

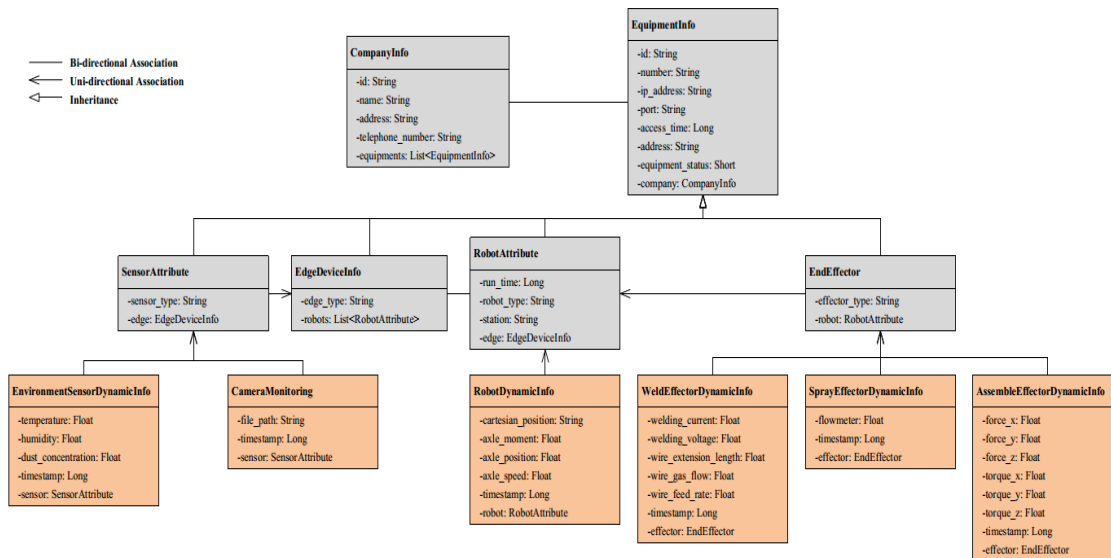
ACbot: An IIoT Platform for Industrial Robots

**Rui WANG, Xudong MOU, Tianyu WO, Mingyang
ZHANG, Yuxin LIU, Tiejun WANG, Pin LIU, Jihong YAN,
Xudong LIU**

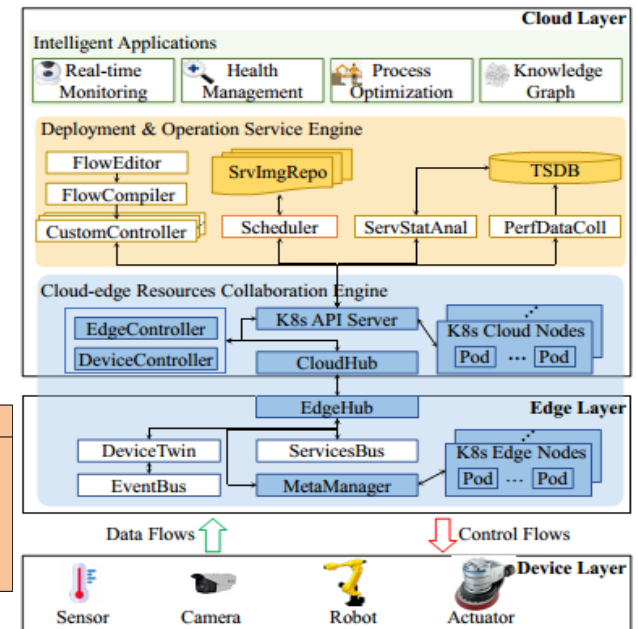
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Problems & Ideas

- Problems of Intelligent Operation and Maintenance (O&M) for Industrial Robots (IRs):
 - The intelligent IR O&M, including maintenance, process optimization, and knowledge sharing, crave supports from the Industrial Internet of Things (IIoT) platforms.
 - The field of robotics involves multiple participants, while existing platforms ignore the compatibility of multiple tenants.
- Ideas: Establishing an IIoT platform dedicate for IRs.



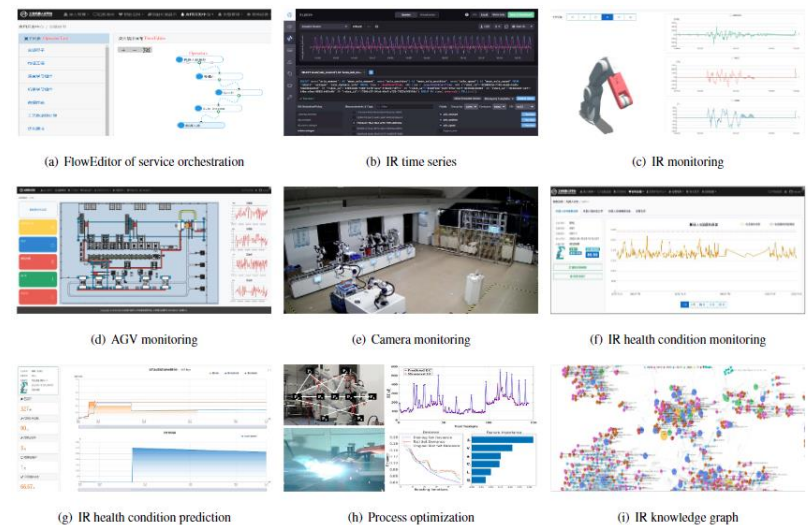
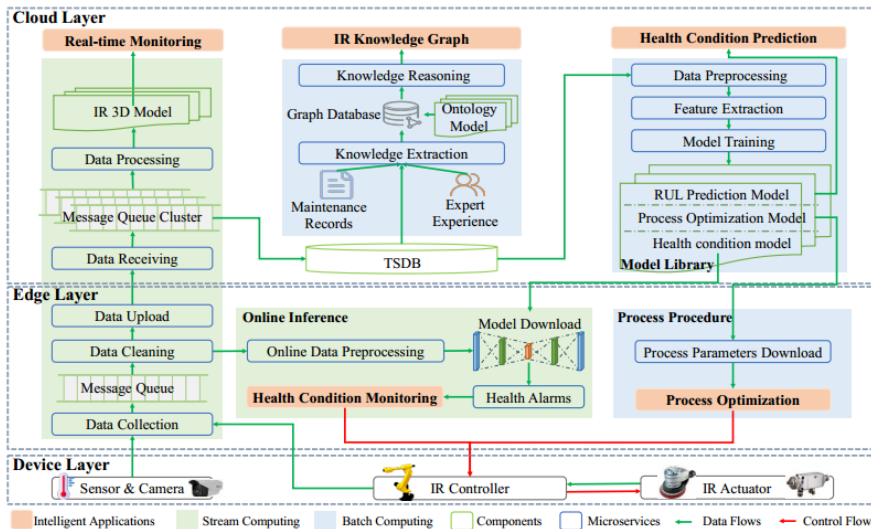
Left: ACbot information model to cover multiple tenants, devices, and data.



Right: Cloud-edge-device three layers and two core Platform-as-aService (PaaS) functional components, cloud-edge resource Collaboration Engine (CoEngine) and Deployment & Operation service Engine (DeOpEngine), to implement various O&M applications.

Main Contributions

- Contributions:
 - ACbot, the first IIoT platform for IR with a multitenancy-oriented information model and a three-tier cloud-edge-device architecture.
 - A cloud-edge collaboration mechanism implemented by a containerized solution, microservices service, and orchestration engine.
 - we have developed real-time monitoring, health management, production process optimization, and knowledge graph as four intelligent applications for IR.
 - The ACbot platform accesses 10 companies and academic institutions, manages 60 IRs, collects about 100 billion time series points from devices, and provides the abovementioned services for them.



ACbot application results. Left: Implementation architecture of Acbot.

Right: Flow orchestration and various O&M applications involving IR maintenance, process optimization, and knowledge sharing.