

FASTTRACK

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Renewing Ridership with UV Disinfection

Public transport - and rail in particular - is by far the most spatially efficient way to move large numbers of people around when commuting. However, in the current age of COVID-19 and "social distancing", rail public transport is struggling with reduced patronage due to the increased reticence of commuters to share a confined public space for long periods of travel time.

Approaches to address this travel-reticence are needed by enabling physical distancing such as limiting ridership, staggering ridership throughout during the day and across the transport system, and instituting rules and changes to cleaning regimes that safely increase system capacity.

How do we restore confidence in public transport in the "new normal"?

The *Trougakos, Chawla & McCarthy (2020)*-authored study found that coping mechanisms, such as handwashing facilities, provided relief from COVID-induced anxiety. Similarly, if the rail public transportation system and/or interchanges are clean then commuters are likely to have an increased confidence and ridership will return. In 2020, during the peak of COVID-19, Sydney Trains employed an extra 100 cleaners with nearly 256,000 additional cleaning hours being carried out on every one of their 2216 carriages. With the increased down time and cost on network operations associated with the rigorous cleaning regime, a better way is needed.

Ultraviolet (UV)-C light technology has been used for decades to disinfect and sanitise air, water, and tools. The effectiveness of *Germicidal UV-C* light rays (typically at 254 nm) is that they work by breaking down DNA or RNA inside bacteria, viruses and fungi and are an efficient and proven technology for eliminating viruses, including SARS-CoV-2 that causes COVID-19.

In early 2020, the New York Metropolitan Transportation Authority trialled *UV-C* lamps by PURO lighting (*Figure 1*) to disinfect the agency's trains, buses and work areas. The PURO lighting lamps can be installed on a ceiling or wall, with an automatic shut off to prevent unnecessary UV exposure. The units disinfect both surface and airborne pathogens, eliminating up to 99.9% of present viruses and bacteria.



Figure 1 - PURO UV-C Lamp setup

Safety

UV-C radiation has not been found to be a cause of human skin cancers or other types of human cancer, which is typically linked to *UV-A* and *UV-B* radiation. The dead skin of the human body is sufficient to absorb *UV-C* light.

However, Germicidal *UV-C* light, due to its intense radiation could reach live skin tissue such as a significant wound or superficial tissue of the eye. Hence, *UV-C* radiation can be a health hazard to the skin and eyes. For this reason, the *UV-C* light can only be operated during an overnight shutdown and is supplemented with traditional cleaning measures.

Into the Future

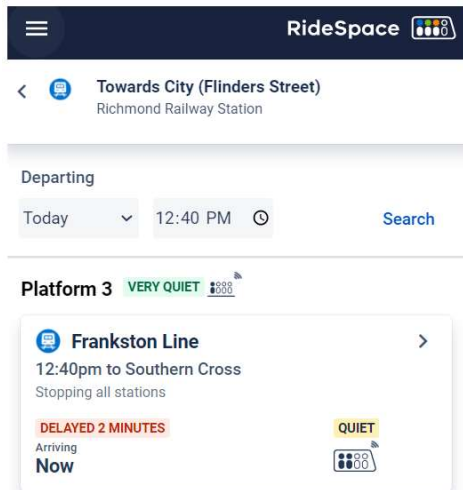
Further studies are under way using low levels of a specific ultraviolet light - *Far-UVC (207 - 222 nm)*. *Far-UVC* light could be circulated continuously in an enclosed space and break down some forms of human coronavirus as effectively as conventional *UV-C* light, without the harmful effects to human eyes and skin.

Think about the possibilities - a *Far-UVC* light could offer a whole new level of protection for passengers and transport employees. by continuously keeping our trains, trams and stations clean by killing all off all pathogens in the air and on surfaces with 99.9% efficacy.

Journey Planning with Real-Time Passenger Capacity Data (RideSpace)

As major cities - particularly central business districts - transition their workforces from home-based back to office-based attendances, post Covid-19 pandemic, public transport plays an integral part in the transition.

Pre-pandemic, 69% of central city workers commuting in from outside the CBD utilised public transport, compared to 13% for all work travel across greater Melbourne. The radial structure of metropolitan Melbourne means that public transport remains the most efficient way to move large numbers of commuters in and out of the inner city.



With social distancing principles becoming commonplace during 2020, a lack of confidence with travelling with large groups on public transport will mean more commuters will preference using the personal car for required travel, increasing congestion and pollution on Melbourne’s road network.

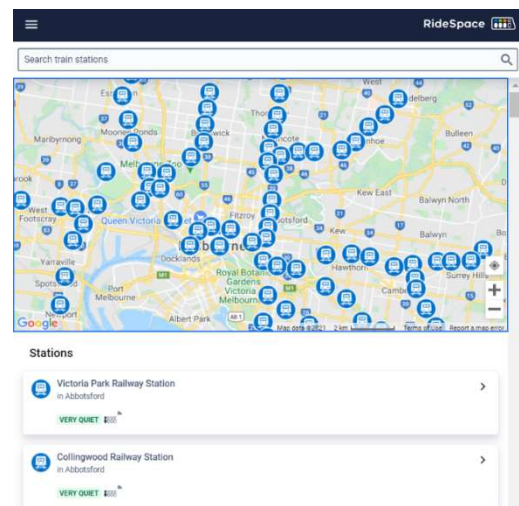
As part of the “return-to-office” transition for staff in many businesses, the need to provide flexible office working hours, outside the normal 9am-5pm timeframes serves as an important transition tool. In-hand from a public transport perspective, the need to dissipate the peak hour travel periods (8-9am, 5-6pm) over a wider timeframe is important to encourage people to preference public transport usage over driving.

RideSpace is an online journey planning tool developed/released by the Department of Transport in February 2021 for commuter use across Melbourne’s metropolitan train network. Utilising real-time passenger information with station infrastructure asset data, it provides a real-time capacity grading (“Very Quiet”, “Quiet”, “Busy”, “Very Busy”) of passenger volumes on operating train services as well as individual platforms and stations. The occupancy data is collected by passenger counting sensors and predictive modelling technology to collate in the published capacity grading for stations and services.

In addition to current public transport health requirements (E.g. – mask wearing), by incorporating a social distancing aspect into existing passenger journey planning, it provides extra flexibility for commuters in travel planning, and choosing when/which public transport services to travel on, particularly for those which are reticent to travel on highly crowded services.

Links -

- <https://ridespace.coronavirus.vic.gov.au/near-me>
- <https://www.ptv.vic.gov.au/more/ridespace/>
- <https://lens.monash.edu/@politics-society/2020/06/03/1380582/returning-confidence-in-public-transport-in-a-post-covid-19-pandemic-world>
- <https://cities-today.com/real-time-data-aims-to-win-back-melbournes-public-transport-passengers/>
- <https://www.theage.com.au/national/victoria/cars-continue-to-rule-melbourne-roads-census-shows-20171023-gz6djk.html>
- https://s3.ap-southeast-2.amazonaws.com/hdp.au.prod.app.com-participate.files/7015/2412/3934/Transport_Strategy_refresh_-_Public_Transport.PDF



Companies Jump Onboard for the Post-COVID Transport Age

World-leading technology will see Opal digital customers gain credit to their account when they transfer to NSW's public transport network from Ubers and other rideshare services. The need for this technology has been triggered by an unprecedented period of low public transport demand following the COVID-19 pandemic.

Interestingly however, there have been benefits of this lower public transport demand with an increase in the network's punctuality, with 94 per cent of trains running on time through April, compared to 89 per cent in April 2019. Trains reached a pinnacle of almost 98 per cent on-time running in both June and October last year, which has slowly dissipated as more people return to the network. With that said, public transport providers are continuing to look at ways to incentivise commuters to return to their train, bus and ferry services.

One such initiative is a partnership with Uber where commuters can receive a discount on their Uber travel if they use public transport within an hour of an Uber trip. NSW Minister for Transport and Roads Andrew Constance announced participants in the Opal digital card trial will be the first people in the world to use the new technology. As Mr Constance outlined:

"From the middle of this year up to 10,000 Opal digital card users will be able to pay for an Uber, a fixed fare Ingogo taxi trip or a Lime bike journey using their Opal card. If they then catch public transport within 60 minutes, they will receive a credit to their Opal account of up to \$3"



With Uber as the pioneer, you might expect that it is only a matter of time before other companies move to utilise this technology to partner with wide-ranging transport providers and incentivise public transport with loyalty programs.

In additional parallel innovation initiatives, the transport body recently launched a state-of-the-art lost property system in a further bid to return commuters to public transport. The system is a one stop shop for all lost property across the Greater Sydney area and for all NSW TrainLink services where customers can submit enquiries 24/7.

The Emergence of Hydrogen-Powered Trains

It was only five years ago that French-based rolling stock manufacturer Alstom SA first announced the development of what was to be the world's first production hydrogen powered train, the *Coradia iLint*. Like other hydrogen-powered vehicles, the train propels itself through hydrogen-powered fuel cells that convert hydrogen and oxygen into electricity. The by-product consists of just water and a train that can travel up to 140 kilometres per hour with a 1,000km range.

Adapted from the design of their Coradia Lint 54 train, the iLint - having enjoyed its first successful trials in Alstom SA's Salzgitter plant, Germany and in the Czech Republic in 2017 - first entered passenger service in the German State of Lower Saxony in 2018. Here they continued to be successfully tested on a 123-kilometre railway section until February 2020. Following the ongoing success of these trials, these trains are now scheduled to enter regular commercial service in March 2022 with Alstom SA set to deliver 14 iLints to LNVG, the local transport authority of Lower Saxony.



Alstom SA are not the only manufacturer in this space. In Europe alone, Siemens, CAF and Stadler are all also developing their own hydrogen-powered models. As European emission rules become more stringent in future years, [it is estimated by Morgan Stanley](#) analysts that the market for hydrogen-powered trains will jump between \$24 billion and \$48 billion by the middle of this century.

As a future mode of rail transport, hydrogen propulsion will be most suited to deployment where operators are looking to reduce their emissions - where it is not economical to electrify a rail line and where the required distances travelled are too great for battery powered trains alone.

Deutsche Bahn, who are in joint development with Siemens on the production of their hydrogen-powered train, note the need of such trains in their push to become climate-neutral. Currently they utilise 1,300 diesel-powered trains in their regional service with approximately 40% of their 33,000-kilometre rail network are not electrified – highlighting the complexity of rail operators to move away from current diesel-powered trains and their accompanying emissions.

In Australia, while there are no trials of hydrogen-powered trains currently planned in the immediate future, Aurizon is one company that has publicly declared their interest in maximising the benefits of these locomotives, having in 2020 committed \$50 million towards battery and hydrogen trains with the goal of reducing their emissions to zero by 2050.

It is stated that as a nation, Australia currently has untapped clean hydrogen potential, with Australia's National Hydrogen Strategy (2019) noting we are in a unique position to maximise on this opportunity. The strategy in particular highlights heavy and long-range rail transport as one of a few key strategic areas in which governments should prioritise investment into research, development and projects in the short-term to help develop the long-term future of hydrogen use in Australia.

So, while we have yet to see the emergence of hydrogen trains in Australia, following the success of initial European trials, it may only be a few more years until we see the deployment of such trains across the national network here, procured from the billions of dollars to be spent by both government and industry in meeting the increasing needs of public transport, our carbon reduction commitments and replacement of our ageing fleets.

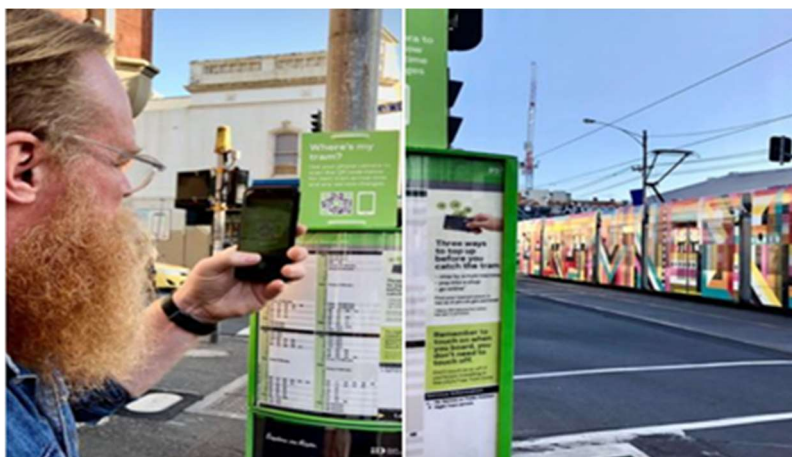
QR Codes – The Unexpected Opportunity Rail Operators are Capitalising On

Covid-19 struck in March 2020 and devastated a once lively and often overcrowded Public Transport network. Melbourne Public Transport Operators were faced with a challenge that no one could ever have foreseen – little to no passengers. Extended lockdowns saw thousands of CBD offices working from home, as well as the temporary end to catching trains and trams to get to the AFL or head out with friends. Whilst the network didn't stop, the patrons became only those traveling for essential reasons.

Victorians are resilient and 2020 proved this. What it also showed us was the power of technology and our ability to transcend our lives and businesses into a new way of operating. Who could have imagined having a medical appointment via an application on your phone or digital learning for school age children? Digital devices became the source of work, entertainment, and socialisation – they became our new way of life.

Victorian Public Transport operators, like all businesses, have needed to adapt. Suddenly QR codes began popping up everywhere, - a technology that most would be surprised to hear was *“invented in 1994 by the Japanese company Denso Wave, a Toyota subsidiary that needed a more accurate way to track vehicles and parts during the manufacturing process”*.

What is a QR code you may ask? According to tech experts, it is a machine-scannable image that can instantly be read using a Smartphone camera. Every QR code consists of a series of black squares and dots which represent certain pieces of information.



Yarra Trams has led the way by trialling this technology into their tram stop timetables. This provided passengers with the ability to scan a QR code at select stops on the network along Route 19 to find out when their next tram was due, if it would be wheelchair and pram friendly and if their line was experiencing a disruption.

Whilst it seems simple, this was the first time QR codes have been used this way by this public transport operator to assist passengers with up to date information relevant to their journey. The scanned code directly connects to Yarra Trams' *'TramTRACKER'* application, making it easier for passengers to bring up information relevant to the stop.

With the increased recognition of QR codes since the pandemic began, coupled with the success of the trial by Yarra Trams, the organisation hopes to have QR codes rolled out on every stop by end of the year. QR codes are also planned to play a key role to support passengers attending major events, with current plans to use them to support wayfinding during the Australian Grand Prix in November 2021.

Thanks for reading

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