

# Wi-Fi-based buildings occupancy detection, estimation, and location

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cyber-physical  
systems

## Introduction

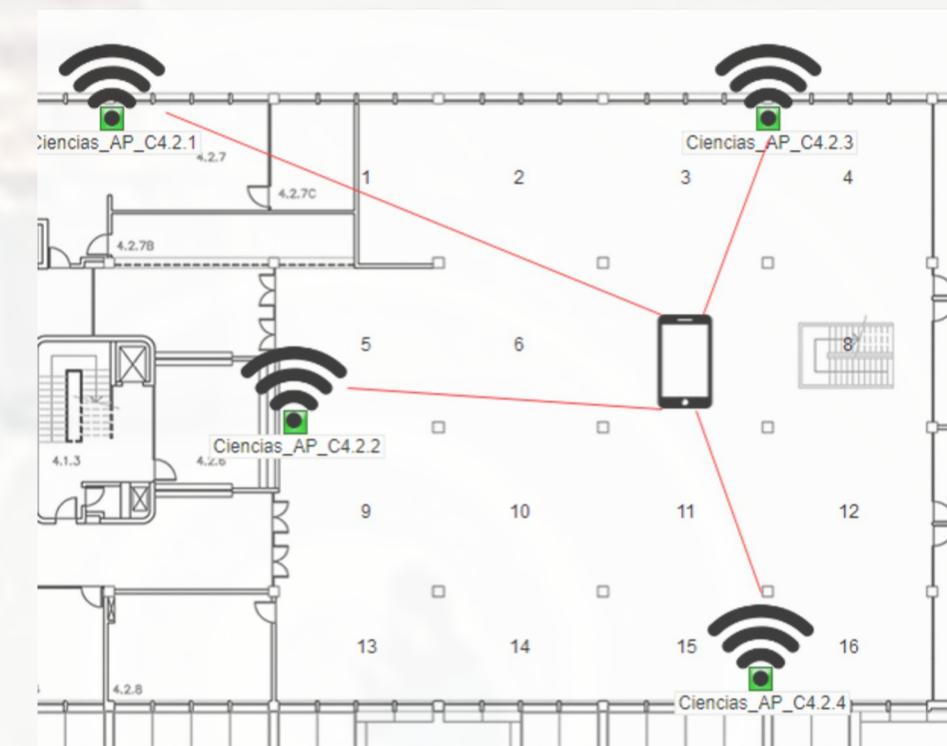
Obtaining the occupation of a building and localization of the people inside is one of the most problematic and essential parts of the creation of Smart Buildings.

## Problem

Previous solutions usually depend on applying ML models, but this can only be done over static networks.

The training dataset cannot be transferred between different deployments.

The base problem hinges on the fact that an easier system deployment could be achieved if we didn't depend on the static nature of the network, which prevents us from reusing models between deployments.



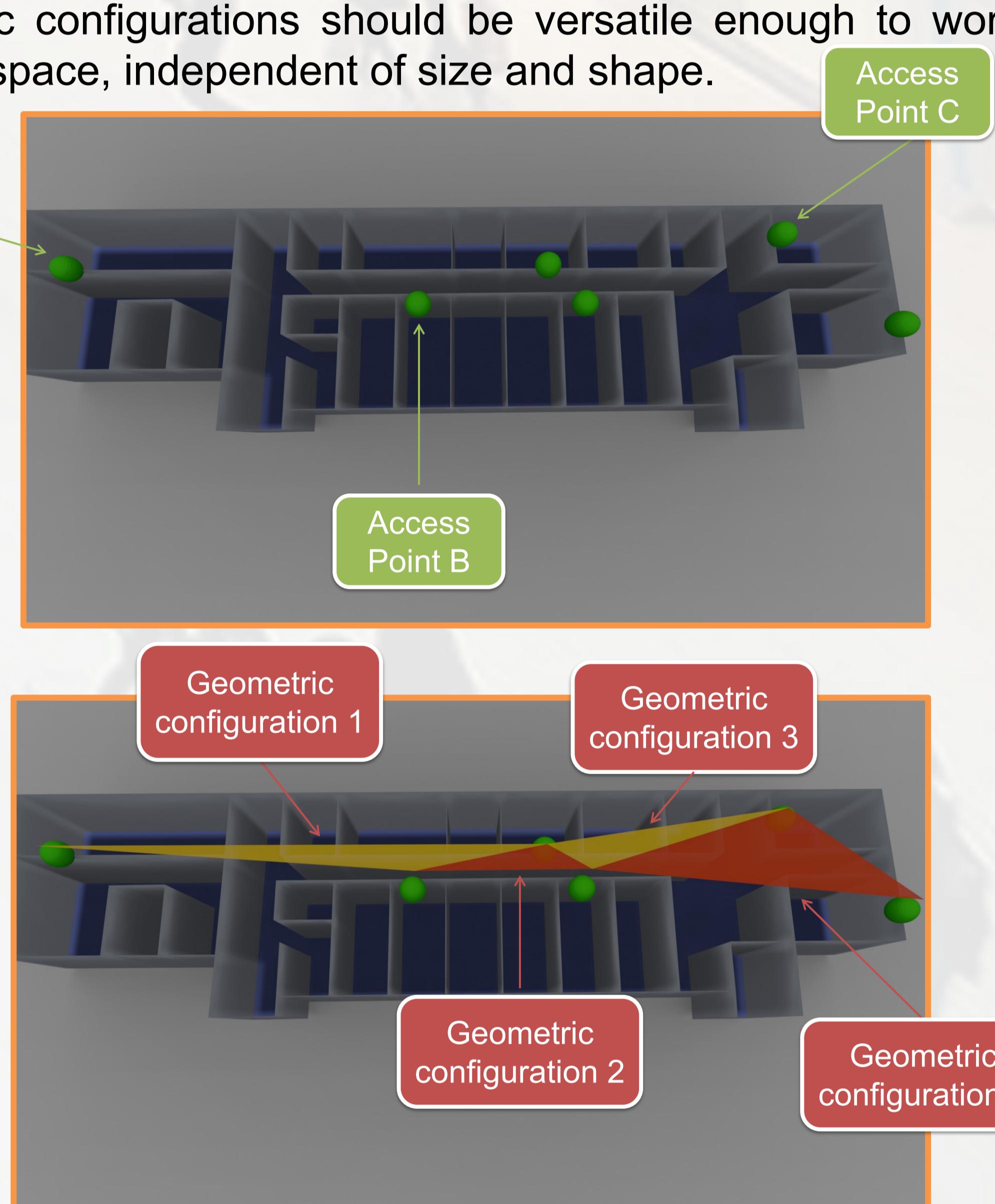
## Goal

Design a system adaptable to networks of different shapes and sizes so that deploying the network doesn't require an intermediate step of re-training the required ML models.

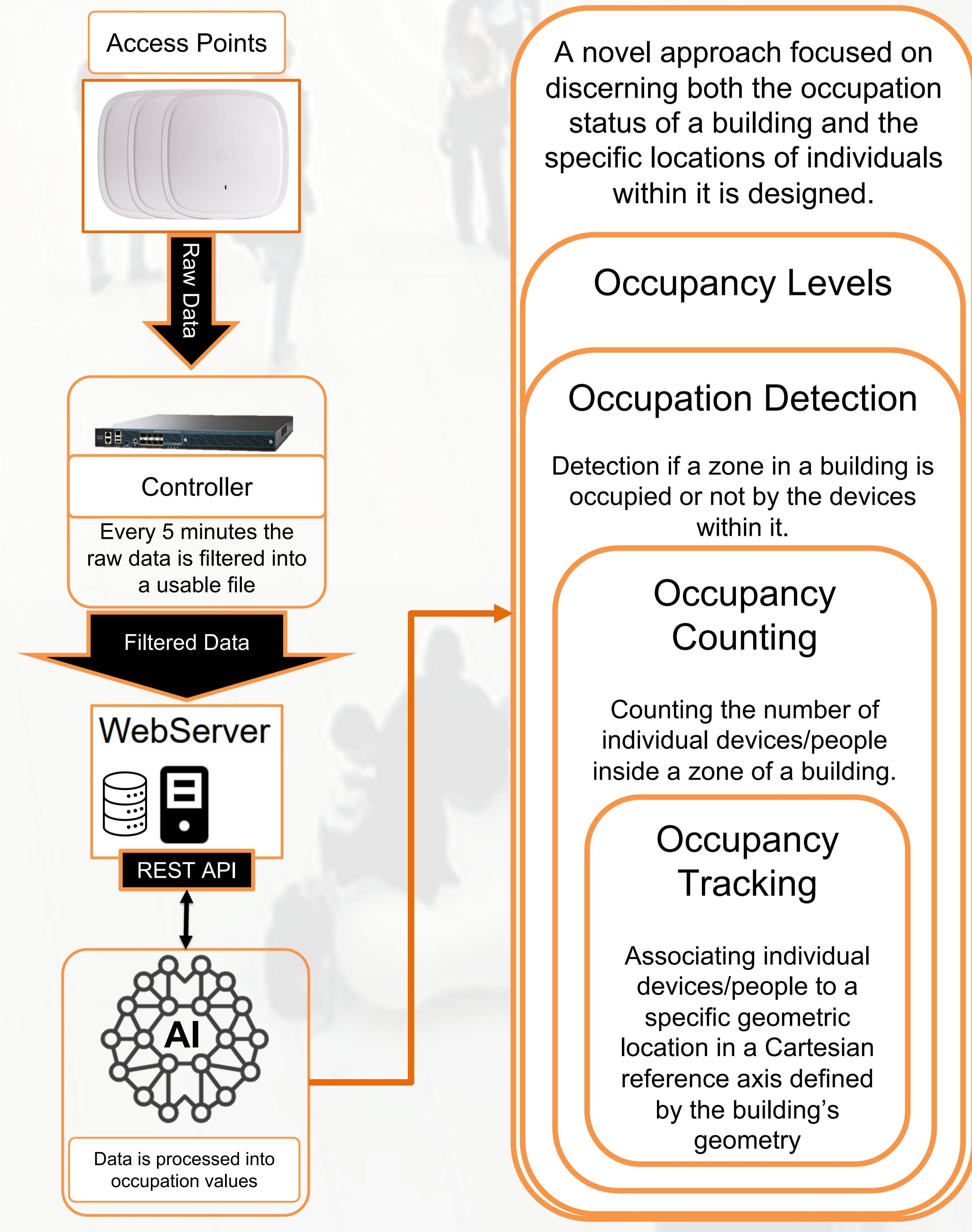
## Space Mapping

Geometric configurations whose vertices are the positions of the Access Points (APs) within the building should be used, and the people should be tracked within a cartesian frame comprised of the APs.

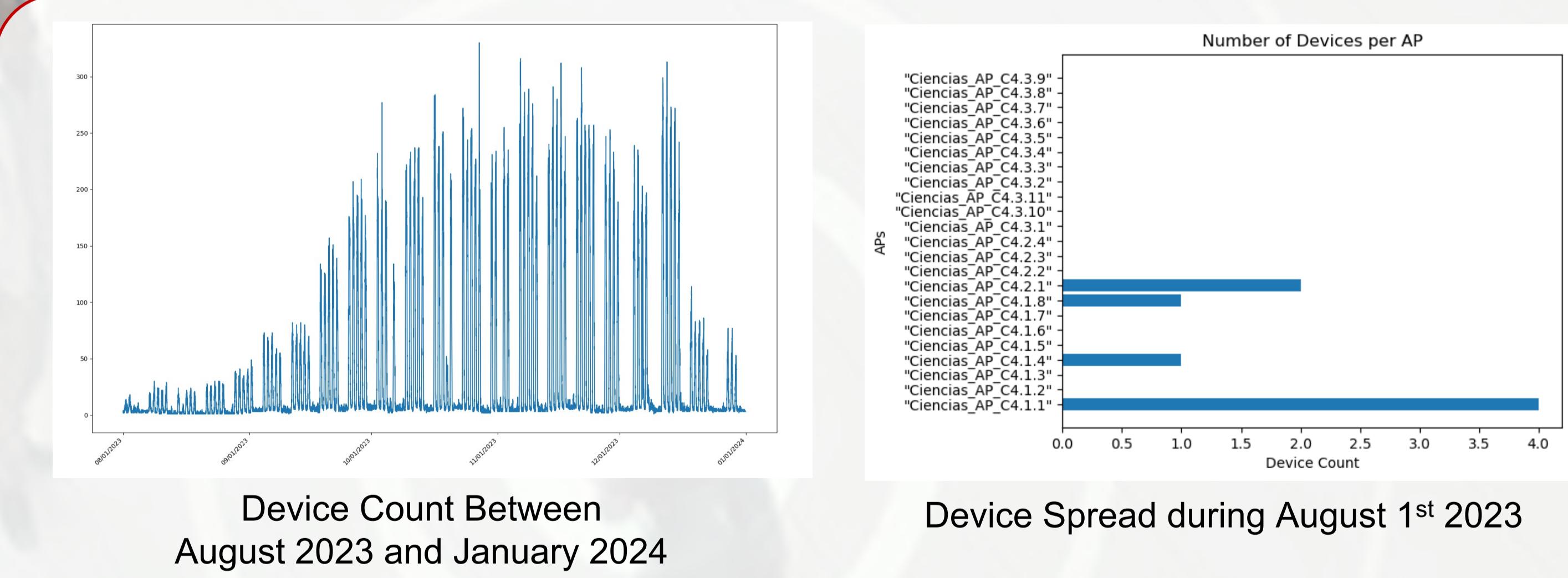
Geometric configurations should be versatile enough to work with any possible space, independent of size and shape.



## System Architecture



## Preliminary Results



## Conclusions

A novel approach is proposed for indoor location within its specific geometric shape. These models' advantage is that they can be reused between deployments, removing the fingerprinting step.

The findings will empower building managers to optimize resources, fostering improved efficiency within the building environment.