Cognitive edge-cloud with serverless computing

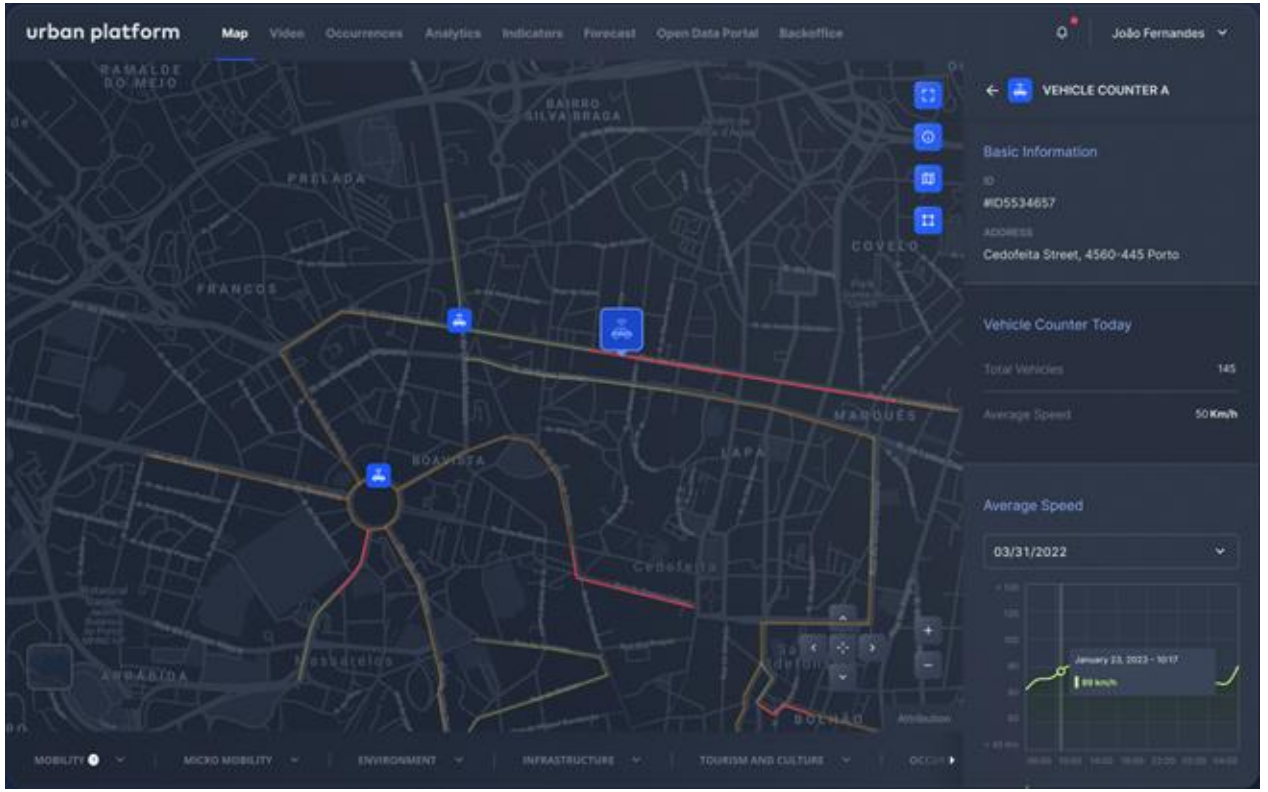
Smart City Analytics Use Case

HiPEAC 26

This project has received funding from the European Union's Horizon Europe research and innovation programme under the Grant Agreement No 101092950.

Ubiwhere

Founded in 2007, Ubiwhere is focused on Research, Development and Innovation of software-based solutions in the areas of Smart Cities, Telecom and Future Internet.



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Use Case

The use case consists of a complete computer vision surveillance serverless application leveraging EDGELESS's orchestration and flexibility capabilities.

The use case was built and developed on Ubiwhere's infrastructure that has available Edge Nodes and Cloud Infrastructure.

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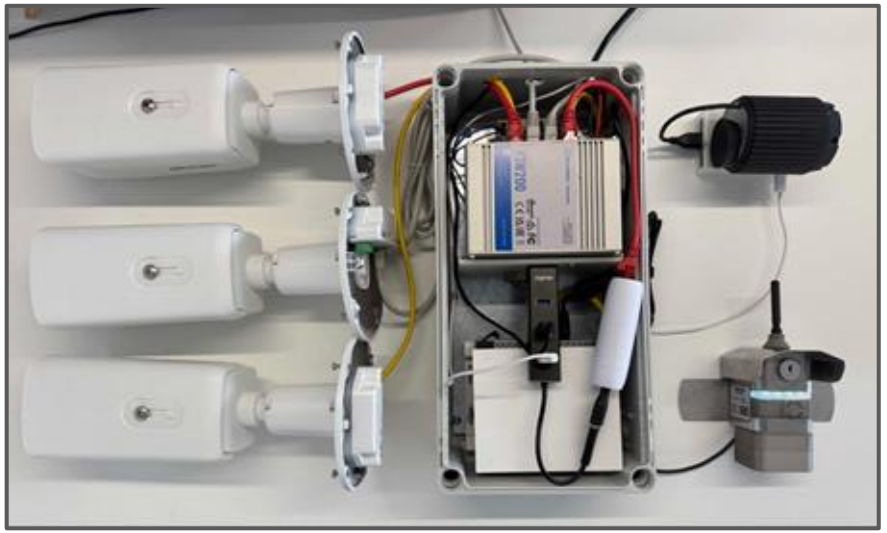
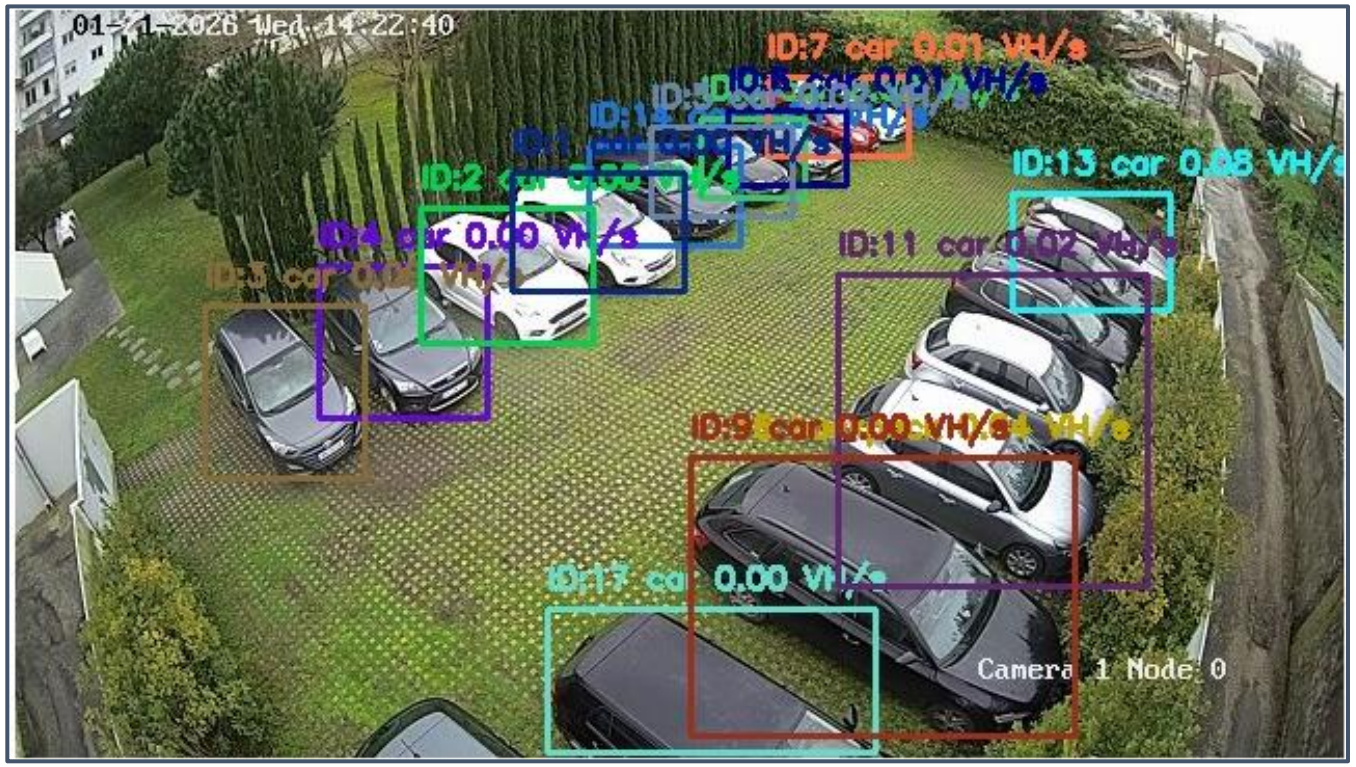
Use Case Infrastructure

- Smart Lamp Posts
- Cameras
- Edge Nodes
- Sensors
- Datacenter





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Use Case Goals

The derived end user goals for the UC are the following:

- Automatic alert authorities for dangerous situations, such as vehicle collisions.
- Decrease the response time for first responders (potentially saving lives).
- Maintain data privacy and sovereignty by limiting the amount of sensitive information exposed across the computing continuum (edge to cloud).
- High availability and resiliency of the Automatic Surveillance service.

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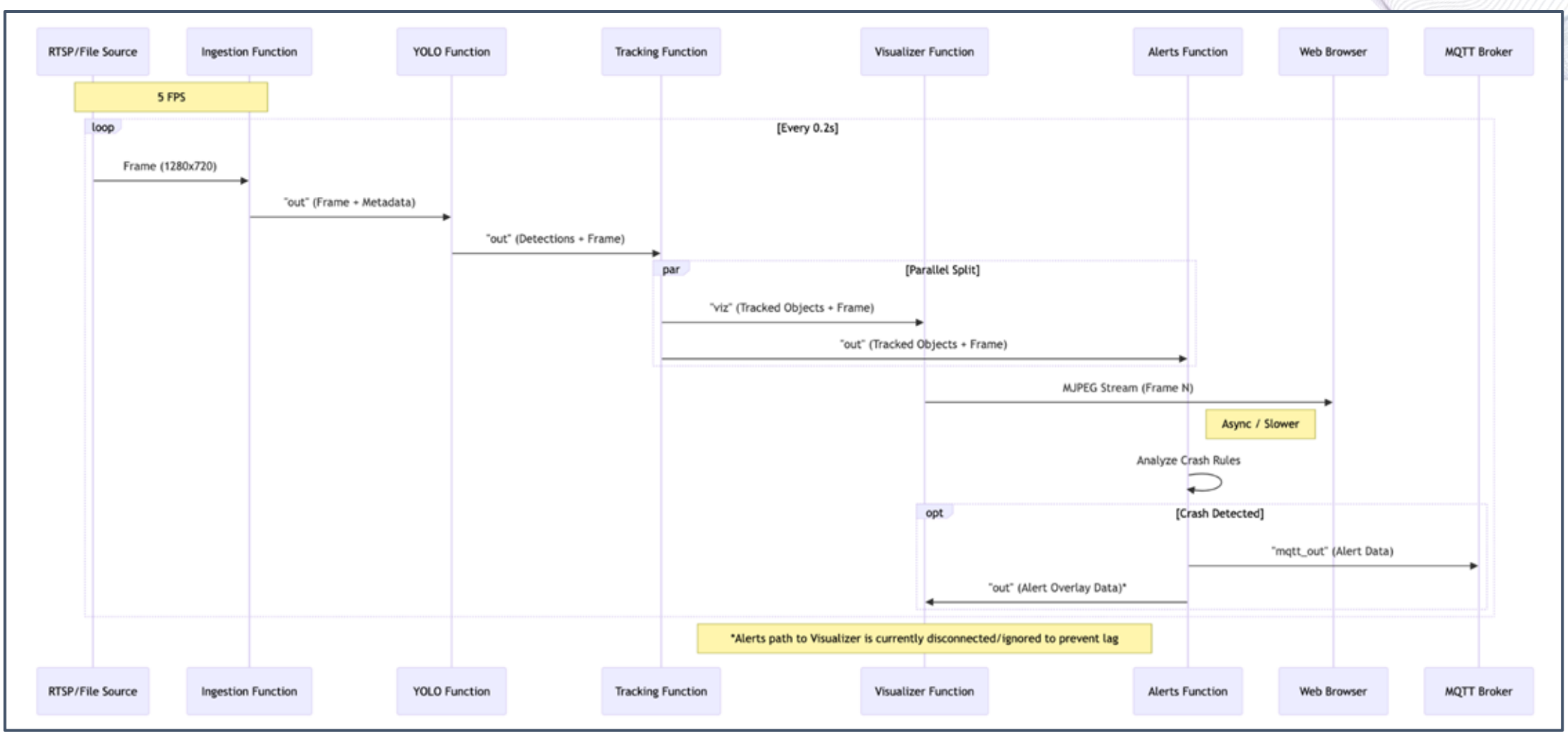
Use Case Workflow



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Results

- CV supports multiple hardware types (Edge to Cloud)
- High availability by moving the workload (Edge to Edge or Cloud)
- CV is able to detect car crashes in real time
- Sends alerts when hazardous events occur
- Provides data and function forwarding mechanisms that assure no data is lost

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docker

```
[yolo_edgeless] INFO: Frame 872: 21 detections, 0.273s
[yolo_edgeless] INFO: Frame 873: 18 detections, 0.236s
[yolo_edgeless] INFO: Frame 874: 19 detections, 0.330s
[yolo_edgeless] INFO: Frame 875: 21 detections, 0.274s
[yolo_edgeless] INFO: Frame 876: 21 detections, 0.232s
[yolo_edgeless] INFO: Frame 877: 7 detections, 0.222s
[yolo_edgeless] INFO: Frame 878: 4 detections, 0.230s
[yolo_edgeless] INFO: Frame 879: 3 detections, 0.276s
[yolo_edgeless] INFO: Frame 880: 2 detections, 0.234s
[yolo_edgeless] INFO: Frame 881: 4 detections, 0.225s
[yolo_edgeless] INFO: Frame 882: 8 detections, 0.251s
[yolo_edgeless] INFO: Frame 883: 10 detections, 0.236s
[yolo_edgeless] INFO: Frame 884: 8 detections, 0.224s
[yolo_edgeless] INFO: Frame 885: 10 detections, 0.222s
[yolo_edgeless] INFO: Frame 886: 7 detections, 0.233s
[yolo_edgeless] INFO: Frame 887: 7 detections, 0.278s
[yolo_edgeless] INFO: Frame 888: 6 detections, 0.256s
[yolo_edgeless] INFO: Frame 889: 5 detections, 0.234s
[yolo_edgeless] INFO: Frame 890: 4 detections, 0.250s
[yolo_edgeless] INFO: Frame 891: 4 detections, 0.240s
[yolo_edgeless] INFO: Frame 892: 3 detections, 0.305s
```

docker

```
[alert_edgeless] WARNING: CRASH ENGINE: WALL_IMPACT (severe): Decel: -15.7
[alert_edgeless] INFO: Frame 707: 1 alerts
[alert_edgeless] WARNING: CRASH ENGINE: COLLISION (severe): Verified History
[alert_edgeless] WARNING: ALERT: Person detected (conf: 0.77)
[alert_edgeless] INFO: Frame 708: 2 alerts
[alert_edgeless] WARNING: CRASH ENGINE: ROLLOVER (moderate): Orientation Change
[alert_edgeless] INFO: Frame 728: 1 alerts
[alert_edgeless] WARNING: ALERT: Person detected (conf: 0.81)
[alert_edgeless] INFO: Frame 755: 1 alerts
[alert_edgeless] WARNING: CRASH ENGINE: ROLLOVER (moderate): Orientation Change
[alert_edgeless] INFO: Frame 771: 1 alerts
[alert_edgeless] WARNING: CRASH ENGINE: ROLLOVER (moderate): Orientation Change
[alert_edgeless] INFO: Frame 786: 1 alerts
[alert_edgeless] WARNING: ALERT: Person detected (conf: 0.55)
[alert_edgeless] INFO: Frame 787: 1 alerts
[alert_edgeless] WARNING: CRASH ENGINE: ROLLOVER (moderate): Orientation Change
[alert_edgeless] INFO: Frame 801: 1 alerts
[alert_edgeless] WARNING: CRASH ENGINE: WALL_IMPACT (moderate): Decel: -9.1
[alert_edgeless] INFO: Frame 810: 1 alerts
[alert_edgeless] WARNING: CRASH ENGINE: ROLLOVER (moderate): Orientation Change
[alert_edgeless] INFO: Frame 844: 1 alerts
```

docker

```
[tracking_edgeless] INFO: Frame 864: 5 tracked, 2 new, 0.010s
[tracking_edgeless] INFO: Frame 865: 11 tracked, 3 new, 0.016s
[tracking_edgeless] INFO: Frame 866: 11 tracked, 1 new, 0.013s
[tracking_edgeless] INFO: Frame 867: 9 tracked, 1 new, 0.030s
[tracking_edgeless] INFO: Frame 868: 11 tracked, 4 new, 0.012s
[tracking_edgeless] INFO: Frame 869: 14 tracked, 5 new, 0.015s
[tracking_edgeless] INFO: Frame 870: 15 tracked, 3 new, 0.016s
[tracking_edgeless] INFO: Frame 871: 13 tracked, 2 new, 0.012s
[tracking_edgeless] INFO: Frame 872: 15 tracked, 3 new, 0.013s
[tracking_edgeless] INFO: Frame 873: 13 tracked, 1 new, 0.013s
[tracking_edgeless] INFO: Frame 875: 16 tracked, 1 new, 0.013s
[tracking_edgeless] INFO: Frame 876: 16 tracked, 3 new, 0.013s
[tracking_edgeless] INFO: Frame 881: 1 tracked, 1 new, 0.013s
[tracking_edgeless] INFO: Frame 882: 5 tracked, 1 new, 0.011s
[tracking_edgeless] INFO: Frame 883: 4 tracked, 1 new, 0.011s
[tracking_edgeless] INFO: Frame 884: 4 tracked, 1 new, 0.011s
[tracking_edgeless] INFO: Frame 885: 6 tracked, 1 new, 0.012s
[tracking_edgeless] INFO: Frame 886: 4 tracked, 1 new, 0.011s
[tracking_edgeless] INFO: Frame 887: 7 tracked, 4 new, 0.013s
[tracking_edgeless] INFO: Frame 890: 2 tracked, 1 new, 0.011s
[tracking_edgeless] INFO: Frame 891: 3 tracked, 2 new, 0.010s
[tracking_edgeless] INFO: Frame 892: 2 tracked, 0 new, 0.010s
```

localhost:55267

localhost:55267

Work

Relaunch to update

CONSORTIUM

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