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 twelfth edition of COVID-19: IoT and Cybersecurity.

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

The revised NHSX app may have new features in addition to contact tracing

The [reasons behind the decision](#)[1] to shift from NHSX's centralised contact tracing app to working with the privacy-preserving [exposure notification framework](#)[2] developed by Apple and Google are becoming clearer.

According to 'people involved in the project', NHSX plans to [add a set of new features](#) into the app when it is released later in the year. NHSX are also considering pitching the revamped contact tracing app as 'PPE in your pocket'.

Reported new features under development include:

- a 'Geiger counter'-style map that would warn people about areas with a large number of infections,
- a countdown timer that helps people track the duration of an enforced period of self-isolation; and
- barcodes for buildings that would enable offices and restaurants to know if someone with the virus visited them.

Overview

- New details on the digital contact tracing solution in the UK reveal plans to add new features in addition to contact tracing
- A new technique developed by the Alan Turing Institute is being assessed by Apple and Google
- Northern Ireland prepares to launch its decentralised contact tracing app within weeks
- This app is made to be interoperable with the app being developed in the Republic of Ireland
- Updates on contact tracing apps in Gibraltar, Spain, and Switzerland
- Israel has approved legislation to resume the use of counter-terrorism surveillance technology to track infections
- An update to the Singaporean TraceTogether app requires ID numbers and vulnerable citizens in Singapore began receiving TraceTogether tokens
- Guidelines to help pubs and restaurants re-open recommend contactless ordering and collecting customer details to support contact tracing
- App-based solutions for businesses have been implemented in some countries
- The ICO has released updated data protection advice for organisations
- Experts in digital health ethics, internet law and social sciences are interviewed as part of the debate on COVID-19 surveillance tools
- The Smart Cambridge project has provided a quantitative metric measuring the degree of lockdown in Cambridge
- IBM has produced a study on working from home with insights on home cybersecurity
- The Royal Society has published a 'good data governance landscape explainer'

The switch to a decentralised contact tracing app has also meant that US-based Pivotal has left the project with Swiss IT firm Zuhlke now leading the technical work on the app.[3]

Research undertaken by the Alan Turing Institute (to be published on arXiv this week) for the initial centralised app has led to a new technique for assessing the distance between two smartphones. This approach would help measure whether a phone is one meter, or three meters away from another device. Apple and Google are currently assessing whether to incorporate these algorithms into their system.[4]

The full Git commit history for the NHSX Isle of Wight beta app has now been published on the NHSX GitHub for Android[5] and iOS[6].

The Department of Health and Social Care are releasing weekly bulletins reflecting the operations of the NHS Test and Trace system. The bulletin contains data on the proportion of people who 'were successfully reached by NHS Test and Trace, but could not provide details of close recent contacts to pass on for further contact tracing (for example, recent close contact with strangers on the bus)'.[7] Since the start of Test and Trace (28 May to 17 June) this is almost 34%[8], highlighting areas where a contact tracing app would be still be useful.

On 24 June, the Joint Committee on Human Rights wrote to Rt Hon Matt Hancock requesting reassurances over privacy with reference to the new decentralised contact tracing app.[9]

Northern Ireland app to be released within weeks, and will be interoperable with the proposed Republic of Ireland solution

It has been reported that Northern Ireland plans to release its own contact tracing app within weeks. This app will be based on Apple's and Google's exposure notification framework and should therefore be compatible with the app developed in the Republic of Ireland which uses the same model. The Northern Ireland Department of Health has said that 'this will ensure interoperability of the apps and the sharing of information across the border'.[10]

On 26 June, The Department of Health and the Health Service Executive issued the Data Protection Impact Assessment[11] for the Covid Tracker App for Ireland.

Updates around the world

Gibraltar

The Beat Covid Gibraltar app is now available on the Apple store[56]. The Google version is expected this week.[57] The app uses Bluetooth technology and digital handshakes are made between contacts who are within 2 meters of each other for a period of 15 minutes.[58] It is estimated that a fifth of the population has downloaded it so far, at a cost of less than £100,000.[59]

Switzerland

Switzerland's COVID-19 contact tracing app, SwissCovid, became available for download on the Apple App and Google Play stores on 25 June. It uses the Apple and Google application programming interfaces. The source code can be found on GitHub.[60]

Spain

On 23 June, a pilot test of the contact tracing app on La Gomera in the Canary Islands was approved. The app is being developed by Indra, a Spanish technology consultancy, with a budget of €330,537.[61] The project began on 29 June, and will continue until 13 July. As part of the test, the Government has hired 300 technicians to walk around the island pretending to be infected. If they interact with any of the inhabitants for 15 minutes within a two metre area, the system will activate and send them an alert.[62]

Israel approves resumption of counter-terrorism surveillance technology to track infections

According to the BBC's summary, answers to the question: 'does anyone have a working contact tracing app?', suggests that there are many countries that do, in fact, have a functioning app. However, the question of 'how effective they are remains to be seen'.[12]

Some countries, however, have stayed out of the debate on apps and have gone straight to network tracking technologies.[13]

In March, Israel's internal security agency, the Shin Bet, was given authority to use covert network tracking technologies to track people's movements to fight coronavirus. Israel credits the ability to

access the location data of millions of mobile phone users to trace those who have been in proximity to confirmed patients with reducing the rate of infection. This practice was stopped on 9 June by Israel's Supreme Court due to privacy objections[14], but also because of the falling infection rates.[15]

On 24 June, Israel's cabinet approved legislation to resume the use of counter-terrorism surveillance technology to track infections[16], as infection rates have increased. There appears to be tension within the Shin Bet about restarting the system, focusing on being unwilling to invade residents' privacy outside its normal remit, and the potential exposure of Shin Bet technology.[17]

The Singapore app is attempting to solve uptake issues by sending out Bluetooth tokens

Vulnerable citizens in Singapore began receiving TraceTogether tokens[18] from 28 June. The tokens are Bluetooth-enabled and are an alternative to the TraceTogether app. They work in the same way as the app, with the tokens exchanging Bluetooth signals with other tokens and the smart phone app. The tokens hold data in an encrypted format for no more than 25 days and cannot capture geolocation data.

The GovTech Singapore invited four experts[19] to inspect the hardware of the new TraceTogether token. These reviews are published online, and investigated the hardware[20], the process, motivations and risk[21], and an analysis of the impacts of Exposure Notification vs TraceTogether.[22]

Singapore has also released an update to the TraceTogether app. The update requires Singaporeans to enter their NRIC numbers and residents of other nationalities to enter their work pass or Dependant's Pass numbers. Short-term visitors will be required to add their passport details. The use of the app and tokens is currently voluntary.[23] The inclusion of the NRIC number allows greater interoperability with the Government's visitor check-in system SafeEntry.[24]

The app update, and the fact that the TraceTogether token now ask for unique identifiers, raised concerns for privacy experts as the centralised storage of interactions could lead to function creep, including use of the technology for quarantine control.[25]

Importantly, performing data protection impact assessments will become mandatory for private sector data processing if the proposed changes to the Personal Data Protection (Amendment) Bill are adopted by the Singaporean Parliament.[26]

Australia is also facing technological and uptake issues

Australia's COVIDSafe app uses the same tracing protocol that provides the framework for Singapore's TraceTogether app and is facing similar uptake and technical problems.

Australia's centralised COVIDSafe app has not identified any close contacts of persons with a positive coronavirus diagnosis that were not already found by manual contact tracing.[27] Testing data on COVIDSafe shows issues with detection of locked iPhones.

The Digital Transformation Agency is reportedly working with Apple and Google on how the exposure notification framework could be applied to Australia.[28]

Are apps the solution to reopening pubs and restaurants safely?

The Prime Minister of the United Kingdom announced that pubs and restaurants in England would be allowed to reopen with certain restrictions from 4 July. There are different guidelines for Scotland[29], Wales[30] and Northern Ireland[31].

Updated guidelines on 'Keeping workers and customers safe during COVID-19 in restaurants, pubs, bars and takeaway services' were released on 23 June. The guidelines encourage 'use of contactless ordering from tables where available. For example, through an ordering app'.[32]

Businesses have been asked to 'help NHS Test and Trace respond to any local outbreaks by collecting contact details from customers'[33] and the guidance document suggests 'You should assist this service by keeping a temporary record of your customers and visitors for 21 days, in a way that is manageable for your business, and assist NHS Test and Trace with requests for that data if needed.'

Venues that do not normally require reservations, and cater for more casual customers, are turning to apps[34] to help both with contactless ordering and collecting customer details for contact tracing. This

is already taking place in Germany[35], Singapore[36], New Zealand[37] and South Korea.[38]

Under GDPR, any solution involving processing of personal data must be 'adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed'.[39] In addition, personal data can only be retained for the amount of time for which it is needed.[40] In the context of personal data for contact tracing, this has been interpreted by many app developers to be four weeks.

Documents from the ICO provide guidance for app developers on Privacy in mobile apps[41] and a Data Protection Good Practice Note on Use of ID scanning devices in pubs and clubs[42] however both advice documents have not been updated[43] since the Data Protection Act 2018 became law.

However, even non-digital solutions have issues with privacy, with a woman in New Zealand harassed by a stranger who allegedly stole her contact tracing details[44] from a handwritten form.

The ICO has released updated data protection advice for organisations

The ICO has released updated data protection advice for organisations.[45]This includes guidance for organisations that are planning on asking people if they have experienced COVID-19 symptoms or are planning to introduce testing[46] and for organisations that are planning on using CCTV, thermal cameras or other surveillance methods as part of testing or ongoing monitoring of staff.[47]

Reflections on the debate around COVID-19 surveillance tools

Five experts in digital health ethics, internet law and social sciences are interviewed on the debate on COVID-19 surveillance tools. Public debate needs to occur around automated decision making via apps or remote sensing, which may bring in 'demands around transparency, rights to an explanation, rights to rectification and even the right to take my information and put it into a different model and try and make it work better'.

Another issue to be debated is whether work-related digital surveillance becomes more or less acceptable, as work becomes more remote, but also in a private space. There are also reflections that there is not much active engagement with

the public and that 'right now the public are represented only as some polling on what they find acceptable'.[48]

Sensors measure the degree of lockdown

The Smart Cambridge project has provided an analysis on a quantitative metric for the degree of lockdown in Cambridge, UK. The data is collected by a network of urban sensors in the region. Pedestrians, cyclists, cars, vans and trucks are classified from images from Vivacity cameras[49] and then counted.[50] Updated graphs up to 20 June are available.[51]

IBM conducts a work from home study

IBM Security and Morning Consult conducted a 'Work From Home Study'[52] between 4 - 7 June 2020. The study involved a 'national sample of 2,001 U.S. adults who are newly working from home due to COVID-19.'[53] The study reveals some concerning insights into working from home. For example, 'over half of those newly working from home said their employer did not introduce or were unsure of new security policies around video conferencing (54%) and managing PII (58%)'.

Royal Society publishes an AI in UK explainer

The Royal Society has published a 'good data governance landscape explainer'.[54] The 'explainer provides an overview of many of the key UK organisations and structures currently responsible for data governance and an overview of UK organisations that advise on data governance.'[55]

Endnotes

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