Subject: **Computing**

Application: **Smart cities**

Using the worksheet and podcast resources

This worksheet is based on the Inventive podcast.

It supports Gatsby Benchmark 4: Careers in the curriculum by introducing a career and role model. The worksheets are based on topics in the KS3 curriculum.

The short audio clips can be used to provide context to the worksheet and could be played during a lesson.

A QR code on the student sheet links directly to the podcast.

KS3 National Curriculum statements

Computing

- Undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users;
- Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct, and know how to report concerns.

Note: The Extend activity has opportunity for students to write for a specific audience, and support their argument with factual detail. You might find it helpful to discuss this activity with colleagues from the English department to see what they would expect students to be able to achieve in their writing skills at KS3.

Audio clips from Inventive podcast.

- **Larissa Clip 1**: Diversity and bias;
- **Larissa Clip 2 :** Smart cities.

The story in the podcast identifies some of the ethical issues related to the development of a smart city, and could be useful for students to listen to before they attempt the Extend activity.

Other resources

Larissa's career poster
More information about Larissa

Meet the engineer

Larissa Suzuki

Data scientist

Larissa Suzuki is a polymath who works as a data scientist for Google. A polymath means "a person of wide knowledge or learning". She is a computer scientist, engineer, inventor and writer, and also works for University Collage, London. One of Larissa's interests is artificial intelligence (when computer system perform tasks usually done by humans for example making decisions or being aware of emotions). Another of her interests is smart cities, which use data and technology to predict and continuously match the needs of people that live there.

Scan the QR code

to access all the resources and the full podcast from:
nustem.uk/inventive/#larissa

nustem
Northumbria University NEWCASTLE
University of Salford MANCHESTER
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Know

1. Computer misuse act, copyrights designs and patents act, data protection act.
2. A smart city collects data and uses technology to provide services that match the needs of people that live there.

Apply

3.

a) copyrights designs and patents act;
b) data protection act;
c) data protection act;
d) computer misuse act.

4.

a) Recording and storing the number plates of all cars that pass the traffic light - No (Data protection act), data is not stored for a specific purpose and is kept longer than needed;
b) Using the number of vehicles waiting at red lights to adjust timing and reduce congestion Yes - no individual information is collected, and data is not stored;
c) Photographing passengers in cars - No (Data protection act); not relevant for controlling traffic. [Human Rights Act gives people a right to a private life];
d) Tracking journeys made by individual cars using sensors in different traffic lights - No (Data protection act), not relevant, more data collected than needed; no specific purpose;
e) Issuing speeding tickets and tax reminders - Probably yes (Data protection act) - data is collected and used for a specific legal purpose.

5. E.g. Sensors detects traffic building up and the timing of lights changes so traffic lights on busy roads spend less time on red. Signals near main routes tell drivers about less congested routes so traffic can spread over more roads. Variable speed limits are used so traffic flows more evenly.

Extend

6. E.g. lots of data is collected and used for different purposes - issues with privacy; safe storage and processing of data; need to ensure relevance, accuracy and time of storage.

Can reduce congestion; make public transport more efficient; inform people of traffic conditions; reduce pollution; make services like hospitals and bin collections more effective; data can be used to track criminals and solve crimes.

Privacy issues; data may be used or stored incorrectly; individuals can't consent; etc.

Worksheet version: 2.0, 2022-06

The ethics of data collection and smart cities

Computers use data in lots of ways, so it is important to control how our data is collected, stored and used. Laws that protect our data include:

- **Computer misuse act:** It is illegal for unauthorised users to deliberately access data stored on a computer (hacking), to access data to commit illegal acts, or to change data stored on the computer (for example installing viruses and malware). Organisations use passwords and other security to stop accidental access.
- **Copyrights designs and patents act:** everyone automatically owns the material they create (for example images, text, videos). This material can only be used legally with permission from the copyright holder (e.g by using a licence) or if they have given up their copyright. You need to be very careful that anything you download from the Internet is done legally, with permission.
- **Data protection act:** Personal data is protected because it is private. Everyone has a right to see data held by an organisation about them, and to correct any mistakes. Personal data should only be accessed by authorised people and kept secure. The data should be used fairly and lawfully, for a specific purpose. The data should be relevant, accurate and kept no longer than needed.

A smart city collects data and uses technology to provide services that match the needs of people that live there. This can improve transport systems, the environment, health, safety and reduce carbon emissions.

Meet the engineer

Larissa Suzuki

Data scientist

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Link to Larissa' story

Know

1. List the 3 main laws (acts) used to protect our data.

2. What is a smart city?

Apply

3. There are three main laws to protect data: Computer misuse act, Copyrights designs and patents act, and Data protection act.

Decide which act applies in each of the following examples:

a) A record company wants to stop people copying a video they've made;

b) A hospital uses passwords to control which workers can see a patient's medical information;

c) All customers can ask to see information their bank holds about them;

d) A student who stole answers to exam papers by hacking, then sold them was jailed.

4. Smart cities collect data about people for example where they are, journeys they make, and which resources they use.

One traffic light has a sensor that collects data about traffic. Signs tell drivers there is a traffic sensor.

Explain which of the following uses of this data could be lawful, and which are not.

a) Recording and storing the number plates of all cars that pass the traffic light;

b) Using the number of vehicles waiting at red lights to adjust timing and reduce congestion

c) Photographing passengers in cars;

d) Tracking journeys made by individual cars using sensors in different traffic lights;

e) Issuing speeding tickets and tax reminders.

5. Congestion is when traffic queues develop so traffic in the area moves slower. This often happens at rush hour (start and end of the working day) when many people use the road at the same time. Suggest how linked sensors in traffic lights can reduce congestion in smart cities.

Extend

6. Write a paragraph explaining whether you would like your nearest town or city to become a smart city. Include advantages and disadvantages of collecting and using data to improve efficiency.