

CYBER-PHYSICAL SYSTEMS (SCADA)

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WHAT IS A **CYBER-PHYSICAL SYSTEM**

A cyber-physical system is a computer system where a mechanism is controlled or monitored by computer-based algorithms. In these systems, physical and software components operate ubiquitously and can interact with each other by changing context.

CYBERNETICS


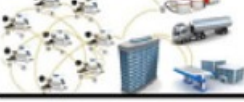

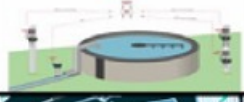




MECHATRONICS

UTILITIES

DIFFERENCE BETWEEN IOT AND CYBER-PHYSICAL SYSTEMS

The primary difference between cyber-physical systems and IoT is the focus on automation vs feedback loops. IoT centers around pure automation without the need for human assistance, whereas cyber-physical systems work in a feedback loop utilizing human intervention.

EXAMPLES

Naming	Classification	Description
 Smart House	Industrial-Consumer IoT	<ul style="list-style-type: none"> • Control Smart Devices • Homeowner Security & Comfort
 Oil Refinery	Industrial-Transportation IoT	<ul style="list-style-type: none"> • Naphta, Gasoline, Diesel • Asphalt, Petroleum, Fuel, Oil
 Smart Grid	Industrial IoT	<ul style="list-style-type: none"> • Smart Efficient Energy • Energy Control & Management
 Water Treatment	Industrial-Consumer IoT	<ul style="list-style-type: none"> • Improved Water Quality • Overcome Contamination & Undesirable Components
 Medical Devices	Medical-Wearable IoT	<ul style="list-style-type: none"> • Improved Patients Life • Enhanced Medical Treatment • Remote Patient Monitoring
 SCADA	Industrial IoT	<ul style="list-style-type: none"> • Control & Monitor Telecoms. • Control & Monitor Industries
 Smart Cars	Industrial-Transportation IoT	<ul style="list-style-type: none"> • Echo Friendly • Enhanced Driver Experience • Advanced Safety Features
 Supply Chains	Industrial-Transportation IoT	<ul style="list-style-type: none"> • Real-Time Delivery Source/Destination • Less Delays & Echo Friendly

SCADA APPLICATION

SCADA stands for 'Supervisory Control and Data Acquisition' and is a control system architecture comprising of computers, networked data communications, and user interfaces for operation of machines and processes. This architecture also covers devices such as sensors and logic controllers.

SCADA **SYSTEM IMPLEMENTATIONS**



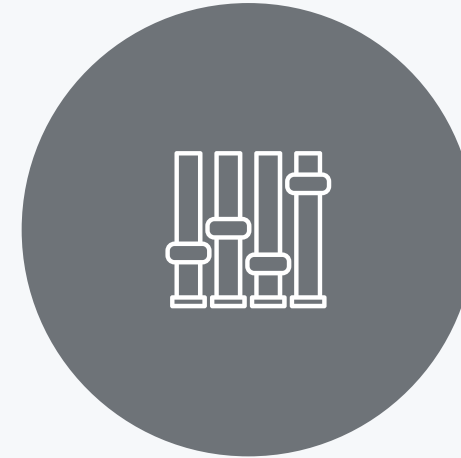
UTILITIES

Electrical Power Distribution
Electrical Power Transmission



WATER

Water Treatment Centers
Waste Collection Facilities



OIL AND GAS

Pipeline Control
Remote Asset Monitoring
Offshore Platforms

SCADA COMPONENTS



SUPERVISORY COMPUTERS (SC)

Core of the system, sending control commands to field devices based on gathered data.



REMOTE TERMINAL UNITS (RTU)

Connect to sensors/actuators and have embedded control capabilities.



PROGRAMMABLE LOGIC CONTROLLERS (PLC)

Specifically designed controllers networked to the supervisory system.



COMMUNICATION INTERFACE

Connects the supervisory system to the RTUs and PLCs, which operate autonomously on near-real time control using the last command given by the SC.



HUMAN-MACHINE INTERFACE (HMI)

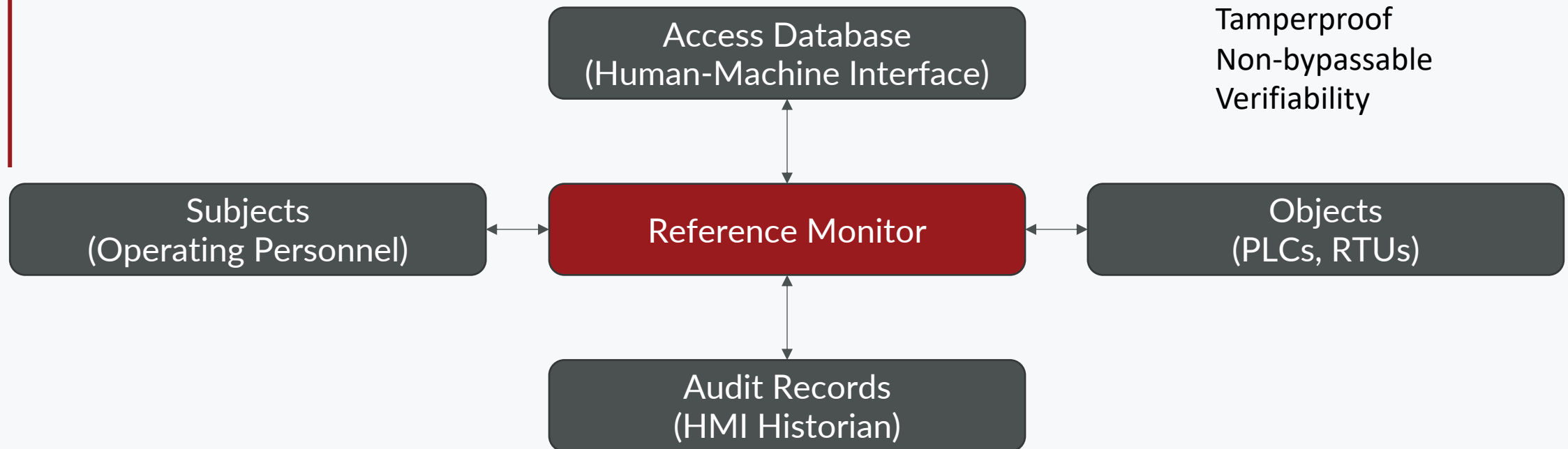
The HMI presents information to operating personnel in the form of diagrams, which allows the personnel to control the entire system through the Supervisory Computer.



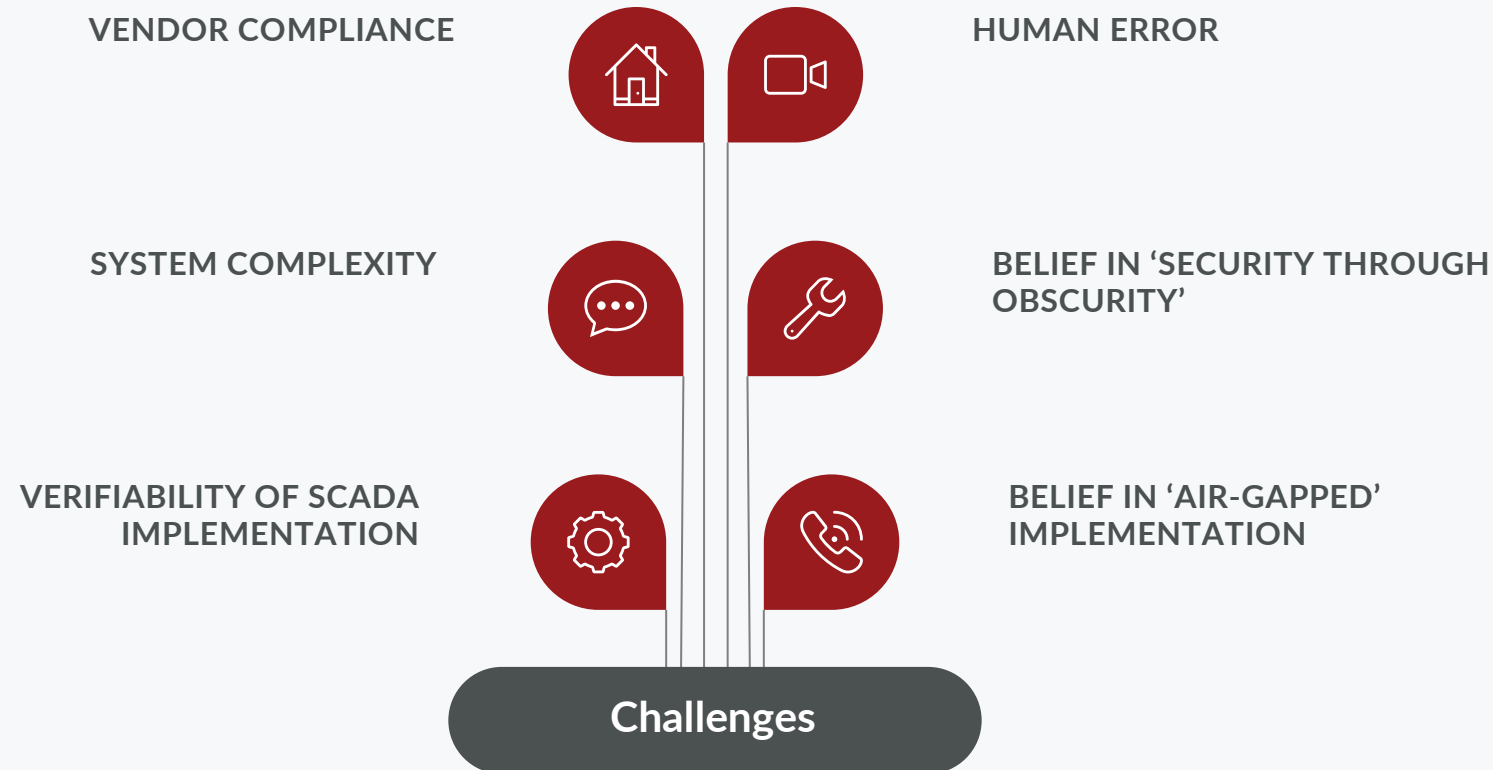
HISTORIAN

A software service within the HMI which accumulates time-stamped data, events, and alarms in a database which can be queried or used to populate graphic trends in the HMI.

RM FOR SCADA



SCADA SECURITY CHALLENGES



MAROOCHY **ATTACK**

- Ex-employee for company Hunter Watertech hijacked the SCADA system for Maroochy Shire in Queensland, Australia and caused the system to dump over 800,000 liters of sewage into local parks and rivers.
- Utilized stolen devices from Hunter Watertech and issued radio commands throughout the area on at least 46 occasions from February 28, 2000 to April 23, 2000

REFERENCES

- <https://www.industrialcybersecuritypulse.com/facilities/throwback-attack-an-insider-releases-265000-gallons-of-sewage-on-the-maroochy-shire/>
- https://www.researchgate.net/publication/221654716_Lessons_Learned_from_the_Maroochy_Water_Breach
- https://en.wikipedia.org/wiki/SCADA#cite_note-SlayMiller-29
- <https://www.sciencedirect.com/science/article/pii/S1389128620312883>



QUESTIONS

THANK YOU & FIGHT ON!



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