrive at your door in no more than 3 minutes, transporting you to your destination at an average speed of 137 mph. No parking will be necessary. Cars will be "on duty" for as long as needed, and when they need to "rest", there will be parking lots outside the cities where they can park and refuel themselves, ready for the command to work next day. And if predictions are accurate, \$4 trillion will be saved in driving expenses in the United States alone, thanks to increased driving efficiency and reduced car ownership costs.

THE END OF THE CRASH ECONOMY



Autonomous vehicle technology promises to make cars increasingly safer, significantly reducing accidents, and greatly impacting the so-called "crash economy" - i.e., traffic accident related businesses. Auto-repair shops and spare car parts will become superfluous, traffic courts will see a reduction of lawsuits approaching zero, and the car insurance industry will be significantly impacted. According to a report by KPMG entitled "The Chaotic Middle", autonomous vehicles could lead to a 90% reduction in the auto insurance industry by 2050.

DRIVERS AND CAR OWNERS WILL DISAPPEAR



With the autonomy of cars, not only do drivers disappear along with driving schools, driver's licenses, responsibilities for fines, accidents, or traffic law violations, but it could also mean the end of individual car ownership. On-demand mobility and ride-sharing are already generating new business models focusing on deploying fleets of cars instead of individual ownership. It is estimated that a private car costs \$1.50 per mile, while robo-taxis cost only \$0.20 per mile. That is a reduction in cost that consumers cannot overlook. Futurist Tony Seba predicts that ten years after the regulatory approval of 100% autonomous vehicles, "95% of all passenger miles traveled in the United States will be served by transport service providers operating fleets of autonomous electric vehicles, capable of offering a higher level of service, faster journeys, and safety at a cost up to 10 times lower" (RethinkX). And UBS Investment Bank predicts that "by 2035, 80% of people will use robotaxis in cities where available, and urban car ownership will decrease by 70%. By 2050, these vehicles will be roughly evenly split between robot taxis and privately owned cars" (Economist). This driverless transformation will help millions of individuals who do not have the ability to drive. U.S. government figures indicate that 20% of the population has some disability, and six million of them have difficulty accessing the transportation they need. According to the study "Self-Driving Cars: The Impact on People with Disabilities" by the Ruderman Family Foundation, this technology could create 2 million job opportunities for people with disabilities and save \$19 billion annually in healthcare expenses due to missed medical appointments. At the same time, it will address the isolation that exacerbates diseases or leads to depression, allowing for an increase in people's quality of life.

NO MORE TRAFFIC JAMS AND SHORTER TRAVEL TIMES



The fact that all cars know exactly where they are going, exactly where are all the other cars around them, and have the ability to respond to incidents immediately, will allow them to travel at high speeds inconceivable for human driven cars. And this because human drivers must be limited in the speeds they drive due to human reaction time. Deployment of fully autonomous vehicles, then, will result in considerable travel time savings. So, while more than 50 EU member countries signed a UN regulation that will limit the use and operation of automated driving vehicles, brands like Audi have designed a car that can reach speeds of up to 220 km/h. Hyundai predicts that by 2030, all its models will be autonomous and able to travel at 200 km/h.

FROM THE CITY CENTER TO THE SUBURBS



The dream of living in the suburbs of cities may come true for many families thanks to both effects of autonomy: traffic reduction and travel time. The "Advisory" report by RCLCO in 2015 predicted that "in the 2020s, suburbs and rural areas may experience a rise in demand as some users who have decided to live in smaller places located in denser sectors to avoid long commutes will be using autonomous electric vehicles to make these commutes less burdensome."

PARKS AND SQUARES INSTEAD OF PARKING BUILDINGS



Future cars will not need to park in city centers, allowing parking buildings to be used for residential apartments, offices, or shopping centers. The same will happen with open parking spaces, which can be replaced by squares and parks, while underground parking lots could be used as personal and industrial storage warehouses. It is estimated that in the United States, there are between 500 million and 2 billion parking spaces covering 10,000 to 41,000 square kilometers, equivalent to the entire size of the Tarapacá region in Chile (42,000 square kilometers).

REDUCTION IN THE PRICES OF GOODS AND DELIVERY



Robot trucks will be rolling warehouses. They will not have a cabin or amenities for the driver. They will not take breaks to rest. Programmed to drive at constant and optimal speeds, these robot trucks will engender great energy savings. These savings in delivery costs will translate into savings in the price of the goods delivered. And the goods will be delivered faster since the robot trucks drive outside current working hours. Meanwhile, e-commerce and food delivery are already implementing AI technology to efficiently deliver products directly to consumers.

NEW AUTOMOTIVE AND AEROSPACE INDUSTRY



According to GM VP Lawrence Burns in his book "Autonomy," the advent of autonomous cars will halve the number of vehicles currently on the road. Tony Seba adds that "annual car manufacturing will fall by 70%." But the autonomous vehicle revolution will not only affect the car industry, it will also affect the aerospace industry! For short-haul flights, many will prefer to travel in an autonomous car and avoid flight delays, security checks, lines, and luggage limitations. A study entitled "To Drive or Fly" (<https://commons.erau.edu/ijaaa/vol5/iss1/3/>) revealed that three-quarters of respondents found it more attractive to travel in a driverless car if guaranteed they wouldn't need to rent a car at their destination.



MOIS NAVON

THE CREATOR OF AUTONOMOUS CARS



During his visit to Chile, we spoke with one of the creators of ADAS technology, the American/Israeli engineer Mois Navon. Mois is also known for creating video on-demand systems for commercial airplanes and designing the computerized missile defense simulator for the U.S. Strategic Defense Initiative (a.k.a. "Star Wars"), as well as numerous other technological innovations.

Who is Mois Navon

Born to Turkish-Jewish immigrants, he grew up in sunny Los Angeles, surfing waves and engaging in outdoor sports, which he still enjoys, especially cycling. But it was his interest in math and science that brought him to engineering. While completing his engineering studies at the University of California (UCLA), family friend Ray Eskanazi invited him to intern at NASA's Jet Propulsion Laboratory (JPL), where he helped create an innovative image processor to automate cancer cells detection.

While working at JPL, Navon developed his engineering skills but also learned that engineering is really just a vehicle to fulfilling purpose. "Ultimately," he explains, "we are all here to fix ourselves and fix the world." This little piece of Jewish philosophy, known as "tikun olam," sparked Navon's interest in Jewish philosophy. And so, upon completing his degree in engineering he took a year off to go study Jewish philosophy in Israel. He realized then that he had to find a way to combine his passions for engineering and Jewish philosophy.

His dream came true in 1992 when his wife, Deena, encouraged him to accept a job offer in Israel as part of IBM's chip design team. That would be the first of numerous positions in which he

contributed to the development of high-tech products powering the automated world we live in. But being in Israel allowed him to dedicate time to learning Jewish philosophy as well. And so, in parallel with developing new technologies by day, he studied to become a rabbi by night.

Things became difficult after the dot-com crisis in 2001, which left Navon, along with many other Israeli engineers, unemployed. But his Jewish philosophy - which teaches that "everything is for the good" (gam zu letova) - allowed him to maintain a positive perspective. After a long job hunt, he joined a small start-up as one of its founding engineers, tasked with perfecting an automotive image-processing system capable of detecting and alerting drivers to potential dangers on the road. That small start-up became the world famous autonomous vehicle leader: Mobileye. "The CEO told me that we would sell this technology in two years ... but, in reality, it took over 16 years," Navon recounts. "If I learned anything from the journey it is that, in addition to a good idea to help the world and a good team implement it, the ultimate key to success is perseverance."

After the sale of Mobileye, Navon decided to dedicate more time to philosophy and went on to earn a Ph.D. in Jewish Philosophy at Bar Ilan University. But he still maintains his life of combining engineering and philosophy as he is currently professor of Ethics in AI at the Ben Gurion University. He also manages to travel the world talking about philosophy and ethical issues arising in the field of artificial intelligence. His central themes include the future of cities, the ethical dilemmas of AI, robots and, of course, autonomous vehicles.



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