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COVID-19: The Internet of Things and Transport

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The COVID-19 pandemic has inspired a range of Internet of Things (IoT) innovations to help stop the spread of the virus.

Pre-COVID-19, the Transport and Mobility sector has undergone disruption by new technologies including the introduction of electric and autonomous vehicles, and greater inclusion of edge computing and artificial intelligence. This briefing looks at how COVID-19 has impacted this sector and how edge device technology in mobility has pivoted to respond to the pandemic.

Past editions are found on the PETRAS website.

Moving towards a green recovery after a short pause in development

A McKinsey and Company article is forecasting that in the short-term the 'development of autonomous cars will likely slow because of lower investment and temporary suspensions of testing programs' however they urge that autonomous vehicle manufacturers increase their resilience to mitigate 'future disruptions by reviewing the just-in-time model for supply chains'[1]. McKinsey forecast that in the long-term, autonomous vehicles 'could see higher-than-expected demand' since they enable physical distancing[2].

A report released by Advanced Propulsion Centre (APC) around a 'green recovery' reveals that in the next five years the move to electric vehicles could benefit the UK economy by £24 billion[3]. The report identifies opportunities for the UK from the

Overview

- COVID-19 is leading the transport and mobility sector to new breakthroughs through repurposing technologies to minimise the impact of the pandemic
- Cameras (including on drones) equipped with face mask identification software can detect mask wearers in real-time, raising privacy concerns
- As lockdown measures start to ease, governments across the world have been increasingly using Artificial Intelligence and Big Data for tracking mobility patterns on public transportation
- Mobility applications are being updated with new features to keep users informed about the new rules and help with social distancing
- There has been a significant increase in the use of e-bikes and e-scooters across the world, leading to new legislation and changes to infrastructure
- Europe is seeing a rapid shift to fully electric vehicles for both public and private transport, seeking to adopt zero emission technologies that provide sustainable travel
- In the UK, there has been a significant rise in the number of cyclists leading local authorities to expand the cycle schemes and invest in storage spaces to keep up with the unprecedented demand

'electrification of passenger cars over the next five years, focusing on batteries, electric machines and power electronics supply chain'[4].

While some autonomous vehicle testing programs have paused, others have pivoted their services to serve the community during the pandemic

In China, Apollo, an autonomous vehicle platform from Baidu, has released more than 100 autonomous vehicles to help in the pandemic

in work such as disinfecting, logistics, and transportation of food and medical supplies across several hospitals. Apollo has also partnered with Neolix[5] and has fed over 100 frontline staff members. The company has recently released the ACE Transportation Engine deployed in over 10 cities in China, which is 'a full-stack solution to help cities build intelligent transportation systems'. The Engine integrates AI with infrastructure, equipment, services, and industry governance, and provides.[6]

In the US, KiwiBot has deployed autonomous vehicles[7] to deliver safety and sanitary products to students in Berkeley and Denver, while another autonomous vehicle start-up Cruise has made 1200 contactless food deliveries to low-income and senior citizens by working with local restaurants and food banks[8]. Robotic Research LLC, an autonomous technology provider is automating heavy-duty public transit buses for the first time in US on the CTfastrak corridor, in partnership with, the Connecticut Department of Transportation[9].

Companies have been repurposing their technologies to support the effort in addressing the COVID-19 challenge

Foresight Autonomous Holdings traditionally supplies sensor technologies to the automotive industry for use in autonomous vehicles. However, recently the Israeli company has been adapting its camera systems and AI that underpins its technologies to allow large group screening in order to detect COVID-19 symptoms[10]. The company recently submitted a patent application to the U.S. Patent and Trademark Office for the new system, and is preparing for pilot deployments[11].

Nuro, a robotics company, has adapted their R2 self-driving vehicles to support COVID-19 medical supply challenges. Originally designed for outdoor package delivery, the vehicle is now being used to deliver linens and medical supplies at medical centres, moving down aisles between patient beds[12].

Face mask detection software on camera drones could help enforce mask regulations, but there are important privacy concerns to be addressed

In France, Aerialtronics has developed 'AI-powered face mask detection software' which works with any existing internet-connect camera (including cameras on drones). The software detects faces and categorises them as either wearing, badly wearing, or not wearing a mask, and can provide real-time notifications to the operator[13].

The technology is intended to be used in public or private places where masks are required, to assist security with the enforcement of mask wearing policies. To mitigate privacy concerns, Aerialtronics has included an optional face blur to protect users' faces from being recorded, however this could be turned off if authorities want to use the technology for law enforcement[14].

A similar trial in a train station in France was recently suspended due to privacy concerns[15]. The CNIL has released guidance on rules and a call for vigilance on the deployment of these technologies that which automated processing of personal data and fall within the scope of the GDPR[16].

Public Transportation authorities are extensively using Artificial Intelligence and Big Data to track mobility patterns as lockdown restrictions starting to ease

The Massachusetts Bay Transportation Authority (MBTA) has launched a new information service within its Transit app following increased requests from riders about crowding levels during the pandemic. The app provides crowding information on bus routes with high ridership utilising Automated Passenger Counters (APCs)[17], with accuracy verified through manual passenger counts. The release makes MBTA the largest US transport authority to provide real-time crowding information[18].

In the UK, Stagecoach has launched a new feature to its smartphone app called the Busy Bus indicator. The feature uses 'extensive data and artificial intelligence to provide a traffic light indicator to help customers choose quieter services and maintain social distancing'[19]. A similar initiative was recently taken by the Canary Islands. The government has begun to use real-time mobility data of passengers using public transport and use AI to analyse their mobility habits to track the spread of COVID-19.[20]

At a more global level, Geotab has announced the launch of the Commercial Mobility Recovery Dashboard, in collaboration with Webfleet Solutions[21]. The dashboard analyses data from over 3 million connected vehicles around the world to provide a visual presentation of the impact of COVID-19 on commercial vehicle activity and support strategic recovery efforts[22].

A large sensor network in the UK is informing the UK government pandemic response

Transport for London (TfL) has worked with Vivacity Labs to deploy camera sensors that use AI to detect road users and decide which mode of transport they are using, in order to plan and operate new cycle routes in London. The trial showed that the sensors are up to 98% accurate. The sensors continually gather data and all video captured by the sensors is processed and discarded almost instantly, meaning that no personal data is ever stored[23]

The smart video sensor devices by Vivacity Labs are also being used directly by government departments to inform the COVID-19 response using a grant awarded from Innovate UK[24]. The network of sensors around different cities and area types in the UK have allowed researchers to analyse compliance with the 2m distancing guidance and the risks associated with a relaxation of this rule[25]. Vivacity are the only data source available for this analysis.

The sensor network is also supporting UK councils in efforts to make permanent a long-term shift towards active travel (walking and cycling) as the public begins to return to work. A new product helps authorities to improve safety for cyclists by analysing 'interaction patterns', such cyclists doing dangerous manoeuvres or using pavements[26].

Mobility Apps given new features as COVID-19 lockdown restrictions eases

Google Maps has introduced new features that will now show relevant alerts from public transport companies. Some examples of these alerts include flagging when government rules impact certain services, or when masks are required on public transport. The Google Maps app has also added alerts to notify drivers about COVID-19 checkpoints and border restrictions along their route[27].

In order to avoid large queues at ticket offices for people trying to request replacements for tickets used during self-isolation, Russia's Moscow Metro has added new feature to its app to allow customers to claim refunds or replacements for all trips they have lost due to the COVID-19 outbreak[28].

Cities around the UK, as well as New York City in the US are becoming more favourable towards electric scooters

The Department for Transport in the UK have set new guidelines allowing e-scooter sharing schemes in England, Scotland and Wales as part of 12-month trial schemes[29]. The UK transport authorities have welcomed these e-scooter trials, however urge caution in a number of areas, such as speed, parking restrictions, training and the impact on active travel[30].

The New York City Council approved several bills[31] that will legalise the private use of e- scooters and e-bicycles and will create e-scooter pilot program starting by May 2021 allowing companies to apply for permits. This legislation specifically requires that the scooter companies work with New York Department of Transportation (DOT), other city agencies and members of the disability community to provide accessible scooter options.[32]

Industry is responding to people's need for micromobility options

Micromobility refers to transport that is small and lightweight such as e-bikes and scooters. The micromobility company Lime released a report on 24 June 'examining trends in transportation preferences as cities around the world work to reopen following COVID-19 related restrictions'. The report shows support for micromobility solutions and maintaining 'slow street' infrastructure[33].

Lime is expanding its subscriptions to include new daily and monthly pass options to be introduced in cities across US and Europe, as people look for more personal mobility solutions in the wake of COVID-19.[34]

A new [online map][35] was recently [launched][36] by Sustrans to help key workers (approximately 40 per cent of the UK's workforce) to stay mobile during the COVID-19 pandemic, with access to bike-related offers and information about local bike shops, repairs and maintenance of equipment and gear[37]. The charity is also producing [briefing notes][38] on Life after Lockdown in relation to future transport needs. The most recent briefing focuses on a [Green and Just Recovery][] which includes recommendations on increasing electric vehicle use, but stating the need to reduce private vehicle use overall[39].
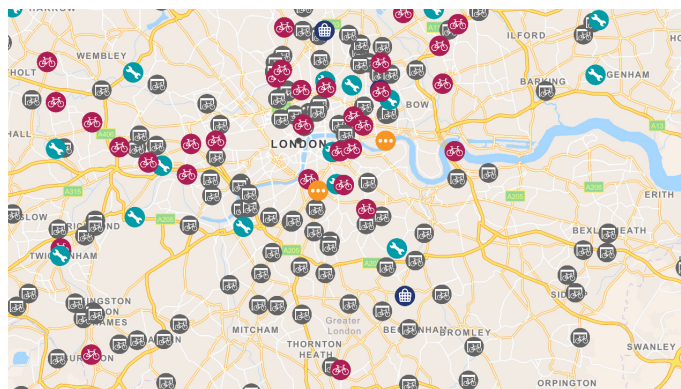
London's first free e-bike sharing scheme

On 22 June, HumanForest launched London's [first free, shared electric bike scheme][], which provides bikes that are dock-less, zero-emission and powered by renewable energy. About 1,000 e-bikes are being rolled out across Central London in the upcoming months. Offering 20 free minutes daily, the company is facilitating what it calls 'a fun, active and sustainable way to move around the city'[40].

The Scottish Government launches free bike-share services

On 29 June, a new, temporary [free bike share scheme][] funded by the Scottish Government has been launched in Glasgow and Edinburgh as COVID-19 lockdown measures ease. Both cities have created more cycle lane space in response to the coronavirus pandemic, and bike share operators are undertaking enhanced cleaning regimes, regularly cleaning handlebars and keypads. The collaboration is being led by the charity CoMoUK in partnership with Glasgow City Council, Transport for Edinburgh, and bike share operators nextbike in Glasgow and Serco in Edinburgh[41].

Significant increase of cyclists in the UK due to pandemic

Last month, Transport for London (TfL) has [set out plans to expand its Santander Cycles scheme][] to keep up with unprecedented demand in the wake of the pandemic. Data from TfL shows that cycling in London has increased significantly in recent weeks. May 2020 was the best May in terms of uptake of the scheme's 10-year history, with 1,120,620 hires[42].

To this end, Transport for Wales (TfW) announced a [significant investment][43] in cycle storage spaces at stations across Wales and England. The investment is part of [TfW's Station Improvement Vision][44], and will see the transport authority for Wales creating [hundreds of cycle storage spaces][] at 247 stations over the course of the next few years[45].

Endnotes

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