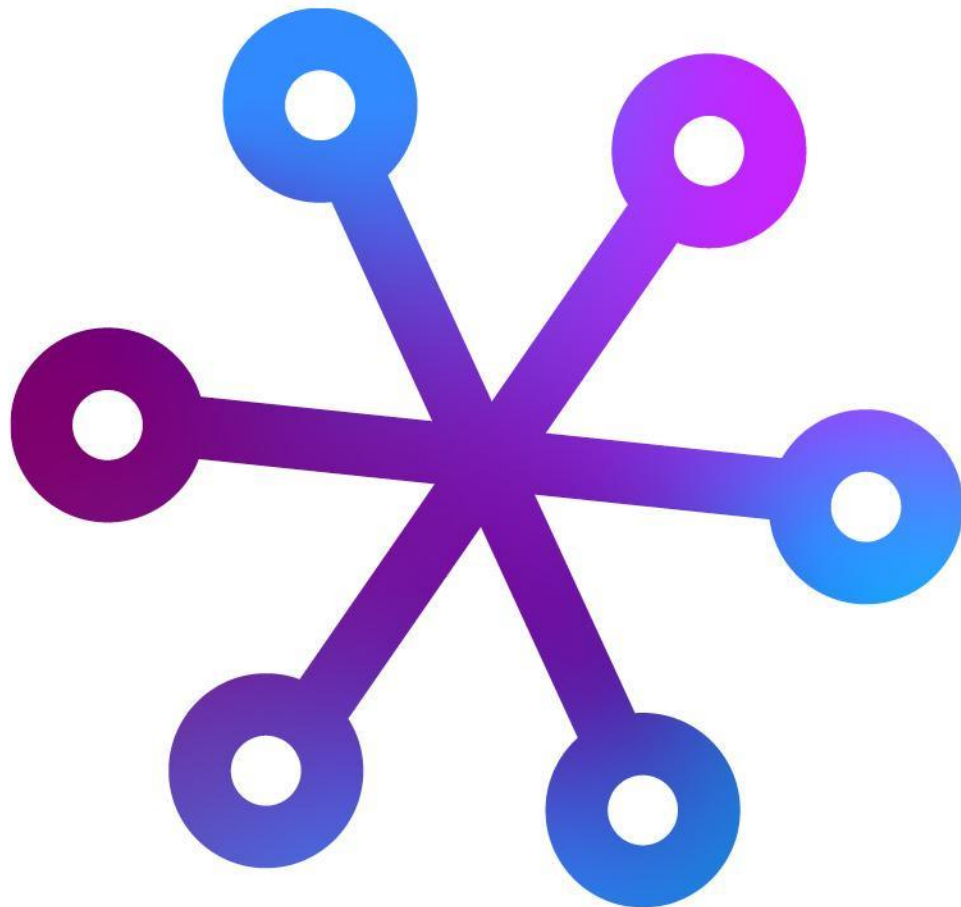
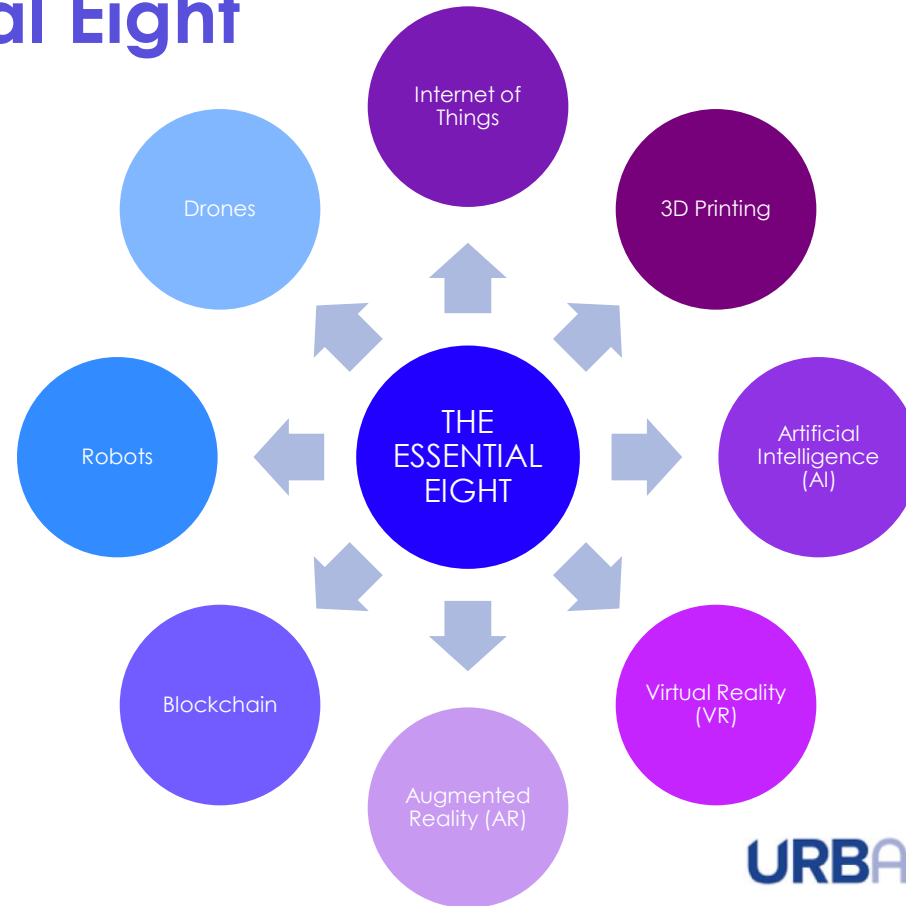


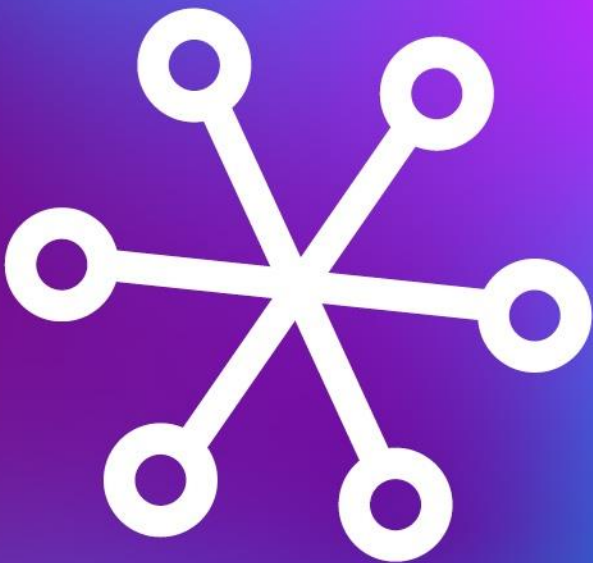


Welcome to the Digital Transition flashcards

These are just a few of the key technologies to get you started. How might they apply to your work?

the Essential Eight





Internet of Things



A definition

Internet of Things refers to a network of physical devices that are fitted with chips or sensors that collect and communicate data. The term IoT encompasses every 'thing' connected to the internet, but it is increasingly being used to define objects that 'talk' to each other because they are connected together, from simple sensors to smartphones and wearables.

These connected devices can be linked with automated systems that gather information, analyse it and create an action to help someone with a particular task, or learn from a process.

In case you want more...

Connected – or smart – devices are physical objects that can connect with each other and other systems via the internet.



Examples

Connected streetlights and lighting solutions are very popular in cities.

The key benefits of smart lighting include a reduction of energy and maintenance costs, increased public safety, safer traffic, and a measurable environmental impact.

Smart streetlights can also be used to double up as Electric Vehicle chargers, emissions monitors, and wireless broadband connection points.

IoT is used across many 'smart city' functions from smart bins (which automatically notify waste management services when they need to be emptied) to smart parking (which enable citizens to know where and when spaces become available) to smart grids that help balance energy generation, supply, and demand and smart kiosks (which provide city services across multiple communities).

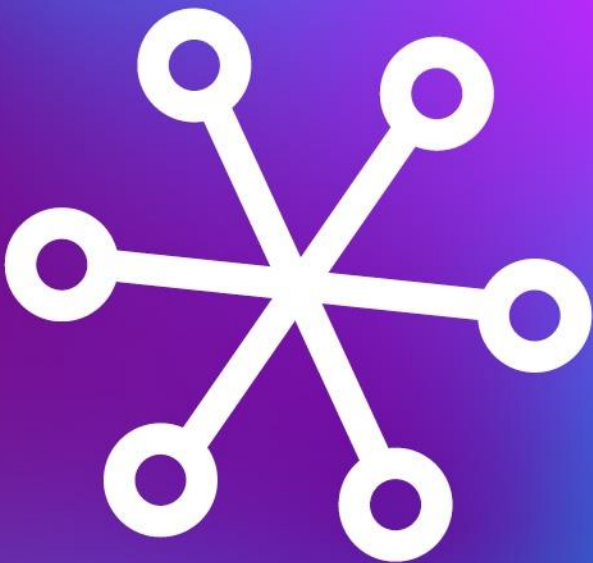


My city might use IoT to...

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3D PRINTING



A definition

3D printing uses a special printer that can print solid, tangible shapes and products. It does this by using filament in the place of printer ink, typically made of a suitable material like plastic. To produce the object, the printer uses a 3D computer rendering of a physical object and 'prints' it out by moving the printer head up and down as well as side-to-side.

In case you want more...

3D printing is a core element of 'Advanced manufacturing technology' which covers the use of innovative technology to improve products or processes that drive innovation.



Examples

Many believe that 3D printing is the future of construction and therefore a central technology for the future of cities.

There are already examples of houses being built using a 3D printer. 3D printing also contributes to sustainability by using the exact amount of materials and reducing waste.

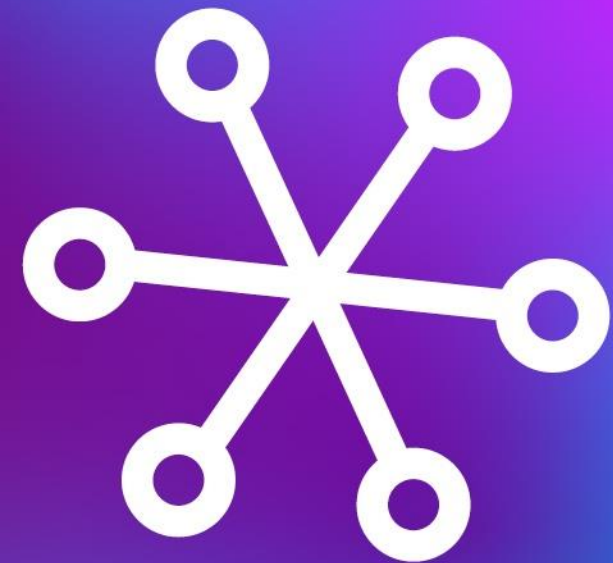


My city might use 3D printers to...

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Artificial intelligence (AI)



A definition

Artificial intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems

In other words AI is computer systems that can perceive the digital or physical world, process what they perceive and, in most cases, take the kind of action that normally requires human intelligence.

In case you want more....

Artificial Intelligence is an umbrella term that also includes Machine Learning. Machine Learning is an application of artificial intelligence (AI) that provides systems with the ability to automatically learn and improve from experience without being explicitly programmed.

Both rely on data.



Examples

AI is already helping drones fly, robots act and electrical power flow in our cities.

It helps machines maintain themselves, predict needs and adjusts temperatures and speeds accordingly – and can even send in a robot to carry out repair work.

It can be used to better predict risk for housing or food insecurity, improving public policy and quality of life in our cities.

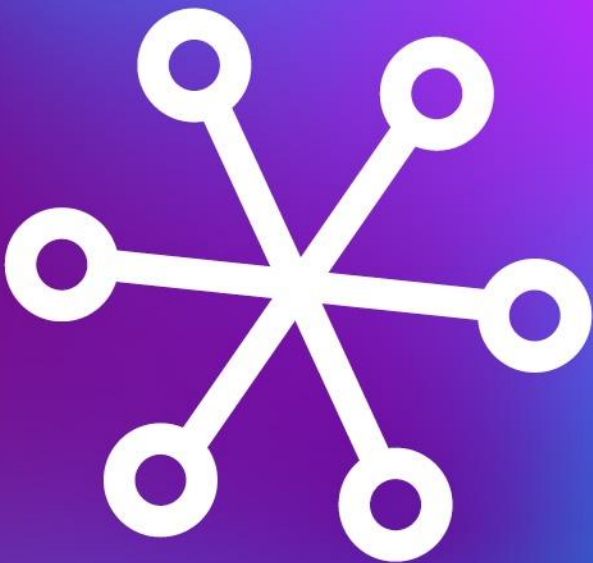


My city might use Artificial Intelligence to...

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Virtual reality



A definition

Virtual reality is an artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment

Digital Twins are virtual representation of a real-world physical system or process. They can create simulated cities which use VR, AR and the Metaverse to engage residents in new ways. Essentially they use the tools from the gaming sector and can enable citizens to explore, interact with and comment on their future city plans – or simply to access public services in a more appealing way (through avatars).

In case you want more....

Across Europe Digital Twins are being used to support sustainable mobility. Madrid, The Hague, Lyon, Porto, Budapest and Oslo are using digital twins for low emission last mile logistics. And they can also support many other aspects of city life from digital skills to policy making and citizen engagement.



Examples

To use virtual reality, you put on a headset which enables you to see and hear an immersive, 3D experience of the world.

Cities use VR extensively for tourism and promotion purposes. In healthcare it is used to manage pain or mental health conditions.

It is also used extensively in training e.g. by simulating an environment or situation.

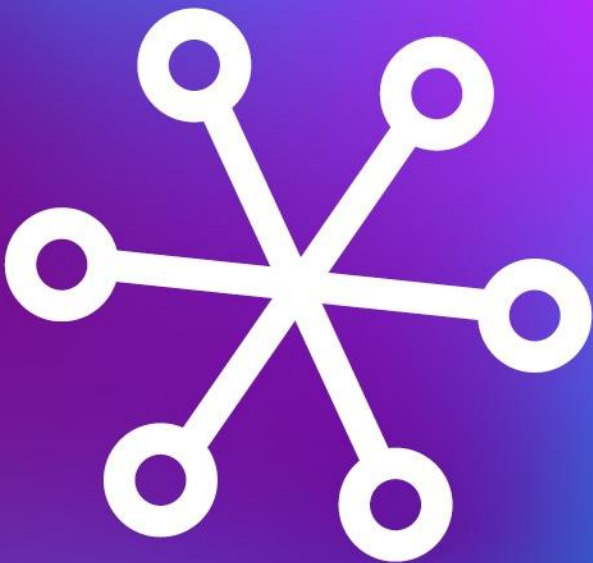


My city might use virtual reality to...

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Augmented reality (AR)



A definition

Augmented reality (AR) is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology – often a smart phone

Augmented reality almost blurs the line between the real physical and the digital world. It adds an interactive layer that combines the virtual and the real.

In case you want more...

Augmented reality is a key part of the Metaverse which could be defined as ‘the internet, but with a spatial (3D), game engine-driven collection of virtual environments’. This article [‘How to Explain the ‘Metaverse’ to your grandma’](#) explains it well.



Examples

Augmented Reality is often used to support tourism promotion e.g. through AR guides which offer customised and interactive tours of new places and enable visits to learn about the city's history and culture.

AR – by integrating AI with air quality sensors – can also enable people to navigate their way through a city using a route which minimises exposure to pollution, or avoids traffic congestion.

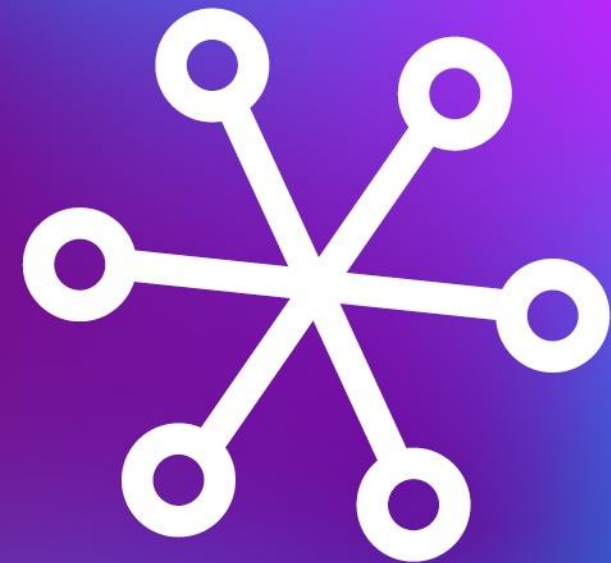


My city might use augmented reality to...

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Blockchain



A definition

Blockchain is an alternative system for keeping records and storing transactions. It holds data in a decentralised ledger (the Blockchain) which is maintained across a network of participants, not a single, central server. There is no central authority - it uses the participants to confirm transactions - so there is no central point of failure. It maintains a log of all transactions in its chain and each is time stamped and encrypted so a logical sequence of all transactions can be traced back in time.

In case you want more...

A cryptocurrency is an encrypted data string that denotes a unit of currency. It is monitored and organised by a peer-to-peer network called a blockchain, which also serves as a secure ledger of transactions, e.g., buying, selling, and transferring.



Examples

City governments, like all large organisations, can struggle to coordinate processes across disparate stakeholders. Blockchain is an important tool for local governments in terms of enhancing trust & transparency.

As a simple example, a municipal officer scanning a citizen's ID could confirm their name and city of residence, without revealing any other sensitive information. This secure digital identity can streamline access to public services.

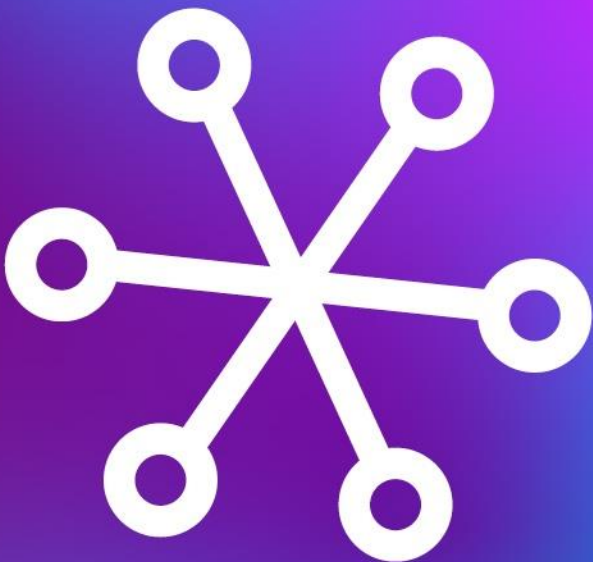


My city might use blockchain to...

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Robots



A definition

A robot is a type of automated machine that can execute specific tasks with little or no human intervention and with speed and precision. Robotics deals with robot design, engineering and operation.

In case you want more...

Robotics and Autonomous Systems could support smarter urban development across transport, logistics, policing, healthcare, maintenance, construction and more.



An example

Robots are commonly used for deliveries across cities and many believe there is potential to reduce traffic congestion and air pollution through increased use of robots for 'last mile delivery'.

Robots can drive a vehicle, water things, build things, clean our streets, respond to emergencies, offer basic medical support to vulnerable people.

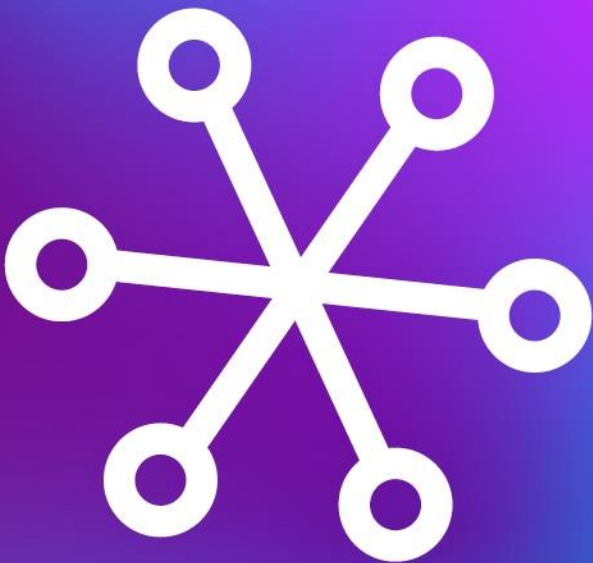


My city might use robots to...

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Drones



A definition

A drone is a flying robot that can be remotely controlled or fly autonomously using software-controlled flight plans in its embedded systems.

In case you want more...

Drones are often used in conjunction with onboard sensors and a global positioning system which uses satellites that orbit the earth to enable people with ground receivers to pinpoint their location.



Examples

Drones are commonly used to monitor the environment, construction works, traffic or crowds or emergency situations.

They are often fitted with sensors &/or high quality cameras which can transmit images or video 'live' and provide a birds eye view of city life.



My city might use drones to...

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