Detailed Project Report

Prepared for: Kerala Startup Mission & Kerala Police Cyberdome

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Proposal number: TRP-1545

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EXECUTIVE SUMMARY

Objective

Design a tracking solution for kerala police department for the tracking and monitoring of prisoners during transit.

Solution

Smart handcuff is a combination of hardware, embedded software, backend, dashboard and mobile application. To start with, the Hardware attached to the handcuff works in the low power mode when the prisoner is in the safe custody. On detection of an abnormal condition, the realtime location, movement, audio and other data according to the requirement is sent securely to the backend available in the dashboard, mobile application and API to any existing systems.

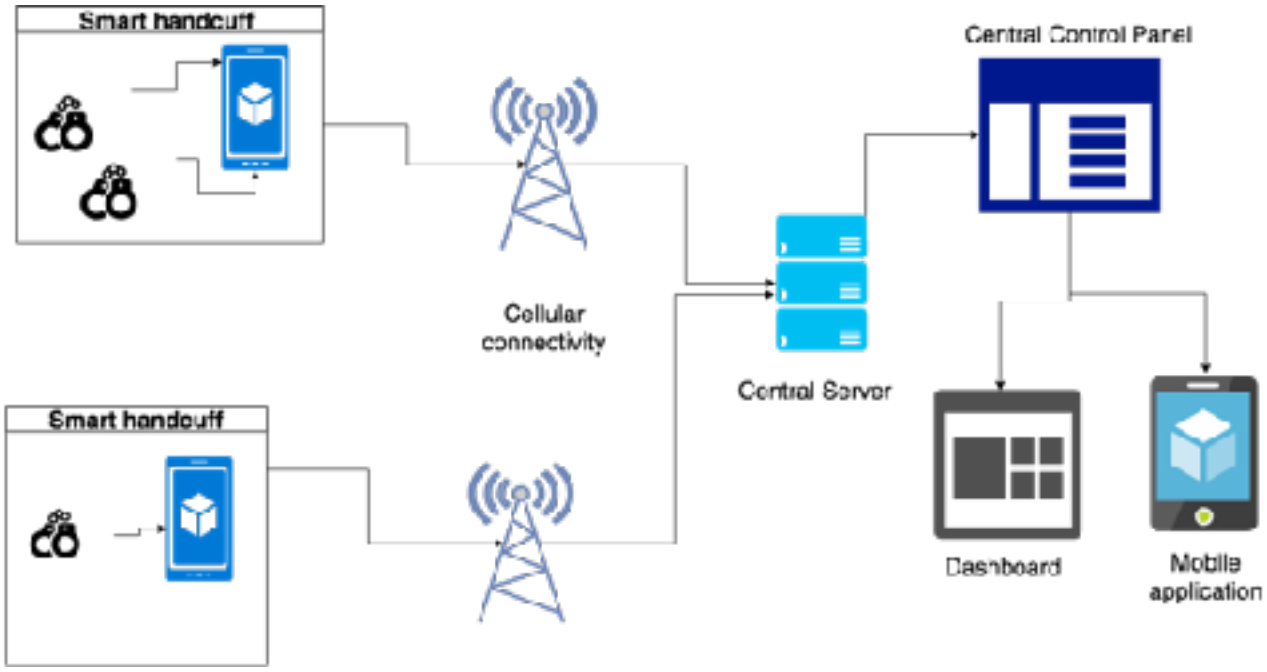
Project Outline

The smart handcuff solution is the application of our tracking platform, where modifications are done according to the requirements .

- The hardware consists of Controller, GNSS system, low power BLE, battery, cellular communication system, sensors and our embedded system .
- The hand cuff rack system help to place the handcuff in the secure place, tracking the health of each hand cuff
- When assigned to the a police officer the its paired with his/her mobile with BLE
- The realtime data is communicated in realtime withe the backed system, where its recored and made available in the dashboard or as api/ifttt
- When in the case of an abnormal condition that is detected by the BLE range from mobile /geo fencing and other sensory values the system triggers the emergency system
- The emergency messages with the realtime location and other valuable data will be availed in the tracking application and at the dashboard for the support

SYSTEM ARCHITECTURE

Each hand cuff consists of the tracking device, that can be paired to the mobile of the police officer in control. While the handcuff is in range with the police officer in control, there are no triggers, as soon as the handcuff is out of range from the police officer in control, alerts and necessary messages are send to the control and backend severs, and the prisoner can be tracked.



TECHNICAL SPECIFICATION

Hardware :

- 4 layer PCB
- All SMD components
- 2G, Multi-GNSS system: GPS, GLONASS, Galileo and QZSS
- BLE 4 low power conception
- Protective Metal enclosure

Software :

- Angular 4 front end
- Python Django Backend
- Native Android
- Custom UDP Communication
- OPEN RTOS embedded system

PROJECT TIME LINE AND STATUS

6 October 2017

- Done initial technological and market study
- Currently used technology and similar products
- Submitted the initial report according to the discussions and the requirement

22 October 2017

- Done Detailed market study and submitted the report

2 November 2017

- System Architecture
- Design of proof of concept hardware

6 December 2017

- Meeting with (Kerala startup mission) Dr. Saji Gopinath , (Cyberdome) Prakash, Pramoth, Rajesh
- Support from Startup mission and Cyber dome
- Submitted the initial reports and status

12 December 2017

- Received Handcuff from Cyberdome
- Started enclosure design and PCB
- Backend and dashboard design started

January 2017

- Done prototype demonstration with IG Manoj Abraham
- Technology discussion, feature and mechanical design finalisation
- Submitted the initial report according to the discussions and the requirement

February 2018

- 3d Printing of the 1st mechanical iteration
- PCB and stencil design

March 2018

- Discussion with faculties from Brink (with the help of Maker Village) about Design for manufacturing
- Discussion with Bosch team about the procurement and support
- Testing and analysis

DESIGN

*Above are the current CAD design iterations of the tracker that can be attached the handcuff

PICTURES OF THE CURRENT PROTOTYPE

3d printed enclosure

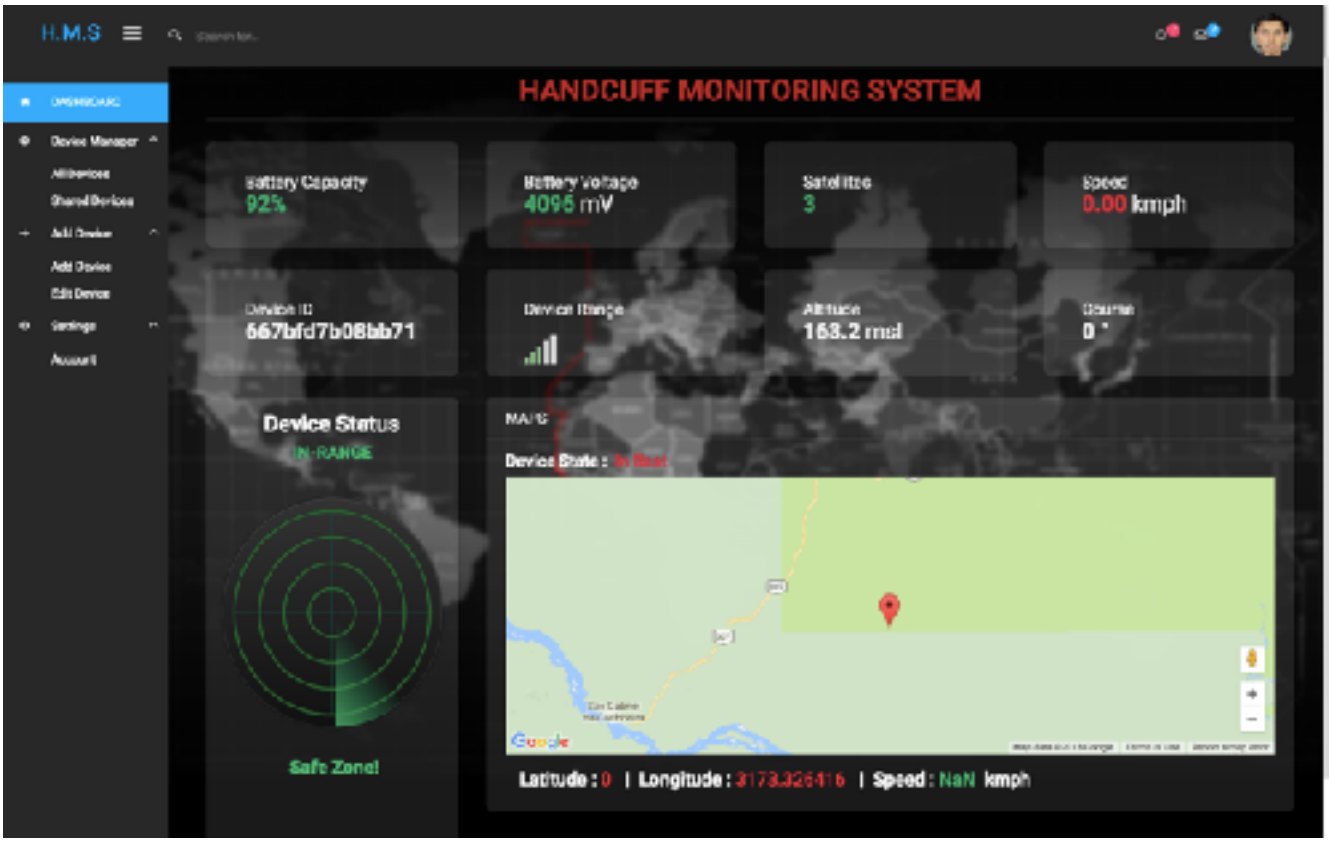
PCB and embedded system

3d Printed Tracker Attached to Handcuff

Central device controller with biometric

Product Testing

3d Printed tracker attached to the handcuff



Dashboard and control panel

Lab testing at Maker village facility