**A Digital Twin Urban Flood Forecasting System**

**Integrating a Weather Forecast Model and an Urban Flood Model**

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***ABSTRACT***

Digital Twin reconstructs corresponding entities of various physical world objects in the information world, providing both dynamic and static attributes in near real-time. To accurately mimic physical world dynamics, it is essential for a digital twin system to integrate cross-disciplinary models that take various IoT readings as inputs, such as meteorological, hydrological, geological observations. While constructing a comprehensive digital twin system is still an on-going task, a subset of this system can be built to prove the concept. Hence, this study establishes a digital twin system focusing on the urban flood forecasting. This system integrates a weather forecast model and an urban flood model. The weather forecast model estimates rainfall distributions based on satellite images and in-situ observations, where the rainfall forecasts become the inputs of the urban flood model for estimating inundation areas. By comparing the forecasts and actual observations, the proposed digital twin system shows a more accurate flood estimation than the traditional solution. In addition, based on the flood forecasts, this study constructed an urban flood navigation application that dynamically adjusts traffic network based on flood areas and performs shortest path navigation, demonstrating the value of the digital twin.

**Keywords:** digital twin, cross-disciplinary models, Internet of Things, weather forecast, flood simulation, navigation