Containerization and Orchestration of Software for Autonomous Mobile Robots and its verification environment on Edge-Cloud architectures

Francesco Lumpp
Samuele Germiniani
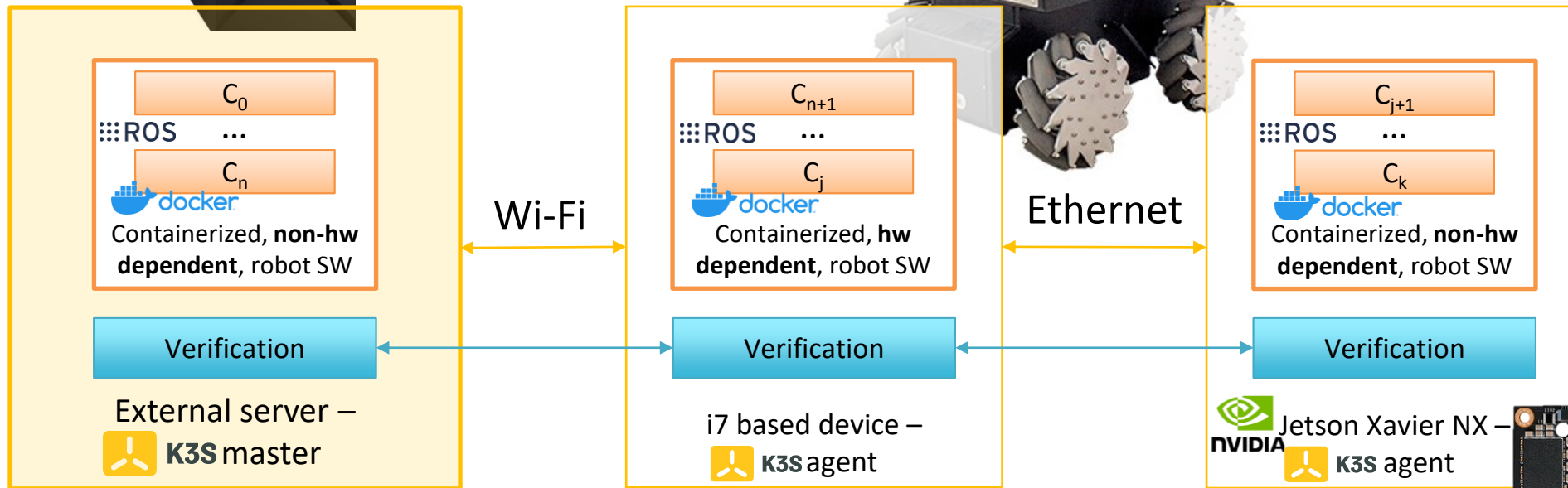Graziano Pravadelli
Nicola Bombieri
Franco Fummi

Kairos k3s architecture

Robotnik
RB-Kairos

The software is completely containerized and distributed across a cloud-edge architecture

Assertion based verification verifies that the robot's behavior is within operational safety constraints

| C_0 |
| ROS ... |
| C_n |

docker
Containerized, **non-hw dependent**, robot SW

Verification

External server – K3S master

kubernetes

Wi-Fi

| C_{n+1} |
| ROS ... |
| C_j |

docker
Containerized, **hw dependent**, robot SW

Verification

i7 based device – K3S agent

Ethernet

| C_{j+1} |
| ROS ... |
| C_k |

docker
Containerized, **non-hw dependent**, robot SW

Verification

nvidia Jetson Xavier NX – K3S agent

Everything is under control

The entire architecture is monitored from a single web-based dashboard, accessible from any device

Thank you for the attention

You can check out the ICE demo running on the Kairos, as well as other technologies, in the ICE laboratory

Francesco Lumpp
Samuele Germiniani
Graziano Pravadelli
Nicola Bombieri
Franco Fummi