



INNOVATE FOR ASSAM

Inspire | Ideate | Innovate

DIROY

the intelligent locator

team **deluminators**

IIIT Bhubaneswar



team deluminators



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Machine Learning
Project Concept



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Backend Development
Project Design
Operations & Logistics



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Application Development
Backend Development
Project Concept



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Scripting
Documentation
Project Design



Problem Statement

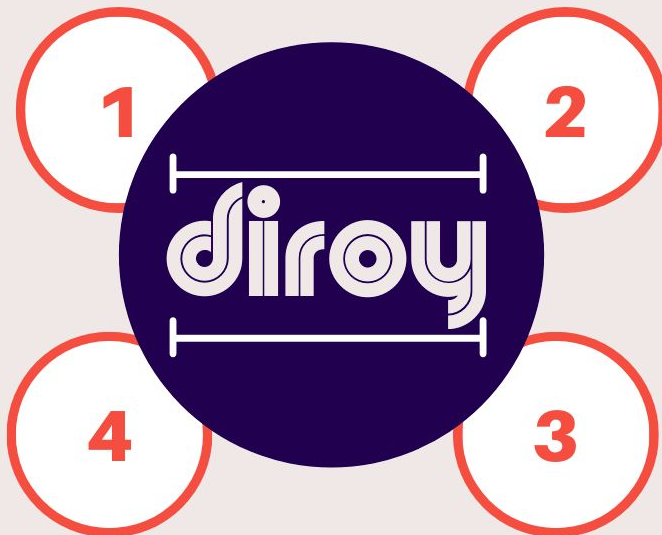


SMART TRACKING

The smart system which can help in tracking of people, vehicles travelling from Point A to Point B.

CONFIGURATION & MONITORING

Efficient management of vehicles in required regions and routes with accurate monitoring.



ROUTE INFORMATION

Mechanism by which law enforcement agencies can track if there is a deviation from a specific route, time is taken for the travel, the speed of the vehicles

FLEET MANAGEMENT

Managing the movement of vehicles in fleet with constant monitoring.

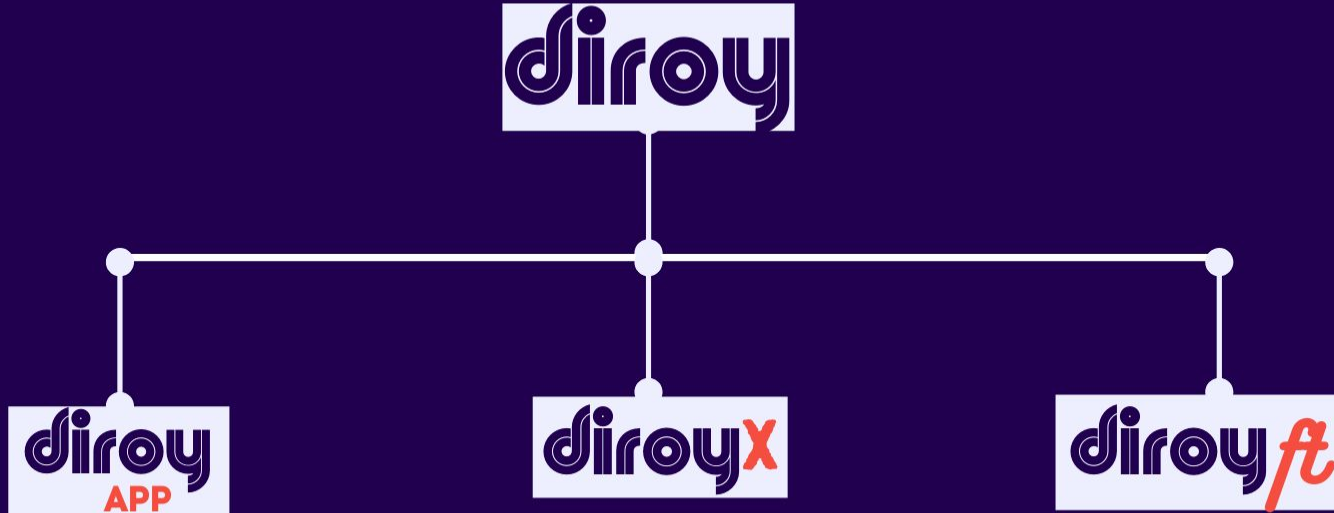




Solution

A robust framework including both software and hardware implementation for accurate tracking, monitoring and managing vehicles and people over a certain region without depending on GPS/GPRS/Internet using the concept of Swarm Intelligence.

Implementation



Mobile App to track geo-location uses **Swarm Intelligence** to find location decreasing usage of GPS/GPRS/Internet and **P2P Mesh network** to transmit information using Wifi, Bluetooth, Cellular frequency

Hardware device to be used in **Raised Pavement Reflective Markers** for recognizing, locating, & measuring speed using **Computer Vision and ML techniques** with highest accuracy without dependency on the driver.

Hardware device specifically for **Fleet Management** and users without application to be kept under monitoring, uses swarm and P2P Mesh Networking for **tracking cellular positioning**.

#DIROY

→ 01

Swarm Intelligence is the collective behavior of decentralized, self-organized systems, natural or artificial. The concept is employed in work on artificial intelligence. SI systems are typically made up of a population of simple agents interacting locally with one another and with their environment.

→ 02

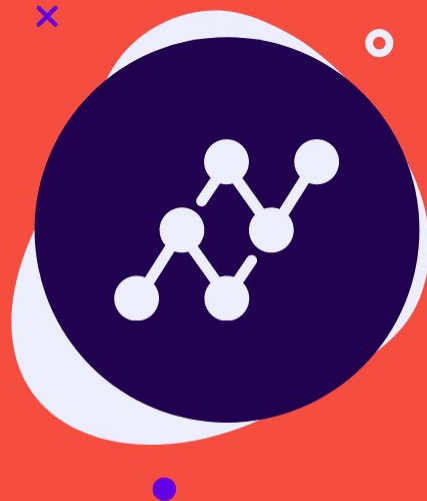
Using a referential based coordinate system and accessing movement data from devices like Accelerometers or Odometers, Gyroscopes/E-Compass to detect the location with respect to other nodes in the swarm thus not relying to Internet, GPS, or GPRS.

→ 03

Transmitting data into the various nodes of swarm thus detecting features of negligence, casualty, divergence etc. and for further action to be taken by the nodes for data transmission, collection, updation and management.

Swarm Intelligence

How the behaviour of ants gave the idea of decentralizing tracking and monitoring?



P2P Mesh Networks

→ 01

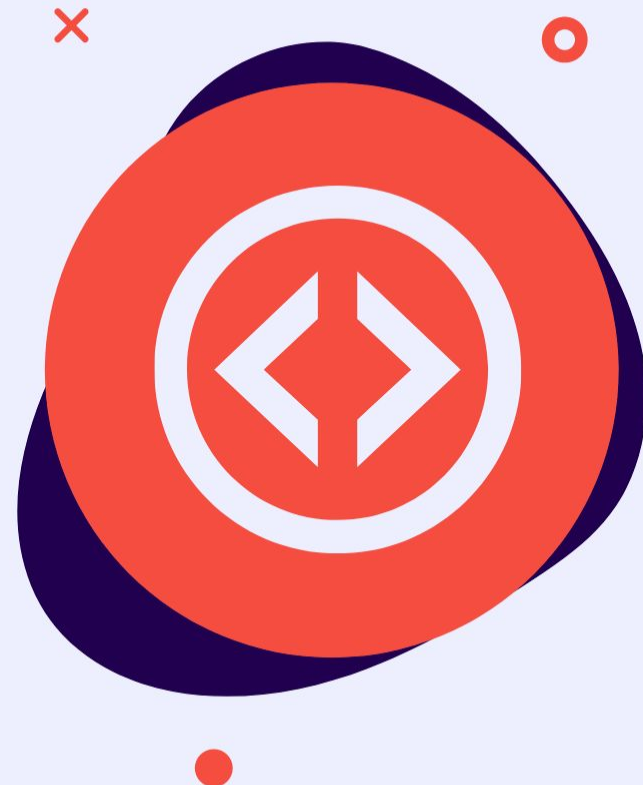
Peer-to-peer networking distributed application architecture that partitions tasks or workloads between peers. Peers are equally privileged, equipotent participants in the application. They are said to form a peer-to-peer network of nodes.

→ 02

A mesh network topology in which the infrastructure nodes connect directly, dynamically and non-hierarchically to as many other nodes as possible and cooperate with one another to efficiently route data from/to clients. This lack of dependency on one node allows for every node to participate in the relay of information.

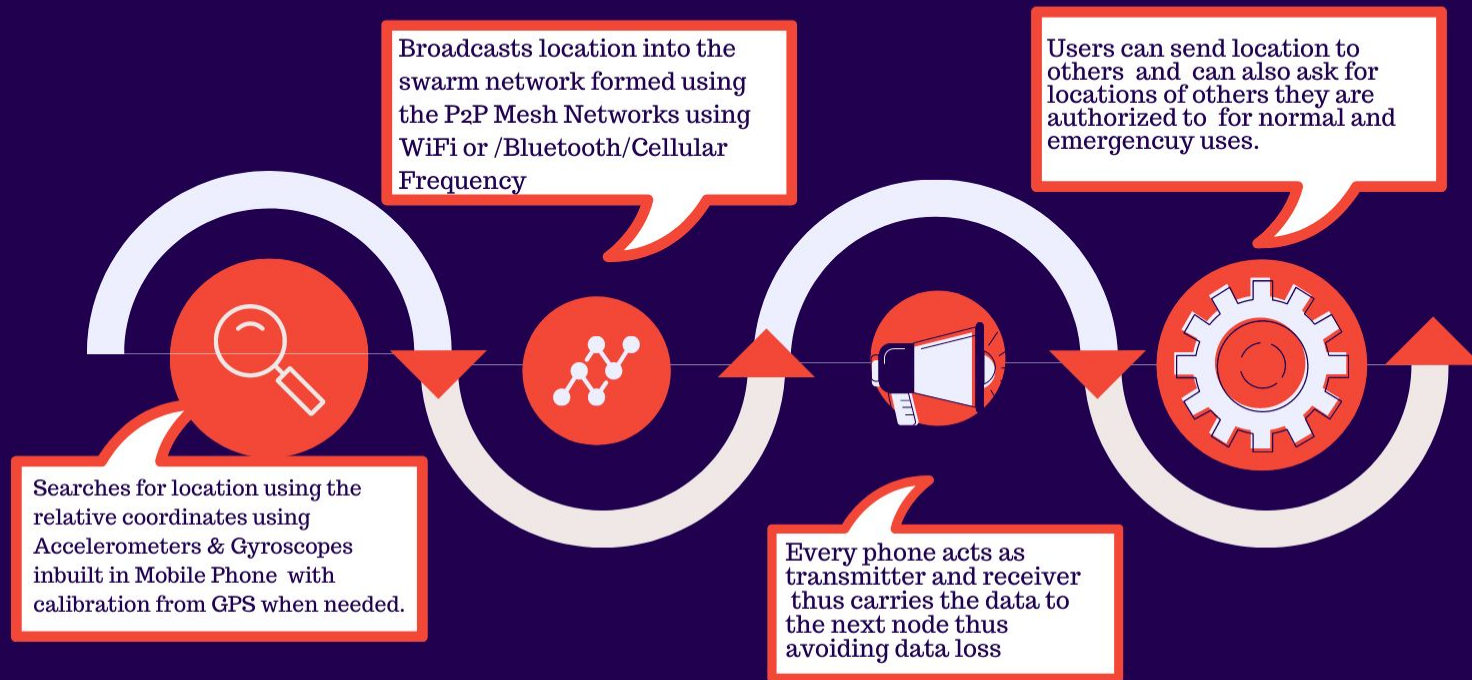
→ 03

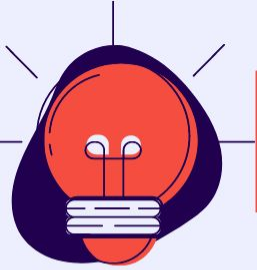
Combining the two topologies, thus making an interconnected of continuous data transfer channel using WiFi, Bluetooth or Cellular Frequency to transmit data, thus expanding the range of data sharing with effective data transfer and least loss.





diroy APP

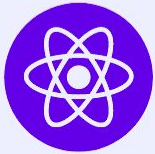




TECH STACK



Mobile Application Development



Database Management System

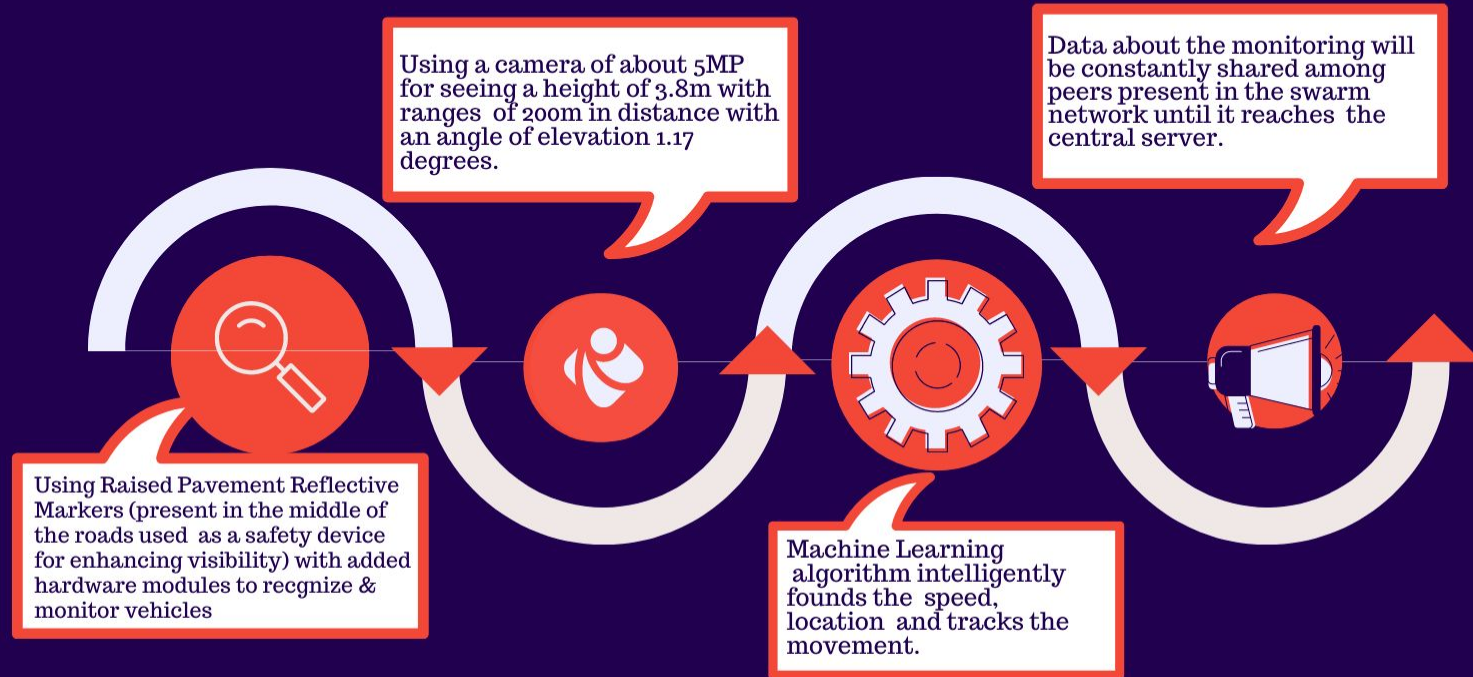


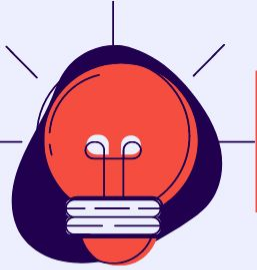
Technologies & APIs





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TECH STACK



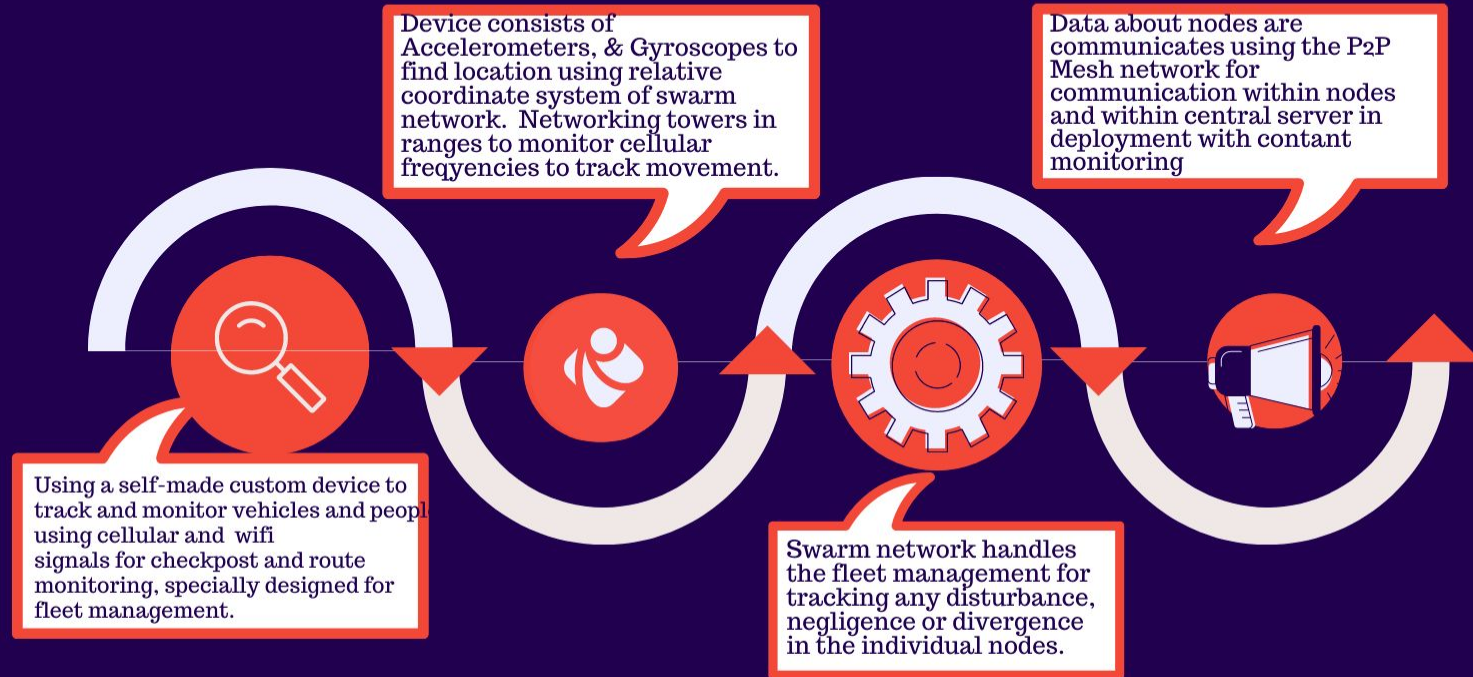
Hardware Devices Required

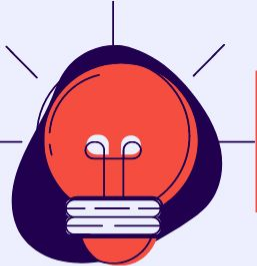
- Raspberry Pi 0 INR 1000
- Camera Module INR 250
- NEO SIM 900A (GPS-GSM Module) INR 550
- Power Source Depends on requirement

Cost for monitoring per 200mts = INR 1800

Raised Pavement Reflective Markers







TECH STACK



Device to be installed in live surveillance vehicles

- | | |
|--|------------------------|
| • Raspberry Pi 0 | INR 1000 |
| • NEO SIM 900A (GPS-GSM Module) | INR 250 |
| • Node MCU (WiFi) | INR 198 |
| • MPU 6050 (Accelerometer & Gyroscope unit) | INR 150 |
| • Connecting wires and Casing (with a Suction CUP) | INR 50 |
| • Power Source (Solar preferable) | Depends on requirement |

Cost per device= INR 1650

Device at Different Nodes or Main Junctions

- | | |
|--|------------------------|
| • Raspberry Pi 0 | INR 1000 |
| • Camera Module | INR 550 |
| • Tx & Rx Transmitter and receiver module (Complete RF Module) | INR 150 |
| • High Gain Antenna | INR 60 |
| • Node MCU | INR 198 |
| • Power Source (Solar preferable) | Depends on requirement |

Cost per device= INR 1960



DEMO LINKS

Github Repository Link: <https://github.com/deluminators/Diroy>

Demo Video Link:

<https://drive.google.com/drive/folders/lvr492zOsBTlQQhCEpUKsQsrATaepo2Zf?usp=sharing>

Android Application Download:

https://drive.google.com/file/d/lxKlbICJYdbRLezJkOiGMI_z_LdQoTtlf/view?usp=sharing