

The background is a light gray map of Aveiro, Portugal, showing the city's grid and the Douro River. A red location pin is placed on the map, corresponding to the 'Aveiro' text in the title.

Aveiro Tech City Living Lab

AI-Powered Platform for Smart City Issue Detection & Resolution

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03.06.2025

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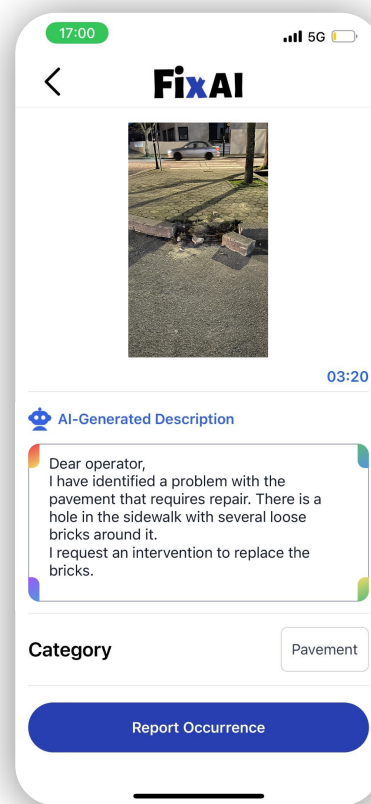
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Setup & Proof of Concept

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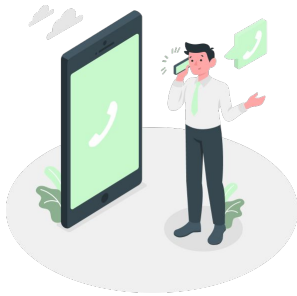
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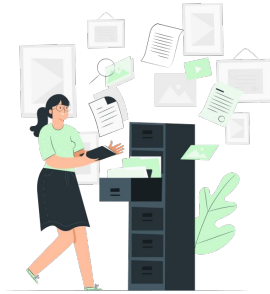


Contextualization

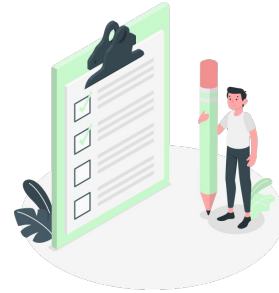
Problems



Manual Reporting



Unstructured Management



No Real-Time Validation

Contextualization

State of the Art



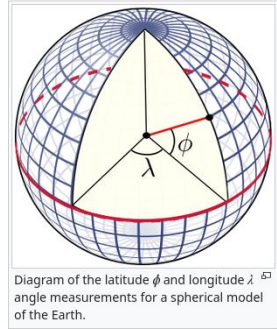
ReportaPorto

Contextualization



ReportaPorto

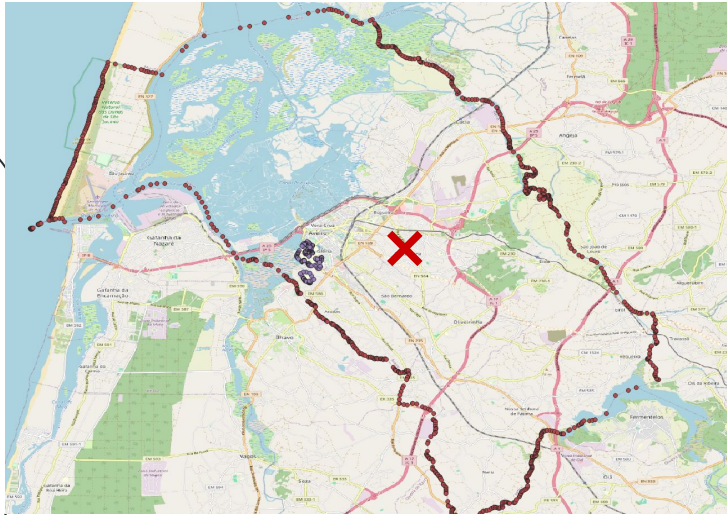
Geospatial Problem



How to store real-world jurisdictions?

Aveiro: **939 points**

Universidade de Aveiro: **169 points**



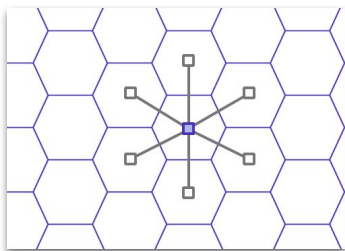
Irregular Polygon Regions

Subdivision

Distortion

Neighborhood Traversal

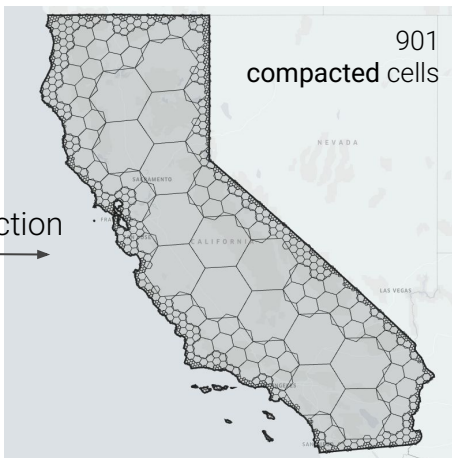
H3 - Index Solution



(lat, lon) → H3 cell



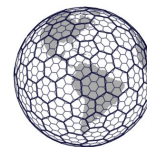
Compaction →



Average area in m²

Here are the same areas, but in m².

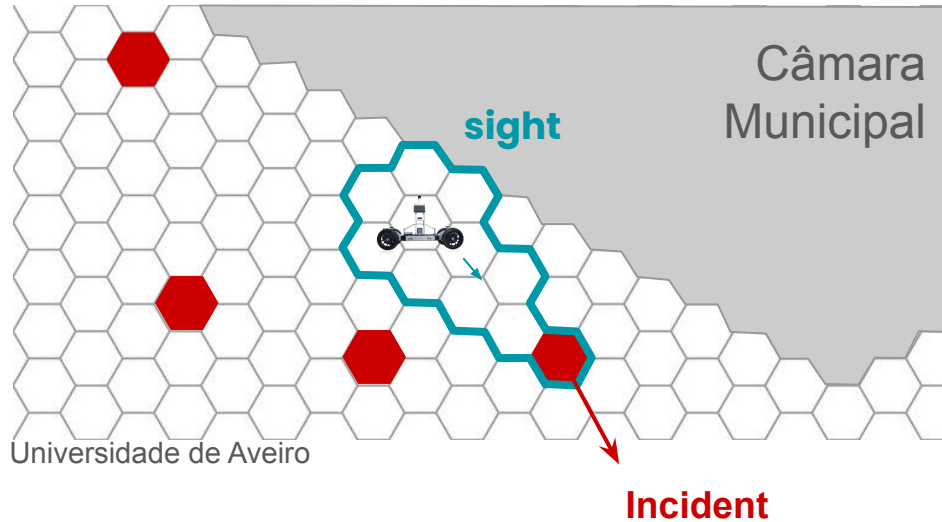
Res	Average <u>Hexagon</u> Area (m ²)	Pentagon Area* (m ²)
0	4,357,449,416,078.392	2,562,182,162,955.496
1	609,788,441,794.134	328,434,586,246.469
2	86,801,780,398.997	44,930,898,497.879
3	12,393,434,655.088	6,315,472,267.516
4	1,770,347,654.491	896,582,383.141
5	252,903,858.182	127,785,583.023
6	36,129,062.164	18,238,749.548
7	5,161,293.360	2,604,669.397
8	737,327.598	372,048.038
9	105,332.513	53,147.195
10	15,047.502	7,592.318
11	2,149.643	1,084.609
12	307.092	154.944
13	43.870	22.135



Uber

H3 – Index Solution

Overlapping jurisdictions through hierarchical indexing

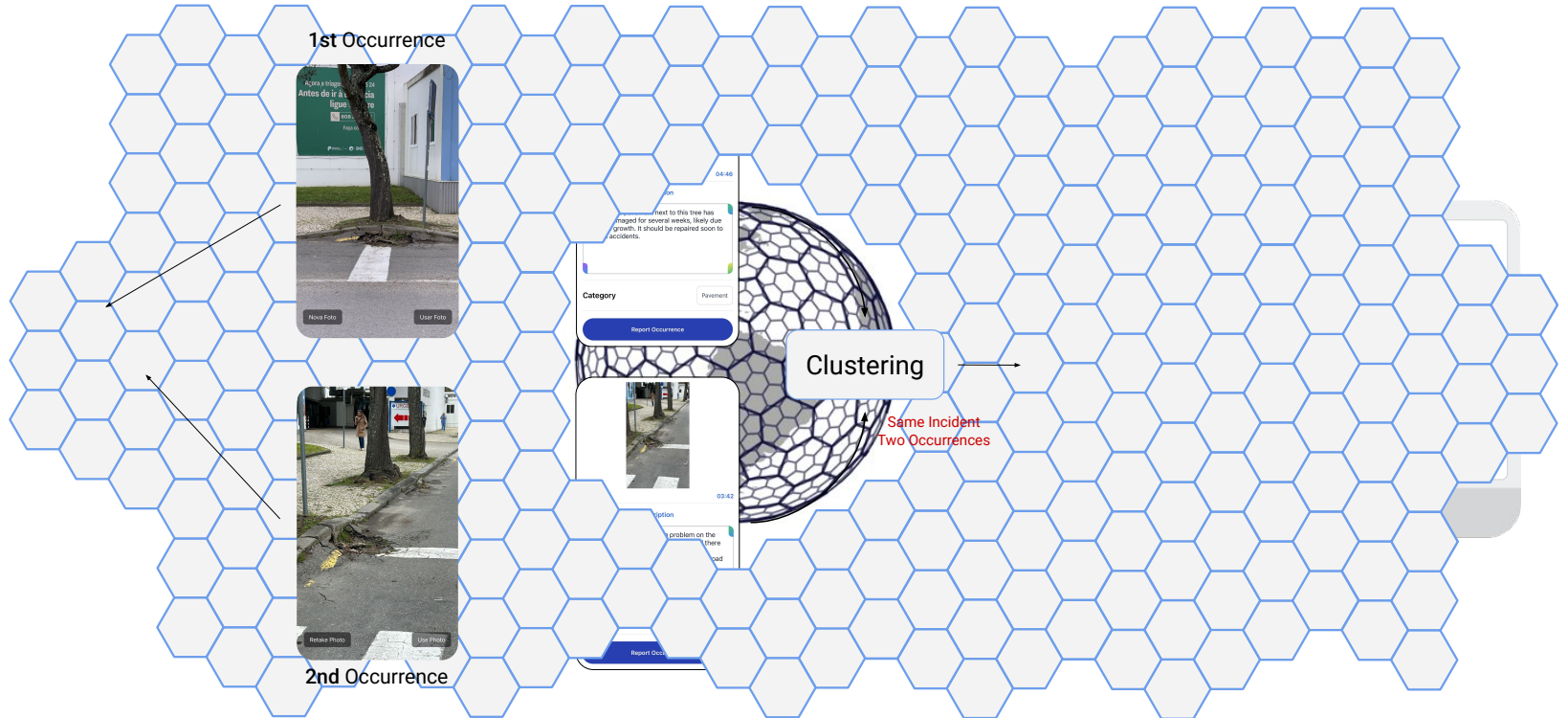


Solution:

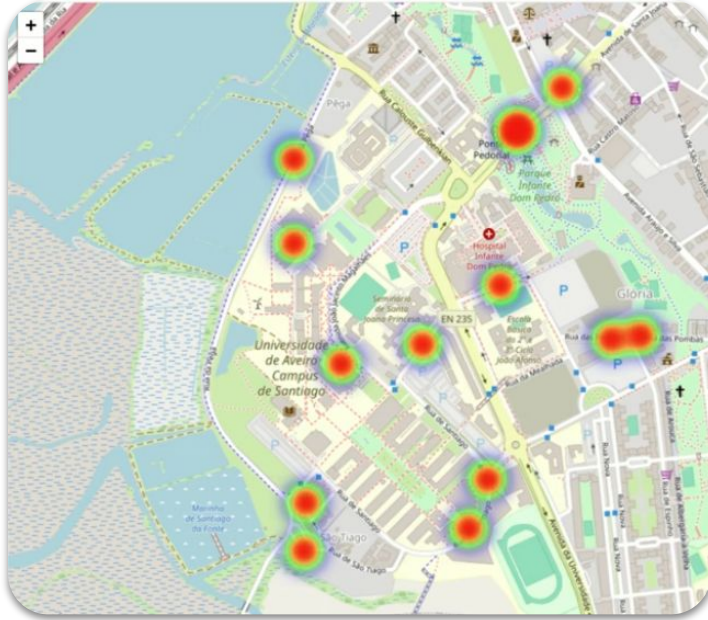
key: h-index

value: (organization, incident_id)

Report Occurrence

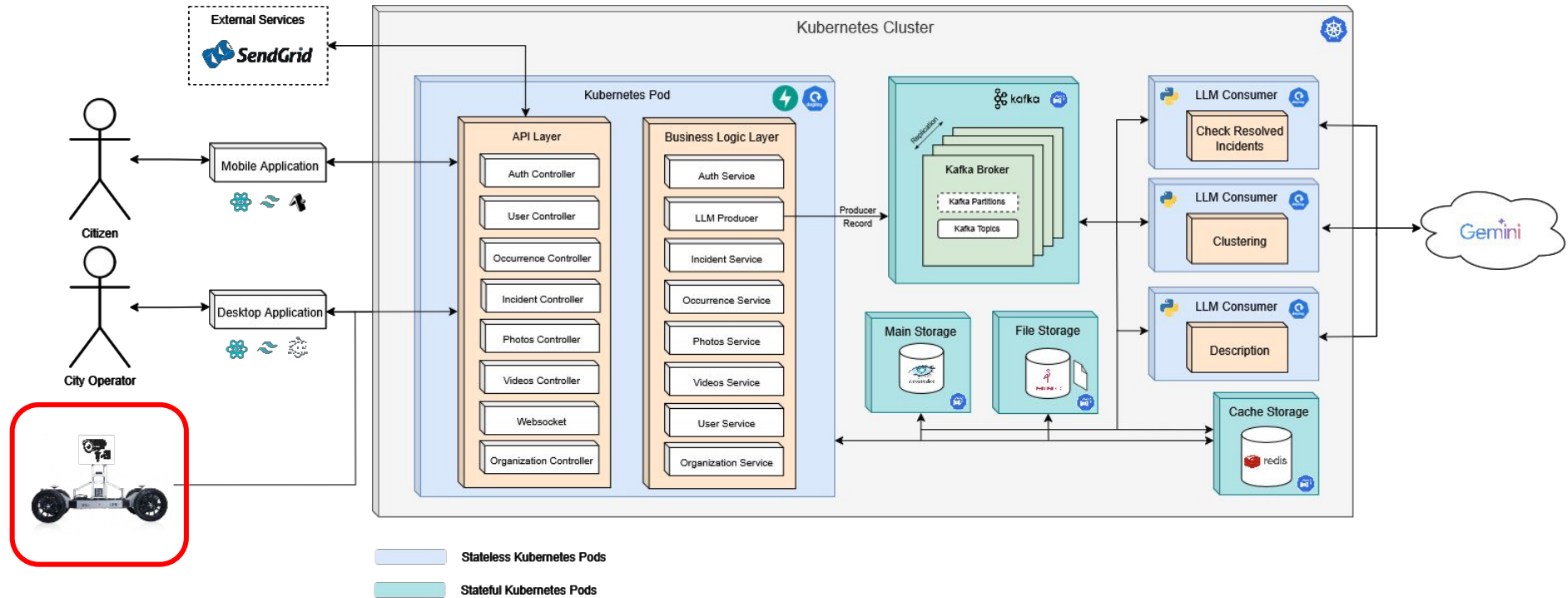


Extra Features



- Operator's Heatmap
- Support to Multiple Languages
- Session with Refresh Tokens
- CD Pipeline
- Secure Account Management
- Report Anywhere

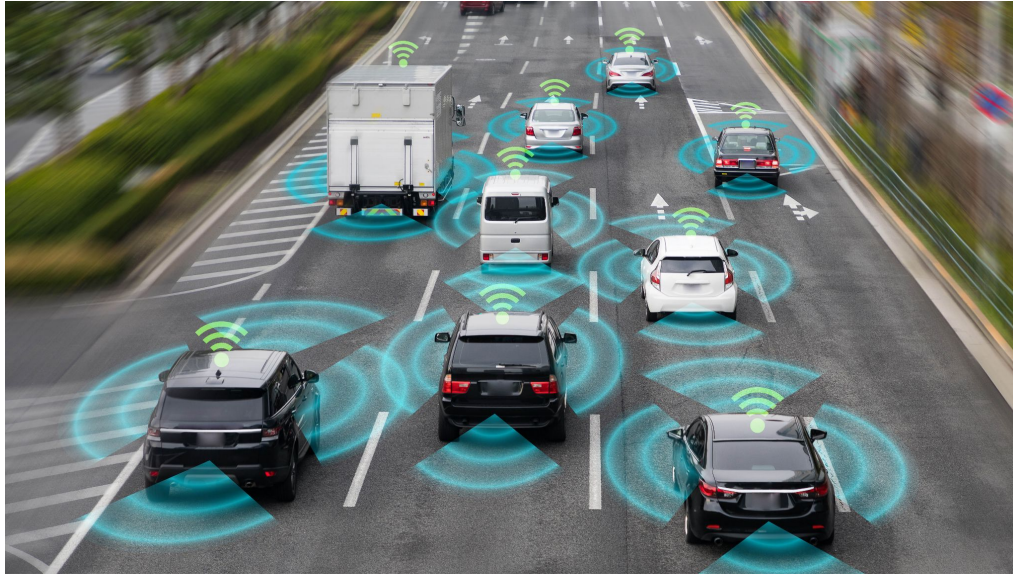
Architecture



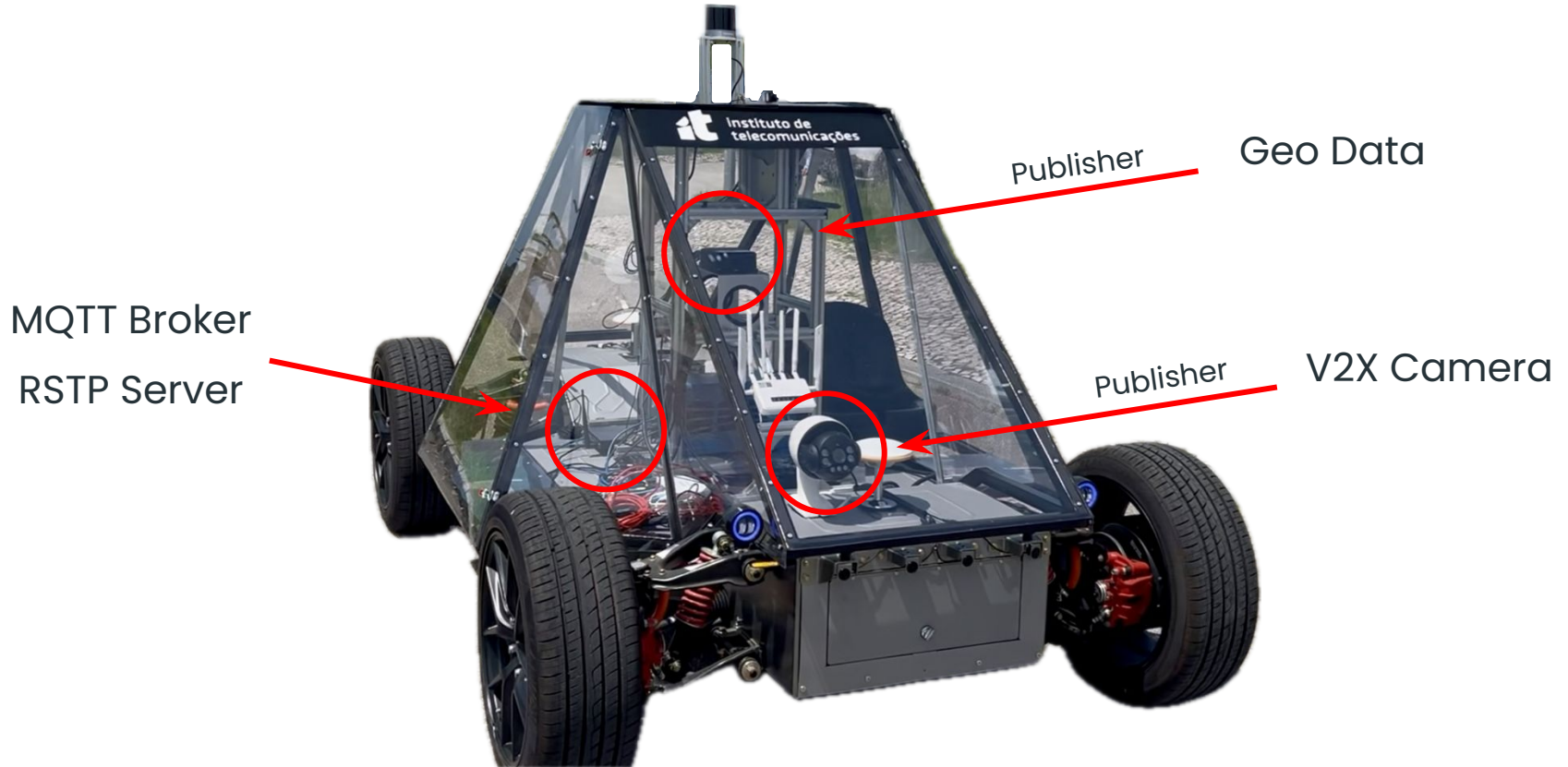
Smart Cities Integration



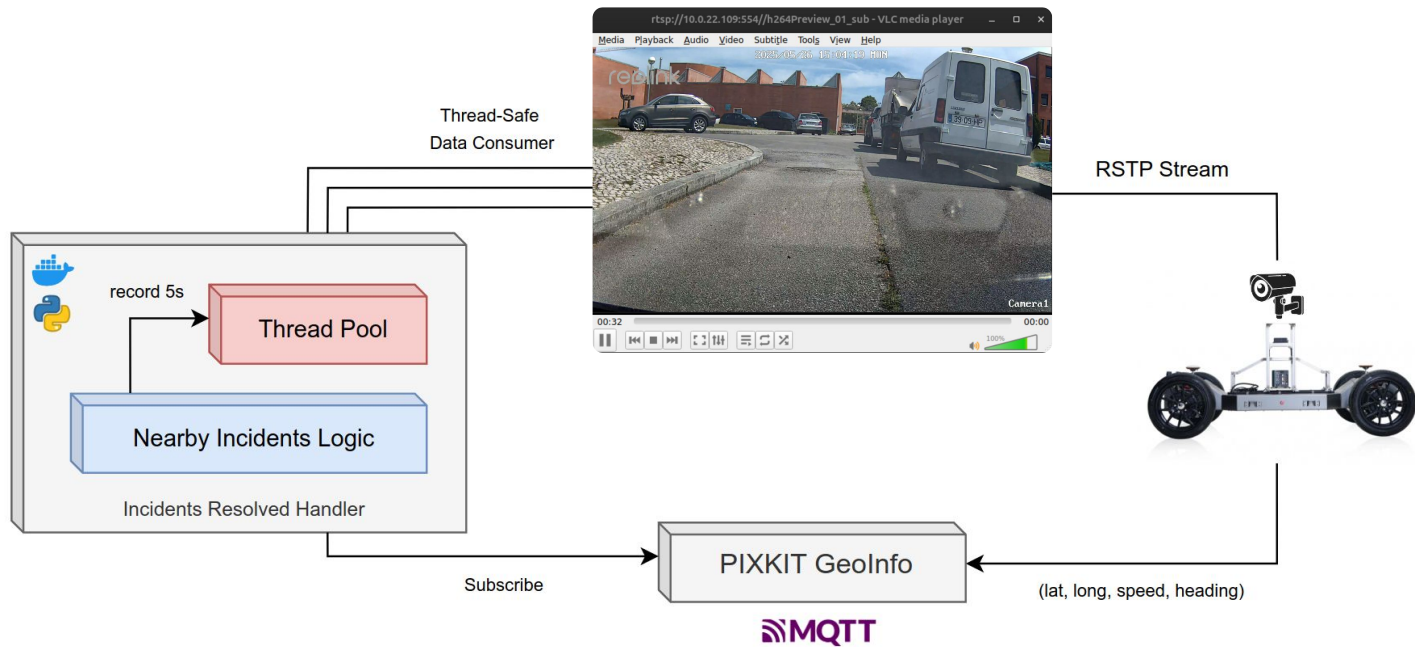
- **Autonomous Driving**



PIXKIT Setup

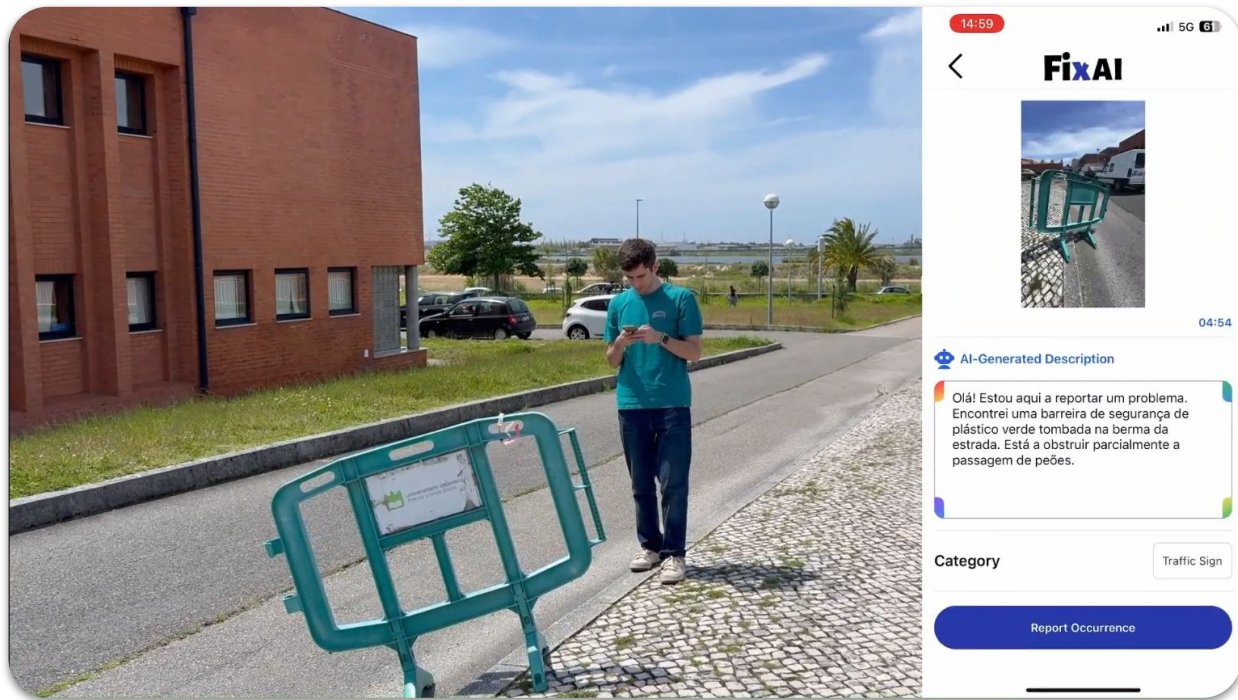


PIXKIT Diagram

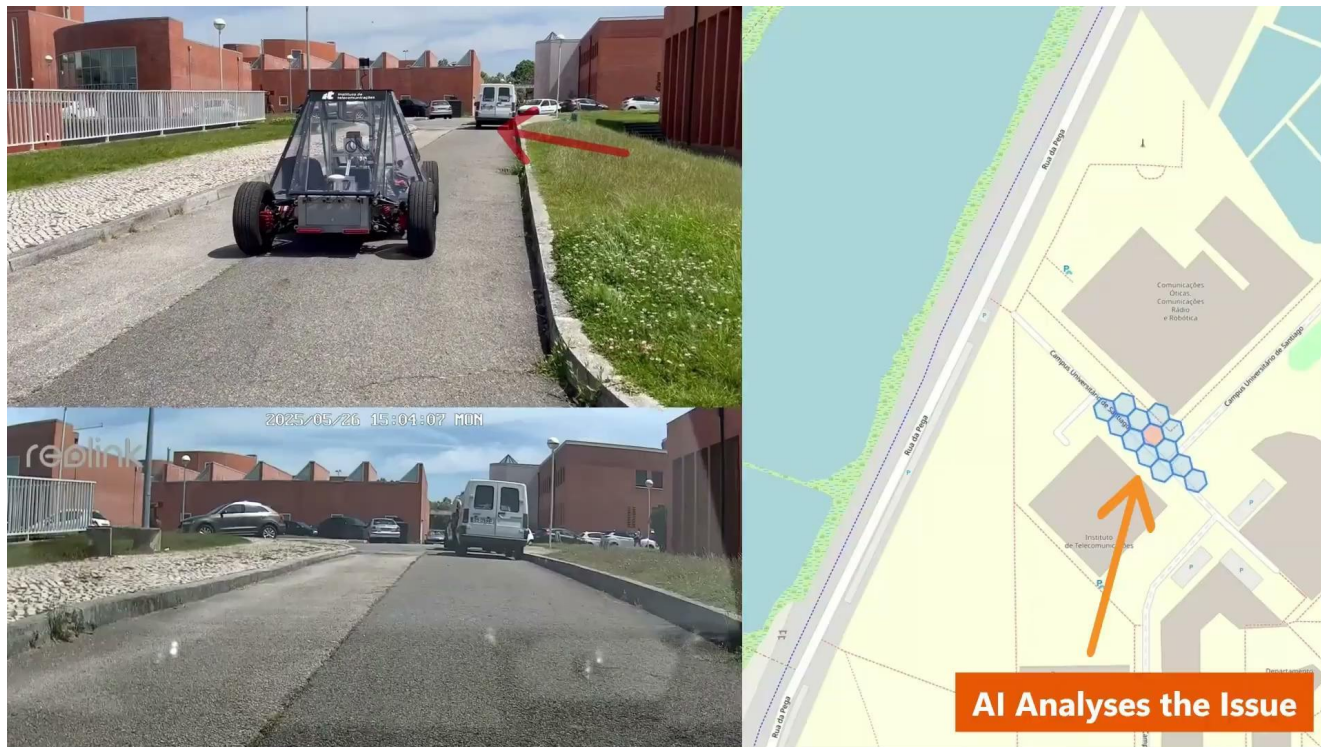


Proof Of Concept

Fast Report



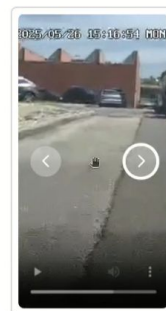
AI-Powered Resolution



Problem Solved Detected



Real Time Processment



Problem Already Solved Detected

Detected Time: 26 May 2025

Edge Data ID: 4a8a0016

Confirm Resolution

Conclusion

Lessons Learned





Questions?

📍 Aveiro Tech City Living Lab

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