PETRAS

LANDSCAPE BRIEFING

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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. This is a sector-specific edition of COVID-19: IoT and Cybersecurity looking at the Transport and Mobility sector.

Past editions are found on the PETRAS website.

Overview:

- Self-driving cars are being used to transport supplies and coronavirus tests at Mayo Clinic in Florida, USA
- Electric Vehicles are gaining popularity globally. Denmark is creating e-bike routes to link its cities to towns and villages.
- Fully Charged, an electric bike retailer, is providing e-bikes to NHS workers in London for a free three-month loan
- The world's largest all-electric commercial plane, took its first successful flight, creating an ambitious roadmap for electric air taxis
- Ford is disinfecting its police SUVs with a newly developed software that heats the car interiors to 133 degrees Fahrenheit, which reduces the footprint of the COVID-19 virus to almost 100%
- Shared-vehicles and public-transport operators are deploying robots and other technologies to minimize the spread of coronavirus
- There has been a significant rise in applications and platforms that support the technological advancements in vehicles
- Drones have become a go-to technology for most countries to combat COVID-19

Rise of the e-bike

In Denmark, electric bike (e-bike) routes are already linking[1] cities to towns and villages as e-bikes enable people to make longer journeys than conventional cycles, bringing new transport options to people living outside urban centres. In the post-coronavirus recovery, e-bikes could offer a safe way for people to travel.[2]

Fully Charged[3], an e-bike retailer, is also providing e-bikes[4] to NHS workers in London for a free three-month loan. Raleigh cycles[5] has also launched a cycle to work benefit scheme, Electric Bike Access, offering customers savings on e-bike purchases.

The Centre for Research into Energy Demand Solutions (CREDS) team at the University of Leeds believe e-bikes could offer a safe and sustainable option especially when it could take public transport systems months to recover the capacity lost. According to the researchers at CREDS, 'In the coming two years, the government's COVID-19 economic recovery stimulus package should fund and implement pilot programmes that test approaches to incentivise the use of e-bikes to replace car travel. As well as lowering carbon emissions from transport, e-bikes have the potential to improve the mobility options for people and communities at risk of transport poverty.'[6] In addition e-bikes can also provide an alternative to cars, especially for the elderly people or those with health conditions.

Owning an e-bike could be expensive and many people end up leasing or renting them from various bike operators or tourism companies.[7] However, shared use vehicles could increase the spread of coronavirus[8]. To mitigate this risk, some companies are disinfecting their vehicles on a more regular basis[9]. Wheels[10], is using NanoSeptic's technology, in their shared-bikes, that self-cleans handlebars

and brake levers[11]. This technology is powered by light, and uses mineral nano-crystals 'to create an oxidation reaction that is stronger than bleach'[12].

Self-Driving Cars transport COVID-19 tests in Florida

Since March 30, The Jacksonville Transportation Authority (JTA) in Florida, US is working with Beep, an autonomous shuttle fleet service provider, and French AV builder NAVYA[13] to use autonomous cars to drive the tests collected at Mayo Clinic's drive-thru testing location[14]. This success has led JTA to plan for an eventual use[15] of these AVs on their other projects as well.

On 29 May, French President Emmanuel Macron announced that state bonus for consumers buying electric cars would increase to 7,000 euros (£6,069) from 6,000 euros (£5,343). He also announced 8 billion euro (£6.24 billion) plan to make France the top producer of clean vehicles[16] in Europe and urged French carmakers to make vehicles in their own country.

Disinfecting Police Cars by 'Roasting' them

Ford engineers and Ohio State University have come up with a clever way to bake away the threat of COVID-19. To help keep police safe from the coronavirus, Ford is introducing a new way to disinfect police cruisers. The company has developed software that cranks the heat in its Police Interceptor Utility vehicles until the temperature inside reaches 133 degrees Fahrenheit (56°Celsius) for 15 minutes. Ford believes this can reduce the viral concentration by over 99 percent on interior surfaces and materials[17].

World's largest all Electric Aircraft take its First Flight

Despite the pandemic, several technological advances are still being made. On 28 May, the world's largest all-electric commercial plane took its first successful flight that lasted for about 30 minutes. The 9-passenger 'eCaravan' aircraft is made by US-based start-up MagniX[18] and modified by aerospace engineering firm AeroTEC.

Future of Aviation

Magnix is not the only player in the electric aviation space. A few companies are promising a not-so-distant future of air taxis. The list includes many established companies like Airbus[19], Embraer[20] and Rolls-Royce[21].

Robots being deployed to clean trains and manage stations

To boost hygiene and health protection for passengers and staff amid the coronavirus pandemic, Hong Kong's MTR Corporation[22] has deployed an automated Vapourised Hydrogen Peroxide Robot (VHP Robot), which carry out deep cleaning and decontamination in train compartments and stations. A co-invention arising from a joint project[23] of MTR and Hong Kong-based biotechnology firm Avalon Biomedical Management, the VHP Robot automatically sprays a hydrogen peroxide solution that is atomised to a specific concentration.

Japan's new Takanawa Gateway Station has deployed cleaning robots to sweep the floors autonomously overnight, covering about 2,000 sq. meters. There will also be robots to perform security duties, in order to manage reduced manpower amid the pandemic. Equipped with a camera, these robots patrol the station, identifying suspicious individuals and alerting security personnel.[24]

Applications and platforms to support the technological advancements in vehicles

Demand Responsive Bus Service

In response to the COVID-19 pandemic, Stagecoach[25], Britain's largest bus and coach operator, has announced the launch of the UK's first demand-responsive public bus service for exclusive use by essential NHS workers on 19 May. Powered by a mobile app, Stagecoach Connect will enable healthcare workers to pre-book a seat[26], in a dynamically routed bus during extended hours. The service was launched in just two weeks[27] as a way to use technology to expand access to safe, flexible and efficient transport to-and-from hospitals.

The service showcases the potential for cities and organisations across the UK to leverage smart, digital platforms as a solution for equitable access[28] to mobility for both essential workers and communities.

Mobility Support for Transportation

A team of tech-mobility experts at Internet of Mobility (IOMOB) has proposed an open SDK-

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based middleware platform that will integrate available mobility service providers (MSPs), public transport, taxis, and other mobility services across multiple cities within Continental Europe and will provide intermodal routing algorithms. This platform is a part of the CORE MaaS COvid-19 REsilient Mobility as a Service) project and will allow users to select available mobility options that optimise social distancing, as a prioritised parameter. For example, if a user is looking to navigate from their home to the local pharmacy or bank, the appropriate mobility options will display based upon least impact to social distancing and potential infection in accordance to the government policy[29]

Drones are helping in the fight against Coronavirus

Delivering Medical Samples and Supplies to and from COVID-19 hotspots

The Japanese company Terra Drone[30] employed drones to transport supplies in China and claimed this increased the speed of transport by more than 50%[31] compared to road transportation.

In UK, Drones started to deliver COVID-19 tests and PPE to Isle of Mull[32]. Drones are flying 12 miles across the sea from Oban to Mull which was closed before the Scottish lockdown. In Rwanda and Ghana fixed-wing drones are used to drop packages[33], including blood, to rural areas with poor roads.

Recently, Google's drone-based start-up, Wing[34], which has been offering local residents in Virginia lightweight autonomous deliveries from local store and has conducted more than 100,000+ flights across three continents, has become the first drone operator to be formally certified by the Federal Aviation Administration[35], as an authorised residential drone delivery service in America.

Supporting Government and Infrastructure

Governments and law enforcement throughout the world[36] including China[37], France[38], Spain[39], India[40], Kazakhstan[41] and the US[42] are also using drones to monitor and ensure compliance with lockdown orders imposed due to the disease. Drones are also being used to spray disinfecting chemicals[43] in some public spaces and on vehicles traveling between impacted areas.

In Philadelphia, US, construction companies are using drones to inspect their projects[44] remotely amid the lockdown in order to maintain an up-to-date inventory of the condition of the materials as well as document any damage to them that will be essential to any potential insurance claims.

For 'Drone-As-A-Service' (DaaS) companies like Wing, COVID-19 has presented a rapid, unexpected case study in scaling up and out and, more importantly, how to re-align the public's perception about what autonomous unmanned aircraft are capable of delivering to improve lives without compromising privacy or airspace safety. 'Long-term drone delivery can translate into efficiency and savings after COVID-19 as well, including fewer trips to the store and a more efficient way for local businesses to reach customers', says Wing's Director of Communications Alexa Dennett.[45]

Privacy and Security Concerns as Drone Usage Increases

Drones have raised concerns[46] for many property owners who perceive it as an encroachment upon their property and privacy. They pose a security threat due to potential usage as a tool for snooping and surveillance by various contra-parties or simple voyeurs. In January, Swiss Post and Matternet had to put their project on hold[47] which transported lab samples by drones between hospitals in Switzerland. A panel of aviation experts were asked to review safety processes following two dangerous incidents.

Canadian company 'Draganfly' recently claimed that it developed pandemic drones that can monitor people's temperatures[48] from up to 190 feet away through infrared thermography, as well as detect sneezing, coughing, heart and breathing rates, and infectious conditions. However, there were concerns over residents' privacy[49] as the drones might hover around private yards or employ facial recognition technology or use the data without anonymising. These concerns ultimately led to scrapping of the program by the company.

Consumer interest is also a challenge in the future development of the drone technology. PwC's research[50] into public and business attitudes towards drones has revealed that only less than a third (31%) of the UK public currently feel positive towards drone technology.

Endnotes

1 https://www.smarttransport.org.uk/news/latest-news/how-e-bikes-could-get-rural-commuters-back-to-work
2 https://www.independent.co.uk/environment/coronavirus-cycling-e-bikes-cars-lockdown-uk-walking-air-pollution-leeds-university-a9521451.html
3 https://cyclingindustry.news/fully-charged-invites-brands-to-join-in-providing-free-loan-e-bikes-to-nhs-workers/
4 https:/www.smarttransport.org.uk/news/latest-news/electric-bikes-get-a-boost-with-discounts-and-offers-for-key-workers
5 https://www.raleigh.co.uk/cycle-to-work
6 https://www.creds.ac.uk/e-bikes-could-slash-transport-emissions-and-get-britons-back-to-work/
7 https://www.theguardian.com/commentisfree/2020/may/15/i-thought-electric-bikes-were-only-for-lazy-people-until-i-tried-one
8 https://www.cambridge-news.co.uk/news/local-news/coronavirus-update-experts-warn-giving-17909645
9 https://www.verdict.co.uk/electric-scooters-coronavirus-bird-lime/
10 https://www.crunchbase.com/organization/wheels

11 https://techcrunch.com/2020/03/27/wheels-is-deploying-e-bikes-with-self-cleaning-handlebars-and-brake-levers/
12 https://www.nanoseptic.com/nanoseptic-self-cleaning/learn-about-nanoseptic-self-cleaning-surfaces
13 https://navya.tech/en/first-autonomous-vehicles-in-central-florida-now-in-service-in-lake-nona/
14 https://www.forbes.com/sites/sebastianblanco/2020/04/03/autonomous-vehicles-moving-covid-19-tests-in-florida/#35cc66a76707
15 https://www.jtafla.com/media-center/press-releases/jta-beep-navya-autonomous-shuttles-help-mayo-clinic-transport-covid-19-tests/
16 https://uk.reuters.com/article/us-health-coronavirus-france-autos/macron-wants-france-to-be-europes-top-clean-car-producer-idUKKBN2322D6
17 https://media.ford.com/content/fordmedia/fna/us/en/news/2020/05/27/ford-heated-sanitization-software-police-vehicles-coronavirus.html
18 https://www.magnix.aero/ecaravan/
19 https://www.airbus.com/innovation/future-technology/electric-flight.html
20 https://embraer.com/global/en/news?slug=1206637-embraer-advances-in-the-development-of-the-demonstrator-aircraft-with-electric-propulsion-technology
21 https://www.rolls-royce.com/media/press-releases.aspx
22 https://www.mtr.com.hk/en/corporate/overview/profile_index.html

23 https://www.railway-technology.com/news/mtr-corp-vhp-robot-cleaning-trains/
24 https://asia.nikkei.com/Business/Transportation/Robots-roam-Tokyo-s-newest-train-station-to-patrol-and-sweep
25 https://www.stagecoachbus.com/
26 https://www.stagecoachgroup.com/media/news-releases/2020/2020-05-15.aspx
27 http://www.transportengineer.org.uk/transport-engineer-news/stagecoach-and-viavan-launch-nottinghamshire-nursemobile/227139/
28 https://www.smarttransport.org.uk/news/latest-news/viavan-and-stagecoach-launch-demand-responsive-bus
29 https://urbanmobilitycompany.com/content/daily/core-maas-a-social-distancing-mobility-platform
30 https://www.terra-drone.net/global/
31 https://www.gpsworld.com/china-fights-coronavirus-with-delivery-drones/
32 https://news.sky.com/story/coronavirus-drones-to-deliver-covid-19-tests-and-ppe-to-isle-of-mull-11994656
33 https://www.businessinsider.com/zipline-drone-coronavirus-supplies-africa-rwanda-ghana-2020-5?r=US&IR=T
34 https://wing.com/
35 https://medium.com/wing-aviation/wing-becomes-first-certified-air-carrier-for-drones-in-the-us-43401883f20b
36 https://www.bbva.com/en/drones-to-stop-the-covid-19-epidemic/
37 https://www.scmp.com/business/china-business/article/3064986/china-adapts-surveying-mapping-delivery-drones-task
38 https://www.businessinsider.com/coronavirus-drones-france-covid-19-epidemic-pandemic-outbreak-virus-containment-2020-3?r=US&IR=T
39 https://www.businessinsider.com/spanish-police-using-drones-to-ask-people-stay-at-home-2020-3?r=US&IR=T
40 https://economictimes.indiatimes.com/tech/hardware/drones-could-be-potential-game-changer-in-fight-against-covid-19/articleshow/74885384.cms
41 https://www.terra-drone.net/global/2020/04/09/kazakhstan-drones-patrol-coronavirus-covid-19-lockdown/
42 https://www.govtech.com/products/Drones-Become-Part-of-Local-US-Responses-to-COVID-19.html
43 https://www.newindianexpress.com/cities/bhubaneswar/2020/apr/15/drones-spray-disinfectant-sanitise-city-roads-2130224.html
44 https://www.constructionglobal.com/equipment-and-it/how-drones-will-revolutionise-construction-industry
45 https://www.forbes.com/sites/petertaylor/2020/04/25/could-pandemic-drones-help-slow-coronavirus-probably-not-but-covid-19-is-a-boom-for-business
46 https://www.forbes.com/sites/stephenrice1/2019/02/04/eyes-in-the-sky-the-public-has-privacy-concerns-about-drones/#10da7a726984
47 https://www.mobihealthnews.com/news/europe/swiss-post-matternet-resume-drone-delivery-operations-hospital-facilities-switzerland
48 https://www.gpsworld.com/draganfly-camera-and-uav-expertise-to-help-diagnose-coronavirus/
49 https://www.independent.co.uk/news/world/americas/coronavirus-drone-pandemic-connecticut-police-symptoms-social-distancing-a9478556.html
50 https://www.pwc.co.uk/issues/intelligent-digital/drones-and-trust.html