Digital Twin: Creating Smarter Cities

Making the most of what we have and understanding where we can improve city life means innovation will need to move from products to connected services. Underpinning this city-wide transformation is the insightful use of data embedded into models or simulations. These 'digital twins' can dramatically improve decision-making, performance and productivity in infrastructure and connected services.

Creating, connecting and analysing data from smart sectors such as energy, transport, waste, health and social care will enable optimised use of resources, achieving a truly smart city.

Within Smart Cities, a digital twin is a virtual model of a city, a digital replica of the physical world. It is used to understand and visualise the pulse of a city faster than real-time which is beneficial, particularly in emergencies, where planners can allocate resources, plan operations and optimise traffic.

Challenges

Rapid urbanisation is fuelling the challenge of achieving a sustainable urban environment. As demand continues to grow for public services and transport networks, governments are increasingly looking to technology and data to gain insight. From city planning, development of infrastructure to new traffic schemes, the ability to simulate scenarios and potential outcomes will aid more efficient delivery of services and resources.

Solution

In assessing both contribution and impact, the Centre for Modelling & Simulation (CFMS) has developed a 2D digital twin model of a central train station and surrounding area of the city of Bristol. Using Sheffield University's Flexible Large Scale Modelling Environment (FLAME) software, the model illustrates the use of traffic and pedestrian routes, which can potentially be used to identify impact and efficiency for a smart city. Creating a simulated digital map, a set of rules were created and applied to the geographical area. The model created visually shows the flow of pedestrian traffic, around different buildings, objects and people.

Benefits

As a digital twin representation of the city centre, it can be used to simulate and model emergent behaviour, typically used for scenario and contingency planning and can provide benefits for traffic related topics such as congestion, accidents, etc, and the ability to predict, respond to or mitigate events and incidents.

City wide digital twin simulation can offer a range of benefits, both reactive and predictive, allowing services to be delivered more quickly, efficiently, and cost-effectively for the benefit of individuals and businesses.

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