Disaster Recovery Plan

Bot Force

The saving force

Purpose

Using AI techniques and IOT to scan through areas affected by the disaster for any traces of life.

To reduce the Risk of rescue / task force getting impacted/ injured.

To plan for rescue , disease prevention and mental health counselling.

"Catch – 22"

A critical component of any successful rescue operation is time. Knowing the precise location of landmarks, streets, buildings, emergency service resources, and disaster relief sites reduces that time — and saves lives. This information is critical to disaster relief teams and public safety personnel in order to protect life and reduce property loss

*** The idea is at a conceptual stage and we have a roadmap to implement it in near future.*

Preamble

- Once the calamity strikes, the toughest task for the rescue force is to scan through areas for life. When DRT want to recover people from a disaster-affected zone, the risks of officials losing their lives to save civilians is high.
- By using machine learning, we can obtain actionable insights about people stuck in affected areas and how they can be rescued.
- This can be achieved by mapping through the zone using image mapping techniques. Using deep learning approach to combine all the data together, remove unreliable data, and then identify informative sources to generate heat maps and have a great impact on saving human lives.
- AI techniques will also be used to train for providing first-aid and giving shots to prevent the risk of communicable diseases.
- Also to provide initial counselling sessions.

Approach without GPS & Cellular Network

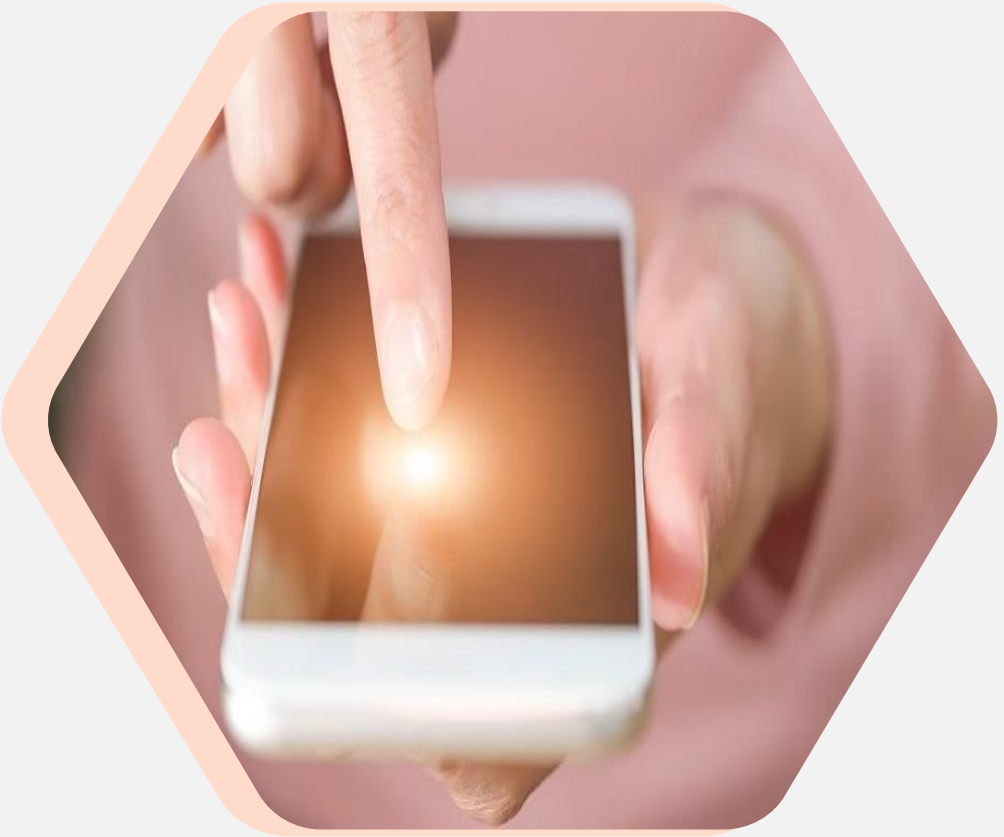
Track Lives – Smart Phone App

- **The Solution:** Most of the people in this world have started to use smartphone or have one in their possession. These smartphones have become more powerful with respect to processing power, battery life and ruggedness. The proposed solution is a smartphone application, when you run this application it presents two options, one is the "Track Me" button and the other is "Track Them" button.
- **Track Me -** A person who is stranded or caught under a building debris, needs to click the "Track Me" button, once the button is pressed, the application will start/enable a Wi-Fi hotspot and Bluetooth with the following name - "SOS_<Unique Identification Number>_<Person Name>. For example, the Wi-Fi SSID or the Bluetooth name will be "SOS_1234567890_Muthu" - Here the "SOS" stands for the universal distress signal name, the "1234567890" maybe the persons, AADHAR, Driving License, PAN or Passport number and the "Muthu" will be the name of the person who is stranded. Once the Wi-Fi hotspot and Bluetooth are activated, the person needs to wait for someone to find them.

Approach without GPS & Cellular Network - Contd.

Track Lives – Smart Phone App

- **Track Them:** Not everyone is trapped or isolated, there will be people or rescuers trying to track and find the missing people. These people need to click the "Track Them" button and move around the affected area if it is feasible/possible or they can attach their smartphone to a drone for tracking. Once the person or the drone with the smartphone in the "Track Them" mode comes near a smartphone in "Track Me" mode, the app will automatically connect to that Wi-Fi hotspot or Bluetooth and will trigger an alarm in the stranded/isolated persons smartphone. The alarm will use both sound and visual. When I say sound, it will play an alarm sound in the stranded/isolated persons smartphone and when I say visual, the LED Torch will light up or the smartphone screen will blink or show some patterns. Once the stranded person gets these alarms, they will have some hope that someone has found them, and they will be rescued soon.
- The applications features can be extended to have a voice/text messenger included in the app to communicate with the stranded/isolated people.



Alternatives

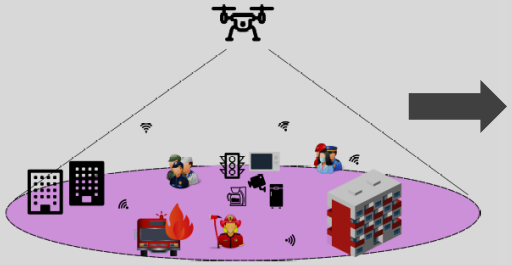
- Use Case Scenarios:
- This smartphone app can be used in various use case scenarios. The only thing we should note here is that the smartphone should be in working condition when you are planning to use it during or after the disaster.
- During natural disaster like earthquakes, flood, forest fire etc., or during a man-made disaster like a building crash, building/house fire etc. we cannot predict the level of damage that is done or being done. But if someone is alive and trapped in the debris of an earthquake or safe in the loft/roof of a house during flood or stranded in the burn out area of the forest fire, or you are trapped in a safe place, then if you are in possession of a smartphone with this app installed, all you have to do is activate the app and wait for someone or a drone to find you.
- Optional:
- The same smartphone app can be run on an exclusive handheld or wearable device too. The smartphone app also can be used in a laptop having an inbuilt wireless adapter which can support “Host AP” mode. The advantage of using this app in a laptop is that we can use external wireless adapter which uses removable antenna. The more powerful the antenna, more area can be covered and the Wi-Fi hot spot signal can penetrate solid walls and reach out to the rescuer.

Bot Forces Approach without GPS & Cellular network

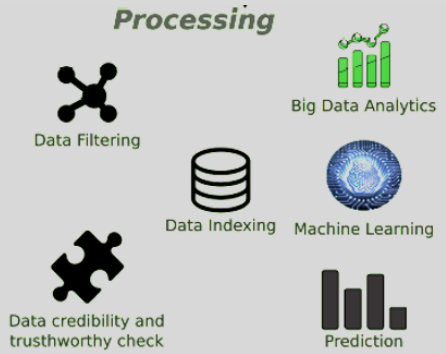
- An IOT device will be attached to any house hold device which would draw power from solar panels, and it will be in active stand-by mode.
- This IOT device will be trained for movement recognition and will communicate with the Drones and Bots using satellite beacon signals.
- Th Bots/Drones will collect information from the Device and send it to the central database which can be trained to dynamically update the heat maps.
- With the Heat map government and other humanitarian agencies can decide where to conduct aerial assessments.
- As a part of the relief activity the bots can be trained using Animal Instincts to identify people in SOS mode under different environment (Land / Water / Debris).
- The Bots and Drones are synched to update the information dynamically for creating new heat maps.

Architecture

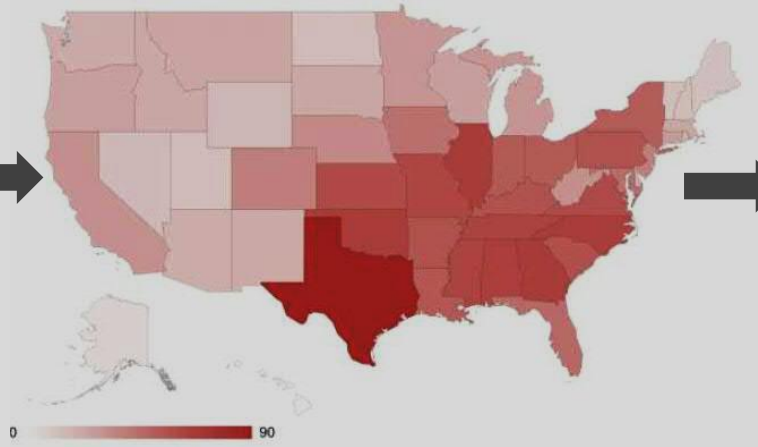
Wireless networking (Smartphone App / IOT Device)



Information sent to Drone



From Drone to central Database where its processed

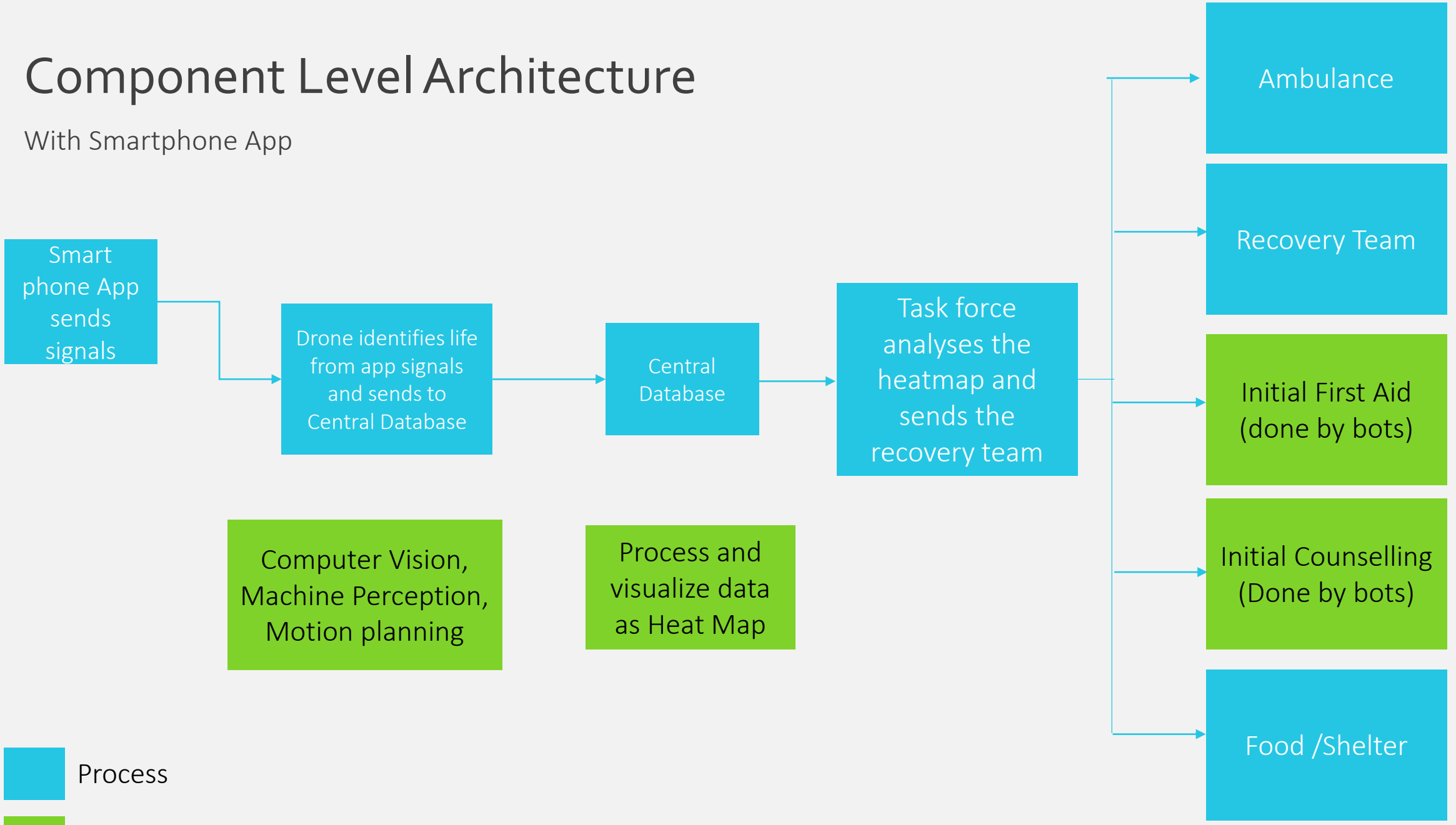


Processed data visualized as heatmap for faster response

DRT teams / Bots aiding in rescue/ first aid / Counselling

Component Level Architecture

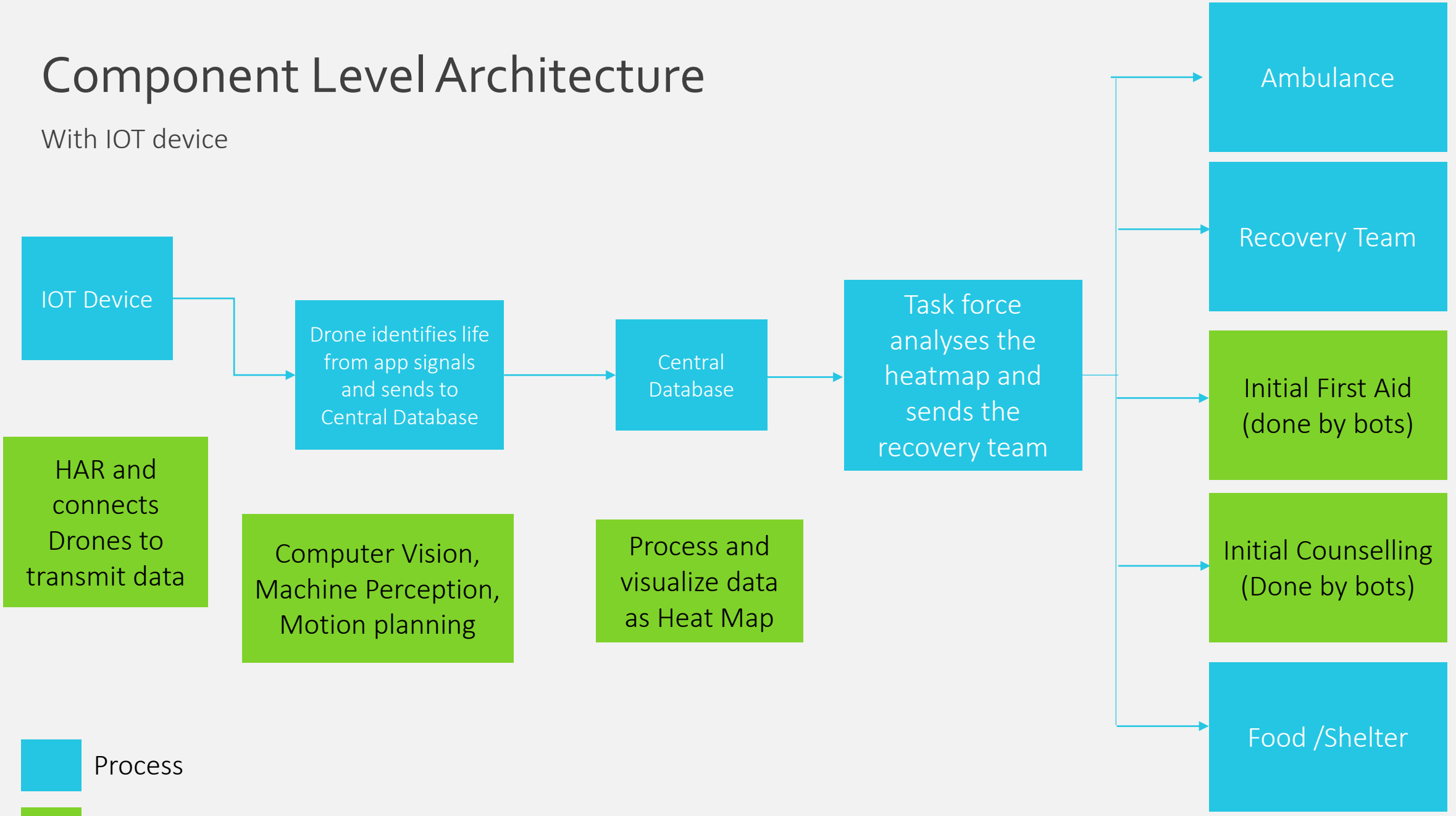
With Smartphone App



* The process is cyclic till all possible life is recovered

Component Level Architecture

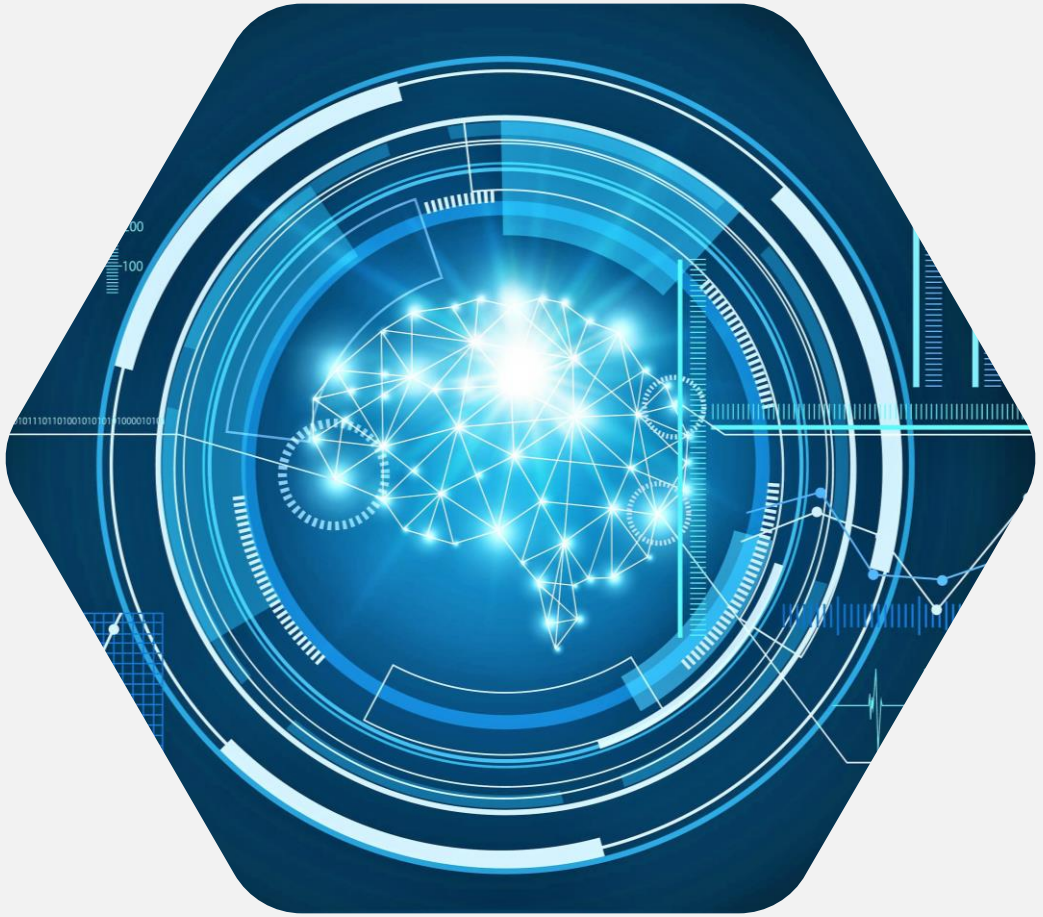
With IOT device



* The process is cyclic till all possible life is recovered

AI Techniques & Devices

- IOT Device (IoT devices, or any of the many things in the internet of things, are nonstandard computing devices that connect wirelessly to a network and could transmit data.)
- Human Activity Recognition (HAR) - It involves predicting the movement of a person based on sensor data.
- Classification- a technique where we categorize **data** into a given number of classes
- Clustering - It is basically a collection of objects based on similarity and dissimilarity between them
- Image Recognition - the ability of software to identify objects, places, people, writing and actions in images



Other Essentials

- **We can use Image recognition to** identify objects and features such as damaged buildings, flooding, blocked roads for immediate relief.
- Once network is gained, social media can be used to perform sentiment analysis to understand the mental health of the people to provide the necessary treatment.

ThankYou

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- Mayur S Gaidhane
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- Sreeanand Chandran
- Sunitha Bhat


BACKUP

Track Lives App – Requirements

- **User Requirements –** "Track Lives" is a smartphone app targeted for Android and iOS devices. It is recommended that you run the latest version of Android and iOS in your smartphone. All the user needs to do is go to the respective application store of Android and iOS and search for "Track Lives" and install the app. The "Track Lives" application is only developed by IBM Inc. and please make sure that the vendor for this app in the respective store is "IBM Inc".
- **Developer Requirements –** To develop this application for Android or iOS, we need smartphone app developers with the experience in the following programming languages. This app is not a very complicated app and an experienced developer can develop this app in less than 300 Hours. Since this application is going to save people's lives, we need to make sure that we do extensive testing in different disaster scenarios.
- **Programming Language for Android Developers –**
- Java
- Scala
- C/C++ with Android NDK (Native Development Kit)
- Python
- Perl
- LUA
- **Programming Language for iOS Developers –**
- Swift
- Objective C