

DIROY the intelligent locator

team deluminators

IIIT Bhubaneswar



team deluminators

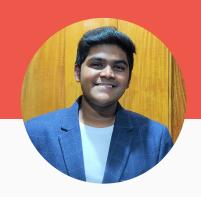


SANJIBAN SENGUPTA



/kahanikaar

Team Lead Machine Learning **Project Concept**



ANANYA APRAMEYA



/aprameya20

Backend Development Project Design **Operations & Logistics**



SOURAV KUNDA



/07souravkunda

Application Development Backend Development Project Concept



DEBRUP DUTTA



/xzayvian

Scripting **Documentation** Project Design

IIIT BHUBANESWAR

X

Problem Statement

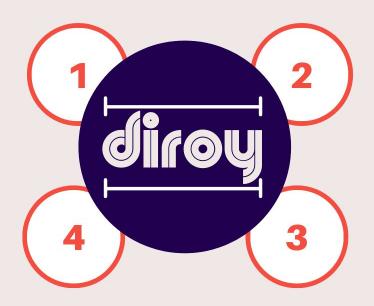


SMART TRACKING

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 roboust 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.





→ 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 decentalizing 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 continous 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.









Broadcasts location into the swarm network formed using the P2P Mesh Networks using WiFi or /Bluetooth/Cellular Frequency

Users can send location to others and can also ask for locations of others they are authorized to for normal and emergencuy uses.

Searches for location using the relative coordinates using Accelerometers & Gyroscopes inbuilt in Mobile Phone with calibration from GPS when needed.

Every phone acts as transmitter and receiver thus carries the data to the next node thus avoiding data loss







TECH STACK



Mobile Application Development







Database Management System





Technologies & APIs





















Using a camera of about 5MP for seeing a height of 3.8m with ranges of 200m in distance with an angle of elevation 1.17 degrees. Data about the monitoring will be constantly shared among peers present in the swarm network until it reaches the central server.



Machine Learning algorithm intelligently founds the speed, location and tracks the movement.







TECH STACK



Hardware Devices Required

Raspberry Pi 0

• Camera Module

NEO SIM 900A (GPS-GSM Module)

Power Source

Cost for monitoring per 200mts = INR 1800

INR 1000

INR 250

INR 550

Depends on requirement











Device consists of Accelerometers, & Gyroscopes to find location using relative coordinate system of swarm network. Networking towers in ranges to monitor cellular frequencies to track movement.

Data about nodes are communicates using the P2P Mesh network for communication within nodes and within central server in deployment with contant monitoring



Swarm network handles the fleet management for tracking any disturbance, negligence or divergence in the individual nodes.







TECH STACK



Device to be installed in live surveillance vehicles

•	R	a	S	p	b	e	r	r	/	P	i	0	

NEO SIM 900A (GPS-GSM Module)

Node MCU (WiFi)

 MPU 6050 (Accelerometer & Gyroscope unit)

 Connecting wires and Casing (with a Suction CUP)

• Power Source (Solar preferable)

Cost per device= INR 1650

INR 1000

INR 250 INR 198

INR 150

INR 50

Depends on requirement

Device at Different Nodes or Main Junctions

Raspberry Pi 0 INR 1000Camera Module INR 550

• Tx & Rx INR 150

Transmitter and receiver module (Complete RF Module)

• 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/Ivr492zOsBTlQQhCEpUKsQsr ATaepo2Zf?usp=sharing

Android Application Download:

https://drive.google.com/file/d/IxKlbICJYdbRLezJkOiGMI z LdQoTtl f/view?usp=sharing

