

COVID-19: The Internet of Things and Cybersecurity

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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 the tenth edition of COVID-19: IoT and Cybersecurity.

Past editions are found on the [PETRAS website](#).

NHSX contact tracing app updates

There have been no concrete updates on the status of the NHSX contact tracing app for England.

The last update on the [NHSX official blog](#)¹ was on 8 May and the [official website of the app](#) still states that the app will be updated for the Isle of Wight trial.² There have been no official communications on the [main government news site](#)³, nor comments on the source code and documentation on the [NHSX GitHub](#)⁴.

There are [reports](#) that the UK Prime Minister ‘wants serious consideration to be given to a different version of the app, which incorporates Google and Apple technology’.⁵

During the Isle of Wight trial, the app has triggered alerts to users if one of their contacts has self-reported symptoms of the virus. This has been a major point of concern due to the potential for misuse. The app has [since been adapted to trigger an alert only in response to a contact receiving a positive COVID-19 test results](#). This has been enabled by an increase in testing capacity in the UK.⁶

Overview:

- No new updates on the NHSX contact tracing app, however initial reports are showing that the app has been successful in containing infection on the Isle of Wight during the trial period
- Further investigation into using Bluetooth LE signal strength to detect proximity is required
- Uptake of centralised apps in most countries is low, and Norway has paused its app and deleted all data previously collected on recommendation by an independent team of experts
- Manual contact tracers in the US have been told not to ask about participation in mass gatherings such as protests as this could discourage individuals from being candid in their answers to contact tracers
- While the UK has not yet indicated an antibody certificate solution to lockdown, there are calls for a policy debate to discuss the societal effects of this idea
- Smart wearables are being trialled as symptom trackers and for remote monitoring
- The Belgian Data Protection Authority has issued guidance on temperature checking during the pandemic in relation to GDPR

The [initial](#)⁷ [report](#) ‘appears to show that [the app] has succeeded in containing the infection during a month long trial’ on the Isle of Wight’. An official evaluation of the project is expected in mid-June.⁸

London’s Deputy Mayor for Fire and Resilience has [voiced concerns about the usefulness of the app in dense housing stock](#), such as tower blocks. Technical constraints on Bluetooth LE mean that distance is difficult to estimate, and this could result in the wrong people being asked to isolate themselves if identified as a potential contact.⁹

Bluetooth LE still problematic for proximity detection

Using Bluetooth signal strength to detect proximity 'may yield benefits but this requires further investigation'. A [research study preprint](#) by researchers at Trinity College Dublin finds that 'Bluetooth LE received signal strength can vary substantially depending on the relative orientation of handsets, on absorption by the human body, reflection/absorption of radio signals in buildings and trains.' It was also found that the signal strength in complex indoor environments, e.g. a train carriage, actually increases with distance, contrary to general expectations.¹⁰

Real-world risk scenarios faced by the Apple and Google Exposure Notification System may be unlikely

Germany [released their contact tracing app](#) on June 16.¹¹ The app is decentralised and based on the Apple and Google Exposure Notification System. Researchers have [investigated the privacy and security of the Apple and Google Exposure Notification System in the context of the German Corona-Warn-App](#) which will make use of this protocol.¹² The report investigates two real-world risks that the current decentralised protocol design is vulnerable to, which concern de-anonymising of infected persons as well as the generation of fake contacts. [Commentary](#) on the paper notes that the technical details are most likely accurate, but the practicality and likelihood of such attacks is minimal.¹³

An information and digital policy advisor to the Latvian president has expressed her frustration with the power held by Apple and Google in relation to contact-tracing applications: '[Do Google or Apple get to tell a democratically elected government or its public health institutions what they may or may not have on an app?](#)' There has been an unnecessary focus on whether an app is centralised or decentralised. She points out that there is not enough attention on 'two real issues' with contact tracing apps: 'whether a digital app can be used to do what many governments do in the real world and, even more important, who decides what public health experts can do with an app.'¹⁴

Uptake of centralised apps around the world

Norway - Smittestopp (centralised)

The Norwegian Smittestopp contact tracing app, which [uses Bluetooth LE and GPS data and carries out contact matching on a centralised computer server](#)¹⁵, released its source code to an independent team of experts on 4 April in order for them to provide an evaluation of any vulnerabilities concerning the security and privacy of the app.

On 18 May the expert group published its findings ([originally in Norwegian](#)¹⁶ and an [unofficial English translation](#)¹⁷). The group concluded that data security and privacy are not adequately safeguarded. Some recommendations include data minimisation, shorter storage time, and the consideration of a more distributed solution. They also suggested splitting the app based on the two-fold purpose of infection tracking and analysis, and enabling users to choose whether to participate in only one of these purposes.

On 12 June the Norwegian Institute of Public Health (FHI) received notification banning the processing of personal data in the app by the Norwegian Data Protection Authority (DPA). FHI's director [disagrees with the assessment but the institute will delete all the app's data and suspend its work](#). FHI will respond to the DPA before the deadline on 23 June.¹⁸

France - StopCOVID (centralised)

The French centralised contact tracing app, StopCOVID, has been available to download since 2 June. [1.4 million users downloaded and activated the app](#) in the first week, which is 2% of the French population.¹⁹

Australia - COVIDSafe (centralised)

The uptake of the centralised contact tracing app in Australia, COVIDSafe, is larger, with 6.2 million downloads since 26 April. However, data from the app has only been used in '[around 30 coronavirus cases nationwide](#)'.²⁰ 'A key learning for us is [nothing can replace manual contact tracing](#),' says an Australian data policy expert. 'One of the problems we can fall into is assuming technology can automate or replace a human role'.²¹

A new version (v 1.5) of the COVIDSafe app has recently been released, however, it contains a bug

which means that [iPhones will not be detected when locked](#).²²

Currently, Australia has a low rate of community transmission, so the potential scale of the usefulness of the app has not been tested. It may provide more benefit during a second wave of infections. Mass gatherings, such as recent protests, sports crowds and non-essential shop reopening as lockdown is eased, [may provide a 'test for the app's efficacy'](#).²³

Digital contact tracing in mass crowds

In New York, it is reported that manual contact tracers have been instructed [not to ask anyone who's tested positive for COVID-19 whether they recently attended a demonstration](#). 'Asking someone if they'd been at a protest could wind up discouraging them from being candid in their answers', notes a public health professor. 'There's definitely a concern that state and city officials have that the protests could be a place where transmission occurs, but that risk is lower than household and other community contacts.'²⁴

[Misuse of the phrase 'contact tracing' in recent law enforcement](#) 'really interferes with [the] ability to build trust with communities who are in real need of services'. The concern of losing trust for manual contact tracing efforts is also shared for [digital contact tracing efforts](#)²⁵. 'Any insinuation that contact tracing can be used to track down demonstrators shows a profound and dangerous misunderstanding of the trust needed to intervene in a pandemic like coronavirus', states the director of a US public health organisation.²⁶

Implementation of antibody certificates requires early policy debates

Progress on antibody certifications or so-called 'immunity passports' has been cautious, as the WHO has not updated its brief that there is [no evidence](#) that people who have recovered from COVID-19 and have antibodies are protected from a second infection.²⁷ A recent [summary of the discussions and trials of antibody certificates](#)²⁸ notes the security and privacy concerns that are similar to digital contact tracing apps as well as some other [policy issues](#)²⁹, and shows the early enthusiasm of some governments and [private industry](#)³⁰ in developing tools to aid in easing of lockdown.

Smart wearables as symptom trackers and for remote monitoring

In an attempt to tackle coronavirus, researchers are [turning to wearables such as Fitbits and Apple Watches to gather data and track the spreading of the disease](#). The benefit of using this technology is that the virus can be picked up even before symptoms appear – this is done by monitoring 'biomarkers' such as heart rate or skin temperature.³¹

On 10 June [NHS England announced a partnership with Huma](#), a British health tech start-up. The purpose of this partnership is to 'see how healthcare teams can get patients to hospitals at the right times for better outcomes, better support early intervention to avoid patients needing ITU care and help to prevent virus spread.'³²

Patients will be [given devices](#) (oximeters) 'which can help spot dips in their blood oxygen-levels.'³³ Furthermore, [patient's smartphone cameras](#) are being 'used to detect resting heart rate by capturing the blood flow at the surface of the skin'.³⁴

If trials are successful, we may see '[a national roll-out ahead of the coming winter](#)'³⁵, which could set the stage for longer-term remote monitoring. This would allow patients to 'track their own biomarkers in communication with their doctor, and health authorities could observe the emergence of disease indicators at a population level.' Difficulties with the use of wearables include their demographic and geographic ownership. Where ownership is low, [outbreaks may be missed](#).³⁶

Are workplace temperature checks allowed under GDPR?

The Belgian Data Protection Authority has issued guidance on temperature checking during the COVID-19 crisis. Its aim is to provide advice for businesses checking employees for fever on entry to the premises. The guidance which can be found in [French](#)³⁷ or [Dutch](#)³⁸ (and an unofficial [English summary](#)), states that organisations cannot record the results of temperature checks or the organisation's response to temperature checks. Organisations cannot use thermal cameras, digital temperature scanners, or other 'automated measuring means'. However, under GDPR the 'simple reading of individuals' temperatures without recording any data does not constitute a processing activity...and is therefore allowed from a data protection standpoint'.³⁹

Endnotes

- 1 <https://nhsx.nhs.uk/blogs/>
- 2 <https://covid19.nhs.uk>
- 3 https://gov.uk/search/all?level_one_taxon=5b7b9532-a775-4bd2-a3aa-6ce380184b6c&content_purpose_super-group%5B%5D=news_and_communications&order=updated-newest
- 4 <https://github.com/nhsx/>
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