



# Aveiro Tech City Living Lab

## **AI-Powered Platform for Smart City Issue Detection & Resolution**

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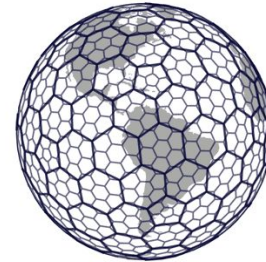
**Advisors**

Susana Sargento ◦ Pedro Rito ◦ Duarte Raposo

11.03.2025

# Index

- Urban challenges today
- How FixAI solves these challenges
- Problems found
- Implemented work
- Ongoing work



# Deadlines

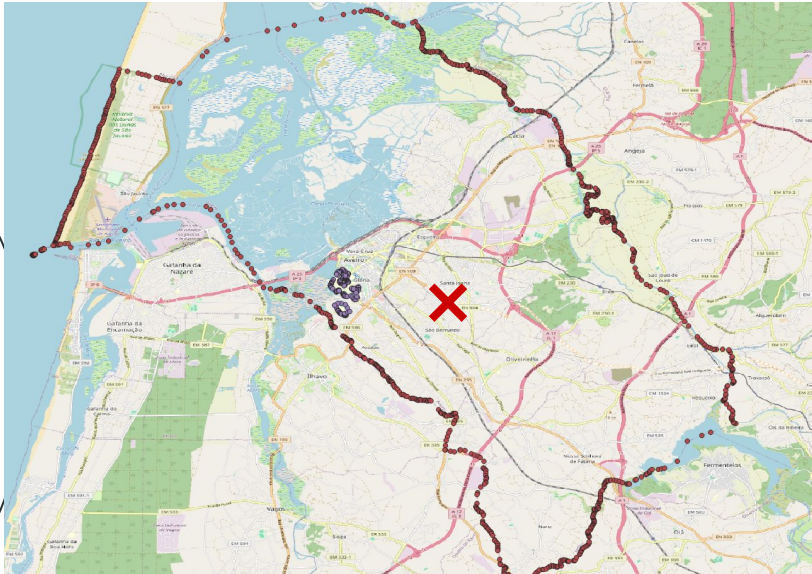
Week	Date	Description	State	Deadlines
1	11/02/2025	<b>M1</b> - Requirements, lifecycle objectives and calendar for the project		
2	18/02/2025	<b>M2</b> - Mockup, Start Architecture and beta application		
3	25/02/2025		Setup	Presentation
4	04/03/2025			
5	11/03/2025	<b>M3</b> - Upgrade of Architecture and full application/website		
6	18/03/2025			
7	25/03/2025			Checkpoint
8	01/04/2025	<b>M4</b> - AI-powered clustering, descriptions and classifications		
9	08/04/2025			Presentation/ Prototype
10	15/04/2025		Start AI	Presentation/ Prototype
11	22/04/2025	<b>M5</b> - ATCLL integration for detection and correction		
12	29/04/2025			
13	06/05/2025			Checkpoint
14	13/05/2025	<b>M6</b> - Stable working application, with monitoring.		
15	20/05/2025			Checkpoint
16	27/05/2025		Docs	Demo
17	03/06/2025	<b>M7</b> - Prepare final report and documentation		Final Presentation
16	27/05/2025			Poster Presentation

We are here!



# Problem Definition

- Region indexation

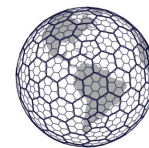


Aveiro: **939 points**

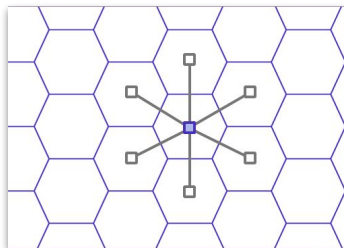
Universidade de Aveiro: **169 points**

**(40.630451, -8.6551867)** is inside which organization?

# H3-Index Solution



Uber

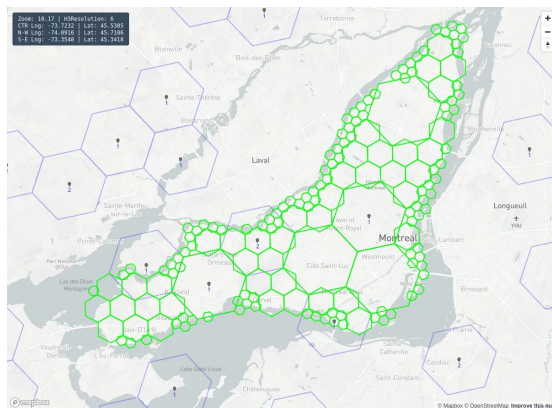


(lat, lon) → H3 cell

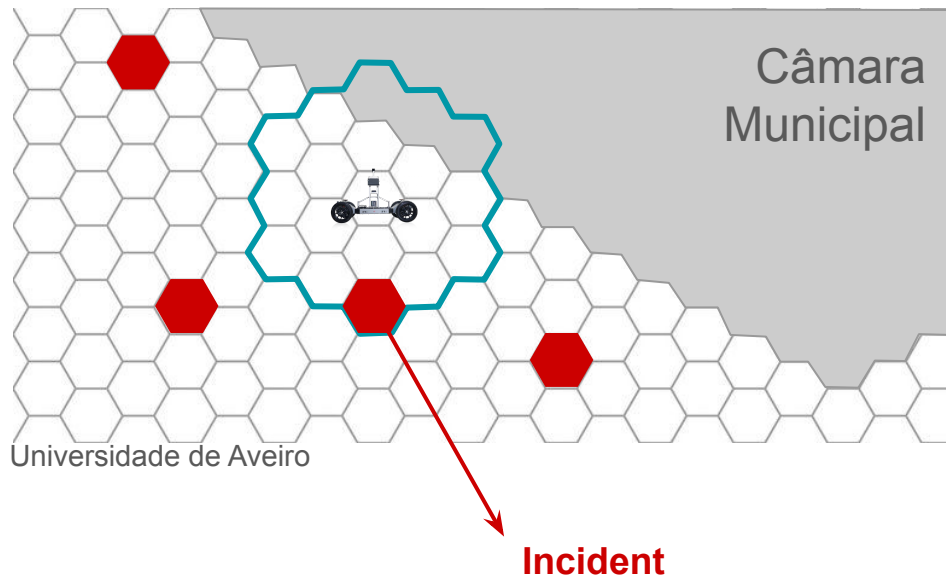
## Average area in m<sup>2</sup>

Here are the same areas, but in m<sup>2</sup>.

Res	Average <u>Hexagon</u> Area (m <sup>2</sup> )	Pentagon Area* (m <sup>2</sup> )
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



# H3-Index Solution



## Solution:

**key:** h-index

**value:** (organization, incident\_id)

## TODO:

- How to aggregate problems?
- How to scan problems with  $O(1)$ ?

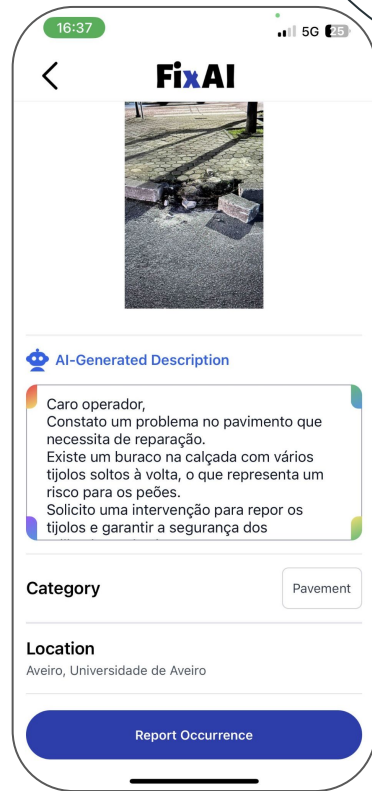
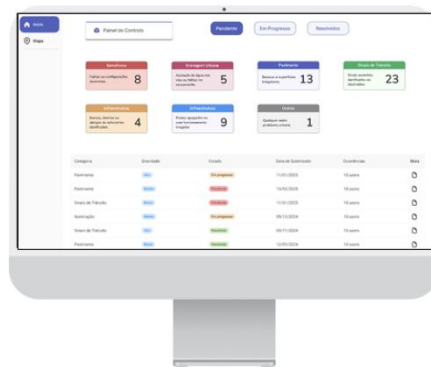


# Website & Mobile Application

- React Native & React JS
- Authentication with Bearer Tokens & Cookies
- Backend integration

## TODO:

- Android 100% compatibility
- Compile mobile application (.apk & .ipa)



# Website & Mobile Application

- FastAPI
- Tokens management
- H3-index integration
- Beta AI Generation with Gemini
- Stateless for Kubernetes
- Email Server with SendGrid

## TODO:

- Incidents aggregation with location
- Async Jobs (e.g., AI) with Kafka
- Anonymization

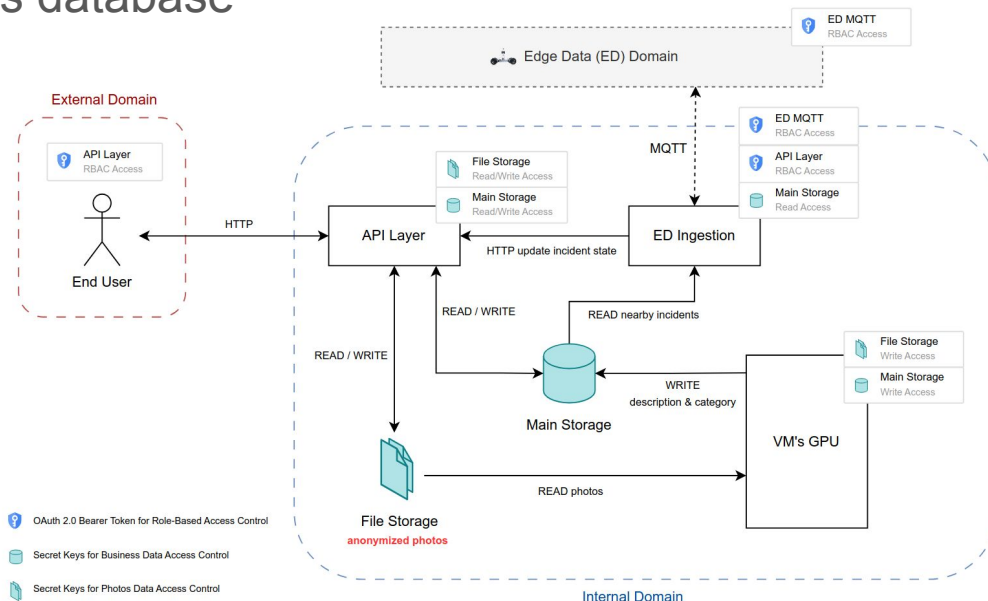


# Databases

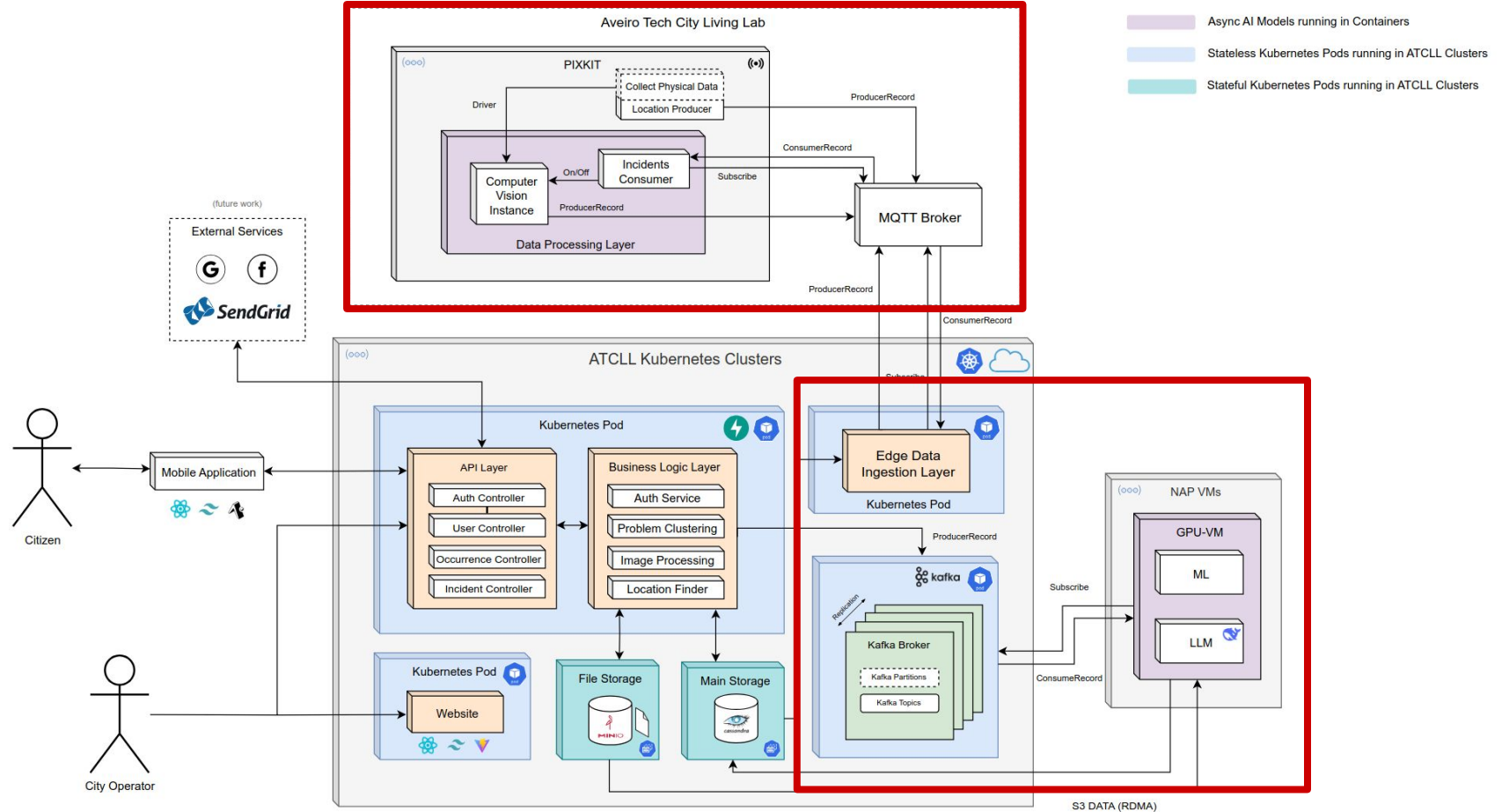
These are the only **stateful** services



- **Cassandra** for main database
- **MinIO** for photos database



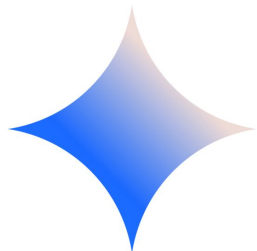
# To do:



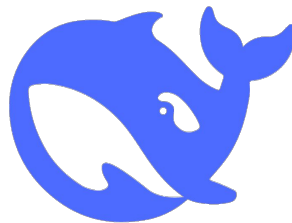
# AI Integration Solutions



**ChatGPT**



**Gemini**

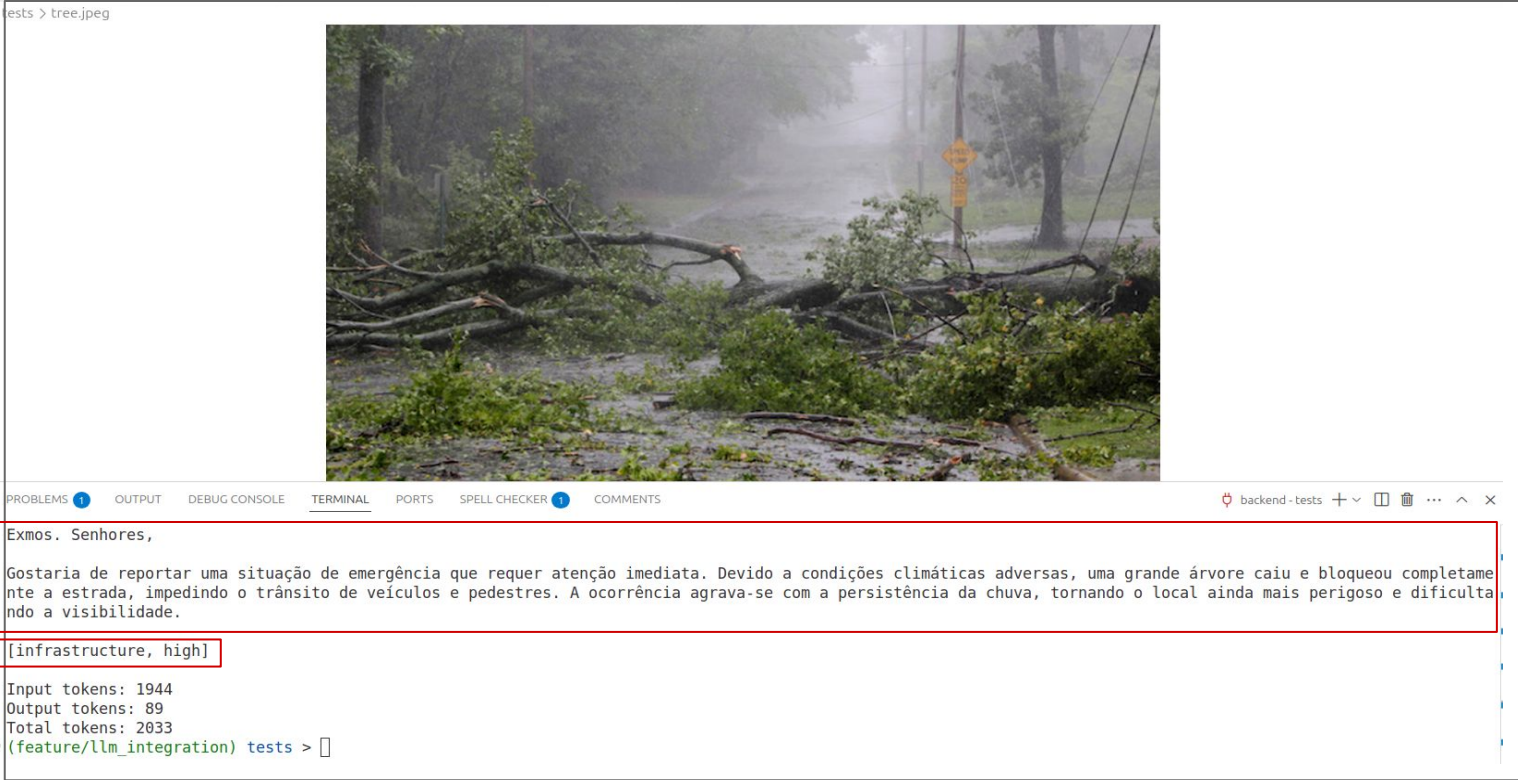


**deepseek**



**LLaVA**

Category  
+  
Severity





Questions?

📍 Aveiro Tech City Living Lab

# AI-Powered Platform for Smart City Issue Detection & Resolution



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