Institute for Ethics in Artificial Intelligence
School of Social Sciences and Technology
Technical University of Munich

TUM
IEAI

AI in Smart and Virtual Cities

From the Urban Digital Twin to the Personal Digital Twin and towards the Metaverse

The smart city appears as another project of global city with an enticing idea behind – technology will support society in becoming smarter. Cities appear in turn as mirrors of the past reflecting a society's complexity and territorialization of competing interests, values, and identities or as a testbed for innovation – a large-scale lab projecting the future. Digital innovation and artificial intelligence have been pushing forward the vision of an interconnected world relying on technology to perform increasingly complex tasks, usually requiring human agency and lately promising humans to delegate responsibility to artificial agents to achieve more efficient, accurate, and even more objective results and outcomes. As these highly complex systems operate and become embedded in our reality the link to the virtual world is reinforced. However, are these city doubles purely virtual or are they also tangible? What possibilities do they create? Why is the smart city such a big promise for the cities of the future and what role do these interconnected twin realities play? As the urban digital twin and personal digital twin rely on data to reproduce virtual entities, one aspect of this new hope lies in the potential power of AI. Enabled virtual cities are acquiring new shapes and embedding new ways to connect virtual and physical realities.

Keywords: Virtual cities; Digital Twin; Metaverse; Gamification of reality; virtual and augmented reality; Artificial Intelligence; Ethics

Specific topics:

- Urban data and privacy concerns
- Ethics of surveillance
- Digital Rights and Human Rights
- People-centered cities and trustworthy technologies
- Human-machine interaction in the context of virtual cities
- Digital Twin applications for sustainability
- Recommender systems as public services and threats to human autonomy
- Democratizing AI in the context of public policy

If interested please contact

Supervisor: Catarina Fontes, PhD catarina.fontes@tum.de

Starting Date: as soon as possible

We are looking forward to your application!

Institute for Ethics in Artificial Intelligence
School of Social Sciences and Technology
Technical University of Munich

Related Literature

Batty, M. (2018). Digital twins. Environment and Planning B: Urban Analytics and City Science, 45(5), 817-820.

EU AI HLEG (2019). A definition of AI: Main capabilities and scientific disciplines. European Commission. Brussels.

European Commission (COM). (2021). Laying down harmonised rules on Artifical Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts. Brussels.

Floridi, L., Cowls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., ... & Vayena, E. (2018). AI4People—An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. Minds and machines, 28(4), 689-707.

Hollands, R. G.(2008). Will the real smart city please stand up?. City, 12 (3), 303-320.

ITU (2016). Overview of key performance indicators in smart sustainable cities. Recommendation ITU-T Y.4900/L.1600

Junior, C. M., Ribeiro, D. M., Da Silva Pereira, R., & Bazanini, R. (2018). Do Brazilian cities want to become smart or sustainable? Journal of Cleaner Production, 199, 214–221.

Kharrazi, A., Qin, H., & Zhang, Y. (2016). Urban big data and sustainable development goals: Challenges and opportunities. Sustainability, 8(12), 1293.

Kitchin, R. (2014). The real-time city? Big data and smart urbanism. GeoJournal, 79(1), 1-14.

Lupton, D., & Michael, M. (2017). 'Depends on who's got the data': Public understandings of personal digital dataveillance. Surveillance & society, 15(2), 254-268.

Naviti, S., Delipetrev, B. & Craglia, M. (2020). Destination Earth. Survey on "Digital Twins" technologies and activities, in the Green Deal area. JRC Technical Report. European Commission

Unesco (2021). Recommendation on the ethics of artificial intelligence, 62201. https://unesdoc.unesco.org/ark:/48223/ pf000038045

UN Habitat (2020). Centering people in smart cities: A playbook for local and regional governments.

UN-Habitat & Mila (2022) AI & Cities: Risks, Applications and Governance. UN-Habitat

United Nations (UN) (2015). Transforming our world: the 2030 Agenda for Sustainable Development. A/RES/70/1.

Vanolo, A. (2018). Cities and the politics of gamification. Cities, 74, 320-326.