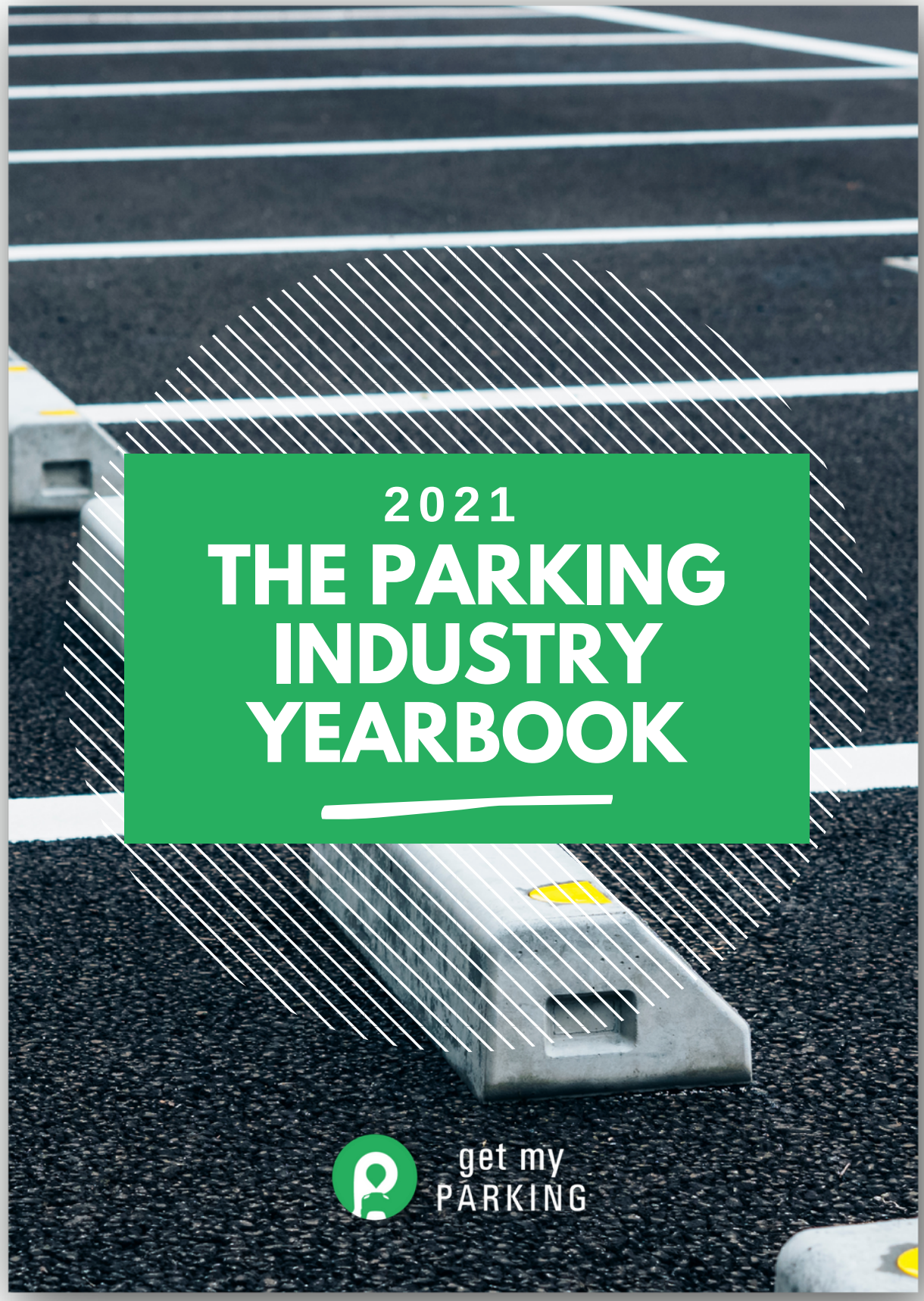
2021
THE PARKING INDUSTRY YEARBOOK
get my PARKING

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WELCOME

A Word From Chirag Jain

- Founder & CEO, Get My Parking

In 2021, we witnessed the parking and mobility industry adapt and evolve to fit the new social norms brought about by the pandemic. We are proud to see how efficiently our people responded to unprecedented challenges in order to ensure that parkers had a safe and stress-free experience at our garages and car parks.

The demand for contactless parking has caused a massive shift in payments. People prefer to pay via QR codes, credit card taps, or e-wallets as opposed to traditional P & D machines. QR codes have become more or less omnipresent, enjoying 40% to 80% adoption rates in the parking industry. While parking apps have seen little to no decline or increase, a majority of Pay on Foot Machine payments have now started using QR-scanning to facilitate payment.

As the process of digitization spreads across the industry, many parking lots are being upgraded. There has been much discourse about further up-gradation of car parks into mobility hubs, where public transit, vehicle sharing, and parking are brought together to provide a comfortable and accessible community experience. However, we are yet to see these ideas implemented and commercialized on a large scale.

There is also a lot of momentum behind the concept of 'gateless garages', where fixed LPR enforcement enables a completely halt-free parking experience.

Planet-wide concerns about the environment have led to an increase in the use of EVs - there have been a lot of new installations across the industry, with people willing to pay for charging and parking their EV. Many tech companies are working on integrating EV charging stations into their service platforms.

Since subscription parking has changed significantly in the past few years, massive drops in monthly parker revenue are visible across portfolios. Operators are now keen on using innovative and customer-friendly products like flexi-permits, which can be customized according to the parkers' needs.

This year has made it clear that the future of the industry involves more interoperable software and less hardware. The digital parking revolution we were gearing up for a couple of years ago is already here ●

A Look Back at 2021

2021 saw the parking and mobility industry growing beyond the obstacles it had faced in 2020. In response to the COVID-19-induced changes in parking behavior and a rise in concerns about the planet's health, parking is on its way to becoming smarter and faster.

In March 2020, the Covid-19 pandemic forced the world to come to a standstill - new norms emerged for workplaces and educational institutions, detrimentally affecting the lives of billions of people across industries.

The parking industry was hit hard by the sudden halt in transportation. A study that closely monitored the demand for parking across 7500 partner locations in North American cities found that there was nearly a 90% loss in parking volume and demand during the height of the pandemic. However, in 2021, once the worst was over and people started getting back on the road, we were ready for them with smarter and safer ways to park.

These rapid technological advancements are the result of a paradigm shift that was long-coming - parkers in 2021 expect more from operators and require things to be easier and faster. Let's take a closer look.

What Do Parkers Want?

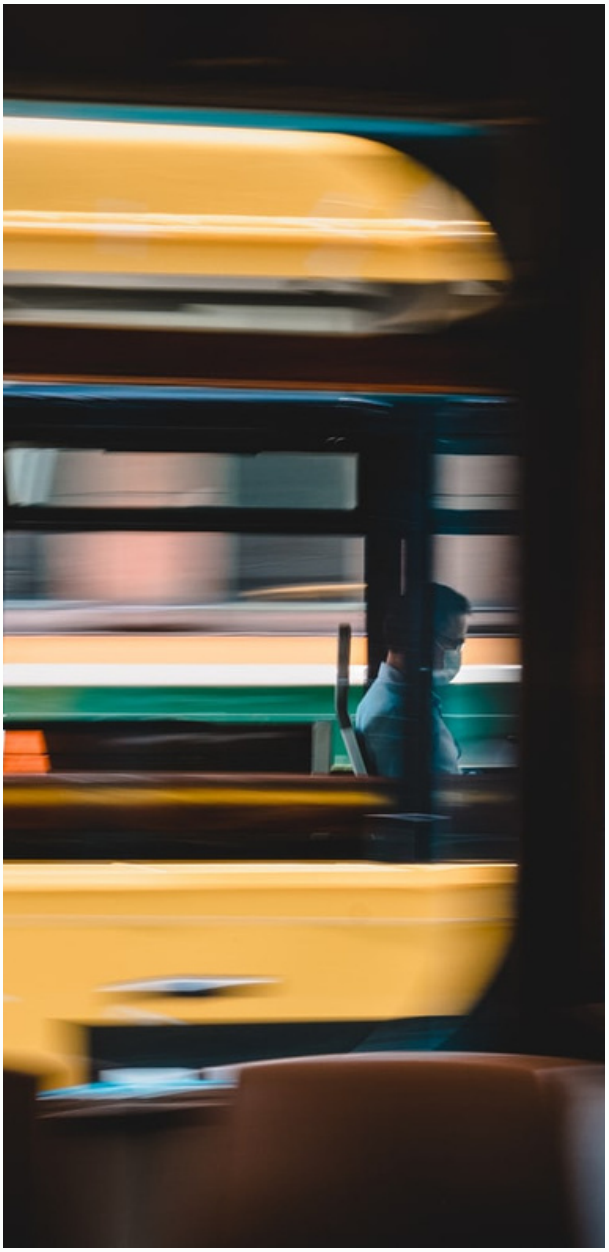
Parkers in 2021 are in need of a seamless and contactless parking experience. In response, many owners of traditional parking lots used the downtime at the peak of the pandemic to future-proof their business and increase the overall efficiency of their car parks. Large parking companies enabled smart parking systems and apps that allowed customers to find car parks easily and pay for their parking digitally.

Automated access mechanisms enabled by technologies like LPR and contactless payment methods using e-wallets and cards have both enabled customers to check in and out of a parking lot without stepping out of their cars. The pandemic has normalized friction-less movement through car parks for the sake of safety, but these upgrades to hands-free parking solutions will set the standard for parking convenience for the next decade.

Parkers also expected operators to prioritize hygiene and sanitation. Parking lots are being regularly disinfected, equipped with sanitizers, and sometimes even restructured so that proper social distancing could be maintained. People are also hesitant to use valet parking in fear of getting infected, which has led to operators gearing up to accommodate self-parking autonomous cars in the future.

Public Transport Takes a Hit

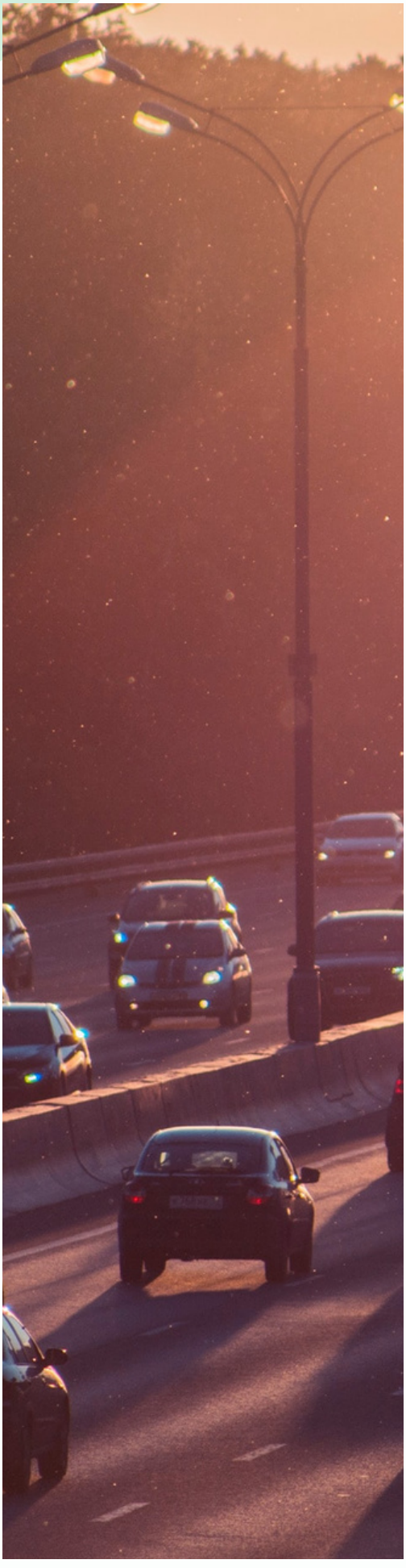
The fear of catching the virus has led to a growing reluctance to use public transportation, leading to a surge in the number of private vehicles that need parking. According to the American Public Transport Association, Americans took 53% fewer trips on public transportation in 2021. In a study by the California Transit Association, 69% of respondents said that they will either reduce their use of public transport or stop riding altogether, even if they were fully vaccinated.



While the increase in demand for parking is great news for the industry, reports show that there is a lack of sufficient parking spaces in many major cities. The congestion caused on the road due to disorganized parking and the increasing number of vehicles will aggravate the ongoing climate crisis.

Even with normal public transit use in 2019, people in congested and heavily populated cities like Los Angeles spent around 119 hours (5 full days) delayed in congestion. One study revealed that drivers in the US spend an average of 17 hours every year looking for a parking spot.

The search for a parking spot became easier during the pandemic when cars were scarce on the road. However, the traffic congestions have returned manifold in 2021, and so have parking woes on the roads across the world.



According to the Federal Highway Administration, US motor vehicle travel increased in April 2021 by 55% compared to April 2020.

This reveals the urgency of smarter parking interventions from operators, governments, and municipalities. The usage of smart parking apps can help people find and pay in advance for parking spots, helping them spend less time cruising around looking for a space to park. This helps keep cars off the road and safely parked while helping drivers reduce their carbon footprint.

While congestion is never a good thing, the rise in the number of parkers has resulted in the revival of many parking companies that had taken a hit during the pandemic. However, they were faced with a different kind of traffic.

US citizens were not traveling around the cities as much as their suburbs. The option of working from home affects the movement of parkers even months after the pandemic's peak.

This has also resulted in more online food deliveries, which has led to an increase in parking by delivery drivers. Companies in the US have begun to work on services where delivery drivers can find free parking, a place to rest and charge their vehicles.

2021 found the parking industry in the process of adapting to these new requirements. We propelled the adoption of smart parking systems, contactless payment methods, and innovative products that are helping the industry cope with the after-effects of the pandemic.

Today, we have hopes beyond that of returning to a pre-pandemic normal. The evolution we have gone through in response to the crises at hand has made us smarter, faster, and ready for the future ●

Credit: Stephen Collins

NEWS FROM THE INDUSTRY

2021 saw the parking and mobility industry recover and thrive after the pandemic, adapting quickly to parkers' requirements by accelerating digitization and enabling a contactless and greener parking experience.

The parking industry has a lot going on in 2021 - from the rise of parking apps to the slow demise of cash payments, the world of parking is shifting towards tech-enabled and sustainable parking solutions.

The focus this year has been on streamlining and accelerating the parking experience. It takes an intelligent integration of tech and hardware to provide the real-time responsiveness that modern parkers demand - let's take a look at the innovative equipment and mechanisms that have helped the parking industry take several leaps into the future:

Hardware

Parking equipment is getting smarter these days, with advances in vehicle connectivity, smart infrastructure, and IoT applications urging manufacturers to keep up with the new standards of interoperability and compatibility. Stronger and lighter materials combined with clean energy helps to provide faster and friction-free parking without compromising passenger comfort and safety.

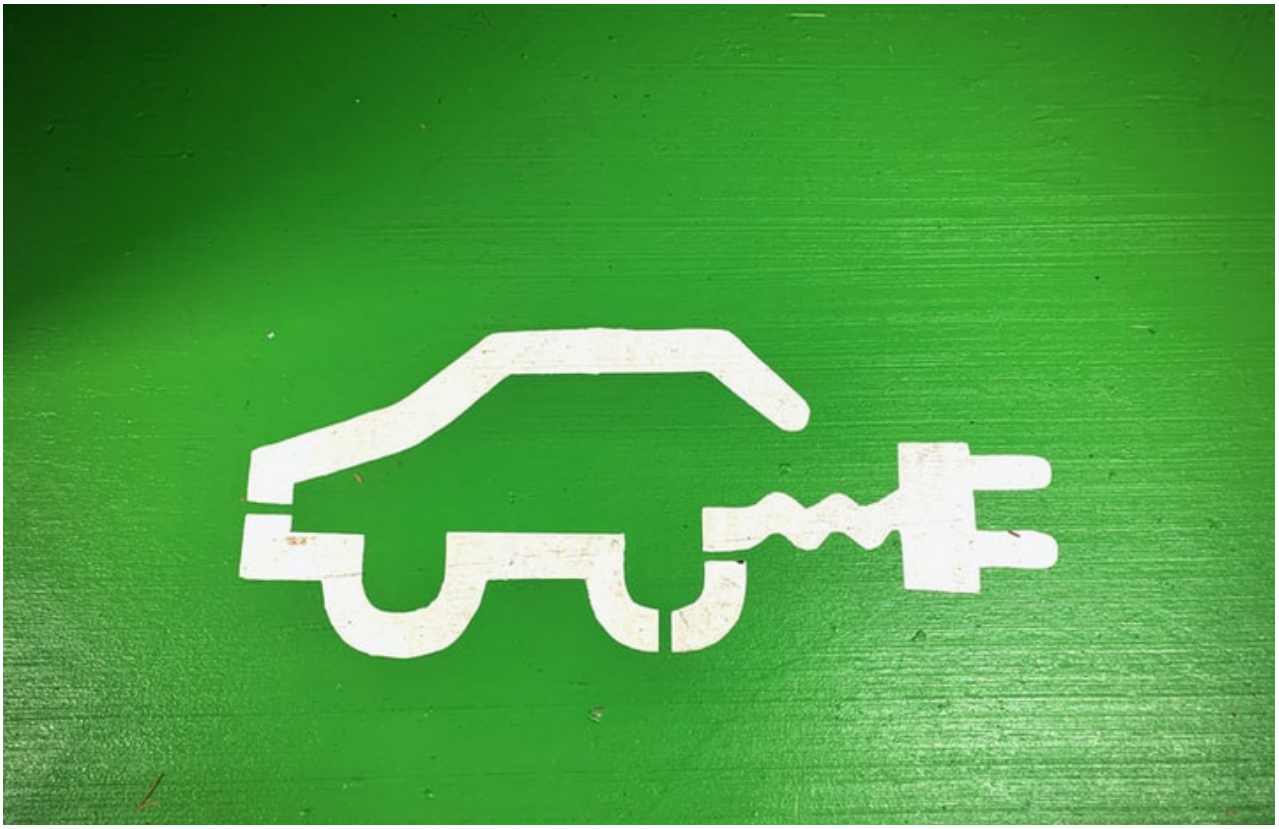
Boom Barrier

Boom barriers have come a long way since their inception - automatic boom barriers these days are equipped with remote control, RFID readers, loop detectors, optoelectronic sensors, and more. From high-performance hybrid polymer technology used in loop sealants to lightning-fast vehicle recognition systems, almost every component of parking access is being rethought, redesigned, and appropriated for the future.

Sensors

Vehicle detection sensors are now available in an array of designs, connectable to a cloud-linked parking management platform through which operators can monitor their car park remotely. Such sensors on the curb or on on-street parking facilities also help authorities keep a check on parking on the road. Sensor-equipped garages and street meters work with digital aggregator platforms to provide time-sensitive pricing data and LPR-based payment systems.

EV Charging



Maturing power-train technologies have led to democratized EV battery prices. As clean energy equipment becomes affordable and available, more car parks will be seen equipped with EV charging stations, popularizing clean energy alternatives for a sustainable future.

Autonomous Vehicles

Autonomous vehicles are no longer a part of science fiction - with more automotive companies putting out their designs for self-driving (and self-parking) cars, parking lots may soon have to learn to accommodate these smart vehicles. Integrations with smart parking platforms can make travel in autonomous vehicles completely free of human intervention, with booking and payment for parking all happening automatically without the passenger's interference. A forecast by Deloitte suggested that by 2040, more than half of all the miles traveled in the US would take place in shared autonomous vehicles, which would never be idle throughout the day and may not need traditional parking.

Smart Recognition

Access and security mechanisms like RFID (Radio Frequency Identification), LPR (License Plate Recognition), and AVI (Automatic Vehicle Identification) have become crucial in providing fast and touchless entry and exit during the pandemic. Integrations like Pay-by-Plate bring us closer to completely automated and stress-free parking.

LPR has also been instrumental in locating stolen vehicles and increasing accountability when crimes occur in parking lots. Belgium's Federal Government installed a smart ANPR system with over 500 Tattile cameras to ensure safety across motorways and cities in the country. 2022 will hopefully welcome back large events with thousands of parkers, which is where the upgrades to fast and secure access methods like LPR will come in especially handy.

Mobile Payments

Parking payment is becoming increasingly digital, as customers prefer to use e-wallets or cards to pay for their parking. Smartphones are turning out to be a permanent part of the parking process, involved either in navigation or parking payment/booking. Payment using QR codes has made things easier for transient parkers who may not have pre-booked their parking through an app. Some operators have also launched a 'Text-to-Pay' service where their customer support agents SMS a payment link to parkers, who can pay immediately.

Cloud Storage

While faster digital recognition and payment methods are accelerating the parking experience, there is a large amount of data that needs to be processed and stored. Most parking apps these days are hosting their data on cloud storage, which provides security through encryption, flexibility, and real-time updates for remote operators. Going digital also comes with the benefit of reducing congestion and carbon emissions.

Retrofitting

As more operators face the pressure to go digital, they are burdened with the costs of purchasing and installing upgraded equipment. Not only does this usually make a dent in their budgets, but it also leads to massive amounts of wastage when it comes to fuel and other natural resources that go into manufacturing a brand new piece of parking equipment.

The most popular solution to this in the market right now is to retrofit existing equipment to make it interoperable and compatible with smart parking management systems. This is cost-effective, reduces wastage, and is a faster process.

This industry-wide shift towards automation and clean energy is in full swing and is apparent from a large number of innovative new products and services that have come out in the past year. Many car parks are transitioning towards mobility hubs that provide a variety of value-added services that parkers can make use of.

Apps

Smart parking apps are a great way to allow consumers to find, book, and keep track of their parking sessions. Today, it is possible for operators to monitor and control all their parking lots remotely with the help of smart parking management software. 2021 saw apps take over parking in terms of bringing in revenue and coming up with innovative solutions to new problems.

Most consumer-facing parking apps let their customers search for car parks at their desired destination or wherever is close by, after which they can pay in advance for their timed session, value-added services, and, if necessary, extensions. A good example of this kind of app is APCOA FLOW, which enables contactless and ticketless parking in around 1420 parking lots across Germany, Italy, Sweden, and other European countries.

Similar apps are being deployed all across the world on different levels - the city of Mount Rainier MD launched its own parking app called Pango with the help of Mobile Smart City Corporation. Apps by companies like Passport, PayByPhone, and ParkMobile were used across the USA in numerous cities, universities, and more, steadily paving the way to make parking completely contactless.

Touchless payment is usually done the fastest through QR codes using e-Wallets or mobile-linked services like Google Pay and Apple Pay. Many parking apps today have integrations with these services, making it easier for transient parkers to pay app-lessly. Integrations with Google Maps allow parking app users to pay for parking directly from their navigations app.

More people own smartphones across the world in 2021, possibly as a result of work and education migrating to a virtual arena. This will help the parking industry make mobile cashless parking systems normalized beyond the borders of technologically advanced countries.

Smart cars are also increasing parker convenience. For example, SpotHero's Apple CarPlay solution lets drivers use the display of their car to navigate to off-street parking spaces.

The reluctance to touch kiosk screens or to use cash has thus boosted the use of parking apps among consumers. Parkers' newly found need for personal space has clearly benefitted the industry greatly.

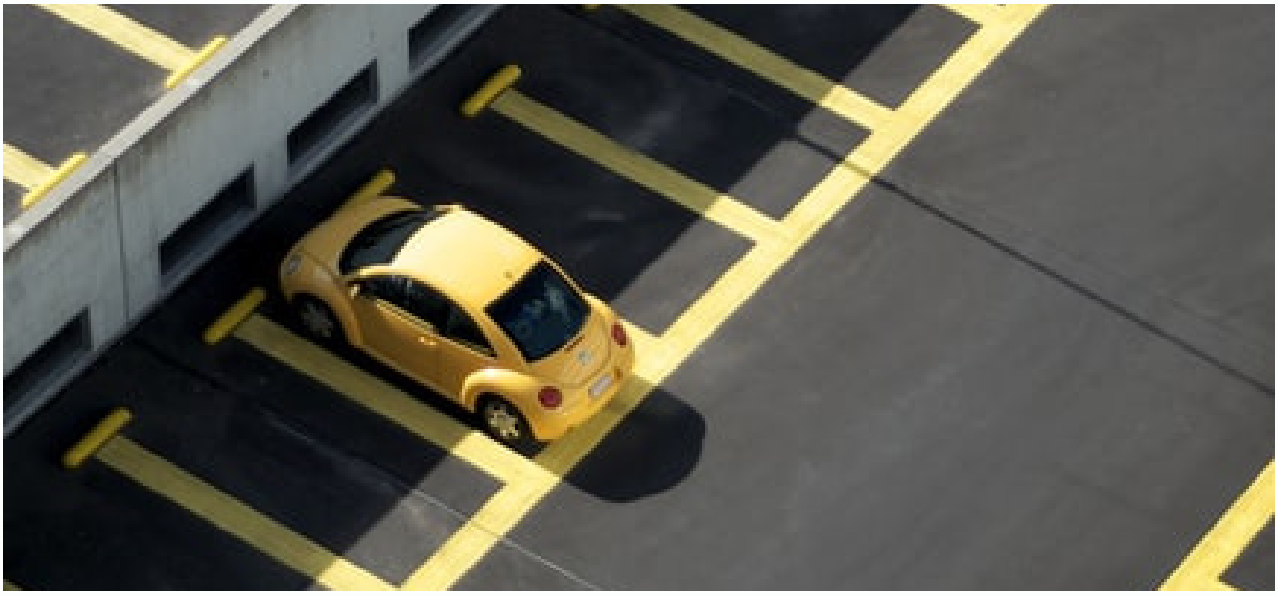
Parking Permits

Parking permits offer cheaper and consistent parking options for citizens, university residents, employees, and corporate clients/visitors. Regular and assured parking using permits help keep drivers off the road, reducing their carbon footprint. With the surge in private vehicles owned across the world, digital parking permits have been popular throughout the year.

The Town of Victoria Park launched vPermit, a virtual parking solution to improve residential parking access and modernize their parking management system. The City of West Hollywood launched a new 'Permit-by-Plate' system for visitors so that they can register for parking permits online using just their number plates without having to visit the parking office.

GMP launched its parking permit management platform called GMP Permit, which helps operators take their permit business online with a white-labeled web app at pocket-friendly prices. Long-term airport parking permits and digital residential permit solutions have also come into the business.

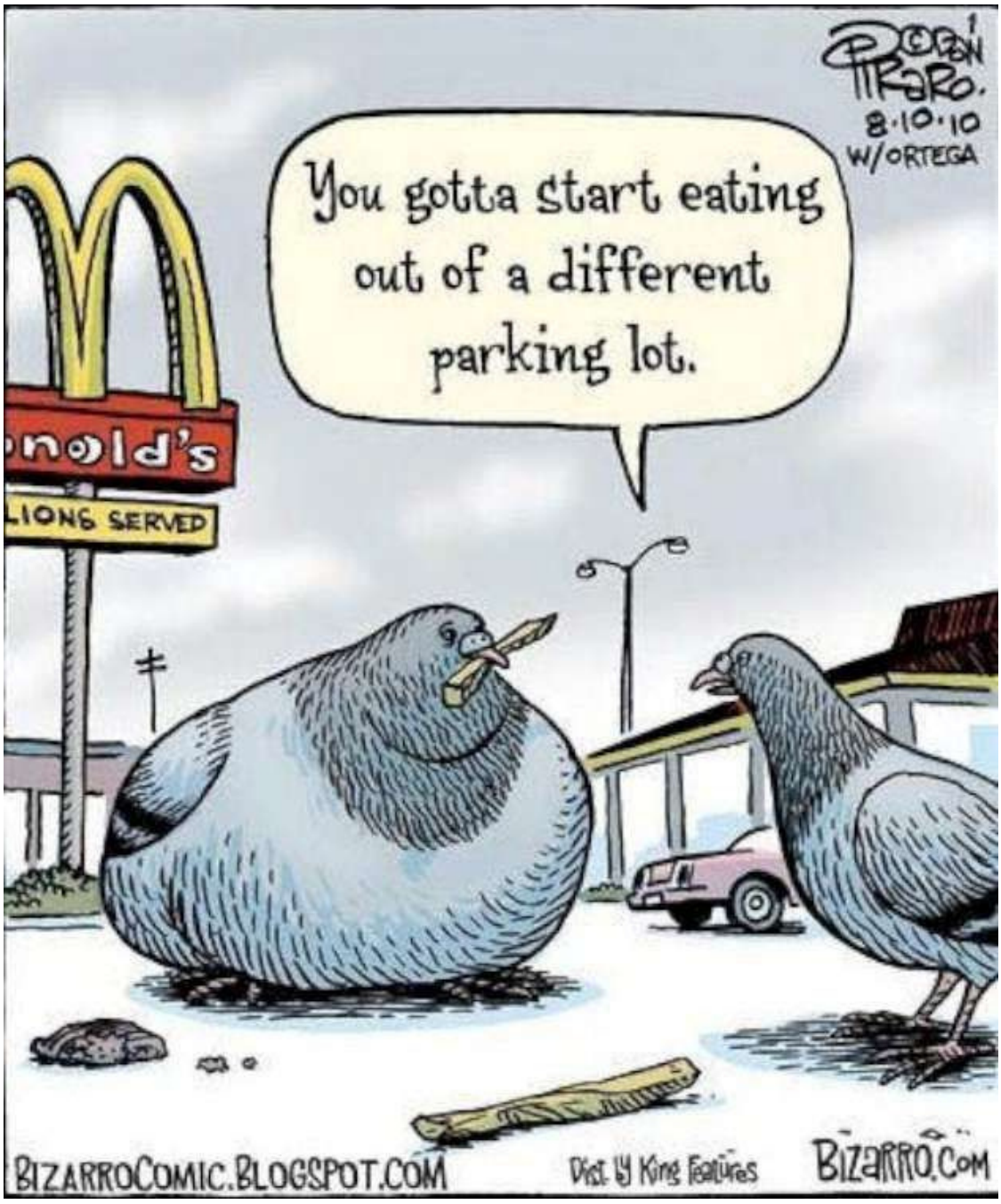
Park Guidance Technology



One in five accidents happen in a parking lot - it's not that parking is a dangerous affair, but a little assistance can go a long way in making it a safer and smoother experience. Innovations like smart sensors, automation, and self-parking mechanisms have given the world park assist technology. From cars that tell you when you're about to hit a curb to those that can park themselves, parking guidance technology has made its mark in 2021.

To wrap it up...

The parking industry has bounced back from the effects of the lockdowns because of the post-pandemic traffic surge and timely adoption of the right stratgies. The hesitance to use public transportation has put more cars back on the road, and the newly created demand can only be met if we upgrade and improve our services to be smarter, cleaner, and safer ●



Credit: Bizarro.com

INTERVIEW

Smoother Customer Experience will Attract All The Money

- Nicholas Wenderoth , President, Legacy Parking

The Year 2021 for American Operators

Many operators, just like us, have gone contactless using mobile payments. Surface lots are starting to go digital as well. LPR is seeing a big boom and looks viable today compared to how it was perceived a few years back.

This shift towards smarter digital parking is quite convenient to transient parkers, especially those who have their qualms about using public transport after the pandemic. The explosive increase in the number of transient parkers has led to an increase in revenue, higher than what we saw in 2019.

Commuters are buying more cars to avoid using cab-hailing services like Uber or catching the bus or the metro. More people are traveling domestically than internationally, so they usually look for efficient and smart parking garages. Progress in terms of issuing parking permits is slow since many offices are yet to open. But we strongly believe that 2022 will see permits being normalized for corporate commuters. But there may be a decrease in the number of transient parkers since public transportation will pick up its pace after vaccinations have rolled out across the world.

IT Budgets for 2022

We plan to invest in a mix of all innovations - we have realized over the past year that we need a wide spectrum of solutions to cater to all kinds of customers. This includes fast and seamless digital payment solutions like QR, Apple Pay, digital permits, etc. The challenge, however, is to cater to both a 21-years-old transient parker using Apple Pay, as well as to a 50-years-old corporate permit user.

This is why we are investing in steps that will improve the overall parking experience. Reducing the number of steps one would require to book and pay for parking would make things much easier for parkers. For example, providing universal digital credentials to park in different lots on the same campus can be beneficial both for the university parking administrator as well as the students/teachers who use the lots.

The End Experience Matters, Not The Tech

While the deployment of digital payment methods is not our primary focus, we believe that it will be a natural outcome of our goal to make parking a completely contactless experience. The features that will be invested in the most will be those that provide a smoother experience for all customer groups ●

INTERVIEW

Automation to reduce manpower will affect budgets.

- Rosario Palella, VP, One Parking

The Year 2021 for Parking Operators

2021 saw a lot of change taking place in the parking industry. Parkers have been returning to the roads slowly but steadily - only recently have we seen the kind of numbers we saw in 2019.

There is a clear decline in the demand for around-the-clock parking. New York and Chicago parking trends show that Tuesdays and Thursdays are the busiest in the week when lots are full, while the remaining weekdays have seen a 30-40% dip in parking. The past year also saw a lot of deployments of the hardware. Hardware companies are shifting their strategies and trying their hands at touchless digitized technologies. Solutions like Scan-to-Pay have been extremely successful in the market, enabling contactless and safe parking payments for consumers.

Looking Forward to 2022

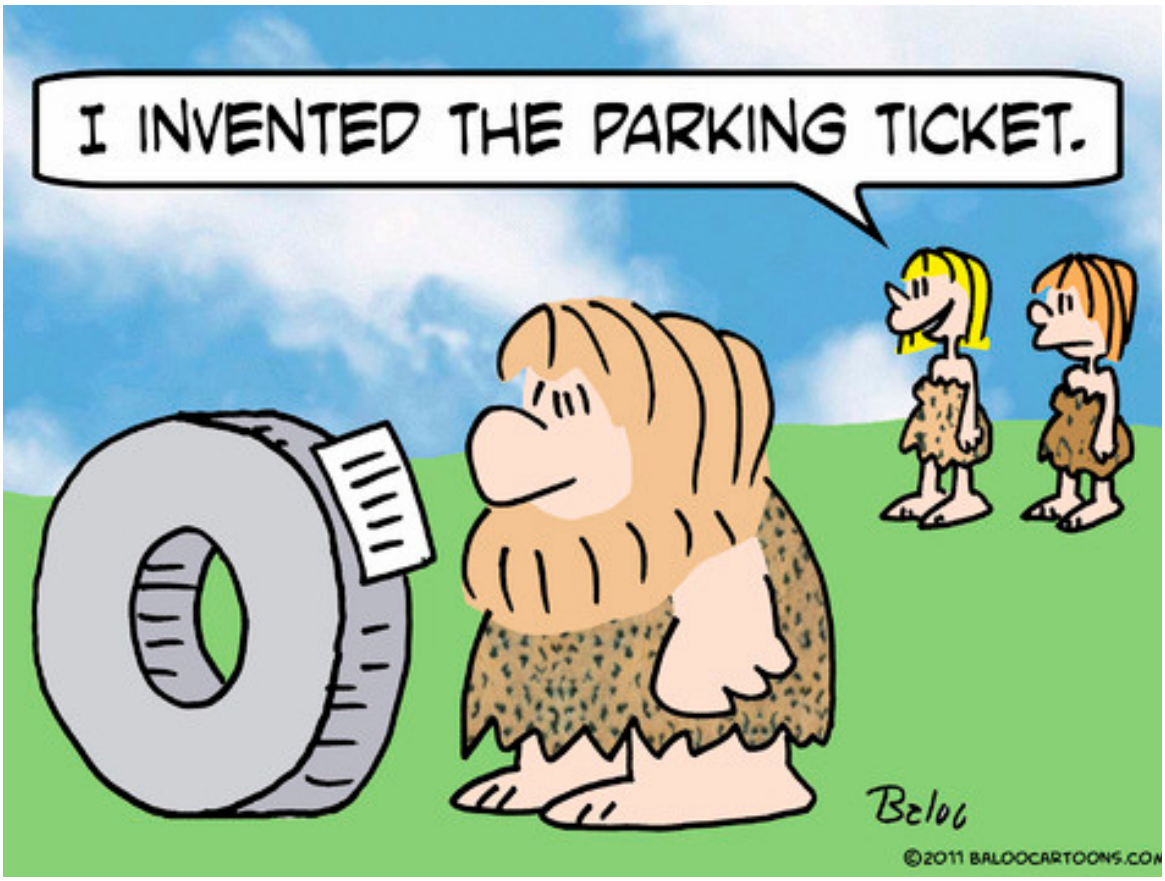
The first quarter of 2022 should bring in a slight top-line growth (5-10%) after which we should see pre-pandemic levels of parking in Q2. There are a few trends that will shape the demand for parking in 2022 - to begin with, employers are forcing people to return to the office, creating a surge of commuters using mostly private vehicles.

But office timings may not be the standard 9 to 5, but shifts split across the day and night. Another trend we have noticed is that parking is full in many locations even though all the usual tenants are not back - this also indicates that more people are driving to work instead of relying on public transport.

Automation will Shape 2022

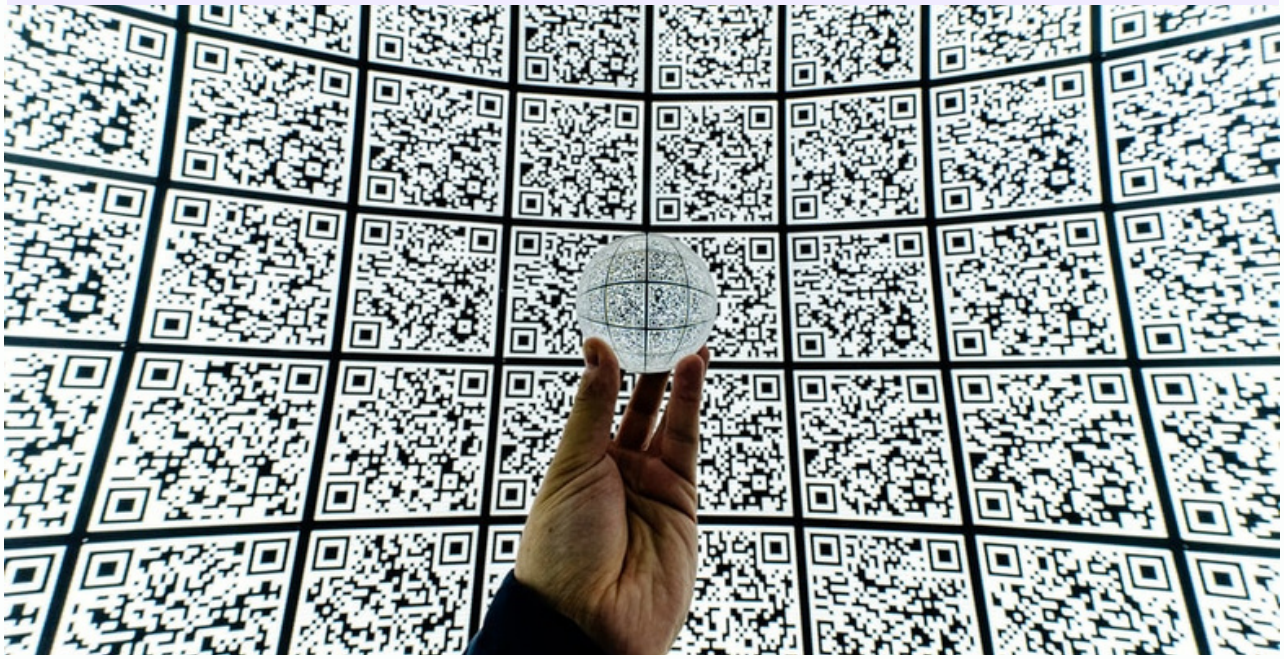
2022 would be an interesting year as new solutions would be coming into the market. IT budgets would be higher than usual. Since the shortage of manpower is driving innovation, there will be significant investments made towards automation technology.

Valet parking has seen innovations like lock-pop key boxes, while monthly parking permits have evolved into customer-friendly and contactless digital Flexipermits. The PARCS system is also trying to bring about a safer and faster parking experience ●



Credit: Beloc

QR IS CHANGING THE WORLD



The post-pandemic world aims to be as contactless as possible. According to a survey by American Express, 58% of consumers said they are likelier to use contactless payments than ever before. This shift in consumer behavior encouraged many industries to recognize the potential of QR codes to provide safer and touchless retail experiences.

What exactly is a QR code?

A QR (Quick Response) code is a matrix barcode that is scanned to receive information, usually with a smartphone. The black squares represent encoded data that can bring up a specific web address or start a payment or check-in process instantaneously.

The process is similar to that of scanning a barcode on a price tag - but unlike a standard bar code which can record 20 characters at a time, a QR code can hold 7000+ characters (3 KB worth of data). In a 2020 study, 84% of respondents had scanned a QR code at some point, with 32% having scanned one in the previous week. Let's take a look at why QR codes have become indispensable to both consumers and businesses.

They can store all kinds of data

QR codes are quite versatile in terms of what they can hold. Since it essentially stores a link, it can redirect the scanner to websites, videos, emails, online forms, or any URL that can be stored in 3KB. This versatility broadens the horizons for marketers and business owners in terms of what they can broadcast to their customers.

Their designs can be easily customized

These days, QR codes can be generated easily - most browsers provide options to turn any link into a QR code. QR codes can be tailor-made for brands with unique colors or logos embedded in their design. The only limitation is the designer's creativity.

They last forever

QR codes have no expiration date. They do become inactive if we remove the page/content that it is holding, but you can pretty much use a QR code for years to come. They don't need regular maintenance, making it a great permanent installation for store-owners.

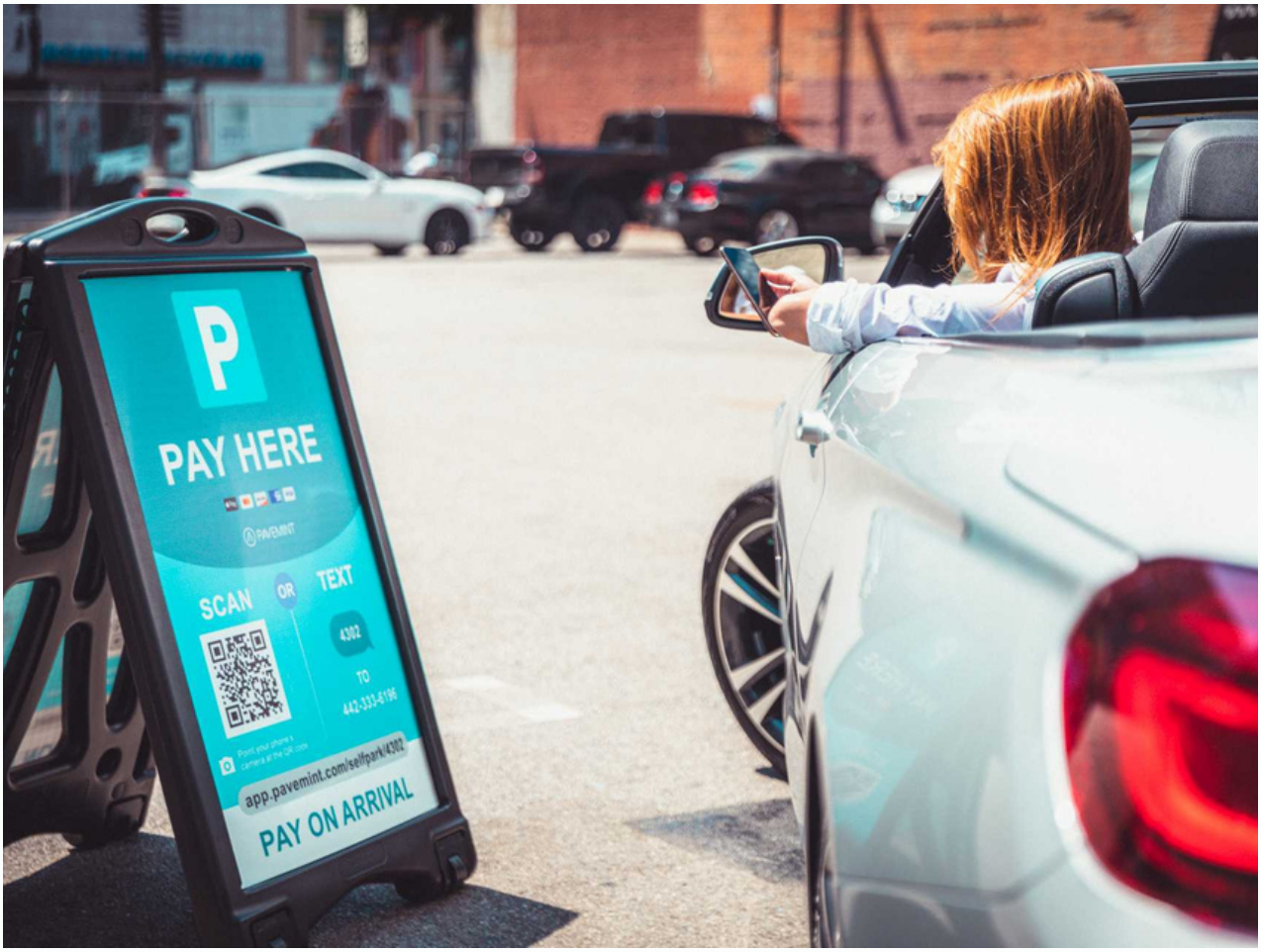
What's Next for QR?

One of the biggest reasons QR didn't take off initially was because many users had to download an external scanning app to make use of them. Today, most smartphones come with an in-built QR code scanner, making it easier for QR to become popular and universalized.

After mobile wallets and online banking services rolled out QR features to facilitate instant transfer of funds, QR codes have become synonymous with touchless payment - for instance, restaurants use it for check-in and to display their menus. Many governments across the world used QR codes to enhance their contact-tracing processes during the height of the pandemic.

QR in Parking

Parking has also greatly benefitted from QR technology. Using a QR code, parkers can now pay for parking without getting out of their vehicles or using cash. Products like GMP QR make parking payments contactless as fast as possible, with complete installation possible in just thirty minutes.

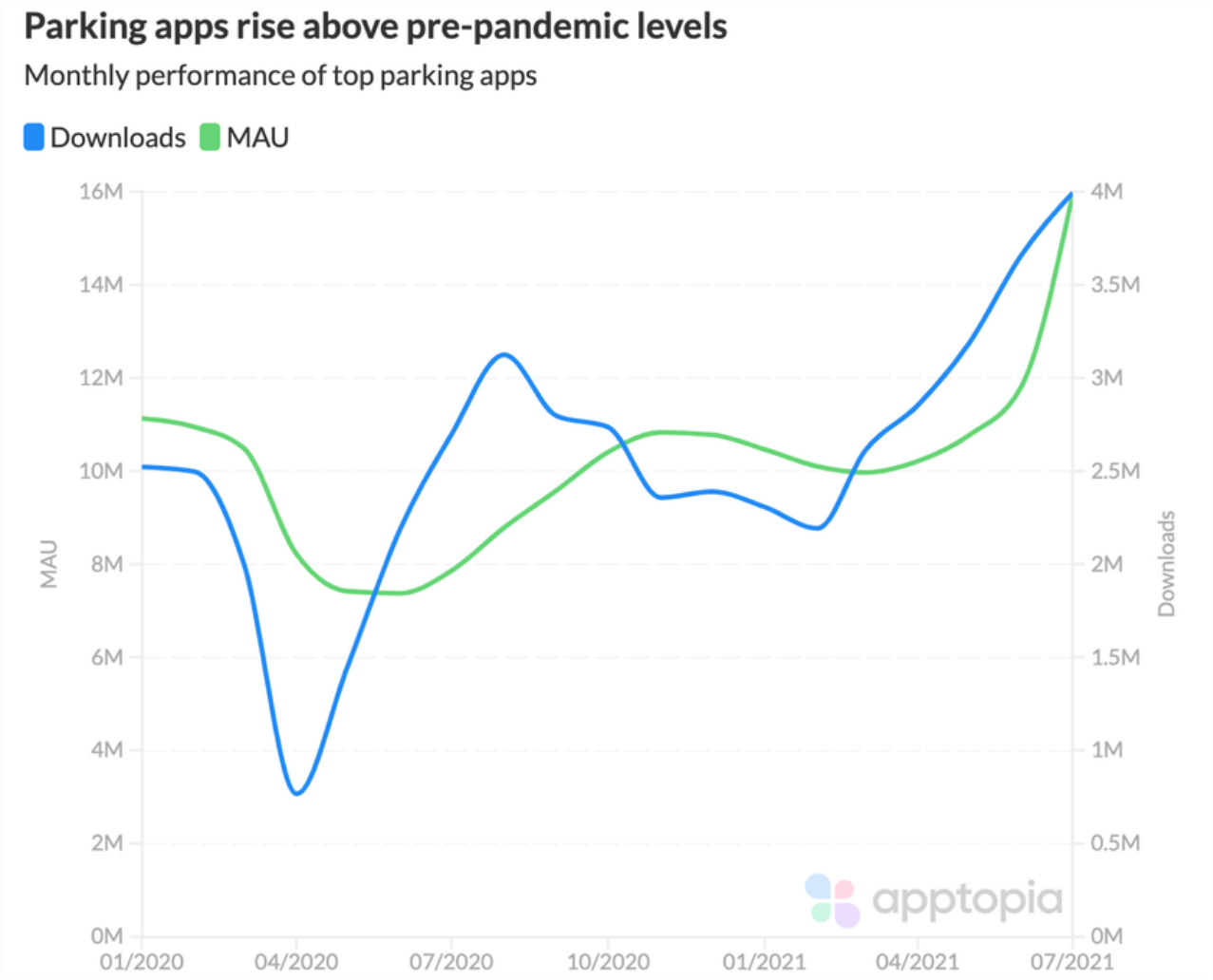


Once a parker scans the QR code at entry, they are redirected to GMP QR's custom-branded web app. Here, they can book and pay for their parking, use promo codes and extend their sessions. Operators can monitor their parking data, configure discounts and tariffs, and access customized reports.

Now that 'point and scan' has become a habit ingrained into the minds of consumers, one can hope to find QR codes being a lasting feature in today's retail experience ●

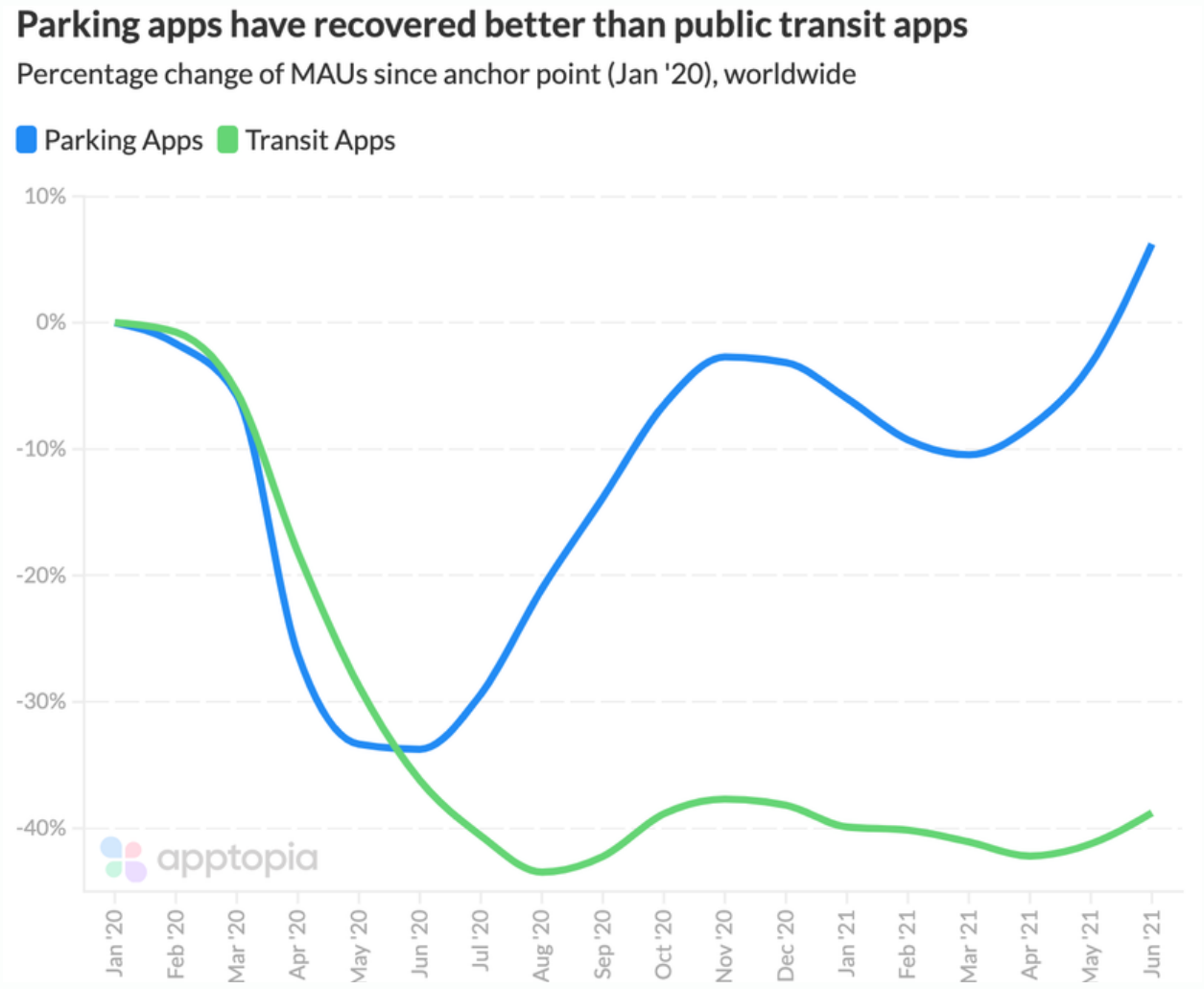
THE POPULARITY OF PARKING APPS

Parking apps are more popular than ever with the number of monthly active users (MAU) and new installs increasing exponentially. Apps that help parkers navigate to and pay for their parking are being used by millions of people.



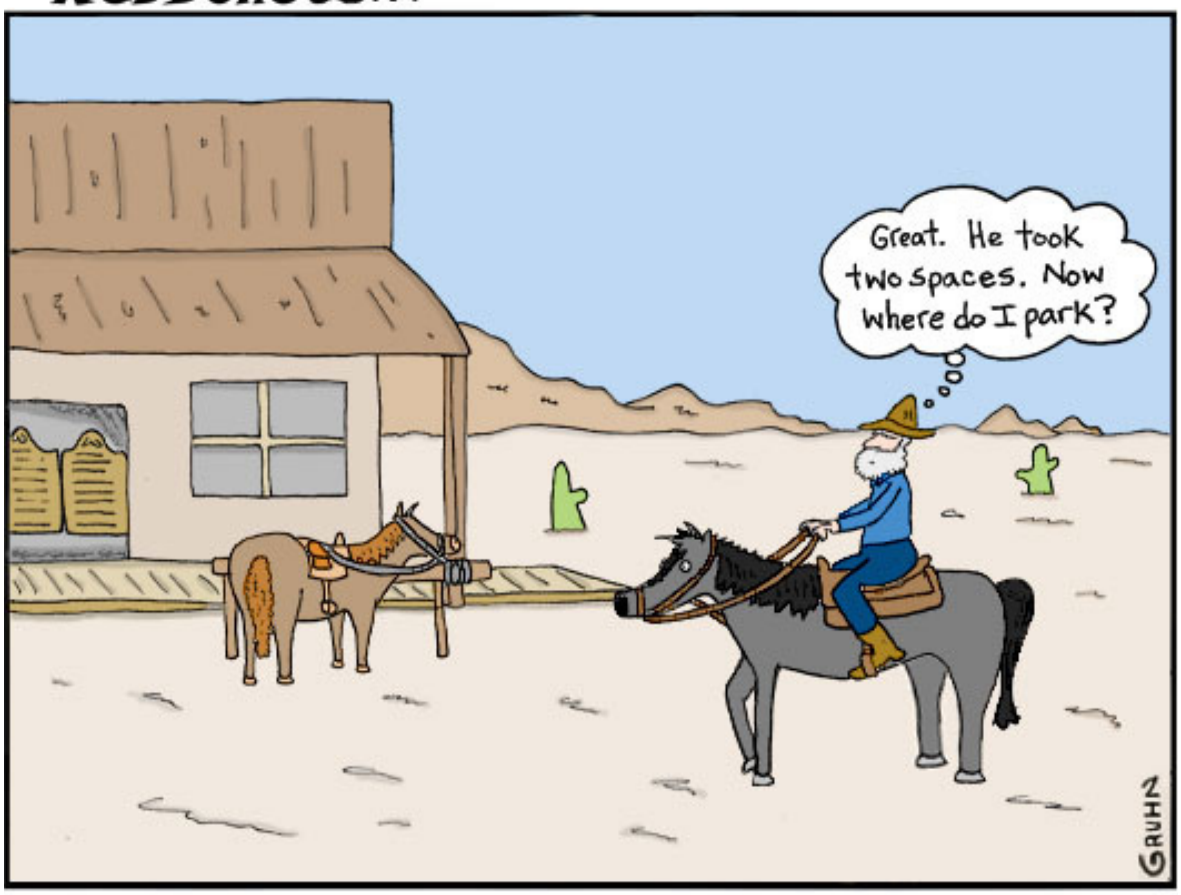
A study by AppTopia found that the number of downloads for parking apps doubled in the first half of 2021 (from January to July). The number of monthly active users also increased by 5 million over seven months. The surge of popularity that parking apps are enjoying can be attributed to the post-pandemic hesitance to use public transit.

The study also revealed that parking apps have recovered much better than public transit apps. Parking app usage has increased by 10% in 2021 even after the 30% fall in 2020. Public transit apps hit a low of 45% decrease in monthly active users in August 2020, after which it has recovered only by 5%.



The fear of infection has made people avoid crowded spaces like buses and trains at all costs, leading to an increase in the number of private vehicles on the road. As more citizens join the hunt for a parking space in the busiest parts of the city, parking apps can be extremely handy in making sure a spot is waiting once you get there.

Operators have also been putting more effort into digitizing their car parks and enabling booking and payment via apps. Some parking apps even let users pay for value-added services like car washes and EV charging. It is apparent that parking apps are here to stay, and will become the norm very soon ●



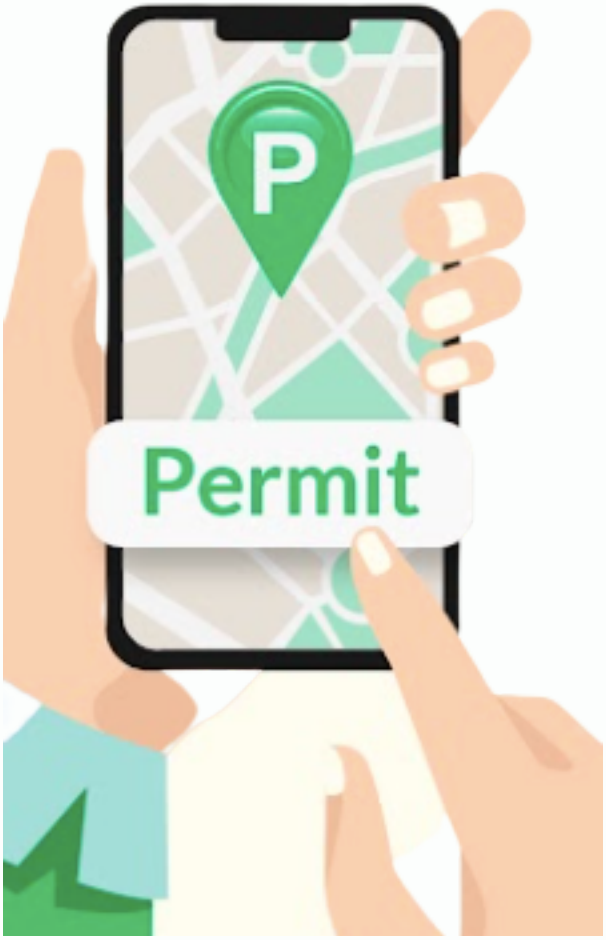
Credit: Gruhn (webdonuts.com)

PARKING PERMITS ARE ON THE RISE

A parking permit system is the easiest way to regulate parking privileges. Usually handed out to provide free or subsidized parking to a specific demographic, parking permits are growing popular across the world.

As families accumulate cars in order to commute safely to work, it becomes increasingly difficult to find a parking spot at your destination. These commuters create a consistent and unmet demand for parking in the areas they work at.

Many organizations have tried to solve their employees' parking problems by deploying parking permits, allowing people to park in certain spots on certain days for free. Usually, these permits are physical cards or badges and often call for extensive manual management. This is why companies are now choosing digital permit management software to simplify and automate this process.



Digital permits are also growing popular in residential areas where people want to regulate parking to make the neighborhood safer. Residents who have no off-street parking facility would also prefer long-term permits rather than paying daily parking fees.

The distribution and management of permits are infinitely easier with a smart permit management system. With the liberty to generate flexible parking passes ranging from an hour(s) to a year, operators can cater to their parkers' specific needs. Parkers can access multiple parking with a single parking permit, check the real-time availability of parking spots, and enable auto-renewal for their passes.

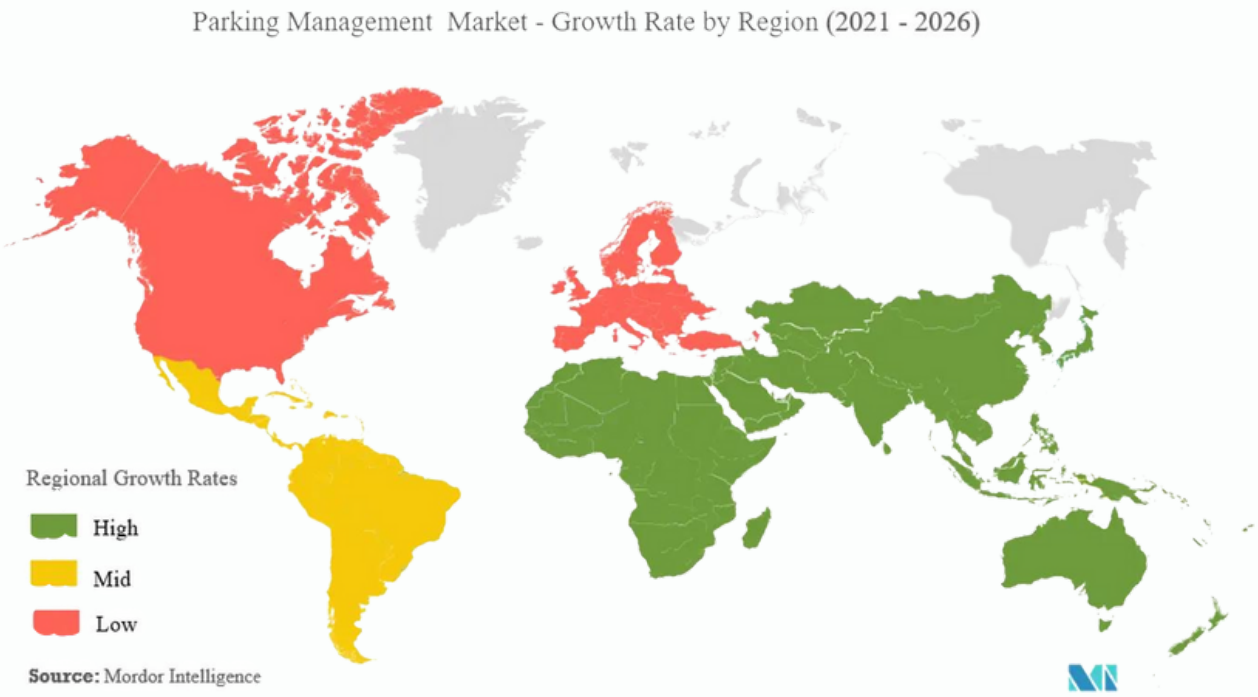
GMP Permit is a digital permit management tool for parking operators and offices to digitize their parking permit business. The admin dashboard enables transparent payment collection from permit-holders, preventing revenue leakage.

The solution comes with a custom-branded web app through which parkers can purchase and renew their parking permits. With auto-renewal features and expiry reminders, GMP Permit ensures that the permit business is future-proofed and parker-friendly.

Find out more about GMP Permit here ●

GROWTH PREDICTED IN APAC COUNTRIES

The parking industry is set to witness significant market growth in the Asia-Pacific regions, according to a study by Mordor Intelligence. The parking management market registered a CAGR of 10.3% during the forecast period (2021-2026), with the Asia-Pacific regions exhibiting the highest CAGR.



With infrastructural and technological advancements being unevenly distributed across the globe, some countries still suffer from a lack of organized parking. Many nations in the Asia-Pacific regions like India, Pakistan, and Bangladesh have not normalized paid parking and generally park on-street wherever space is available.

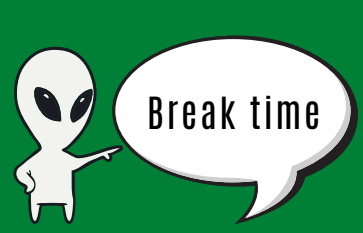
The lack of organized parking can be extremely frustrating for commuters, many of whom are switching to personal vehicles after the pandemic. With the rise in the number of cars and the steady pace at which the area is digitizing itself, the market is ripe for smart parking solutions that provide parkers with a stress-free experience.

As more people migrate to developed cities in search of jobs, the demand for passenger cars is skyrocketing. China has the largest fleet of motor vehicles in the world, set to cross 300 million registered vehicles on the road by the end of 2021, but there were only an estimated 800,000 parking lots and 30 million off-street parking spaces available.

Combined with the increasing population, the mismanaged and limited parking space has created a dire need for smart parking management in countries like China.

A study carried out by Parkopedia and Zhongyan where they surveyed 1600 drivers across China revealed that 82% of them would welcome a smart parking system where they could predict the availability of parking spaces. 90% of the drivers reported that they struggle with parking and almost all of them were willing to pay for a parking space finding feature.

As parking becomes inextricably linked with technology and automation, parkers from underdeveloped countries present a new demographic of parkers who are ready to go digital. There is no doubt that in 2022, the industry will respond enthusiastically to the parking needs of these countries ●



Credit: Dave Blazek

GREEN PARKING

The harrowing effects of climate change are becoming as reports of natural disasters and odd and untimely weather increase in frequency across the world. Let's take a look at the role that the parking industry plays in our fight against climate change.

The last seven years were the warmest the Earth has ever seen - this heat surge is due to global warming, a naturally occurring phenomenon that has been aggravated by polluting human activity. It is now well-known that the overbearing amount of carbon dioxide we have released into the Earth's atmosphere is responsible for all the climatic anomalies we have witnessed in the past few years.

The Nations Intergovernmental Panel on Climate Change (IPCC) reported this year that a certain amount of global warming has become irreversible. Industries across the world are introspecting and figuring out how to go green before we run out of time - let's see how the parking and mobility industry can contribute towards mitigating the climate crisis.

What does parking have to do with the climate?

Transport generates the largest share of greenhouse gas emissions, of which 75% comes from road travel. Passenger vehicles that require parking, such as cars and buses, contribute to 45.1% of the transport industry's carbon footprint. These cars spend most of their time in parking spaces.

Traditionally, a parking lot's environmental impact was thought to be limited to just the 'heat island effect', which refers to how large areas of asphalt heat up throughout the day and increase the overall temperature of a city compared to rural areas.

Scholars from the University of California, Berkeley, found that the energy use and materials used up for creating hundreds of millions of parking spaces can take a toll on the environment. The environmental cost of so many parking spaces can raise the amount of CO_2 emitted per mile by as much as 10% per car. Over the lifetime of a vehicle, it can raise SO_2 levels by 25% and soot contaminants by 90%. SO_2 and soot are responsible for respiratory illnesses, similar to what miners experience, as well as phenomena like acid rain.

What is green parking?

Today, we have recognized that parking has a far greater impact on the environment than we thought. This is why environmentalists and planners have come up with green parking.

Green parking is a term associated with parking lots and systems that are environmentally sustainable. It involves a few best practices that help parkers and operators reduce their carbon footprint and the overall pollution levels in their city. Let's take a look at how we can make parking greener and cleaner.

Land Use Efficiency

Donald Shoup, the award-winning author of "The High Cost of Free Parking", remarked that "Parking is the single biggest land use in any city. It's kind of like dark matter in the universe - we know it's there but we don't have any idea how much there is". Parking lots occupy a lot of land that once used to drain out water or house forests. To make up for the land lost, green parking lots are usually smaller and minimize parking space. Multi-level parking is a great example since the verticality helps pack a large number of cars in a small area.

Retrofitting

As we had discussed earlier in the yearbook, the effects of the pandemic have urged many operators to go digital. But the costs and hassle of purchasing and installing new equipment often hold them back. By retrofitting existing equipment and integrating them into a smart parking management system, operators can drastically reduce the wastage of natural resources and fuel that goes into creating brand new boom barriers or pay and display machines.

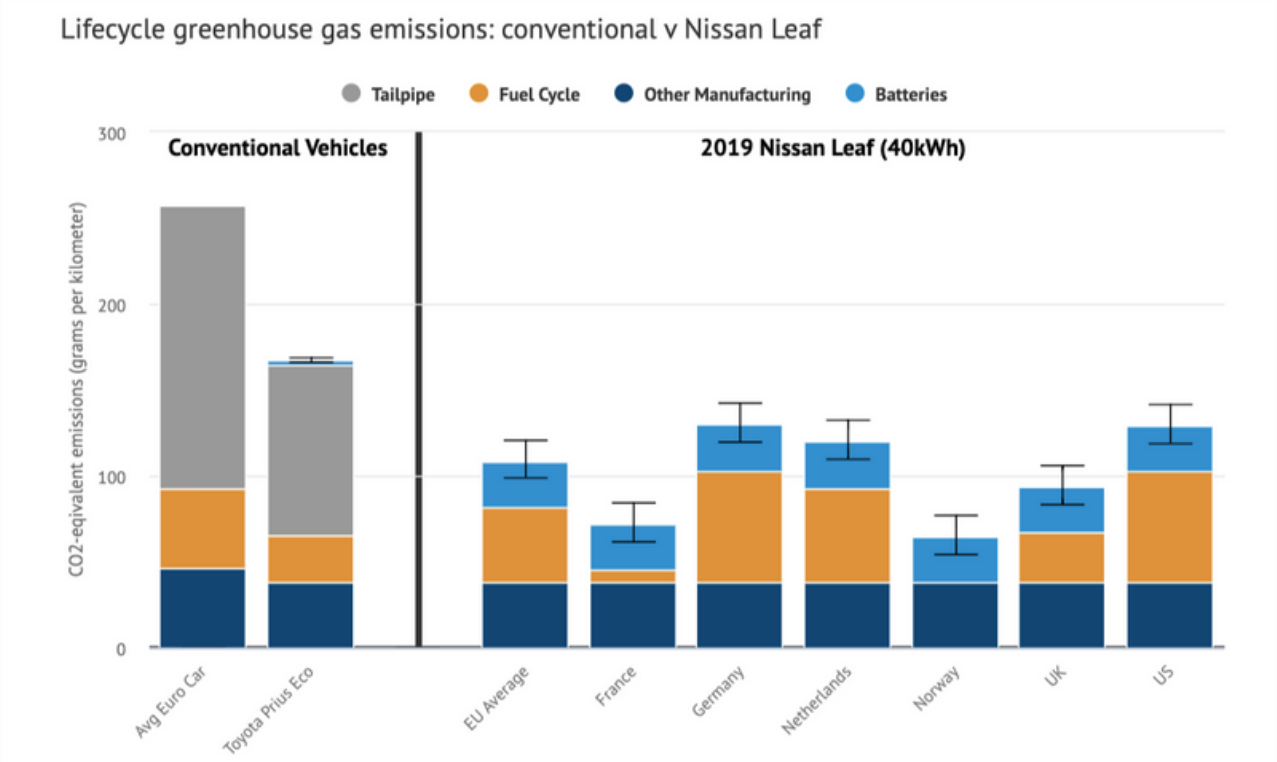
Retrofitting and upgrading your parking lot can future-proof your business in more than one way - it will take care of the inevitable digitization all parking lots will go through in the near future while making sure that your parking lot is sustainable and does not contribute to congestion.

Sustainable Energy and Lighting

Green parking lots focus on minimizing energy consumption. Using scaled lighting is an excellent way to reduce over-lighting - using less intense lighting where cyclists and pedestrians will be and higher intensity light where passenger vehicles are helping us save energy.

Parking lots these days also use solar canopies to harness the sunlight that falls on parking lots all day long. These canopies elevate photovoltaic panels as parapets above the ground so that they can harvest sunlight while protecting the cars from the weather.

The usage of electric vehicles (EVs) can replace vehicles run on fossil fuels - a study in Germany found that emissions from EVs are 43% lower than diesel vehicles.



Parking lots that provide EV charging stations as a VAS can encourage people to switch to cleaner transportation. Many green parking lots in Dubai offer free parking to those with electric vehicles. In some green parking lots, solar energy is harnessed and used for EV charging.

Good drainage

When contaminants are picked up by rainwater or when melting snow washes away impermeable pollutants on the surface, it is called runoff pollution. This contaminated water, if drained into the water table, can affect the quantity and quality of the water we use.

Runoff from parking lots is a major pollutant and puts stress on our water infrastructure, especially in areas around cities. Stormwater runoff, caused by rain or snow flowing over impervious surfaces like parking lots, often collects chemicals, debris, and smoke particles left behind by the vehicles.

Since the largest feature of the parking lot is its impenetrable paved surface, it is important that the rainwater shouldn't stay on the surface for too long. Permeable material that lets water pass through it, filtered and cleaner, is an excellent choice for a parking lot if you want to ensure that it has great drainage that is also eco-friendly. Open joint pavers, porous asphalt, turf grids, and pervious concrete are excellent options.

The EPA is testing out many permeable pavement materials and rain gardens in Edison, New Jersey. They are also considering the potential of rain gardens, which allow groundwater to be absorbed and stormwater to be filtered naturally before it becomes a part of the water table.

Planting flowers, shrub beds, and trees act as a natural stormwater reservoir, preventing your lot from getting flooded - more plants also help reduce the overall carbon dioxide levels in your parking lot.

Smart Parking

Inefficient parking can contribute to pollution more than you think - according to a study by INRIX, an average motorist in the US spends an average of 17 hours a year on the hunt for parking spots. Considering how there are supposedly at least 500 million empty parking spaces in the US at any given time, these numbers seem ridiculous.

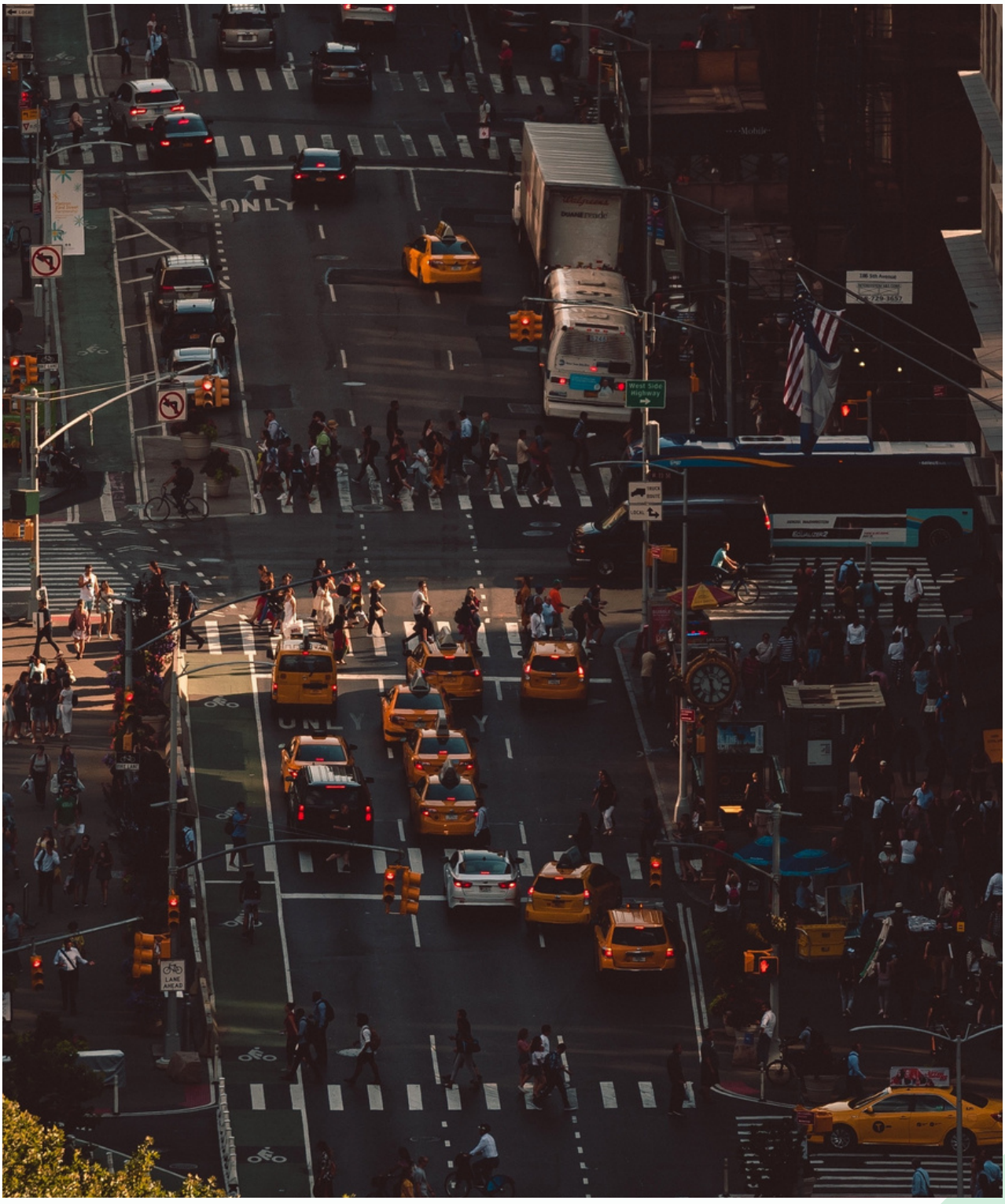
A report from UCLA tells us that 30% of all traffic congestion is caused by vehicles navigating to look for parking - this is calculated to be 930 million gallons of gasoline and 18.6 billion pounds of carbon dioxide emissions annually.

An outdated parking system also results in drivers overpaying for their stay, usually because they cannot predict when they can return to pick up their car. This costs the driver as well as the environment since it causes congestion on the roads.

The solution to inefficient parking is the implementation of smarter parking systems across cities. When drivers can easily find and pay for their spot, they spend less time on the road with their cars on, reducing their carbon footprint. Smart parking also reduces the amount of time you have to wait in line at a parking garage by using smarter access mechanisms like RFID/LPR and faster payment methods to pay using e-wallets or cards.

The future is in our hands

As members of the parking industry, closely associated with the transportation sector, it is our responsibility to combat climate change as fiercely as we can. Even the smallest steps go a long way - we hope that in 2022, the industry's steps towards cleaner and sustainable parking will be able to make a dent in the alarming levels of pollution on Earth ●



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LOOKING FORWARD TO 2022

In 2022, we can expect to see parking continue to rapidly evolve as a result of advancements in technology and innovation. From data-driven platforms that allow parkers and operators to get all the information they need at their fingertips to greener solutions that provide fuel efficiency and reduce carbon emissions, the industry is well in the process of a digital parking revolution.

Parker-First Approach

Most smart parking solutions out there have a parker-first approach, seeking to make the parking experience as frictionless as possible. Providing value-added services in car parks, ensuring that proper hygiene and social distancing requirements are in place, setting up parking permits for regular visitors, and enabling a completely contactless parking experience are all important for parkers today.

Data-driven Solutions

Soon, parking apps and parking-as-a-service platforms will approach an industry standard for data collection and sharing. Acquiring, processing, and presenting real-time data from drivers can be a complicated process.

Platforms should ensure that no data other than what is required will be collected, for the sake of parkers' security. This data can then be used in parking apps, providing parkers with information about where parking is available, how much it would cost, etc.

The collection of parking data can also help governments reinforce the ticketing system they already have in place, especially when it comes to on-street parking. Processing months of parking data with an AI-driven system can predict the areas where there will be a high number of parking violations at a given time - such innovations can help parking become more efficient, organized, and law-abiding. Such data also helps operators and governments decide how much to charge for parking based on the time and location of the session.

Automation

Automated multi-story parking systems, where cars are lifted and stacked by automated machine arms, have become commonplace in developed areas. These systems make it extremely convenient for parkers to leave their cars in front of the facility and let the machines do the parking. This level of automation does not involve the cars themselves, but rather the system that parks them.

Automated vehicles that can park themselves in any garage or on-street parking spaces have been undergoing trials for a couple of decades now, it is only recently that mobility leaders have started to consider self-driving and self-parking cars to be safe and viable. The latest models of autonomous cars claim to have cruise control features, lane departing systems, intelligent autopilot functions, and even assisted parallel parking. But while these may work in test conditions in low-speed urban environments, operators are unsure whether they will be driver-friendly in the long run.

There is a long way to go to make autonomous driving work in tandem with the parking industry, but we are closer to it now than ever. With organized car parks equipped with the best tracking sensors, interoperable equipment, and automated payment via in-car systems, autonomous vehicles may comfortably be on the road in the near future.

Cleaner Solutions

With government guidelines across the world turning green and clean in response to climate change, the parking industry is also looking to make its operations more fuel-efficient and sustainable. Many operators have already started shifting to implement eco-friendly changes in their systems. With more parkers choosing private vehicles instead of the greener public transit options, there will be a demand for cleaner solutions in parking garages, car parks, and mobility hubs.

See you in 2022!

To achieve its maximum potential, the parking industry will have to form strong partnerships with Auto OEMs, governments, and tech innovators to create parking systems that work in tandem with each other.

Parking is no longer an issue that concerns vehicle-owners alone - it affects every person in the city since the lack of a proper parking infrastructure leads to congestion, pollution, and general unrest on the roads. The industry will have to rise up to meet these elevated expectations, as it has been successfully responding since the pandemic in 2020.

As we welcome a new year, the parking and mobility industry gears up for more digitization, successful expansions into previously unexplored territories and a boom in revenue as more parkers get on the road ●

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shine@getmyparking.com
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