

# Digital twin for real-time flow management in hospitals

*supervised by*

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Discrete event simulation stochastic queueing systems [1]. It is often used to model health-care systems because it can represent complexity and randomness in patient flow as a network of activities (e.g., triage, treatment) and queues (e.g., waiting for triage, waiting for treatment, waiting for a bed to become available) [2]. Digital twins extend the utility of simulation models by synchronising them with the physical system through real-time data integration, enabling the simulation to support dynamic, online decision-making [3].

This project will address methodological and data-driven challenges in real-time updating, validation, and decision support for digital twin models. A strong background in Mathematics is required for this project. Experience with simulation and Python will be considered an advantage.

## REFERENCES

- [1] J. BANKS, *Discrete-event System Simulation* Prentice Hall, 2010.
- [2] C.S. CURRIE, J.W. FOWLER, K. KOTADIS, T. MONKS, B.S. ONGGO, D.A. ROBERTSON, AND A.A. TAKO (2020), *How simulation modelling can help reduce the impact of COVID-19*. *Journal of Simulation* 14(2) pp.83-89.
- [3] G. LUGARESI, S. GANGEMI, G. GAZZONI, A. MATTA (2023), *Online validation of digital twins for manufacturing systems*. *Computers in Industry* 15(2).