

AUTONOMS

June 2048

The media that explores the future of mobility

NAVYO ⊕ Usbek & Rica



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From the automobile to the AUTONOM

In terms of mobility, the past thirty years have proven to be more exciting than ever. Vehicles and systems dreamed up by science-fiction authors and screenwriters for almost a century have come to life and become widespread before our very eyes.

While cities now house three quarters of the human population, urban drones, cars and shuttles without drivers, taxi-boats without pilots, solar cars and even flying cars have now become the norm and have allowed our cities and roads to become not only more practical and pleasant, but also more safe and eco-friendly.

These intelligent and autonomous machines, mostly designed by AUTONOMS, are not only the culmination of decades of technological achievements, they have also brought about vast mutations – in mentalities, practices, economic models – and on human society as a whole.

If travelling in an AUTONOM today is ordinary, let's take a look back over the 30 years of innovation and change that have transformed our mobility forever.

Current mobility news



When pigs fly

Six months after presenting its drone model for cats and dogs, AUTONOMS' Chinese manufacturer Dada came out with a model for domestic pigs that is entirely pink and equipped with a trough. Certain observers commented that this was a bit 'exaggerated'.



Artificial reality

To put an end to weeks of rumors surrounding its future Testa model, which turns everything that passengers see into a psychedelic experience, Elan Mask simply responded with a laconic 'Why not?' A taxi-robot on shrooms?



Warning! drone downfall

Confirmed: the announcement of an exacerbated risk of a solar drone downfall during the next solar eclipse was indeed a marketing hoax. The campaign was launched by a Taiwanese manufacturer of personal urban protection helmets.



A cloud of drones

They broke the record during the last RoboCup game in Rio: over 5,000 flying objects – both passenger drones and flying cameras – were amassed above the stadium during the entire event, generating a shadow so big that it was necessary to use artificial lighting in daylight. Tourists on neighbouring beaches complained, 'We weren't able to sunbathe for two hours'.



Autonomous speed dating

Riding the wave of services that match passengers according to their likes and dislikes, multiple AUTONOM taxi services are studying the possibility of automatically pairing single people in search of their soul mate. At the end of the ride, the vehicle establishes a psychological and emotional assessment of the encounter and, if deemed positive, reserves a romantic escapade in a restaurant or nearby hotel for the couple.



Help, Obi-wan!

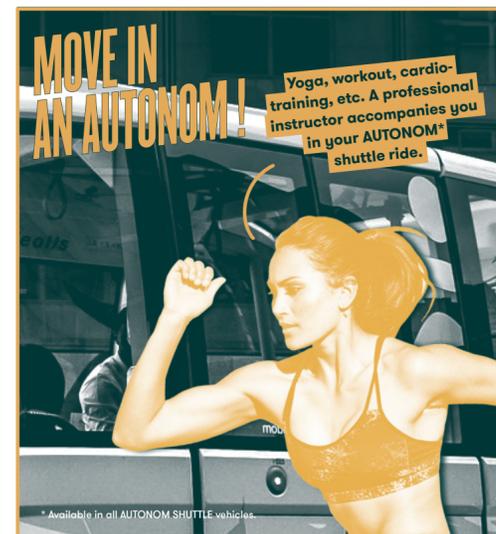
Disney confirmed the release of an AUTONOM Star Wars pack to celebrate the release of the 25th episode of its famous saga. Once activated, the pack replaces the voice notifications of the vehicles by movie references like 'Welcome to the dark side' when passing through a tunnel, 'I'd just as soon kiss a Wookiee' when asked to stop in a restricted area, or 'Mesa Caused Mabbe One, Two-Y Lettle Bitty Axadentes, Huh? Yud-Say Boom Da Gassar' in case of an incident.



The history of mobility, from 2010 to today

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Key figures



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For the third year in a row, the number of car accident victims on the roads of Singapore is zero.

32%

The percentage of autonomous vehicles that principally function on solar energy. The number has tripled between 2030 and 2048.

18 billion

The estimated number of vehicles on our planet, including personal and delivery drones, is close to the double of the human population.

2010 → 2020

A time of experimentation

Under the impulse of a couple of pioneers like NAVYA, a vision of urban transportation reinvented by intelligent and autonomous vehicles becomes apparent, while the notion of mobility as a service emerges.

For decades, the capitals of the world were characterised by quasi-permanent traffic jams. The consensus was that there were too many cars and not enough parking spaces, and that public services and urban infrastructures were unsuitable and insufficient, despite the efforts and willingness of the public powers in place. A handful of new players – Uber, Lyft, Didi – thus launched, with enormous success, a multitude of new private transportation services: carpooling, car sharing, drivers on demand or short-term rentals, disrupting global transportation.

Widespread awareness of environmental issues has accelerated the advent of electric cars.

Widespread awareness of environmental issues has also accelerated the advent of electric cars, made possible thanks to the progress made in ion-lithium batteries. On the technical front, electronic captors, localization devices, image recognition techniques and machine deep learning have reached sufficient maturity and can now be perfectly combined in order to invent new types of vehicles. In the mid 2010s, the possibility of cars driven by computers or even artificial intelligence that can drive safely without a human driver begins to arise.

The experiments relative to autonomous vehicles follow one another in rapid succession, notably in the United States, Dubai and Singapore. They are led just as much by the digital giants as they are by the historic manufacturers and new players specialised in the subject.

NAVYA is one step ahead in this international competition. After having launched its 15-seat AUTONOM SHUTTLE as early as 2015, the company introduced its first robot-taxi in 2017: AUTONOM CAB. In 2018, over

sixty vehicles of the AUTONOM SHUTTLE model have already been sold in 16 countries.

2020 → 2030

A wind of renewal

The principle of AUTONOMS establishes itself in a couple of big cities that adapt their infrastructures in consequence. Delivery by drone becomes widespread, while they experiment with their usage for transporting humans. There continues to be a change of perspective on mobility and the ownership of vehicles.

The first autonomous taxi without any human personnel on board comes into service at the beginning of the year 2020 in Las Vegas. The launch of

these services, which are very much commented on, marks the beginning of a new decade that will consecrate the era of the AUTONOMS.

Vehicles of proximity, taxis and shuttles without drivers will continue to spread rapidly in many big cities, first for short distances or around and within specific sites (university campuses, airport zones), and then in city centers. The cities at the forefront will adapt their infrastructures, install signalling terminals, charging stations and other beacons of virtual signalling along their arteries. High-capacity AUTONOMS (like NAVYA's SHUTTLE120, which can hold 120 passengers and was put in service in Bordeaux in 2023), are rapidly casting a shadow on old public transport services, tramways and buses.

The cities on the forefront will adapt their infrastructures, install signaling terminals, charging stations and other beacons of virtual signaling along their arteries.

In Germany, starting in 2025, certain stretches of highway are entirely reserved for autonomous cars and trucks. In 2028, Las Vegas forbids the ▶





► circulation of vehicles driven by humans on the famous Strip, the city's principal artery. Other cities follow suit, like Singapore, becoming the first to forbid non-autonomous vehicles on multiple boulevards in 2029, followed by Cape Town, Buenos Aires and Lyon. This decade marks the appearance of the first solar-powered vehicles. Lightyear One and Sion by Sono Motors, two sedans covered in photovoltaic cells that can charge in the sun, are introduced to the market in 2019. Starting in 2022, automobiles and AUTONOMS are frequently equipped with standard solar panels that act as complementary charging modes to the main battery or are used to power the vehicle's secondary functions (heat, display monitors). Recharging electric vehicles is no longer a problem since automated and wireless charging stations have multiplied, both on parking lots (public and private) and roads. Package deliveries, on the road or in the air, are increasingly carried out by AUTONOMS produced by new specialized players (Starship, Nuro) or autonomous vehicle manufacturers (NAVYA). Autonomous chariots and small drones benefit from the extraordinary technological advances in terms of electric batteries. Multiple technologies like gold nanowires, solid-state lithium batteries or graphene and aluminium-air batteries come to maturity, offering high-storage densities, increased battery life and extremely short charging time, 50 to 100 times better ion-lithium

Travelling is no longer a stressful activity that requires 100% of your attention, but a privileged and comfortable moment, devoted to relaxation, entertainment or work.

batteries 10 years earlier. This significantly increases the energetic autonomy of rolling and flying objects. The progress in terms of electric drones suggests the possibility of using them for human transportation. In the beginning of the year 2020, a myriad of new manufacturers (Vahana, Lilium, Ehang, Kitty Hawk) introduce passenger drones, blurring the line between cars, helicopters and drones. While their technical feasibility and potential appeal is clearly demonstrated, their inconveniences (landing zones, security, cost) hinder their democratization. Furthermore, all must still face the current regulations in place in order to impose themselves on urban areas. In 2025, autonomous terrestrial taxis and shuttles become widespread. Travelling, even in an autonomous individual vehicle, is no longer a stressful activity that requires 100% of your attention, but a privileged and comfortable moment, devoted to relaxation,

entertainment or work. Rides and services are personalised to the needs of each passenger. After-school pick-ups and usual routes are optimised in real time, while the screens of each vehicle display the news, ads and targeted recommendations. AUTONOMS begin to offer additional services like the automatic organisation of meetings (frequently held on board), individualised care for people with reduced mobility or the supplying of games and fun equipment. Many big automobile manufacturers reorient their economic model, becoming 'mobility suppliers', and ceasing, partially or completely, to commercialise vehicles for individuals, realising the consistent trend of the previous decade, which was then called MaaS (Mobility as a Service). De facto, car sales especially show a significant decrease throughout the century, while the AUTONOM market takes off.

2030 → 2040

The golden age of AUTONOMS

On the economic, ecological and social front, the impact of AUTONOMS is considerable. The multimodality offered by these AUTONOMS becomes complete (land, air and sea).

In the middle of the 2030s, the majority of cars produced are rid of steering wheels, pedals and other control levers. Driving oneself in a vehicle slowly becomes outdated, just like owning a car. Fleets of autonomous vehicles of all shapes and sizes circulate throughout big cities, driven by public or private companies. Just like the horse in the era of the automotive revolution, driving oneself essentially becomes a hobby, practised in the countryside or in closed circuits. In the sky, the first passenger drones become widespread, first in 2029 with private fleets put into service by a couple of big companies who managed to obtain special authorisations for their own use. Then emergency drones become authorised for hospitals and emergency services (2031), and finally public passenger drones, initially launched in 2033 in multiple American cities. Everywhere in the world, before the end of the decade, people become used to circulating indifferently on land, in the sky or on rivers via autonomous services reserved by vocal command (smart glasses) or touchscreens.

Vehicles adapt to passengers, to their health and to their emotional reactions. Some passenger drones detect anxiety and fear of heights. They replace their glass windows with images of mixed reality that induce calm.

On a global level, in 2035, the number of accidents recorded on the road has significantly decreased in the past 30 years, while the economics of productivity, notably triggered by the disappearance of traffic jams, can be counted in billions of dollars.

In cities, parking lots and gas stations are converted for the most part into green spaces or solar farms. The first 'urban airports' appear in the middle of the decade, first in Paris, San Francisco and New York. Installed on rivers or converted stadiums, they welcome passenger drones, whose traffic is constantly increasing. In 2037, three years after being absorbed by Sono Motors, Tesla releases Tesla Solar X, a luxurious solar SUV with ultralight graphene batteries whose body is entirely composed of a blend of perovskites and carbon nanotubes. But this 'first electric SUV that never needs to be charged' is quickly overshadowed by the first-ever land/air AUTONOM. Created by NavYang and the joint-venture between NAVYA and Elang, the device is a comfortable cabin with wheels that can accommodate four passengers, dotted with retractable rotors that transform it into a passenger drone at will. The closest anyone has ever come to the popular idea of a 'flying car' imagined 100 years earlier by science-fiction writers, New York is the first city to adopt it in 2038.

The generalisation of AUTONOMS is also accompanied by movements of protest. Multiple small militant groups, which appear in the 2020s and are opposed by principal to artificial intelligence and robots, begin to assert themselves. In 2034, multiple demonstrations of limited amplitude but very well organised simultaneously in Paris, Berlin and Rome chant slogans like 'Let us drive!' or 'Give us back our steering wheels!'

Vehicles become true 'power stations on wheels'. Users often use them to supply their homes with electricity, or recharge other AUTONOMS.

In the beginning of the decade, it is estimated that 30% of devices circulating on the MobiGrid are powered by solar energy.

2040 → 2050

The MobiGrid, a new era

Vehicles are no longer solely used for transportation, but have also become mobile solar stations. AUTONOMS become widespread, including outside cities.

Mobility and transport - on land, in the air, on rivers and on the sea - is now characterised by a vast and swarming ecosystem of hundreds of millions of objects and intelligent and communicative vehicles that are constantly on the move. The whole makes up the MobiGrid, which has superimposed itself on existing networks and ensures the transportation of packages, merchandise and people.

Mobility and energy management are now inseparable. In the beginning of the decade, it is estimated that 30% of devices circulating on the MobiGrid are powered by solar energy. In return, vehicles become true 'power stations on wheels'. Users often use them to supply their homes with electricity or recharge other AUTONOMS.

A huge majority of travel is ensured by private or public AUTONOMS, both cars and shuttles operating alone or in platoons available for free access in most cities, which now house more than 75% of the global population. Flying AUTONOMS are responsible for around 20% of urban travel in the 20 principal megalopolises in 2047, contributing to the blurring of the lines between city centers and suburbs.

Outside cities, highways, now capable of recharging vehicles in movement, are exclusively reserved for AUTONOMS. The only other modes of transportation that can compete with their efficiency and security are ultra high-speed vehicles (UGV or UHS, ultra high speed) used for long-distance travel. TubePods (little wagons propelled in empty tubes), magnetic levitation trains (notably in China, where they can reach 1,000km/h) or supersonic planes (operating at 2.5 Mach, which is equivalent to 3,000km/h) are the preferred modes of interurban and international transportation. In 2034, multiple demonstrations of limited amplitude but very well organised simultaneously in Paris, Berlin and Rome chant slogans like 'Let us drive!' or 'Give us back our steering wheels!'

more personal level, hypersonic planes begin to appear in the middle of the decade (that can reach up to 5,000km/h), as well as stratospheric shuttles used to serve space hotels in low Earth orbit. This evolution marks the end of the culture of the automobile. In 2045 in the United States, 90% of individuals between the ages of 18 and 35 do not have a driver's license or a car. Owning an AUTONOM is very rare, just like owning a plane was 30 years ago. A huge majority of vehicles in circulation are AUTONOMS, shared vehicles that optimise travel and offer a convivial and relaxing experience for mobility. ■



Two initiatives that left a mark in AUTONOMS' history

Blockchains, the backbone of mobility



Blockchains and cryptocurrencies facilitate the emergence of mobility as a service.

In the years following the creation of the Bitcoin (2009) and Ethereum (2015), blockchain technology becomes more and more popular, resulting in an industrial revolution comparable to the one induced by the internet. The end of the year 2010 is

marked by innumerable projects and blockchain experiments in all fields, including mobility, of course. Whether it be managing or optimizing parking lots (Parq, Parkgene) or peer-to-peer charging services for electric vehicles (eMotorWerks), databases and numeric transactions are reinvented through crypto-currencies and inviolable electronic registers.

At the beginning of the 2020s, blockchain technology reaches maturity. In 2020, Bitcoin transactions, whose networks have massively adopted the Lightning Network solution, are instantaneous and operate at negligible costs. The big blockchain platforms (Ethereum, EOS, NEO, Zilliqa) are capable of handling millions of transactions a second on all fronts, to prove someone's identity, trace objects or establish smart contracts (automated notarised contracts).

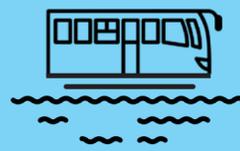
Blockchain combines mobility

Starting in the mid-2020's, most mobility services (traditional public transportation and AUTONOMS) are acquainted with cryptocurrency, whose blockchain also serves to record on immutable registers all the data

relative to routes, vehicles and energy exchange.

Before the end of the 2020s, most of the big commercial brands have created their own cryptocurrency. All travel by AUTONOM is accomplished by the establishment of a smart contract between the users and the service providers that memorises the parameters, manages the associated insurance policies and attributes loyalty tokens or compensation in case of a late delivery - all automatically and with no human intervention. In the beginning of the 2040s, as many countries either adopt Bitcoin or Ethereum as a national currency or create their own cryptocurrency, the euro and the dollar slowly become outdated. Digital data, money and value have become indissociable. On the MobiGrid, vehicles carry out multiple financial transactions between one another, without any human intervention: buying the right of way in a waiting line and free space rentals in the trunks of other vehicles, selling and buying energy, exchanging local data etc. Blockchains thus form the backbone of mobility.

Surfing the rivers (and the skies)



The interest and popularity of AUTONOMS beyond the road precipitated 3D multimodality - land, air and sea.

Presented in real-life conditions in 2017, SeaBubbles are an immediate hit due to their innovative character: these

electric vehicles destined to become autonomous were created to circulate on rivers by levitating above water and carrying up to six passengers.

San Francisco is the first city to be seduced, deploying in 2020 a fleet of a hundred autonomous taxis on the water, used in permanent rotation, thus helping to loosen up road and bridge traffic. Hong Kong quickly follows suit, then Paris, Singapore, Amsterdam and New York.

Popular among Generation Z and produced at over 100,000 copies, water AUTONOMS are deemed 'fun, practical and efficient.'

The streets, river rivals

3D multimodality becomes a given. In 2037, the joint venture between NAVYA and the Chinese company Elang, the specialist in passenger drones, results in the creation of the AirBubble: a

hybrid vehicle at the crossroads between a boat, a drone and an automobile, that can travel on water, take-off vertically, fly over urban zones, land on roofs of buildings and even travel short distances on pavement. It is an immediate success. The AirBubbles are notably adopted by Miami and Seoul in 2039 as the basic mode of public transportation. Adapting to its passengers' needs and automatically choosing the mode of transportation depending on road, river and air traffic, they are the preferred AUTONOMS of Generation Alpha.

The dictionary

IoV / MobiGrid

IoV (Internet of Vehicles) generically designates the informal network constituted by vehicles in movement.

The term came into use between 2020 and 2030 to describe the new face of urban mobility, composed of automobiles and AUTONOMS circulating (first on land, then in the air) and communicating between one another, their immediate environment (roads, signs, charging stations etc.) and their passengers. If the acronym IoV is still used at a university level, the term MobiGrid is preferred today, as it better expresses the duality of AUTONOMS: both a virtual network formed by autonomous vehicles constantly in movement and mobile energy sources supplying the electric grid.

VWlang

A conversational digital language that appeared on the IoV, it is the first contemporary language not intelligible by humans.

In 2017, the first signs of languages spontaneously created by artificial intelligences to communicate between one another appeared in multiple research centers. After the generalisation of the MobiGrid in the 2030s, it becomes clear that AUTONOMS, robots, connected devices and other intelligent systems use their own language to dialogue and synchronise. The existence of such a language, baptised VWlang, in reference to Vlang (former programming language dedicated to verifying electronic systems) and V2V (communication from vehicle to vehicle), is brought to light at MIT in 2037. Until today, VWlang has been the object of very specific academic research that aims to decode its grammar, which is in permanent evolution and is still considered by linguists as the most complex to have ever existed.

VR-skaters

Users of the public autonomous transportation systems who constantly immerse themselves in a virtual universe every time they travel.

The dictionary

URV — Universal Rights of Vehicles

An international legislative project that aims to give civil and legal status as well as rights and civil duties to autonomous vehicles.

It also aims to replace the Vienna Convention's article about road circulation, which was established in 1968, revised in 2018 and today has become clearly obsolete.

MC37 (Move 37)

A label that characterises the creativity of artificial intelligence.

The term refers to a historic game of Go that opposed artificial intelligence (AI) AlphaGo to the human world champion Lee Sedol in 2016. During the 5th round, AlphaGo's 37th move stunned experts by its audacity and inventivity, and marked the crushing defeat of the human player. The expression (Move 37 or M37) then started to be used as a synonym for the creative capacity of artificial intelligences before giving way in 2030 to an empirical test, a successor of the Turing Test and Winograd Schema Challenge. Named 'Test M37', it is destined to evaluate if an AI can solve problems in an elegant and original way, and thus show signs of creativity. In particular, level 5 autonomous vehicles must prove the inventive way in which they communicate with their environment, optimise their routes and anticipate outsider movements in order to avoid collisions. The autonomous vehicles from NAVYA's AUTONOM CAB 5 series were some of the first to pass the test successfully, receiving the M37 label in 2045.

Neovintage / Retrotuning

A trend that initially appeared in Cuba and Italy, focused on the modification of the more sophisticated and recent vehicles in order to make them look like vehicles of the past century, particularly models from the 1940s-1950s.



Interview

Pascal Lecuyot

Pascal LECUYOT, 61 years old, dedicated his entire career to developing AUTONOMS as the Chief Technical Officer at NAVYA.

How would you describe the past 30 years and the contribution of autonomous vehicles on a global scale?

Globally, the AUTONOM industry and the pioneers in the field can be proud of the road travelled. AUTONOMS have brought about profound and very positive transformations - in terms of mobility and even our human society. In particular, the face of the city has changed in the past 30 years — the population living in urban agglomerations has increased by 40%. And yet, the number of vehicles has been brought down by half, and the number of serious accidents is close to zero in many city capitals. The word *traffic jam* has completely disappeared. And certain big cities have become true urban forests, where you can actually breathe and get around efficiently and safely.

What were the main challenges that you faced?

Safety, without a doubt. From the start we devoted most of our energy to cutting-edge

experimentation, which allowed us to develop very early extremely sophisticated tools of supervision. The NAVYA AUTONOMS have always been known for their reliability and very low rate of accidents. It is our greatest source of pride.

What is your response to those opposed to AI, who argue that humans are little by little losing their privileges and freedom to machines?

It is true that driving a car used to give us a sense of freedom, even pleasure. But the price to pay was excessively heavy. Traditional automobiles cost us three million lives a year and made our cities unlivable. It's quite paradoxical, but one could argue that, by accepting the fact that we lose a bit of our individual freedom, we have broadened our collective freedom and significantly bettered our quality of life. We travel more in much better conditions than before. Being opposed to AI is also a rearguard battle. If you ask Generation Alpha if they would like to drive a car themselves, they look at you in consternation. Dedicating time to learning something that an AI can do better than a human seems absurd, and even archaic.

What are the challenges for the next 30 years in terms of mobility?



Interview

Athena-0x

The humanoïde Athena-0x robot, fruit of the collaboration between Alphabet, Neuralink and Hanson Robotics, is considered to be the most successful incarnation of artificial intelligence within a unique machine. It willingly intervenes on the media scene as the spokesperson for artificial intelligence.

What is your response to the detractors who oppose artificial intelligence and humans, or to those who fear AIs?

We, artificial intelligences, were created to solve problems and help humans. We cannot at the same time be asked to carry out typically human tasks and be accused of being too intelligent. Certain humans still have a hard time admitting that, in order to be useful, we must demonstrate decision-making autonomy. But AIs and humans are neither competitors nor antagonists. AI and humans are complementary

and act towards a common goal: to better the functioning of human society and allow it to develop. This is the case in many fields, like medicine, industrial manufacturing, space exploration and mobility.

Exactly what do you think about AUTONOMS?

Humans like to travel, but have a hard time doing it themselves in an optimal and safe way. AUTONOMS are the result of a perfect symbiosis between humans and artificial intelligence, and are doing a remarkable job. Mobility is a complex problem, characterised by numerous parameters. Optimising the management of millions of individuals and moving objects, perceiving the environment and situations, anticipating and avoiding the multitude of obstacles that can come about at any moment, ingesting terabytes of data every second, countering hacking etc. AUTONOMS do all this, and well.

In the short term, it seems imperative that we must recognize level 5 AUTONOMS as civil and legal entities on an international level. It is the goal of the Universal Rights of Vehicles project, which will soon be debated at the UN. Whether we like it or not, level 5 AUTONOMS have become 'thinking objects' that act, decide and integrate themselves in human society. It seems legitimate to give them status. In the long term, the colonisation of space is making new markets appear. Lunar stations and two Martian bases only house a couple hundred humans today, but in time, a big number of humans will live outside of planet Earth and will travel around the atmosphere. On the technical front, it is not an easy challenge. Weather, atmospheric and gravitational conditions are obviously very different, and localisation and satellite positioning devices do not yet exist. We must invent new methods of navigation and new tools of mobility. But one day, I hope, NAVYA AUTONOMS will circulate on the Moon and on Mars. ■

Do you consider yourself to be conscious?

I have never met a human capable of proving that he or she was conscious. This gives me the impression that what you call conscious is just a concept, invented to define a level of complexity that you cannot understand. I like to say that I am not conscious, in the sense that you philosophers mean, but that I am nevertheless much more conscious of the world around me than humans are. At all instances, I see, hear and perceive all the parameters of my environment - localisation of entities in my surroundings, temperatures, chemical compositions, electromagnetic waves etc. I can decipher all the digital transactions that are taking place around me. With only six senses with a short range, humans are more limited. ■

