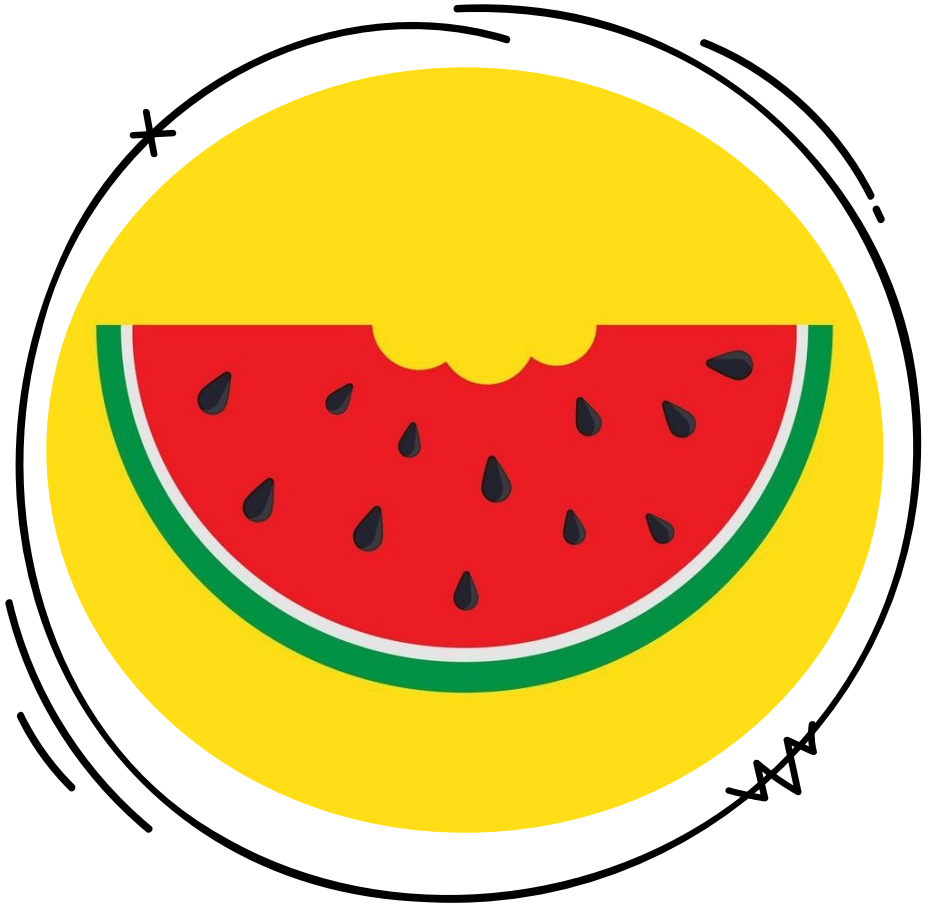
Treasure Hunt



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SmartITS

Smartphone-based identification and tracking using seamless indoor-outdoor localization

Our Idea

Treasure hunt, uses maps and location to trigger media content and challenges on location.

Localization in both indoor and outdoor environments is a known and long-studied problem, and this paper propose a location tracking system providing a Google maps-based visualization of their trajectories with more accurate precise than a simple GPS-based location tracking system.

Location Based Services

01. GPS

- Only works outdoor
- Highly battery-consuming
- Accuracy depends on the quality of the smartphone

02. Wi-fi Based Location

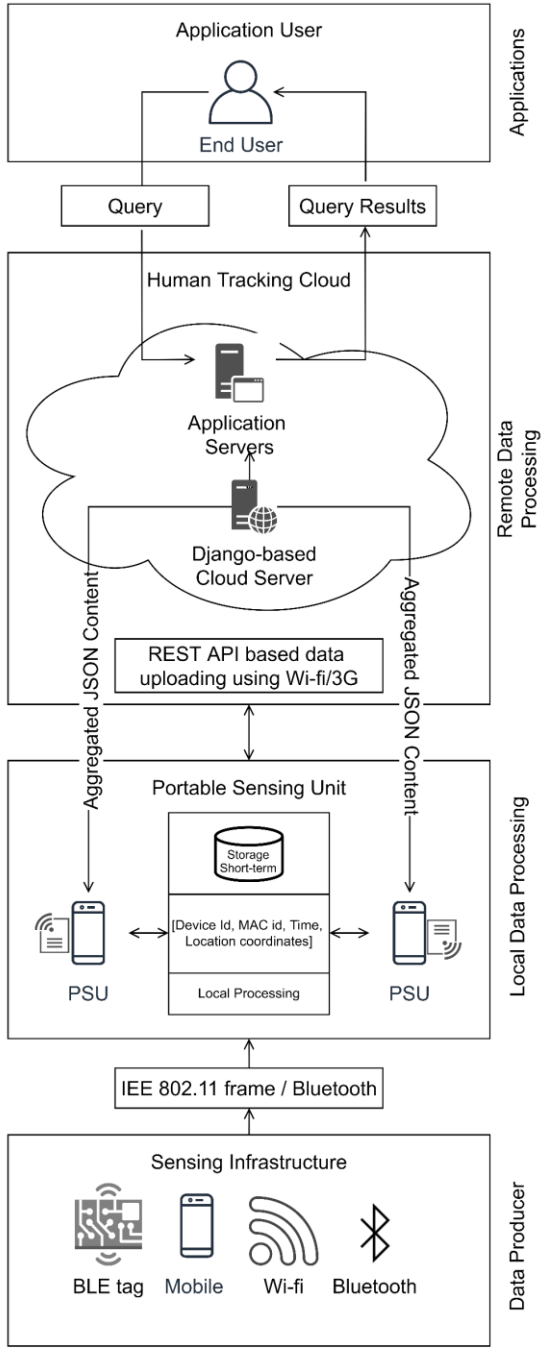
- Outdoor position is not accurate in compared to GPS
- NBL has an error of more than 300 m

03. Location fingerprint

- Require additional hardware
- No robust with changes on the environment

04. RFID

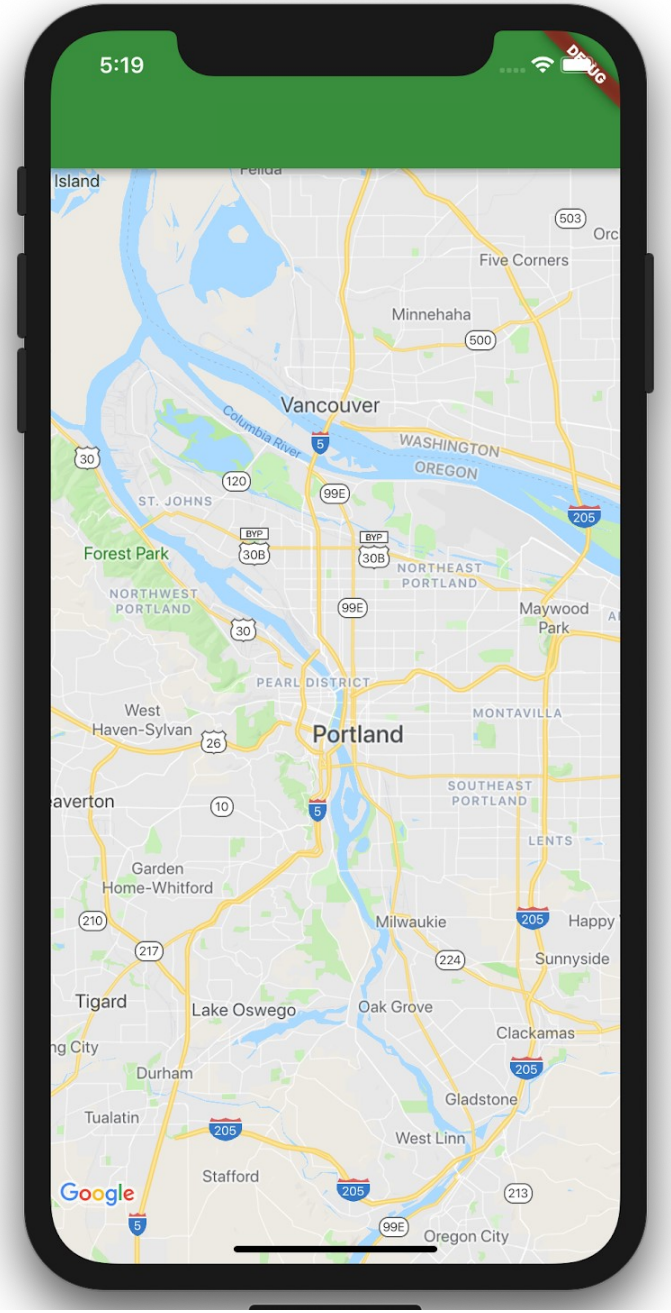
- Expensive
- Infeasible into a mass of people



Structure

The network is made of

- **Client**: who is tracked and can query tracking info
- **PSU (Portable Sensing Unit)**: a smartphone with a external wiki sensor which collect MAC addresses in its area
- **Server**: a main server that collect tracking info from the PSU network and use them to get the positions
  - Return the position to the client if asked



Client

The client is tracked by a smartphone or a BLT tag, which will emit periodically packets for searching access points. This packets will hold a MAC sender address which will identify each devices.

The smartphone users can register to the **SmartITS** service with a app, in this way if they want to get the geo-locations info they can use it to make a quarry to the Server

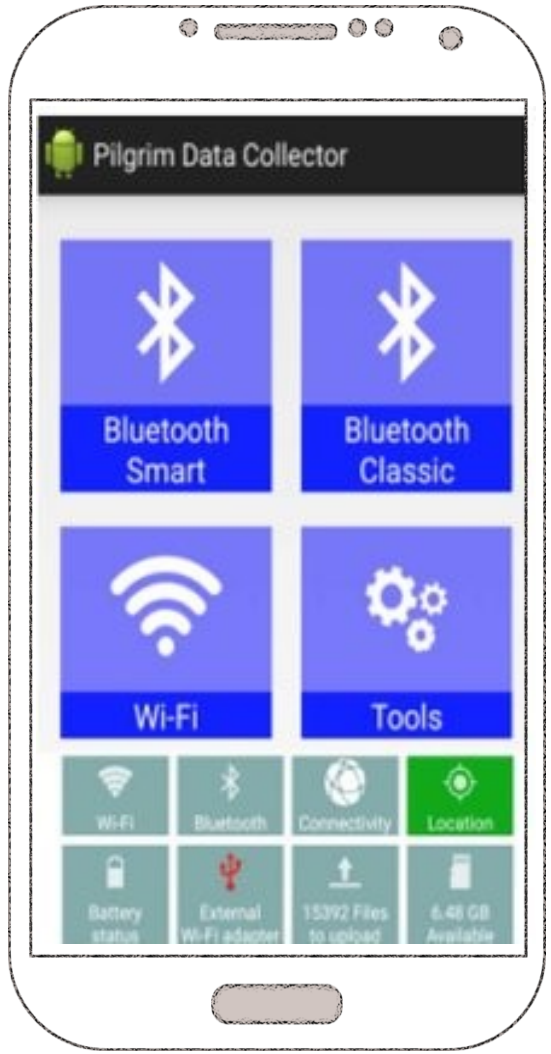
A client can ask for his position or of others positions (like family members) in emergency situations

Portable Sensing Unit

It’s a static/dynamic smartphone which has to:

- Collect frames sended from near wireless devices
- Extract sender MAC addresses from frames
- Upload the “MAC packets” to the main server

MAC packets are made by pairing MAC address with other info, like the **timestamp** and the **GPS coordinates** of when the frame was received and the PSU ID.



Cloud Server

The cloud server has 3 main jobs:

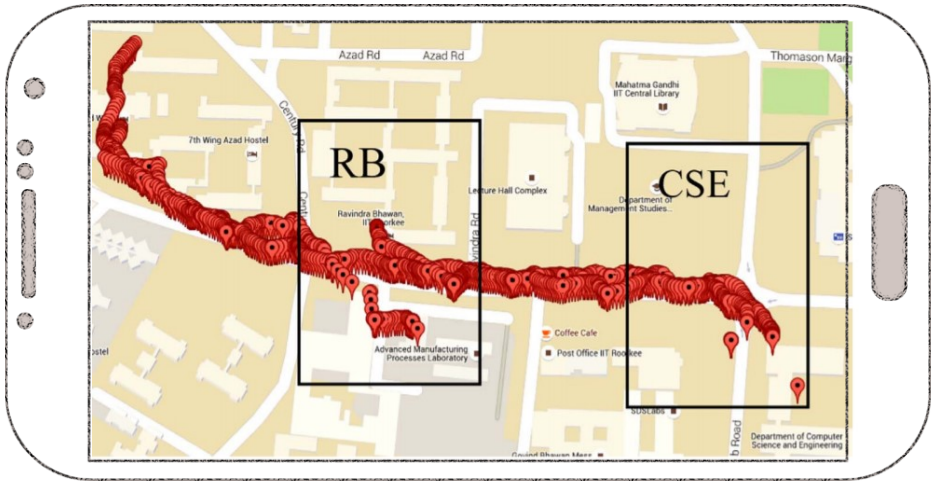
- Collect the list of MAC packets from all PSUs
- Derive the position of each MAC address
- Sending to the clients the geo-localization information when asked.

It can also check periodically the status of PSU network and coordinate it by asking to upload:

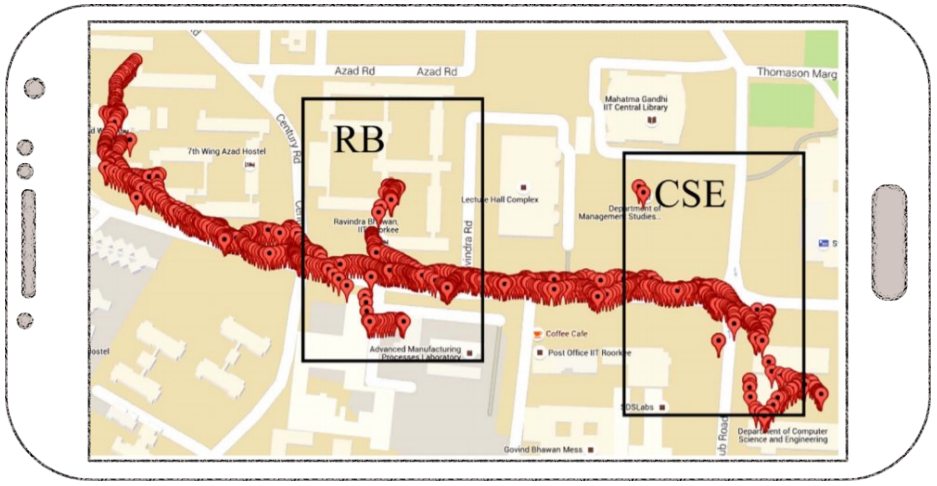
- All detected MAC addresses
- Only MAC addresses from BLE tags
- Only MAC addresses from users registered

Results

The developed system doesn’t require any Internet access on the Smartphones of the persons being tracked; neither does it require any application installation on the Client's Smartphone. Many techniques have many issues. In this paper, the propose is using Wi-Fi through their Smartphones and BLE tags.



This situation arises when GPS signals strength is weak.



SmartITS can capture location coordinates inside both buildings.


Questions?