WiFi Based Indoor Positioning System

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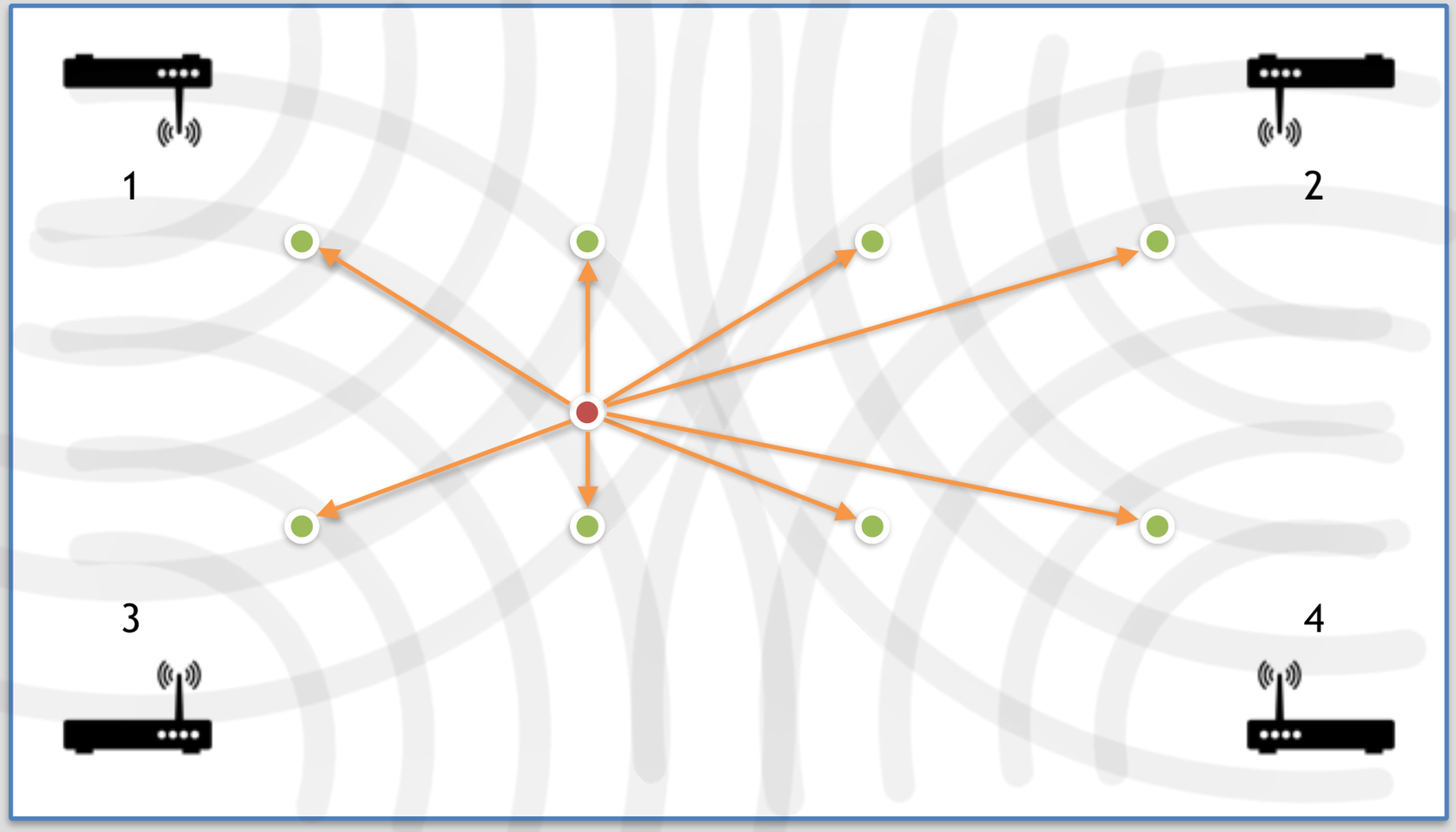
Problem Statement

- Design and implement a mobile application which will be able to estimate the position of a user within a building using WIFI signals.

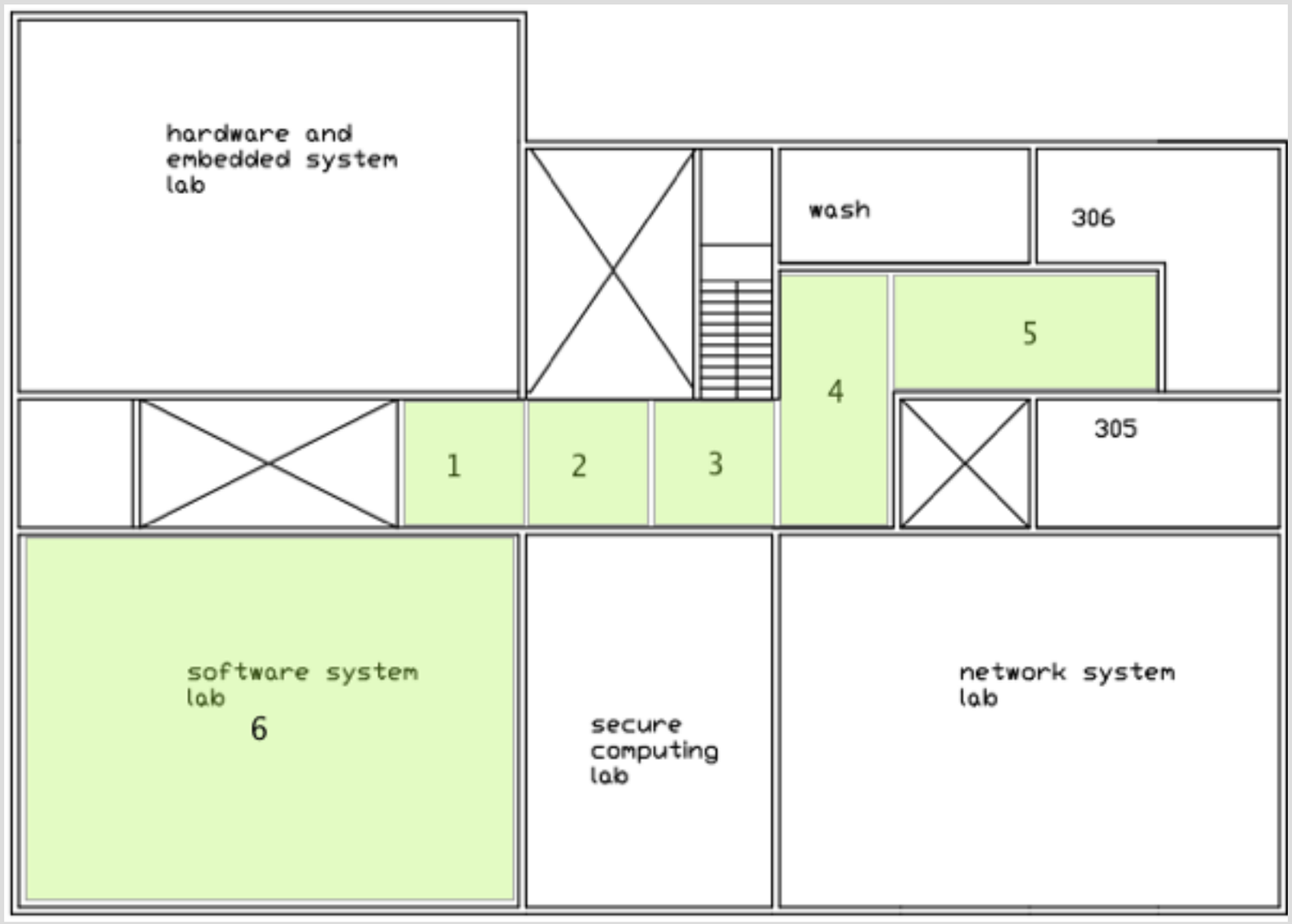
Work Done

- Designed an application that familiarises the environment using location fingerprinting.



Work Done

- Prototype Android App performed mapping of 2nd floor of CSED lab building.



Work Done

- Weighted k Nearest Neighbour algorithm with k=1 used.
- Device position logs could be tracked from website.

Work Remaining

- Explore the possibilities of WkNN with k>1 to ascertain whether that provides an improvement in accuracy.
- Calibrated readings should be made available for all devices.
- Readings taken should be normalised so as to work for all devices.

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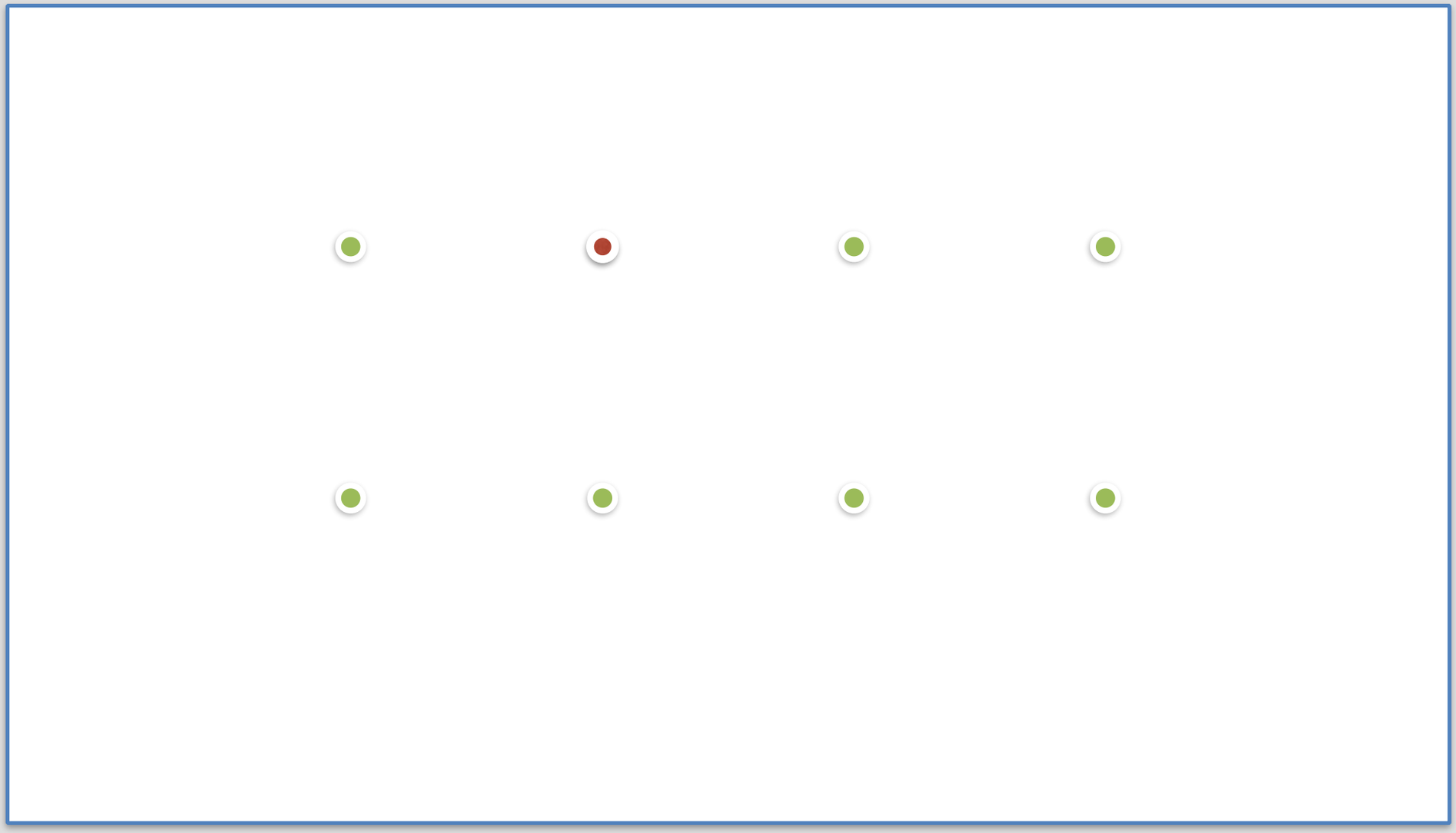
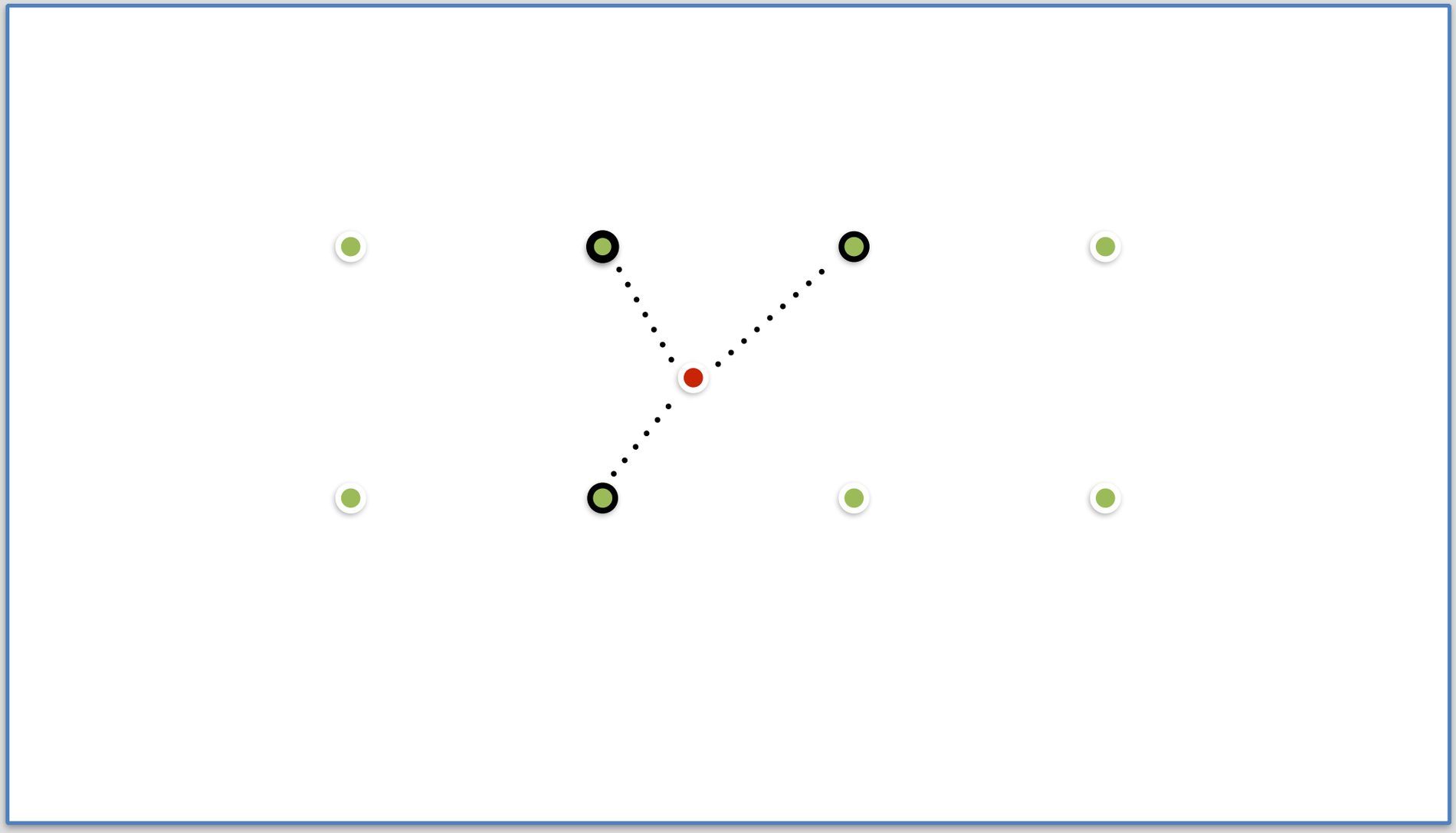
Weighted k Nearest Neighbour

- With k = 1, positions are discrete.



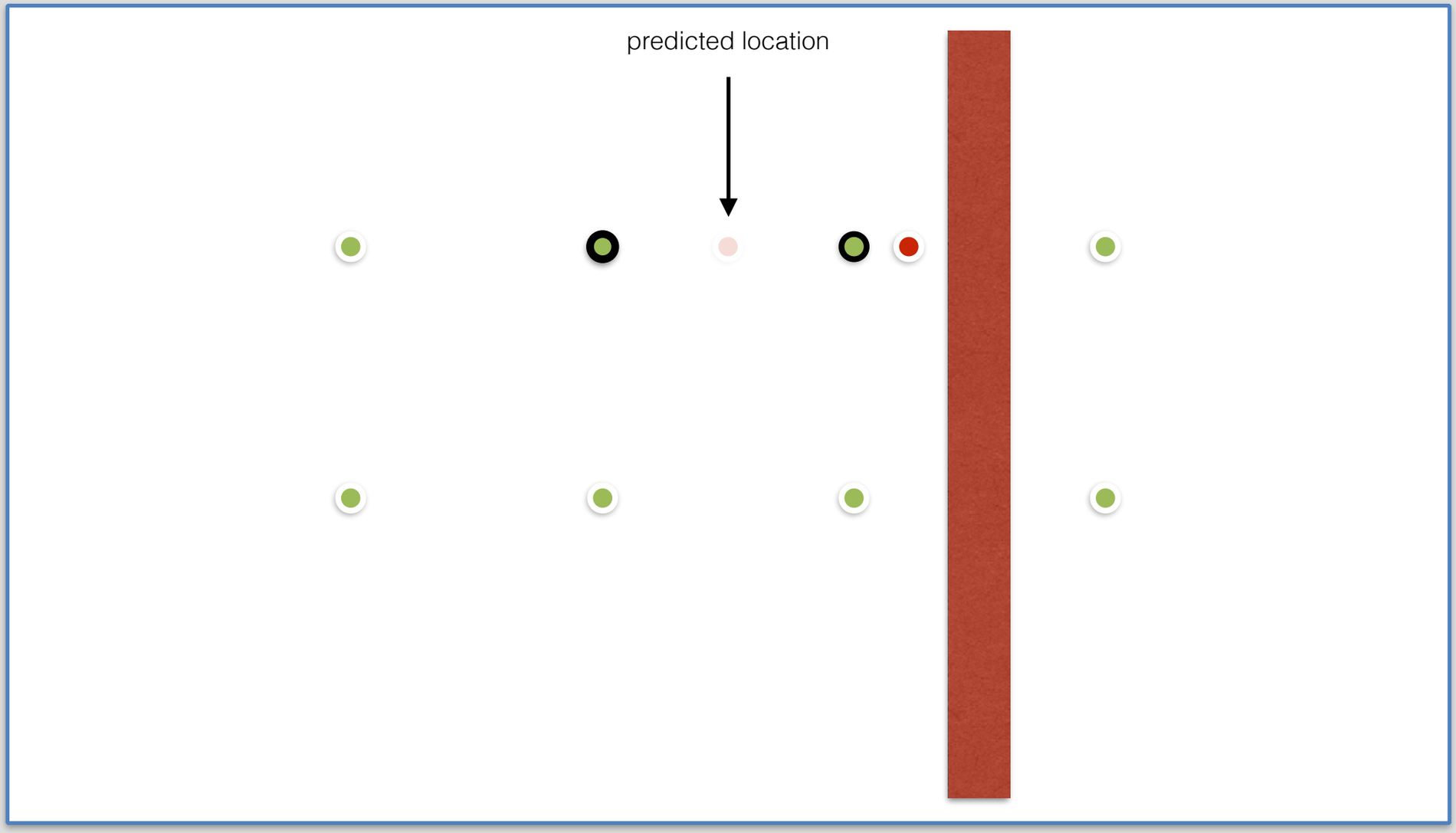
Weighted k Nearest Neighbour

- With k > 1, possibility of increased accuracy



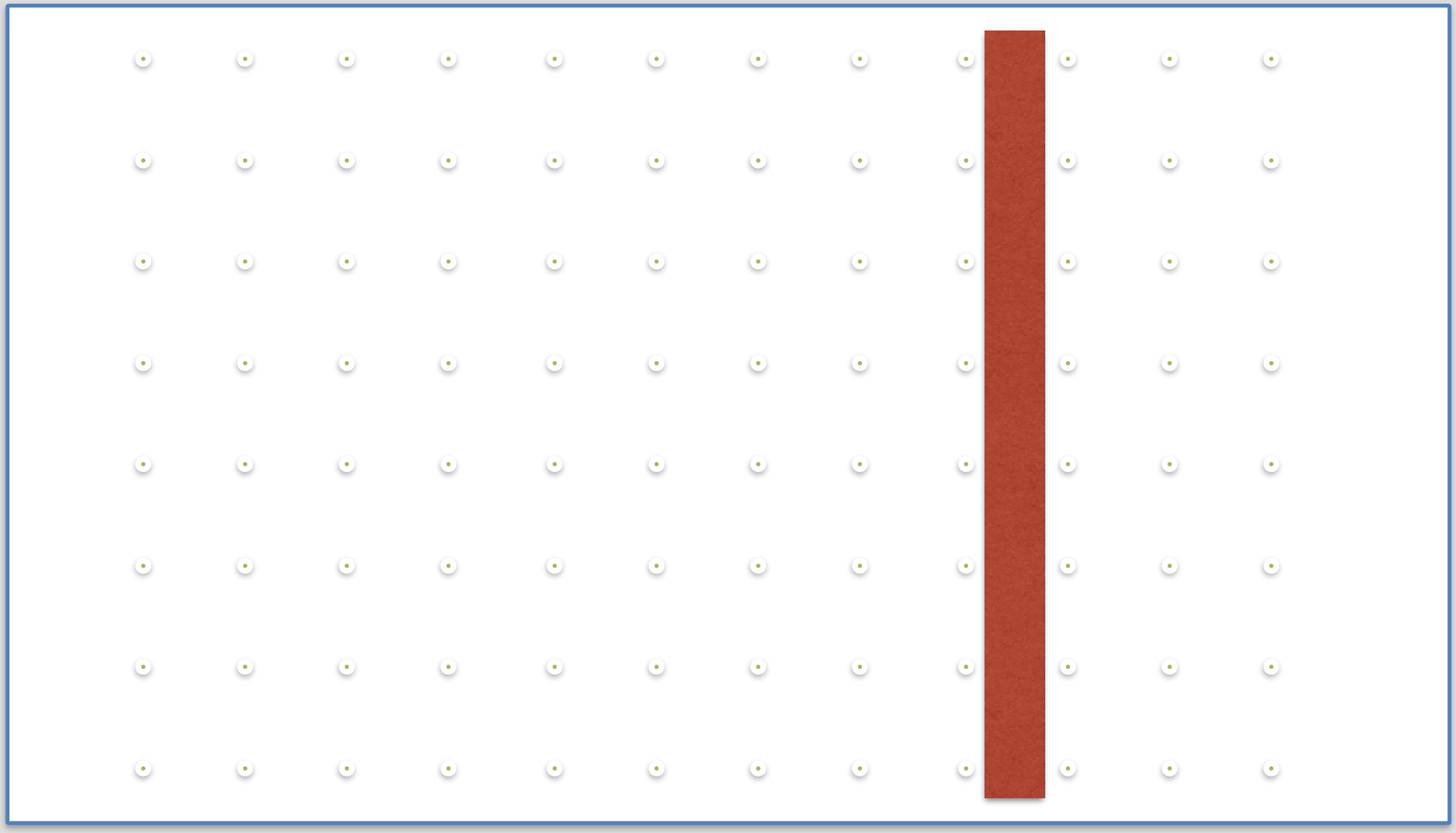
Weighted k Nearest Neighbour

- Practically not ideal, environment contains obstacles.



Weighted k Nearest Neighbour

- Solution: use k=1 on a larger grid



Provide Calibrated Readings

- Calibration phase:

Android Phone

1. Select building
2. WifiManager.scan()
3. Results stored to PositionData

PositionData:
String name
HashMap<String, Integer> values

jsonarray

PHP Server

Data stored
to SQL table

id	building_id	position_id	ssid	mac_id	rssi

Provide Calibrated Readings

- Positioning phase:

Android Phone

1. Request data from server
2. Store jsonarray to SQL table

id	building_id	position_id	ssid	mac_id	rssi

jsonarray ←

PHP Server

3. Form PositionData array from SQL table
4. WifiManager.scan()
5. Results stored to PositionData object

PositionData:
String name
HashMap<String, Integer> values

6. Compared with array to get nearest neighbour
7. Get building id of the location and load layout on device
8. Mark position of user on layout.

Questions?

Thank You