

WELCOME

TO THE
UNIVERSITY OF WORCESTER



Welcome to the
Department of Computing
Worcester Business School

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Worcester Business School

Today...

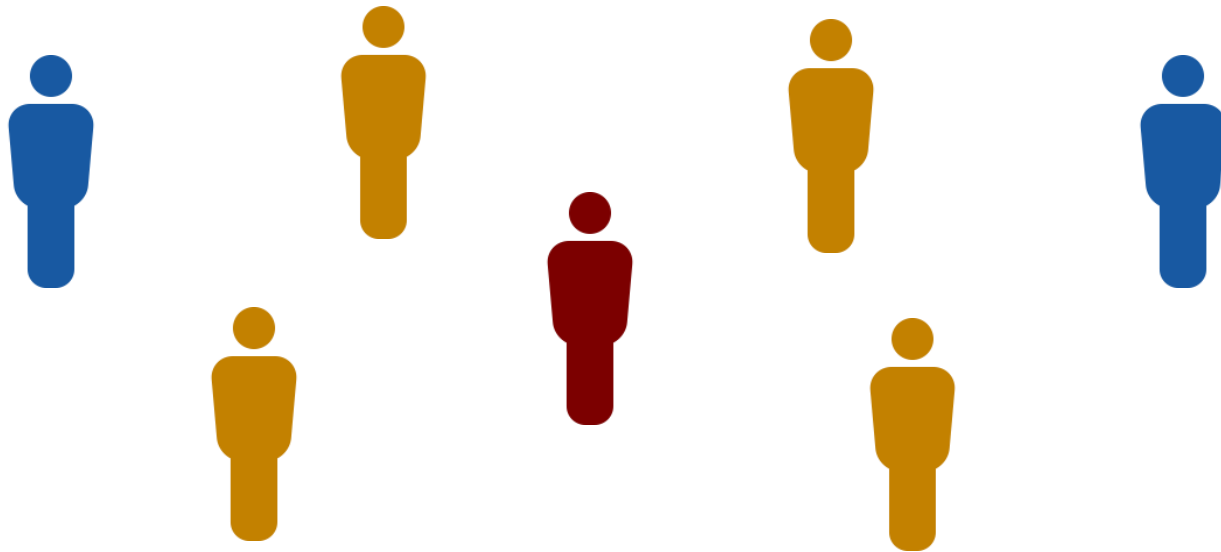
Introduction

How does Covid-19 mobile device contact tracing work?

Q&A: The Computing courses on offer at Worcester

What is contact tracing

The process of identifying individuals who have been potentially exposed to a disease through proximity to a source of transmission.



How is contract tracing performed ?

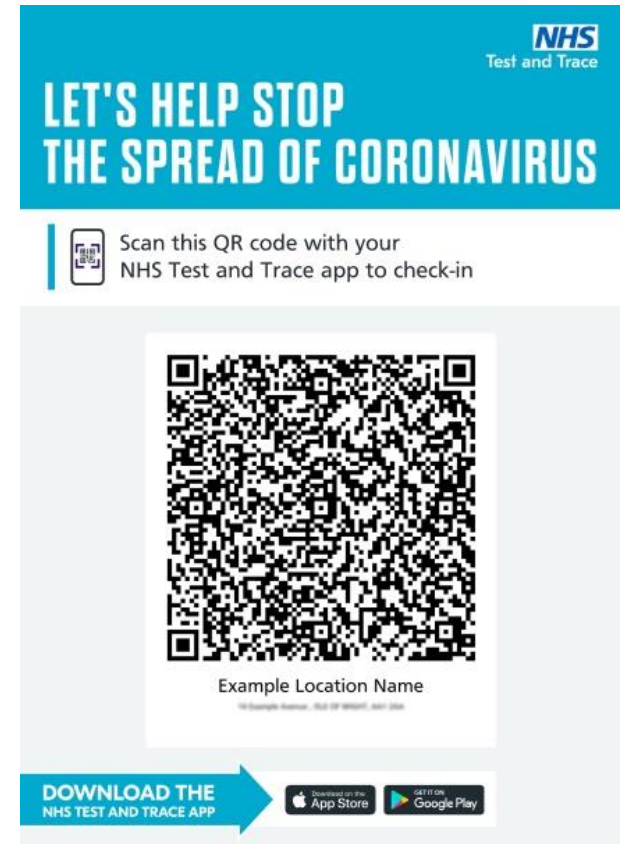
Through recorded information:

- Occupation records
- Transactions at a location

Human recollection

Forward tracing: Searching for possible spread from a known source.

Backward tracing: Searching for the source of an infection.



Electronic contract tracing

Advantages

- More efficient than manual tracing methods
- More effective as human error removed.

Disadvantages

- Discrimination may occur
- High potential to violate privacy.



Two COVID-19 approaches

Centralised

VS.

A central store of data holding both:

- A list of infected users
- A list of other users each user has been in contact with

Decentralised

No central store or only none identifiable data held.

Centralised Contact tracing



- Tracking using location, payment transactions and CCTV data.
- Data gathered and stored in centralised server.
- Can be done with or without a mobile app.

The centralised approach



Multiple sources of data can be combined.



It can be highly accurate and quantify risk.



Has the potential to record a lot of individual data that can be used for more than contact tracing.

Decentralised contact tracing

Encounters are recorded on device NOT on a server.

But wait... a server is still used.

A server is used only to record who is infected in a privacy preserving way.

Devices can check if any of its encounters have been with a device owned by an infected individual.

The UK approach



The NHS Covid-19 application v1

This initial attempt to create a contact tracing app used a centralised approach.

Devices reported information about other devices that had been in close proximity directly to the server.

This data was anonymised to protect privacy but would help scientists to study the virus.

What went wrong with v1?

Bluetooth communication protocols were used to detect encounters between devices.

This proved technically challenging.

Bluetooth is designed to be used in specific roles on a mobile device.

But not this role... this required a lot of access to the operating system that mobile application developers don't normally have.

Issues included:

- Reduced battery life
- Incompatibility with some devices
- Inconsistent capturing of encounters

The NHS Covid-19 application v2

This second version used the Google/Apple Exposure Notification systems

This used enhancements made to the operating systems that improved Bluetooth performance for the purposes of detecting encounters.

However Apple and Google would not allow this to be used in a centralised manner.

So v2 was a decentralised approach only recorded encounters on the device itself.

The server only records device ID of positive cases.

Recording Encounters

Relies on BLE (Bluetooth Low Energy) protocol.

When two devices are within range (10 meters) of each other they 'handshake'.

This means sending encounter messages which contain:

- A unique ID for each device
- The strength of the radio signal
- The length of time of the encounter*

To record an encounter, two devices must be:

- Share a high enough signal strength to indicate close proximity
- Be within this range for long enough to pose a risk of spreading the virus

What is stored on your device

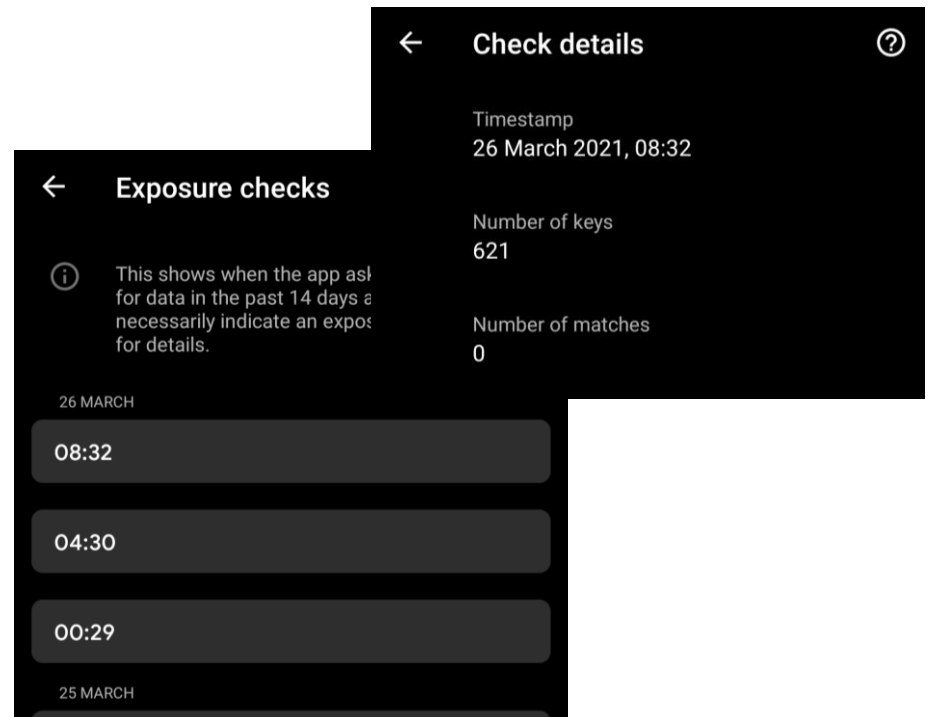
A list of encounters with other devices via BLE.

Each encounter message is stored for 14 days.

There is no way to access this list on your device.

A list of devices from recently reported positive cases.

This is downloaded at intervals through the day from a central server.



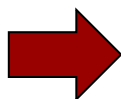
What happens if you take a test

If you received a code with your test result

If you report symptoms and book a test through the app, you do not receive a code.

Enter your test code

Example: 7g8s3stn



A positive result

Your unique device ID is sent to the server and then to all other devices.

Any matches with known positive cases will trigger the app to display instructions to self-isolate

A negative result

The result alone is uploaded to the server.

Device continues to record encounters



Privacy and Security



It's not tracking you but your device.



Your device ID is encrypted to create a Temporary Exposure Key with a secret key held only by your device



It creates a new Temporary Exposure key every 15-20 minutes.



Only these Temporary Exposure keys is shared with other devices or the server.

Privacy and Security

This secures your privacy in two ways:

There is no way to identify you or your device from the temporary exposure key.

Because the key changes every 15-20 mins its impossible to trace your location by repeated observations of the same key.

Criticisms

Only works on newer devices.

Over **98% of Apple iPhone** and **84.9% of Android** devices are compatible with the GAEN system.

Sources:

Developer.apple.com. 2021. [online] Available at: <<https://developer.apple.com/support/app-store/>> [Accessed 18 March 2021].

Developer.android.com. 2021. [online] Available at: <<https://developer.android.com/studio>> [Accessed 18 March 2021].

Criticisms

It's not the most accurate or effective way

This is true. It's a compromise.

It cannot be as accurate as a centralised approach which directly records contacts and tracks the location of individual devices.

Criticisms

Doesn't integrate into existing social or public healthcare systems.

Due to the strong privacy protections its impossible to identify any one individual directly.

This limits how well the app can be used with other systems such as financial support for self-isolation.

Finding out more



The source code for the NHS Covid-19 app including the application and server are available at: <https://github.com/nhsx>



Google Apple Exposure Notification

Google:

<https://www.google.com/covid19/exposurenotifications/>

Apple:

<https://developer.apple.com/exposure-notification/>



Any questions?

Studying Computing

University of Worcester

A brief guide to Computing courses

Study a course that is...

Innovative.

Relevant.

Flexible.

Computing Courses

- **Foundation Year in Computing**
- **BSc (Hons) Computing (including top-up)**

Gain skills employers want

Develop skills in a range of computing areas

Tailor your choice of modules to suit your interests and ambitions

A flexible, curriculum

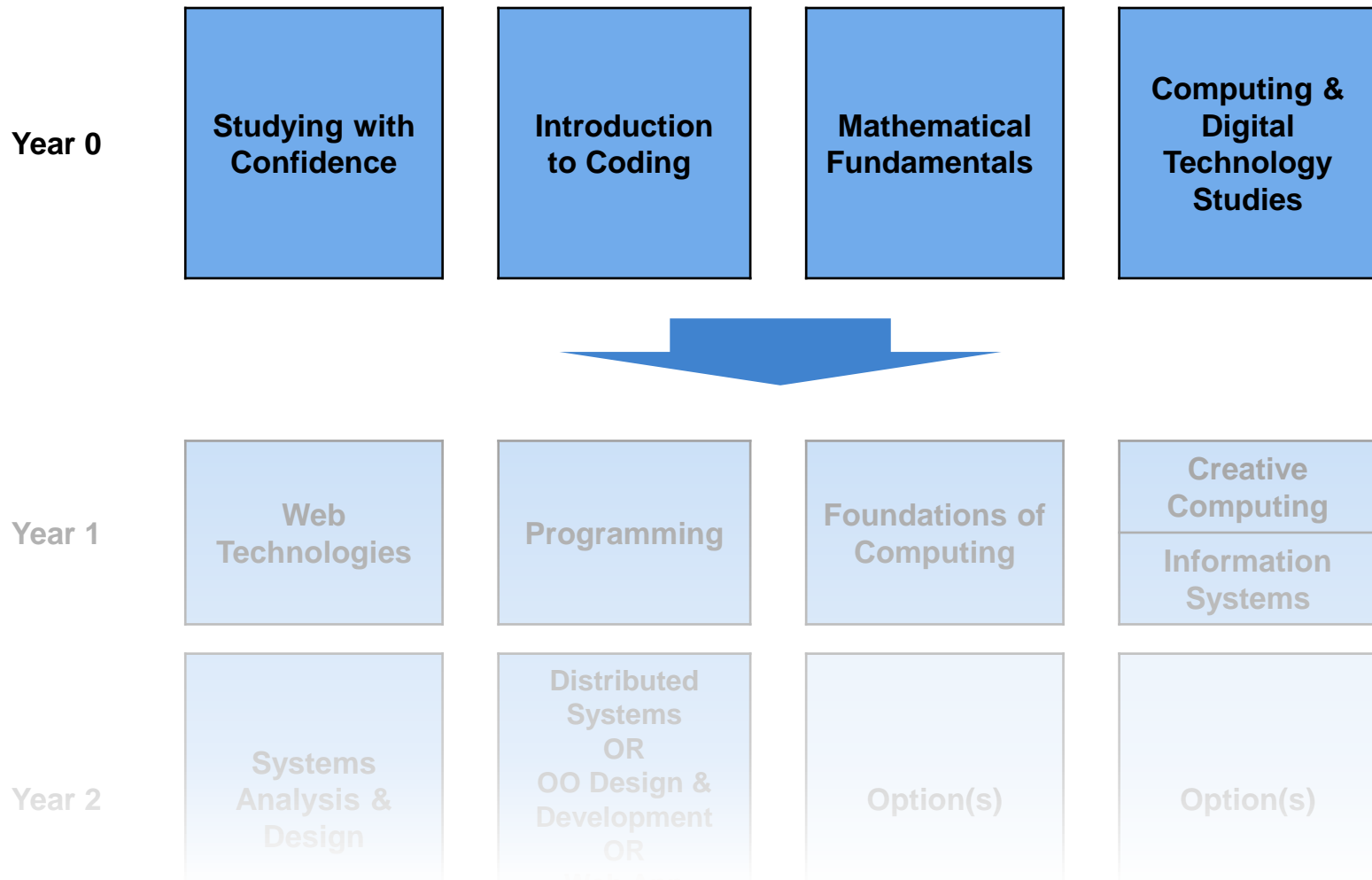
BSc (Hons) Computing Portfolio Structure

Year 1	Fundamentals of Computing
Year 2	Specialist Computing modules
	Optional 1-Year Placement
Year 3	Specialist Computing modules

BSc (Hons) Computing

Year 1	Web Technologies	Programming	Foundations of Computing	Creative Computing
				Information Systems
Year 2	Systems Analysis & Design	Distributed Systems OR OO Design & Development OR Web App Development	Option(s)	Option(s)
Optional 1-Year Placement or Year Abroad				
Year 3	Project	Nature of Computing	Option(s)	Option(s)

Foundation Year in Computing



Choice

2nd Year

Data Mining
Mobile Application Development
Game Design and Engineering
Robotics
Advanced Creative Computing
Interaction Design
Digital Content Systems and Ecommerce
Social Commerce
Web Application Development
OO Design and Development
Distributed Systems

3rd Year

Applied Software Engineering
Advanced Web Application Development
Machine Learning
Advanced Game Design and Engineering
Digital and Social Media Marketing
Applied Drone Technology
Internet of Things
Managing Cyber Risks
Cyber Security
Practical Database Applications
Digital Business

Thank you!

 Any questions?