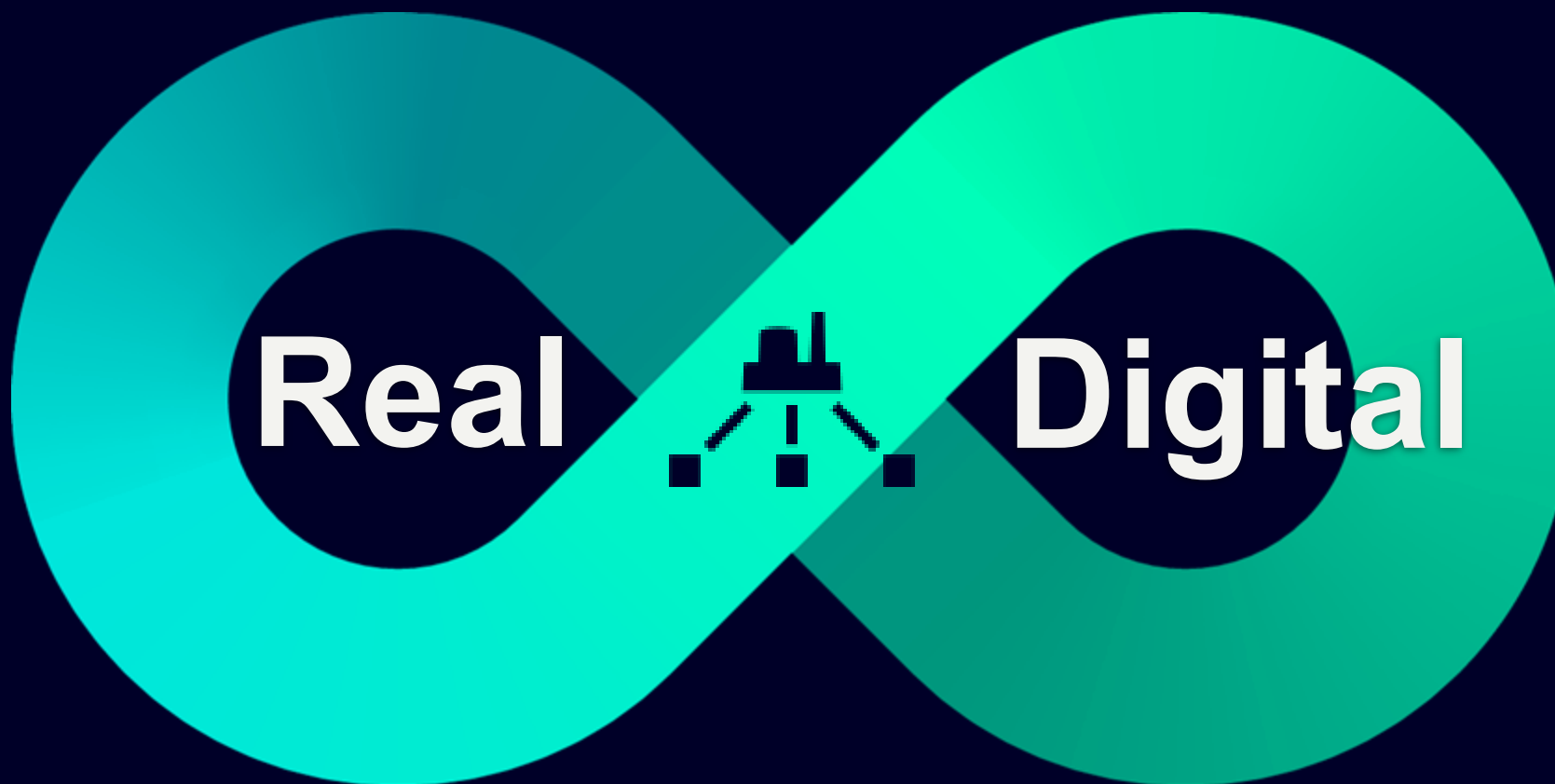


Using Web Technologies to Connect the Real to the Digital World

| Dominik Tacke, Sebastian Käbisch | Siemens AG

ITEA – Webinar: Cyber-physical Metaverse, 18. July 2025

Smart field devices
At the intersection between the real and digital world



Field devices are bridging the worlds

Way forward

Software Defined Field Devices

Needed Features



Portability



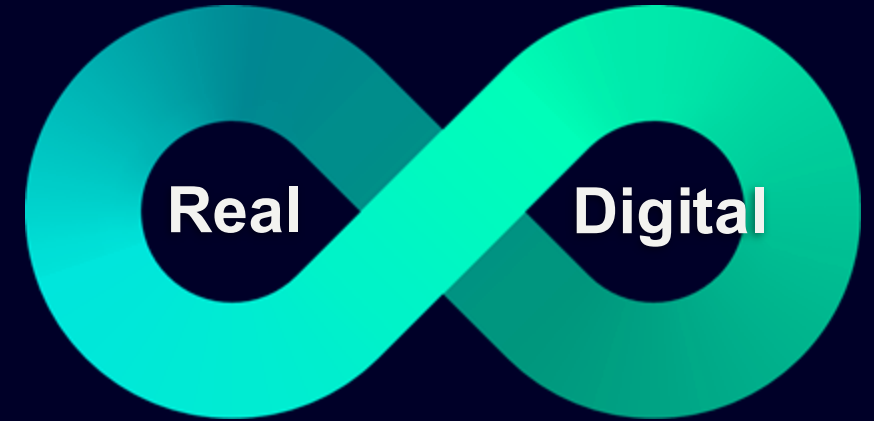
Polyglot



Sandboxing

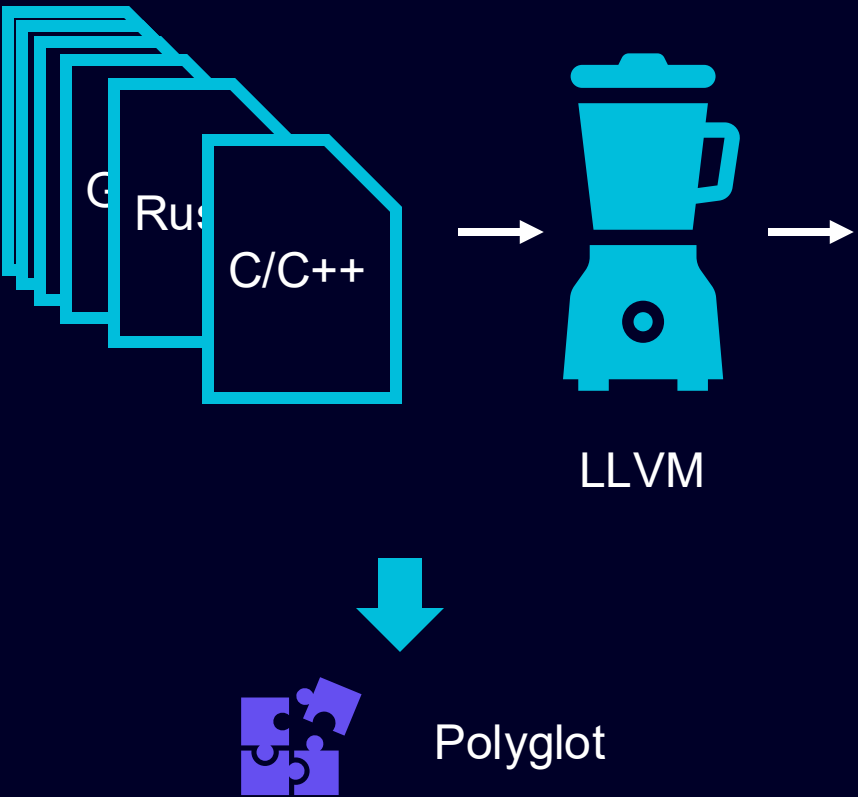


**Understandable
and standardized**



What is Wasm?

Generation

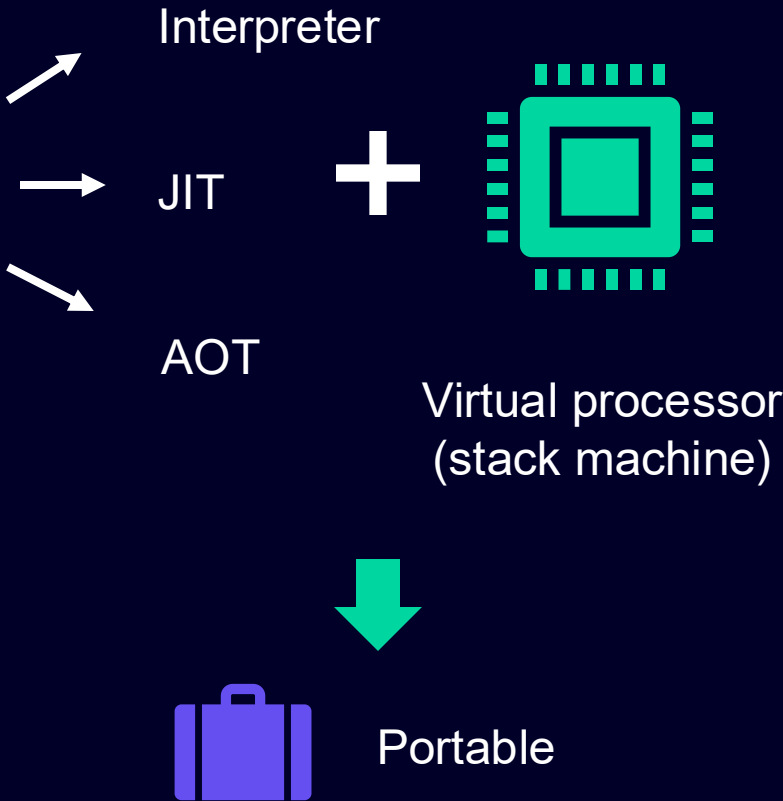


Wasm bytecode



Sandboxed

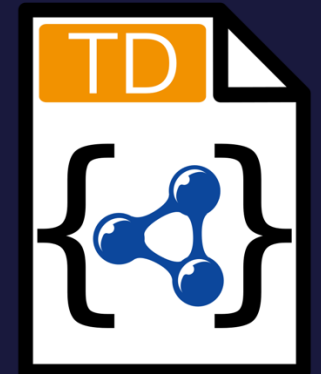
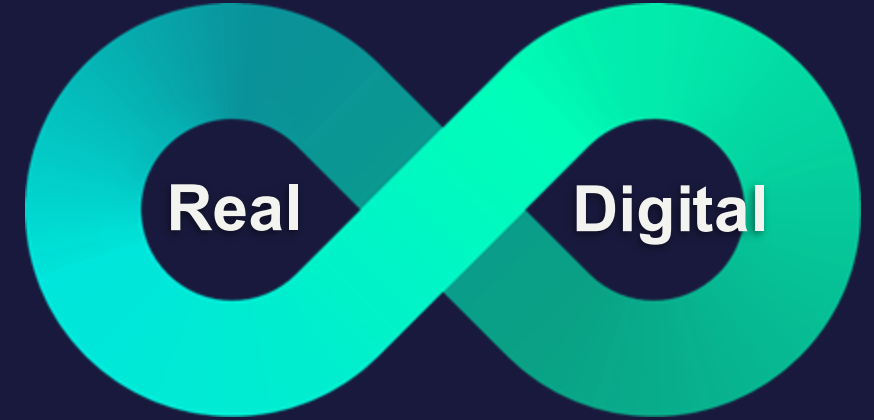
Execution



W3C Web of Things for synchronizing real and digital world

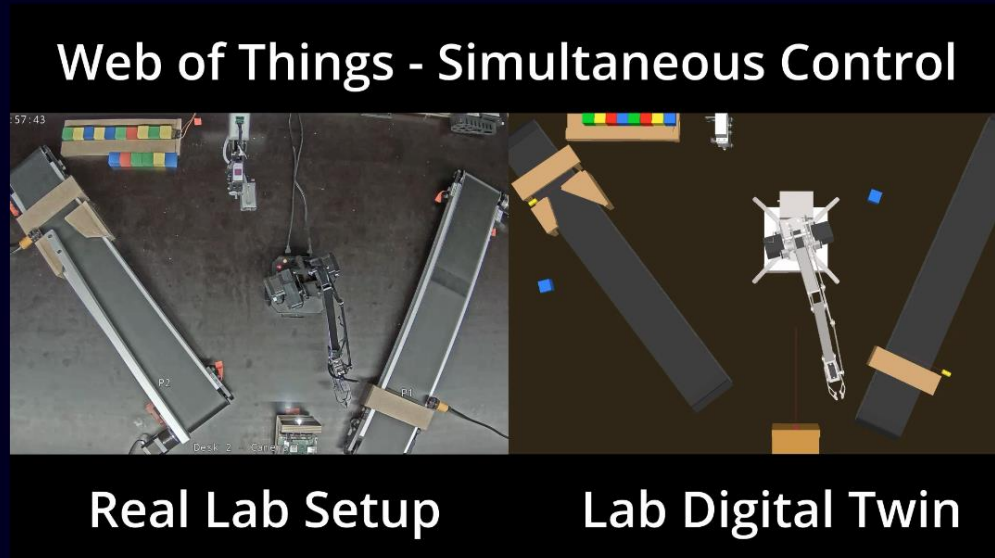
W3C Web of Things

- IT-Friendly technologies, reuse established Web standards
- Protocols agnostics (works with Modbus, OPC UA, MQTT, ...)
- Adapts to any application domain
- Local, Edge, Cloud
- Key technology: Standardized *Device Description Language* called **WoT Thing Description (TD)**
- WoT TD adopted in Asset Administration Shell (AAS) by the Asset Interfaces Description (AID) Submodel

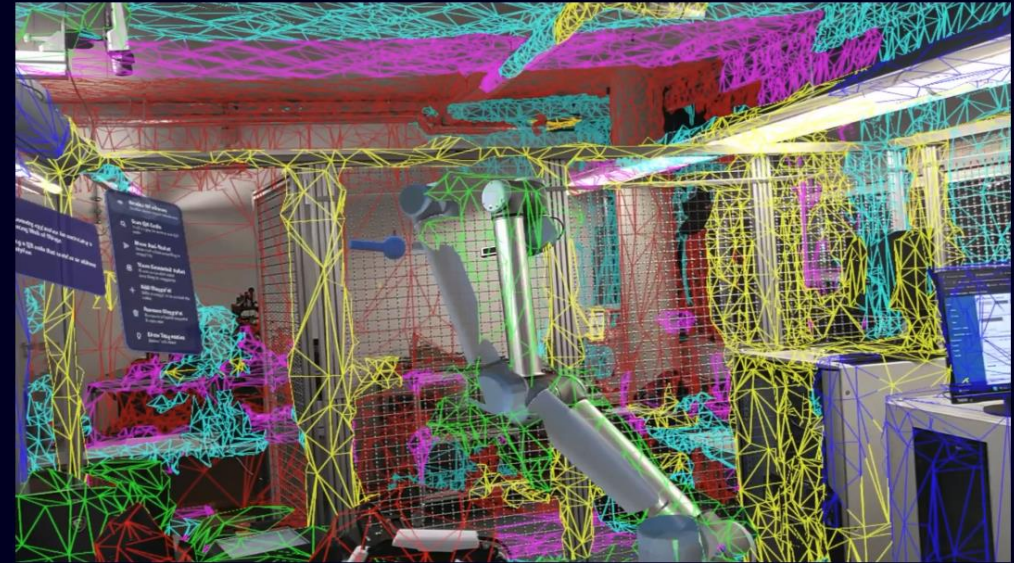


Examples from TUM* – Siemens Research Cooperation

WoT for CPS, Robotics, etc.



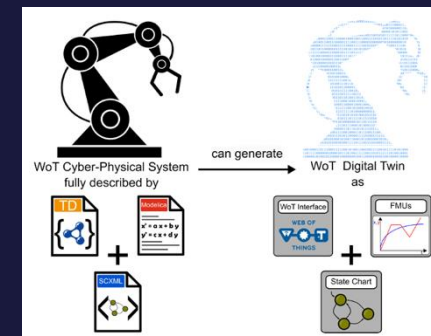
Video



Video

Fady Salama, Zucheng Han, Ege Korkan, Sebastian Kaebisch, Sebastian Steinhorst. **"RobWot: Generating Real-Time Digital Twin Simulations for the Robotic Web of Things"**. In: *2023 IEEE 9th World Forum on Internet of Things (WF-IoT)*. Aveiro, Portugal.

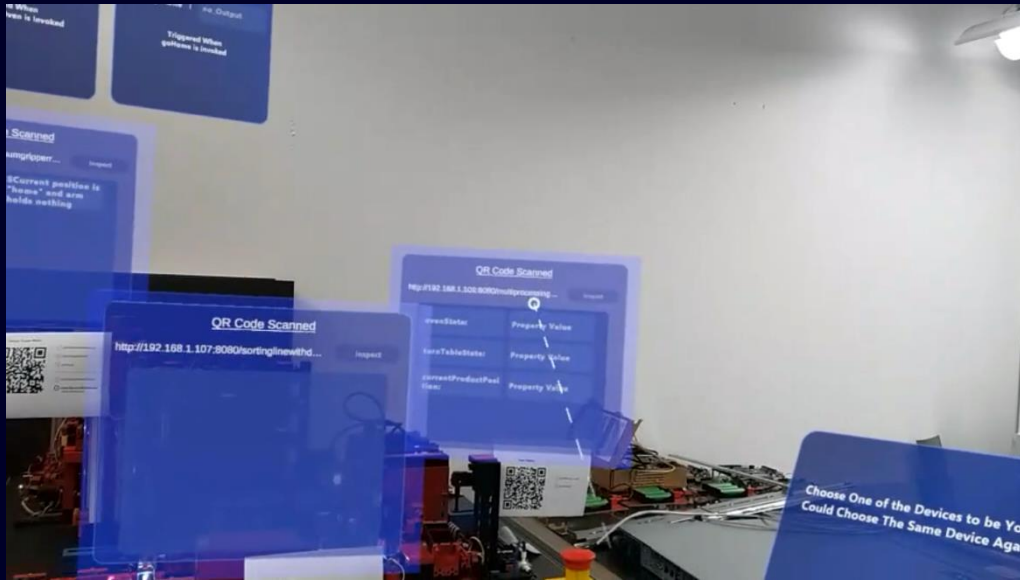
Fady Salama, Anatolii Tsirkunenکو, Ege Korkan, Sebastian Kaebisch, Sebastian Steinhorst. **"WoT-Phyng-Sim: Integrating Physics Simulations with IoT Digital Twins using the Web of Things"**. In: *2023 IEEE International Conference on Omni-layer Intelligent Systems (COINS)*. Berlin, Germany.



*TUM = Technical University of Munich

Examples from TUM* – Siemens Research Cooperation

Mixed-Reality for Web of Things

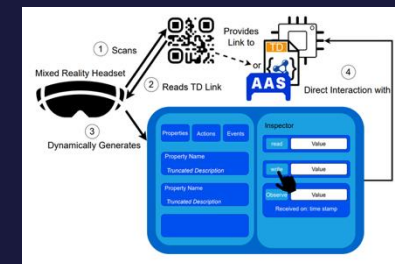


Video



Video

Fady Salama, Idil Sezgin, Ege Korkan, Sebastian Käbisch, and Sebastian Steinhorst. **HoloWoT: A First Step Towards Mixed Reality Digital Twins for the Industrial Internet of Things.** In: *Proceedings of the ACM/IEEE 27th International Conference on Model Driven Engineering Languages and Systems (MODELS Companion '24)*. 2024. Linz Austria.



*TUM = Technical University of Munich

Summary

- Open standards such as WASM and WoT are a perfect vehicle for bridging both worlds, the real and the digital
- Be part of the discussion:
 - WASM [embedded special interest](#) group
 - WoT [community group](#), [discord channel](#), [webpage](#)

