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| **Group** 27 | Item Tracker |
| **Major:** | **Team members:** |
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**Design Functionality**

1. Wi-Fi (Requirement - 1.0 - 3.0)

The Tracker shall include a built-in antenna for IEEE 802.11 standard Wi-Fi communication protocols (UDP) to facilitate the positioning and tracking functionality. The Wi-Fi functionality will also be used to transmit the Trackers collected data to the mobile application for processing.

1. Mobile Application (Requirement – 6.0 – 15.0)

The Tracker shall include a mobile application to allow the user to access the various features of the tracker device from a mobile device. The mobile application consists of four main functional parts the GUI, Database, Background Services, and OS Communication.

* The GUI serves to collect and deliver user data consisting of username, password, network credentials, and tracker configuration data (configured alerts or device naming) to the database for insert, update, or deletion. The GUI component will also handle the display of location data correlated by the Tracker as a point in a graphical representation of the space as built by the user.
* The Database will handle the collection of location data, user data, and tracker configuration data, sending the requested information to the requestor.
* The Background Services component will serve as a listener for data transmitted by the Trackers, as well as, the initiator of alarms or emails required by the device. The location and battery status data will be collected and packaged for storage in the database by the Background Services as they will run continually in the background of the mobile device.
* The OS Communication module will use Android Services to initiate alerts and emails to the user regarding user configured alerts and battery status update emails.

1. Wi-Fi positioning (Requirement – 2.0)

Using open source tools, such as Redpin, the Tracker will construct a Wi-Fi fingerprint for its location with room level accuracy. This system functions based on symbols, instead of geographic coordinates, to represent mappings of location. The position is calculated based on the signal strength of the tracker from adjacent wireless devices and the stored information of these devices to create a network of positions of reference. The system works based on two major components, a network sniffer to locate objects and a location database with algorithms to locate stored objects.

1. Application communication (Requirement – 3.0, 9.0, 11.0, 12.0)

The included smart device application will allow the user to uniquely identify each Tracker on their network. With this application, the user will be able to register Trackers and set notifications and/or alarms for the individual Trackers which will activate the LED at the specified date/time. The user can also use the application to query the current location of any registered Tracker on the network.

1. Surface adhesion (Requirement – 4.0)

The Tracker shall be able to attach to the surface of various objects and remain attached until the user removes it. While on the object, the Tracker will remain in contact with the object to ensure that the tracker’s application can obtain accurate data of the object being tracked. The Tracker must also be able to be removed from the object by the user. The Tracker, when not attached to an object to track, shall be able to be attached to an object that the user chooses to track.

1. Notification/alarm (Requirement – 9.0 - 11.0)

The device will be able to notify the user of is location via audible alarm from the mobile device and/or LED light activation from the Tracker to alert the user as a reminder to locate the object that the Tracker is attached to.

1. User Input (Requirement – 8.0, 13.0)

The mobile application will require the user to register once, allowing the application to capture a user provided email, username, and password for authentication to access their personal list of Tracker devices. Each Tracker can be configured with a user defined name, via the mobile application, for more accurate identification by the user for the purposes of location and alarms.

1. Replaceable power source (Requirement – 16.0, 17.0)

The Tracker will be able to accept a battery as a power source. The Tracker’s battery compartment shall also be accessible with aid of a tool (screwdriver) to remove the spent power source and subsequently replace it with a new power source. The battery compartment shall also be able to be closed and sealed for completeness of installation of a new power source.

1. Minor damage resistance (Requirement – 18.0 - 21.0)

The Tracker’s hardware will be encased in a housing to protect the device from damage. The housing will be designed around the Tracker to ensure the least amount of movement of the device while inside of the housing. The housing will be able to open and close for minor maintenance by the user. When closed, the Tracker’s housing will be sealed to prevent the entering of outside particles and fluids into the housing. In addition, the housing will have a rubberized external coating to enhance the shock absorbing quality of the casing to further protect the Tracker’s hardware.