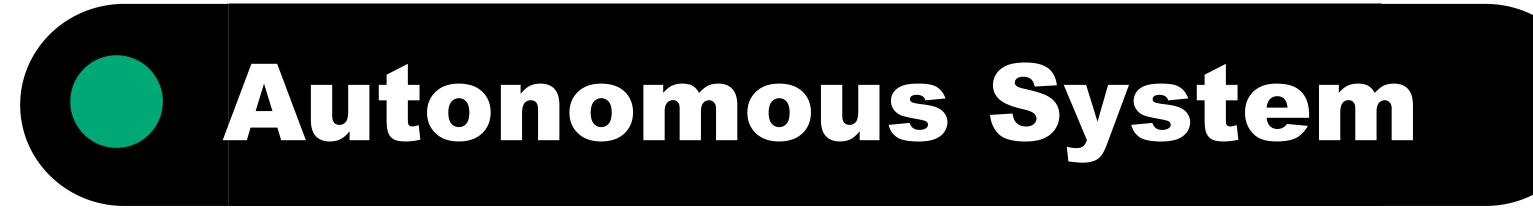
Digital twin: Autonomous System on Public Utility of Chemical Fiber Factory

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O Digital Twin

The fault detection is indispensable for diagnosing system malfunctions. And specification layer governs the entire system including the subsystems.

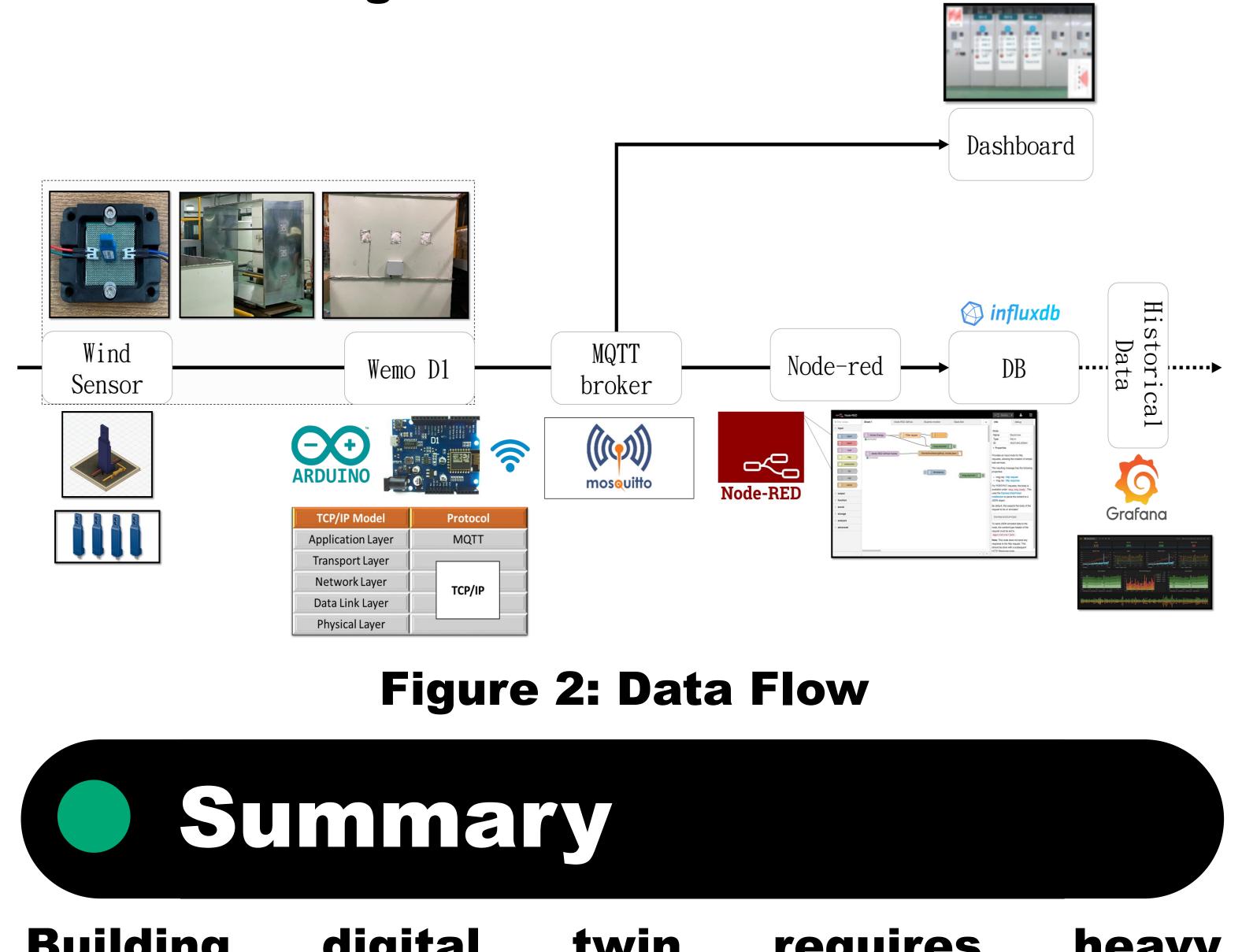
Digital twin is a virtual representation of the physical entity. The physical entity and its virtual counterpart are linked by data. Application of digital twin involves real-time monitoring, simulation, prediction, optimization, etc. In order to maintain the accuracy of model, the digital twin has to be governed by a system structure to deal with the uncertainty. This research proposes an architecture of autonomous system and its application on public utility to build a digital twin for chemical fiber factory.



An autonomous system consists of layers of

Data flow

The data flow coming from sensor and actuator could be obtained and stored in a general pattern shown in Figure 2. For embedded sensor that works with the microprocessor, the data package could be transmitted over MQTT protocol. With a MQTT subscriber on Node-RED, the data can be displayed in real-time and also stored in database for historical data inspection and model training.



function from bottom to top. The layers are actuator and sensor, process, model, critic, fault detection, and specification as shown in Figure 1.

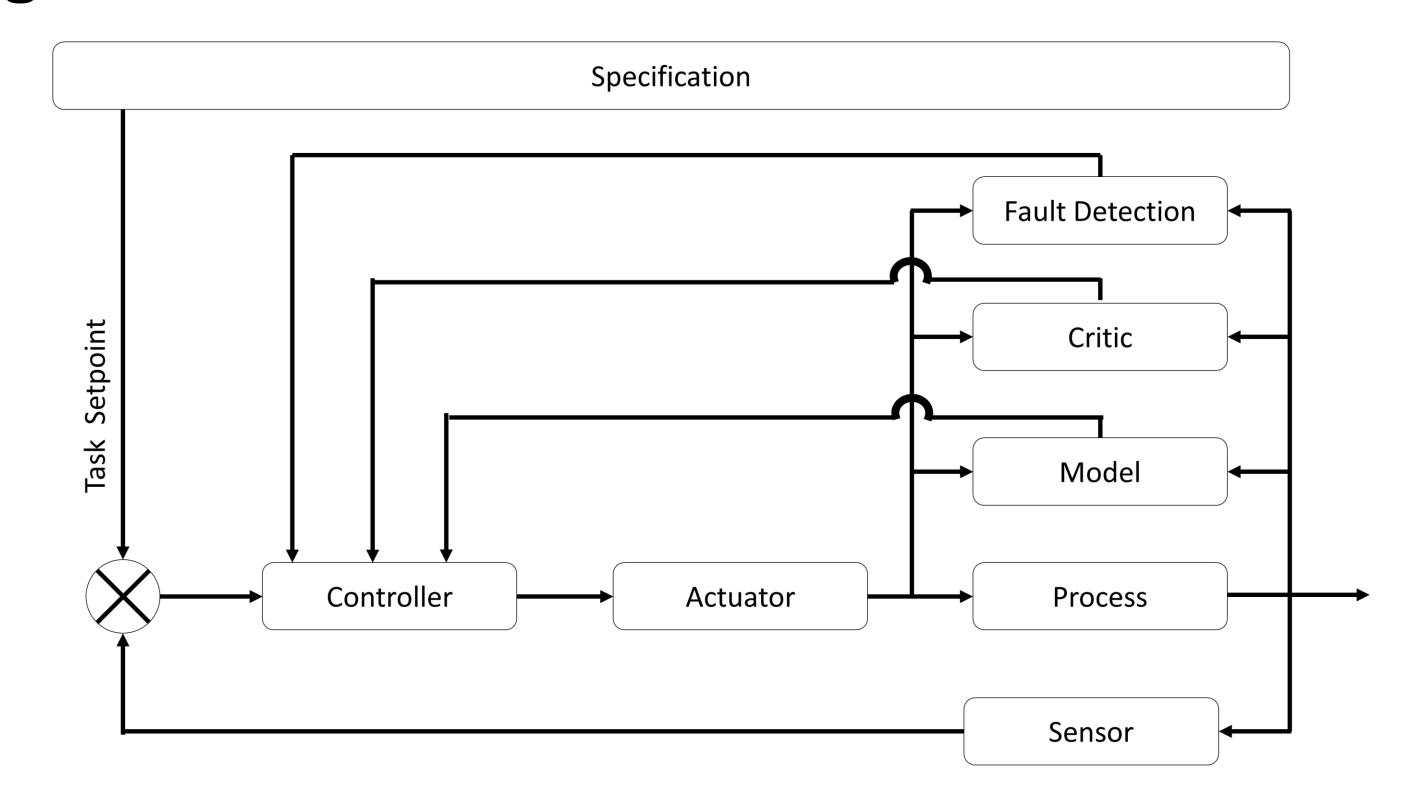


Figure 1: The structure of Autonomous system

requires Building digital twin heavy computations and multiple layers of function especially for applications in manufacturing. high performance computing With (HPC) system and on-premise servers, it provides not protection the ultimate from only cybersecurity threats but the also administration over hardware and software configuration.

The actuator and sensor layer are where the data originated from the physical environment. And the process layer provides the mechanism that define the correlation and causation among the datasets. The model layer is the virtual representation formulated by numerical method and artificial intelligence. The critic layer is responsible to initiate a model re-train process and warning if the prediction of the model deviates from the real-world data readings.

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