HELP: Home Environment Locating People

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Context and problem description

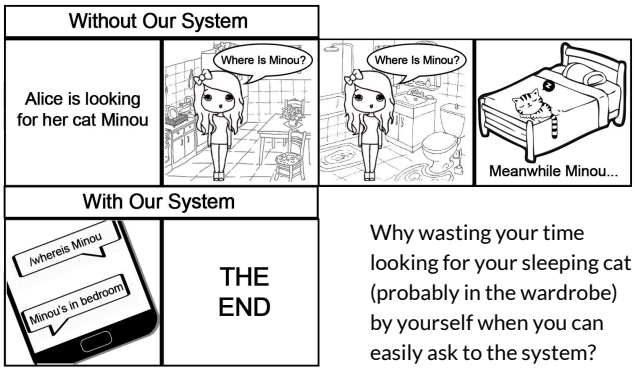
An **user-friendly** indoor **localisation** system based on wearable tags or other **BLE devices**, with interaction via Telegram Bot and RESTful service.

With this system a customer will be able to locate any interested "user" (either a person or an animal) in any indoor environment.

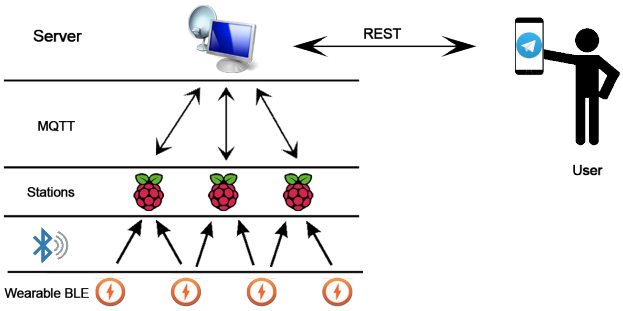
The precision metric is "a room", so the system is able to discriminate the position of a user between different rooms and not the position of the user inside a specific room.

The system is easily customizable by the user with Telegram.

Use case



Why wasting your time looking for your sleeping cat (probably in the wardrobe) by yourself when you can easily ask to the system?



System architecture

The wereable **tags** act as BLE advertisers.
The **stations** (one for each interested room) act as BLE scanners: they send to the server, through MQTT, the tuples <tag, rssi_list> of the scanned BLE packets coming only from the registered tags.
The **server** periodically computes the current position of each user. If a tag is removed, or added, the server eventually sends this information to the stations.
The **user** interact with the system by mean of a dedicated **Telegram Bot**: the Bot communicates with the server through the RESTful interface provided by the server.

Technologies

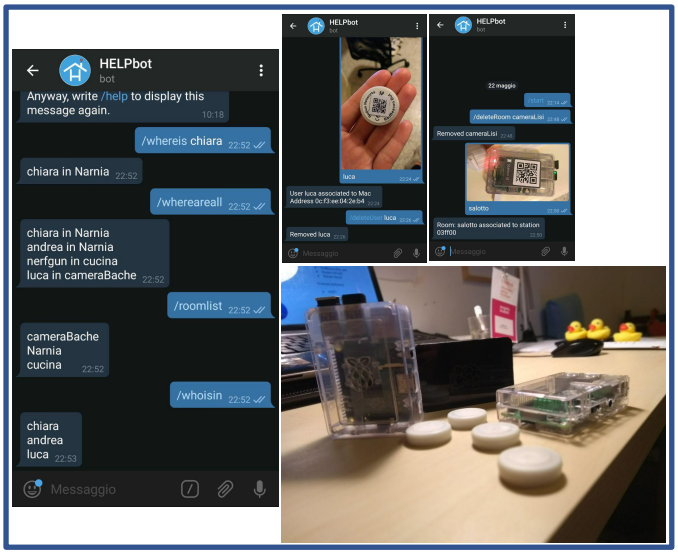
RadBeacon Dot from Radius company as wearable BLE tags;

Raspberry PI as stations;

Laptop as remote server;

Telegram Bot;

MQTT protocol for communication; RESTful interface.



Prototype and demonstration

System setup:

Place Stations	Add your rooms	Add the users	Turn on devs
Place a station in each room you want to monitor.	Associate each station with the relative room using the Telegram bot.	Associate the BLE devices with the user, still with the Telegram bot.	Power on your BLE device clicking on it.

User interaction:

The Telegram bot allows the user to:
- get information about who is where in the house (with relative commands);
- add an user or a room (sending QR code photo);
- remove an user or a room (commands).

Future work

Improve the localisation algorithm;
Extend the system for several installations: add a username/password service to the Bot so that every user would access only to the data relative to his house;
Improve the installation phase: automate the connection to home network, for instance with a WPS button embedded in the stations;
Provide a push notification system.