WEAZARD

Wearable-based assistant for ensuring child group safety on the move

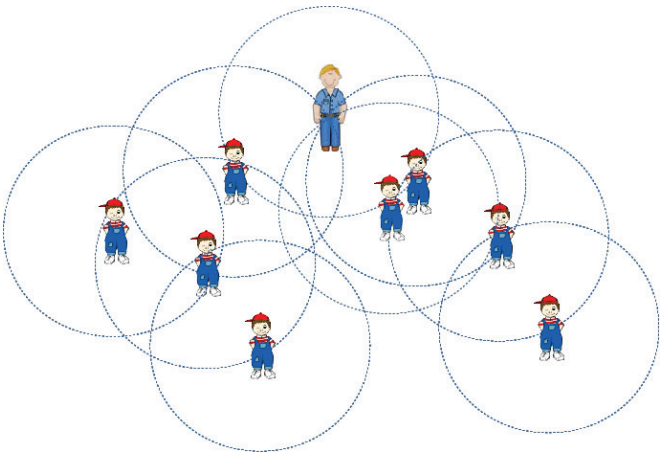
Andres Upegui, David Da Silva, Olivier Chabloz (hepia)
Andres Perez-Uribe, Hector Satizabal (HEIG-VD)

Brief description

WEAZARD is a WEArable system to overcome potential haZARDs while going out with children. It is based on wearable devices and a smartphone as the master device. The smartphone collects information from surrounding children via Bluetooth LE and generates alarms when a child is out of reach. Moreover, devices can relay information from remote nodes to other wristbands and to the smartphone. Childminders can thus track and visualize the group of children on the move.

Key points

- Design and development of compact and low power sensing and communicating systems.
- Design and deployment of distributed and efficient relative localization algorithms.
- Bluetooth LE stack and protocol implementation.
- Android application visually representing children relative location as a graph or a tree.



We developed a set of wearable wristbands endowed with BLE communication, motion sensors, stress sensor (GSR), and providing the possibility of recharging batteries through a Qi wireless charging system. In contrast to existing systems, WEAZARD allows for relative positioning in indoor environments where GPS is not available. Sensor data allow to detect anomalous behavior in children, while the BLE communication in the form of a beacon permits to detect the absence of a child. Moreover, each beacon embeds information about remote nodes in order to describe a view of all the nodes in the network in the form of a graph.

We proposed and deployed two algorithms to properly deal with this information with the objective of estimating the relative localization of nodes and the proximity of out-of-sight users to other users. These algorithms are: DiscoveryTree [1] and a gossip protocol based on a principle called « rumor mongering ». Such a system can be used by childminders or families while going out in the city (e.g., taking the subway, visiting a museum, a mall, etc) or attending a large public event (e.g., Comptoir Suisse). Other applications that can easily take advantage of this service are: points of interest location, entertainment (based on local interactions, dating, friend finding), indoor object localisation, etc.

The WEAZARD system is compatible with estimote beacons. These are small low power devices which can broadcast information for several months without changing their battery. The beacon technology opens the door to new applications in the domain of indoor localization and it is expected to gain a lot of interest in the following years. As an example, the Gatwick Airport has recently been equiped with more that 2000 beacons.

[1] Chabloz, O., Da Silva Andrade D., Upegui A., Satizábal H. F., and Perez-Uribe A.. « DiscoveryTree: Relative localization based on multi-hop BLE beacons » In Global Internet of Things Summit (GIoTS), 2017, pp. 1-6. IEEE, 2017.