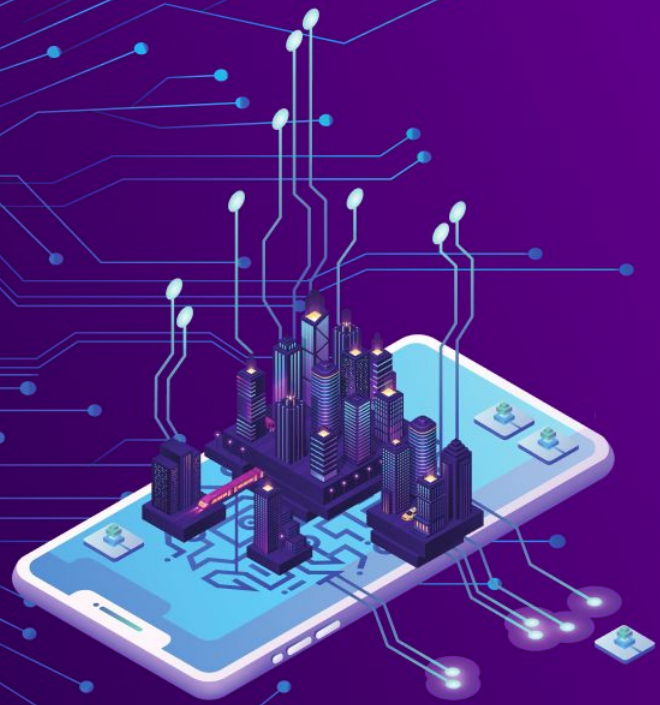
CYBERNATED ROAD NETWORK MANAGEMENT



Our Objectives

Interconnecting all the vehicles through a self-regulating colossal network thereby establishing an efficient form of traffic coordination.

Incorporation of decisive and predictive algorithms to simulate and manipulate such a dynamic network.

Digitalization of traffic lights and other modules.
Direct intimation to the drivers through vehicle-integrable electronic devices.

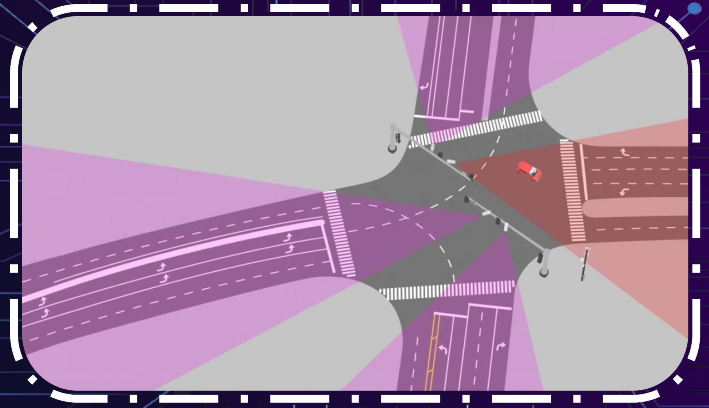
The Implementation

It’s Quite a Long journey. But, the Destination’s worth it.

Take a look at the multitude of technologies involved in its implementation.

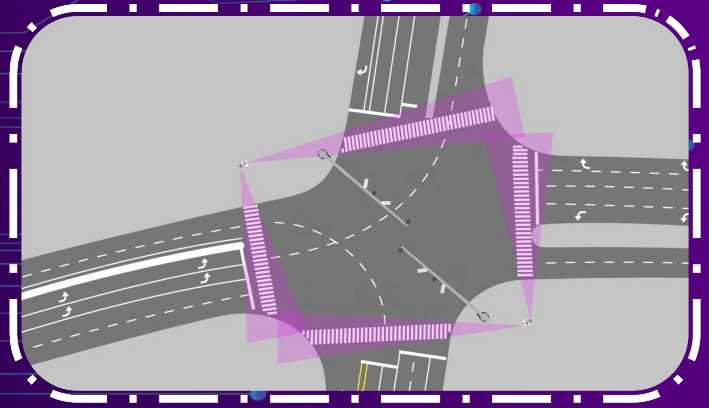
Conventional Technologies

Vision-based vehicle detection



It is a video-based detector that uses background subtraction techniques to find foreground objects in a video sequence. Experimental results show that the accuracy of the proposed vehicle counting system is around 96%.

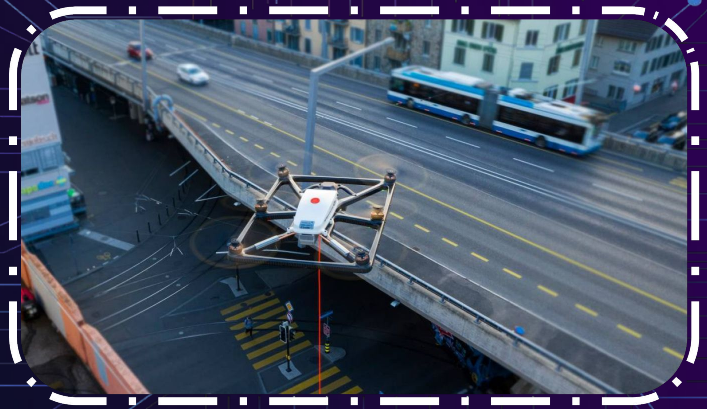
Crosswalk detection



This detector can efficiently extract crosswalk regions under various illumination conditions, which can avoid the selection of thresholds according to the current environment situation and greatly improve the system flexibility and robustness.

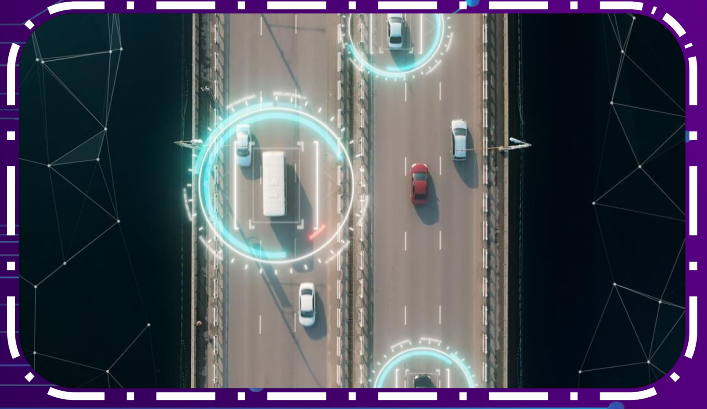
Contemporary Technologies

Drone Assistance



Drones provide bird's eye supervision and nimble assistance to eliminate blind spots. With their smooth maneuverability, speedy and time-critical results, thorough and detailed surveying, drones prove a resourceful substitute to conventional procedures.

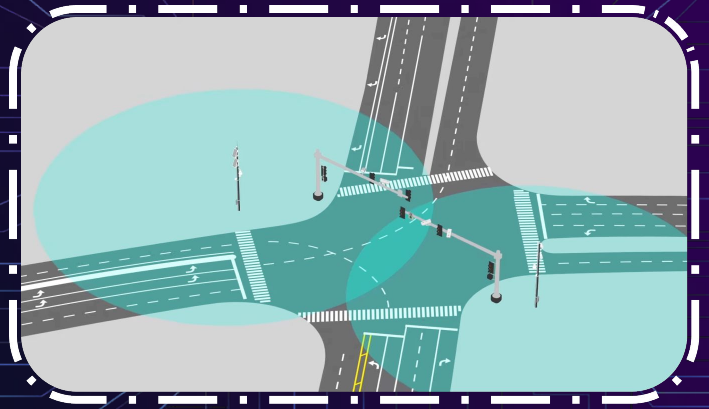
Smart Roadways with HSN



Smart pavements embedded with fibre optical cable technology and wireless connectivity could facilitate high speed seamless data flow. These roadways are also capable of detecting vehicle weight, size, speed, classifications etc.

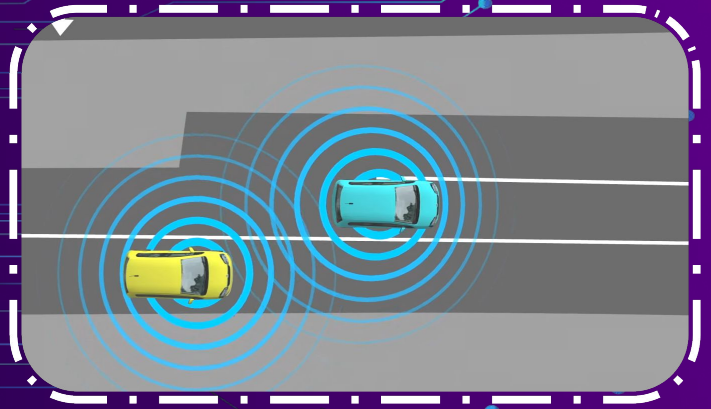
State- of- the- art Technologies

Road-Side Units



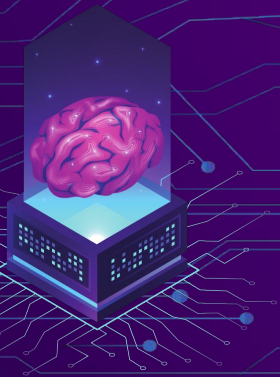
A special wireless communicating device located on the roadside that provides connectivity and information support to passing vehicles, including safety warnings and traffic statistics.

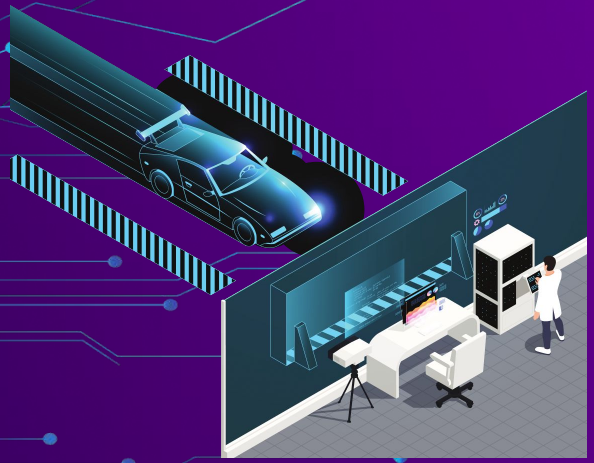
Onboard Units



A transceiver that is normally mounted in or on a vehicle to facilitate Inter-vehicular communication and signal coordination with the roadside units. It is equipped with a user-interactive display.

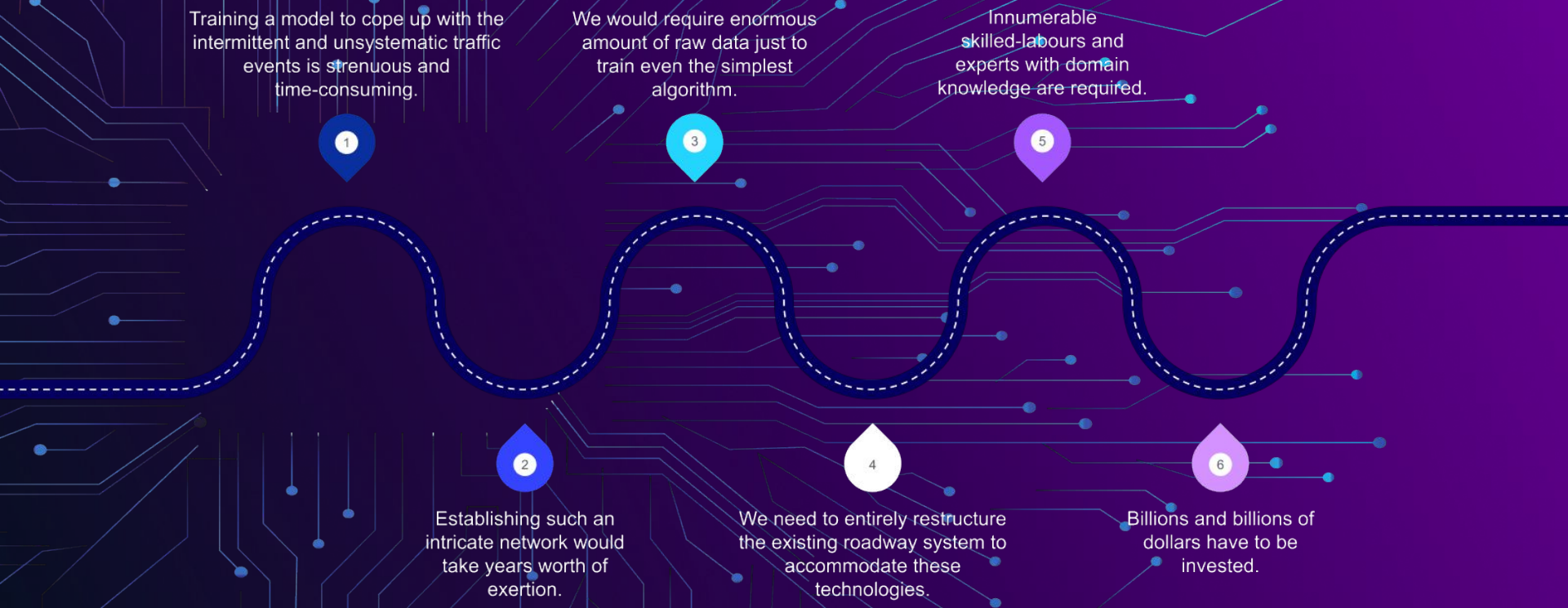
Digitized Traffic Management Centers





DTMCs have to be established to incessantly monitor traffic signals, intersections, and roads and proactively deploy traffic management strategies to reduce congestion. They must be equipped with current generation servers to store traffic data and ultra high speed wifi to ensure uninterrupted connectivity. Each and every road network modules over a vast region could be directly accessed from these centers.

Complexities in Implementation



Achieving our destiny is rarely a straightforward path

Role of AIoT

Back- End Objectives

Data

Collection of tremendous amounts of raw data through variable input sensors. Extracting and organising essential information from the raw data.

Algorithm

To develop pattern recognizing and decision making algorithms and to train such algorithms by feeding loads of information.

Processing

Real time video processing to derive valuable inputs like vehicle count, classifications and mobility.

Output

Self- sustainability and self- reliability of the network and ensured safety against cyber threats.

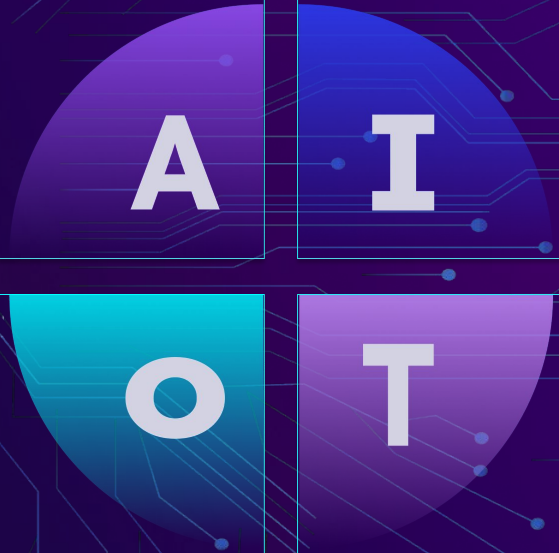
Core concepts of AIoT

PATTERN RECOGNITION

To recognize and retrace multitudes of paradigm associated with the traffic flow in variable situations.

DATA SCIENCE

To derive and organize valuable information from the accumulated raw data for further processing.



To create self- reliant algorithms that can learn from the collected data to make coherent decisions.

MACHINE LEARNING

To derive meaningful outputs from digital images, real- time video footages and other visual inputs

COMPUTER VISION

Individual Benefits

Always Green

Complete prevention of traffic jams through AIoT. Enabling the driver to avoid undesired red signals.

Time and Money

Overall reduction in the travelling time and cost due to a streamlined traffic flow.

Save Lives

Clearing out roadways for ambulances and fire-engines during emergencies while minimising traffic constraints for others.

Caution

Warning the drivers about potential hazards well in advance through intuitive visual aids. Emergency electronic breaks.

Assistance

Dynamic parking availability, virtual display for blind spots, Intersection crossing, instructions on road weather blockage and other sort of assistances. Can assist Level- 4 Autonomous vehicle.

Social Benefits

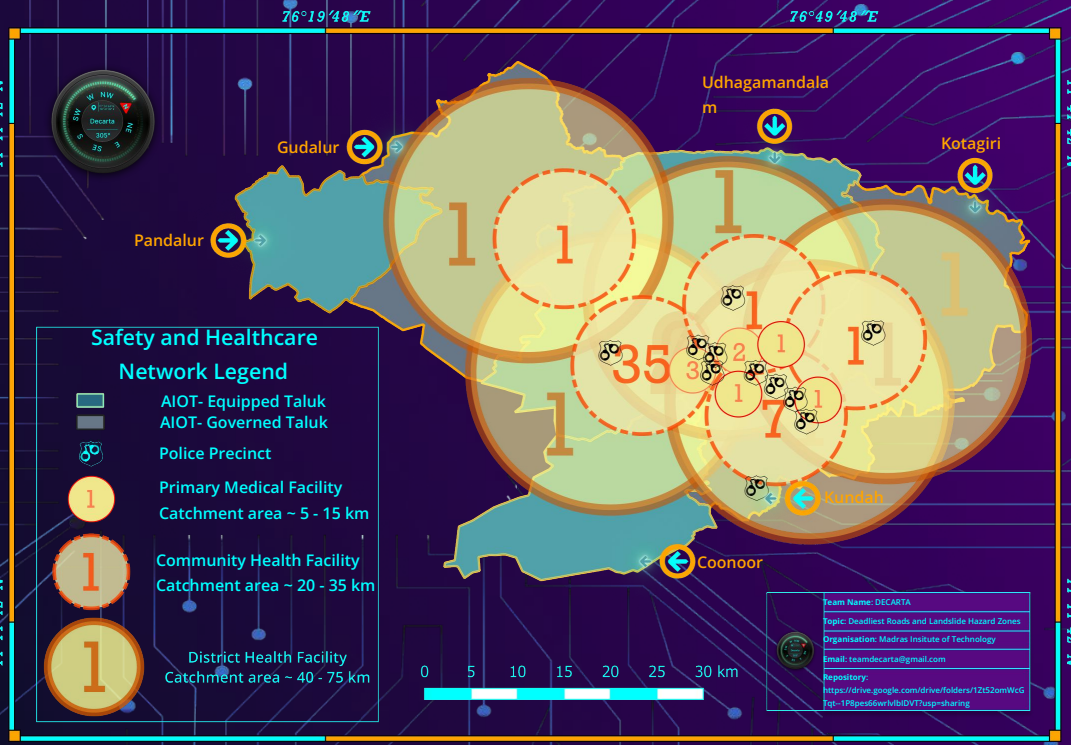
- *Well-organised traffic network means decreased accidents.*
- *Efficient traffic flow will increase the productivity of socio- economic activities.*
- *Methodical assistance to disaster prevention and management.*
- *Energy-saving through indirect prevention of wasteful fuel-consumption.*
- *Mitigation of air and noise pollution.*

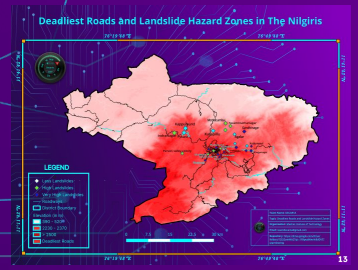
DEMARCATING THE DEADLIEST ROADS AND ACHIEVING AIoT AMELIORATION

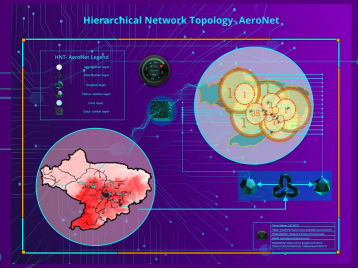
- Uncovering the Perils of the Nilgiris

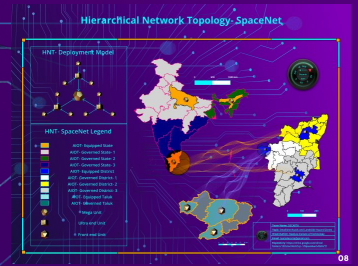
An All- Encompassing Case Study

AIOT- Driven Safety and Healthcare Network of The Nilgiris

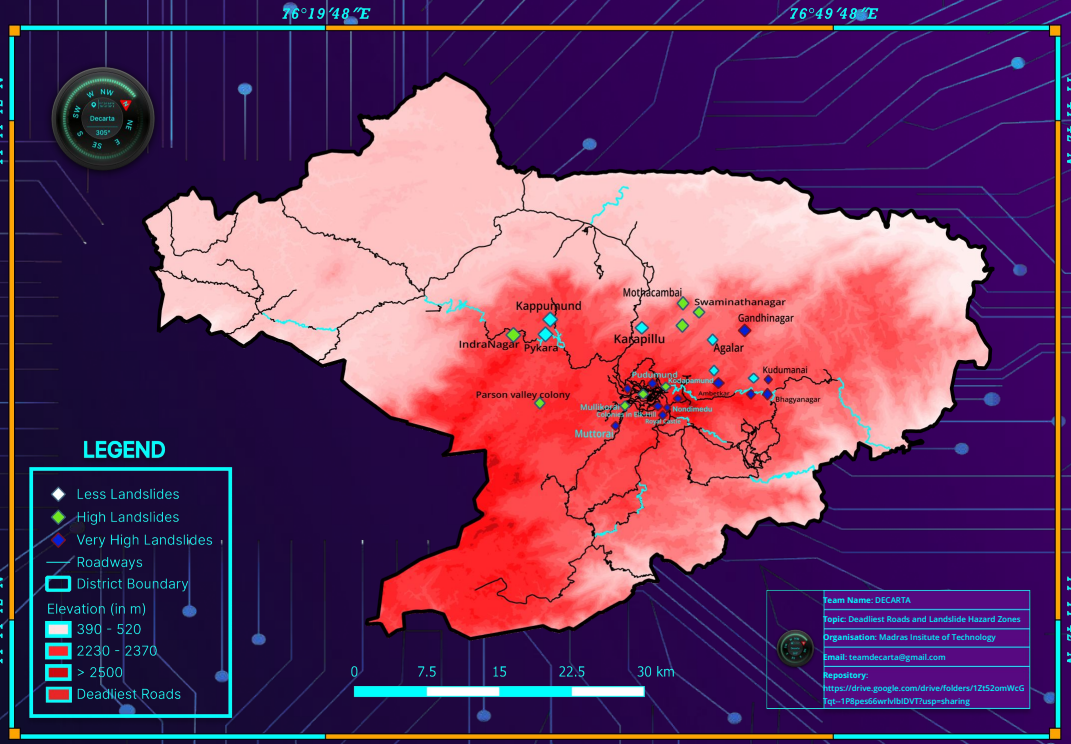


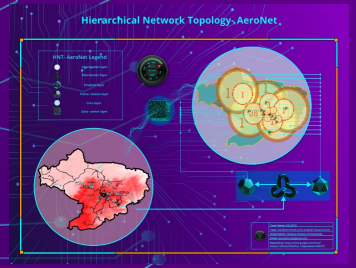


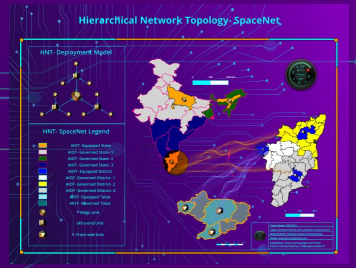


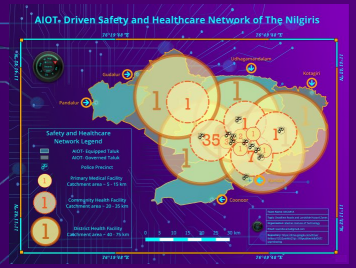


Deadliest Roads and Landslide Hazard Zones in The Nilgiris



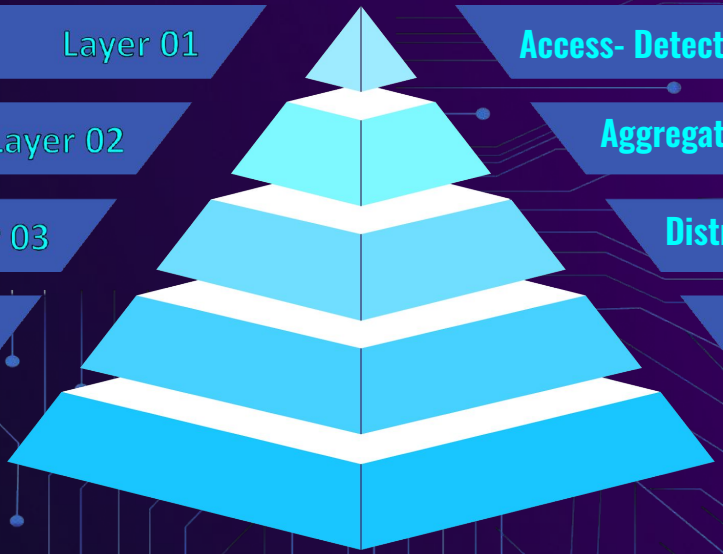






Hierarchical Network Topology

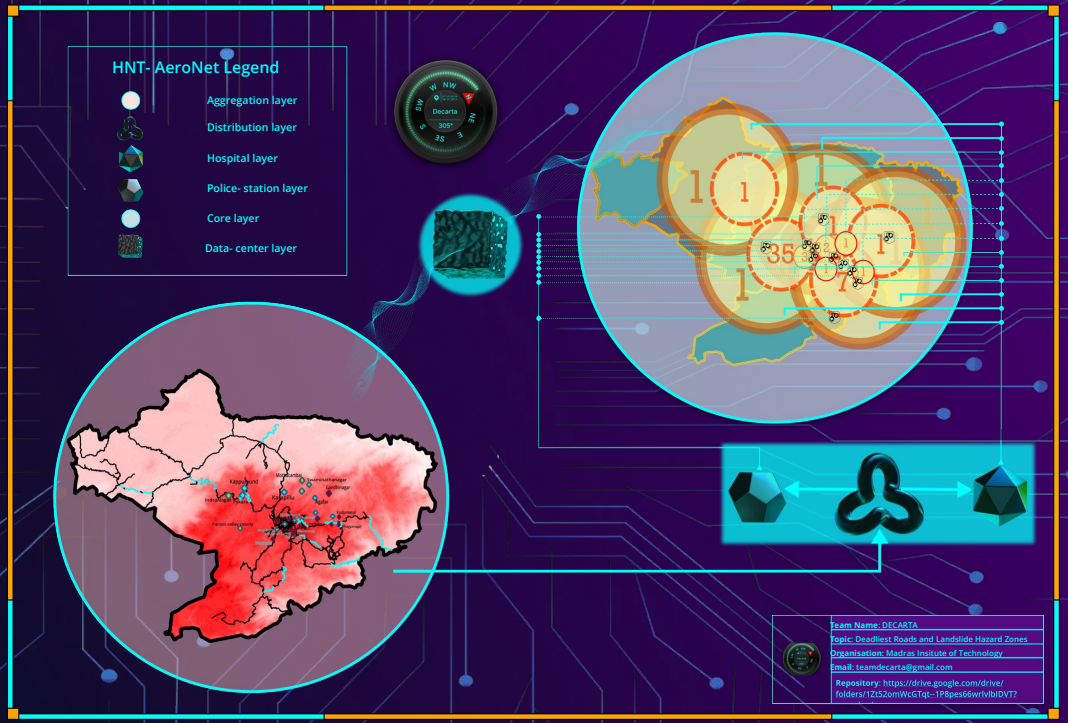
AeroNet - High Altitude Platform Station and Artificial Intelligence of Things networks

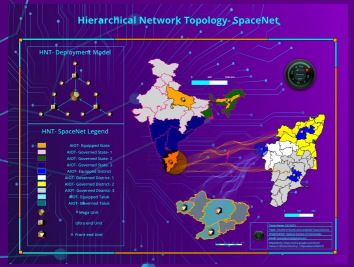


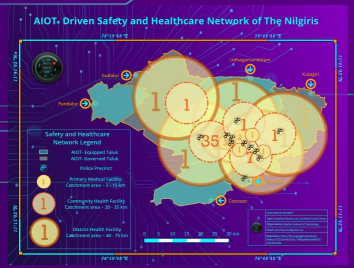
Layer 01	Access- Detection	*cameras, sensors, and other detection equipment*
Layer 02	Aggregation- Advanced Analytics	*switches and routers*
Layer 03	Distribution- Hospital, Police	*CCTV cameras, drones, 3D scanners and GPS systems*
Layer 04	Core- Backbone	*load balancing, packet switching, and routing protocols*
Layer 05	Data Center	*Cloud / Edge- Computing*

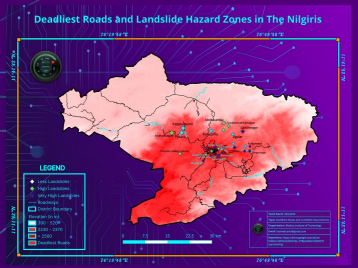

Layer 1: Access Layer
along the roads
real- time data on road blockages, and accidents
an army of intelligent sensors
Layer 2: Aggregation Layer
performing advanced analytics
real- time visibility into traffic patterns and network
VLANs, QoS, and security
Layer 3: Distribution Layer
Hospital Layer- latest medical technology
Police-Station Layer- fire and emergency services
Minor - nearest police station, Major- nearest hospital
Layer 4: Core Layer
high availability
redundancy
failover capabilities
Layer 5: Data Center
servers and storage devices
provide insights into traffic patterns, accident trends
send alerts to hospitals and police stations

Hierarchical Network Topology- AeroNet



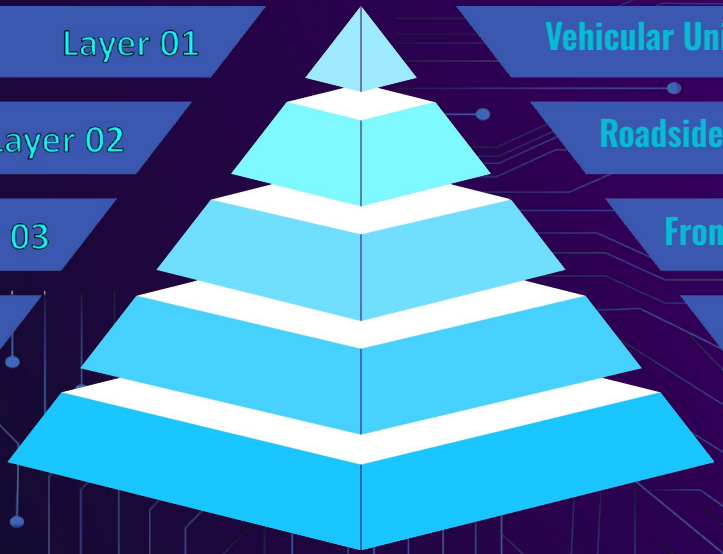




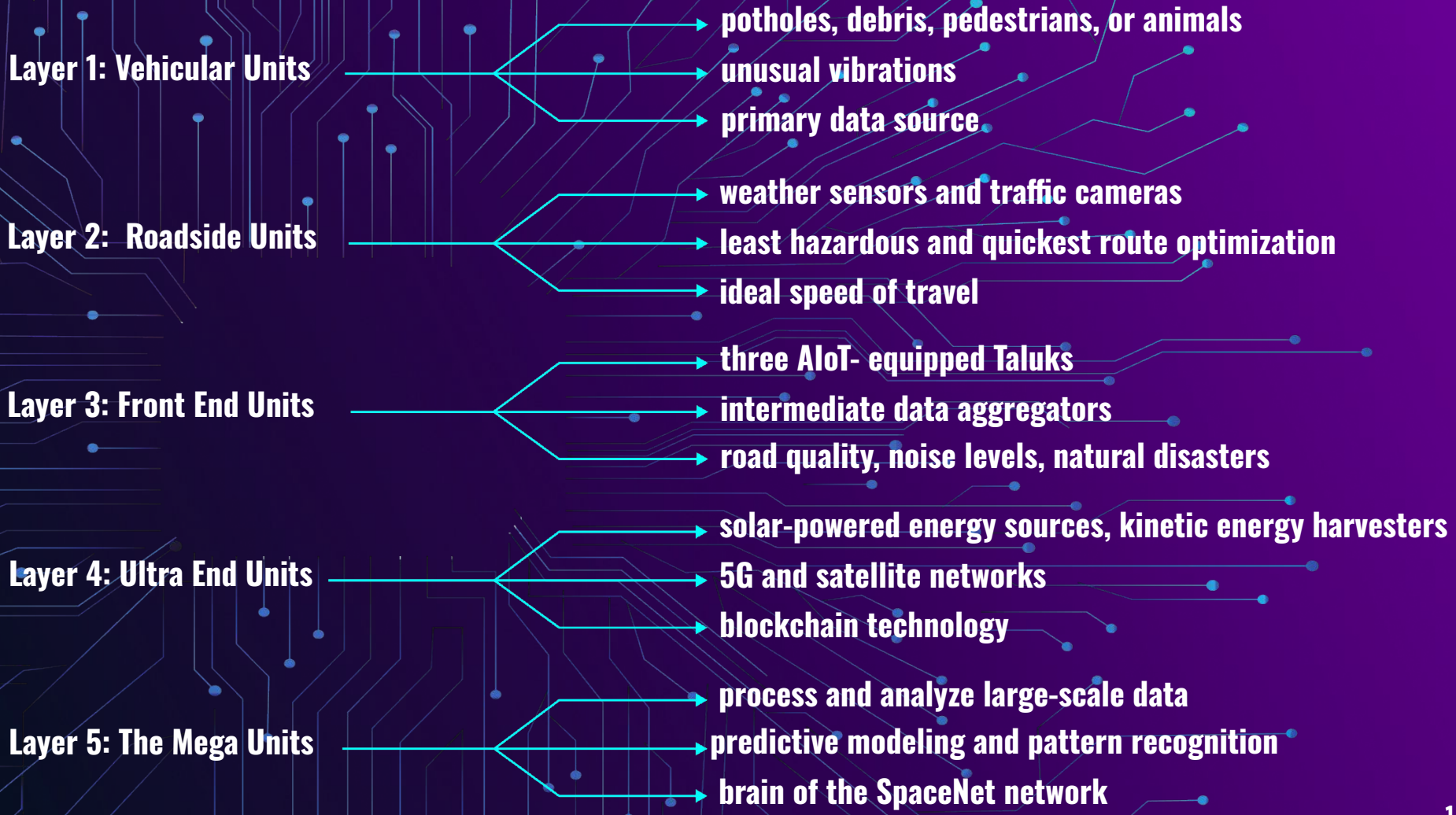


Hierarchical Network Topology

SpaceNet- Low- Earth orbit satellites and Artificial Intelligence of Things networks

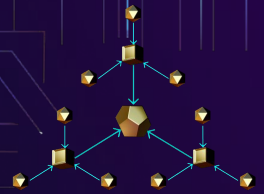


Layer 01	Vehicular Units	e- *chips or devices installed in vehicles*
Layer 02	Roadside Units	*wireless communication capabilities*
Layer 03	Front End Units	advanced sensors and AI algorithms
Layer 04	Ultra End Units	*5G and satellite networks*
Layer 05	The Mega Units	b*lockchain technology*


Layer 1: Vehicular Units
potholes, debris, pedestrians, or animals
unusual vibrations
primary data source
Layer 2: Roadside Units
weather sensors and traffic cameras
least hazardous and quickest route optimization
ideal speed of travel
Layer 3: Front End Units
three AIoT- equipped Taluks
intermediate data aggregators
road quality, noise levels, natural disasters
Layer 4: Ultra End Units
solar-powered energy sources, kinetic energy harvesters
5G and satellite networks
blockchain technology
Layer 5: The Mega Units
process and analyze large-scale data
predictive modeling and pattern recognition
brain of the SpaceNet network

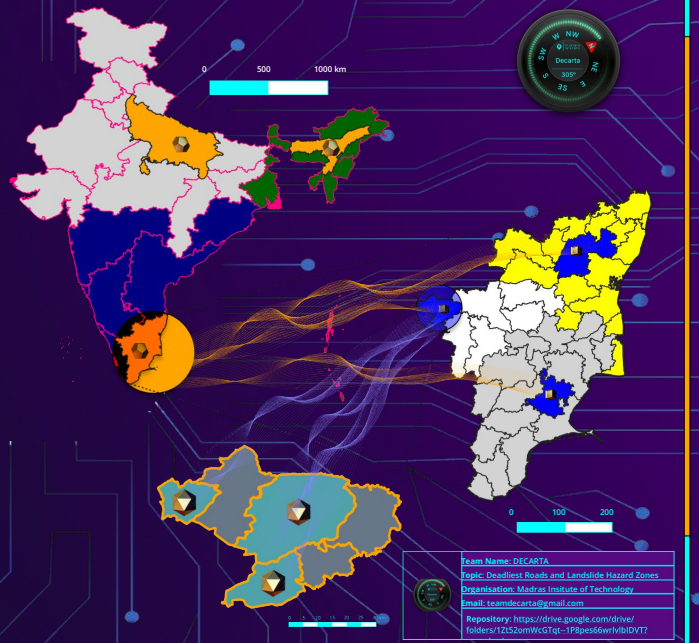
Hierarchical Network Topology- SpaceNet

HNT- Deployment Model

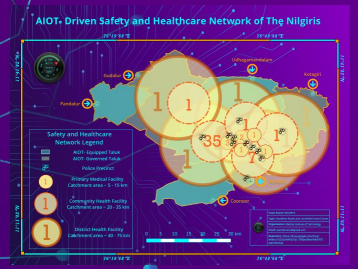


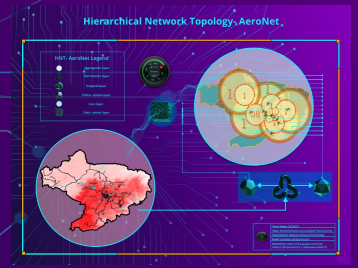
HNT- SpaceNet Legend

- AIOT- Equipped State
- AIOT- Governed State- 1
- AIOT- Governed State- 2
- AIOT- Governed State- 3
- AIOT- Equipped District
- AIOT- Governed District- 1
- AIOT- Governed District- 2
- AIOT- Governed District- 3
- AIOT- Equipped Taluk
- AIOT- Governed Taluk
- Mega Unit
- Ultra end Unit
- Front end Unit



Team Name: DECARTA
Topic: Deadliest Roads and Landslide Hazard Zones
Organisation: Madras Insitute of Technology
Email: teamdecarta@gmail.com
Repository: https://drive.google.com/drive/folders/1ZtS2omWcGTqt--1P8pes66wrlvlbIDVT?





Alignment with Strategic Development Goals

Good Health and Well-being

Healthcare maps improve access to emergency services and promote good health

Partnerships for the Goals

The maps require collaboration between stakeholders to achieve the SDGs and promote a sustainable and equitable world

Peace, Justice, and Strong Institutions

The maps contribute to strengthening institutions, promoting peace and justice, and promoting transparency and accountability

Industry, Innovation, and Infrastructure

HNT and AeroNet maps improve infrastructure and connectivity, promoting economic growth and innovation.

Sustainable Cities and Communities

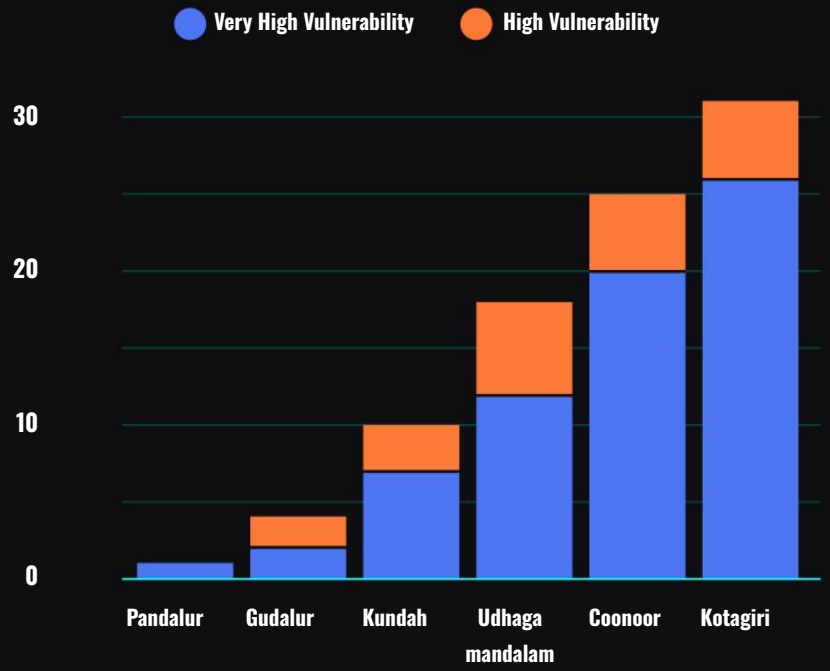
Landslide and dangerous road maps promote sustainable urban development and resilient communities

Climate Action

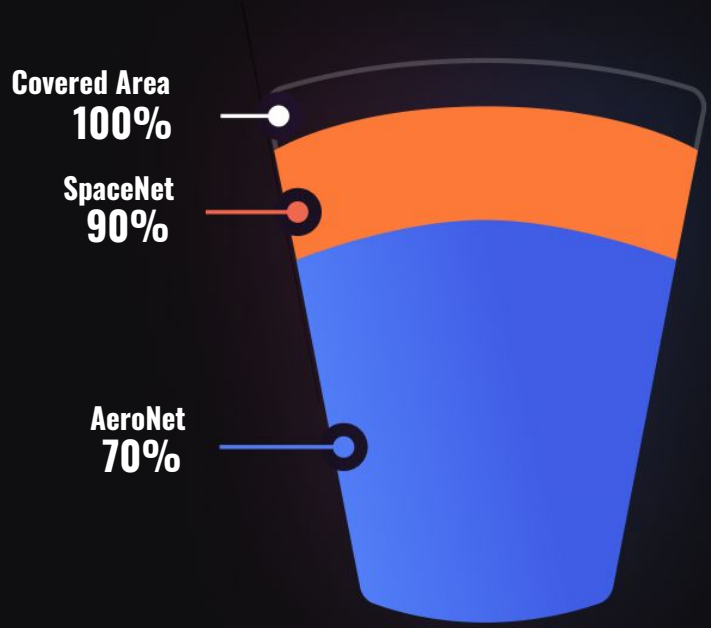
Landslide maps contribute to climate change mitigation efforts by identifying at-risk areas

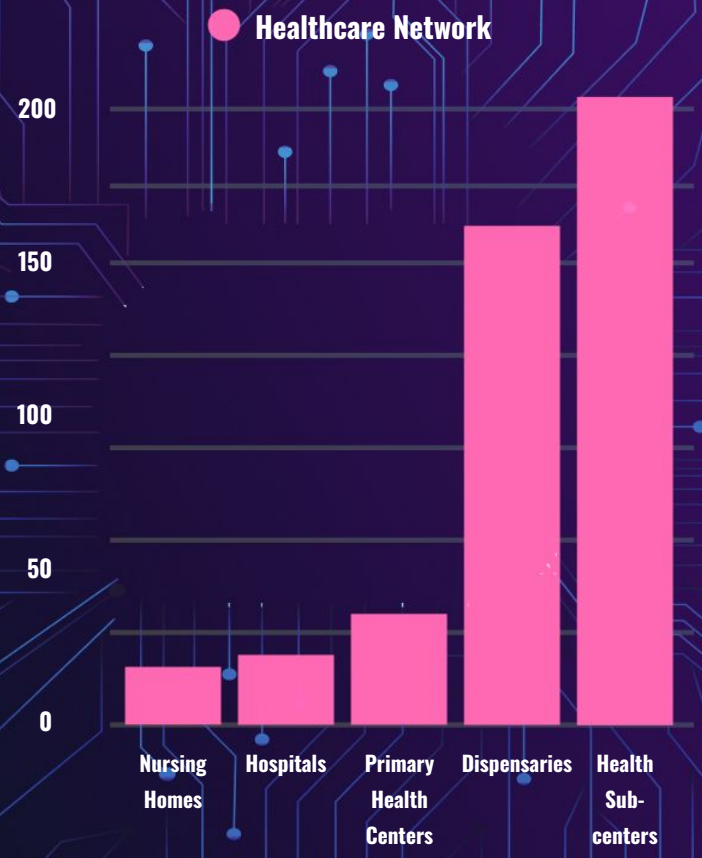
Our metrics

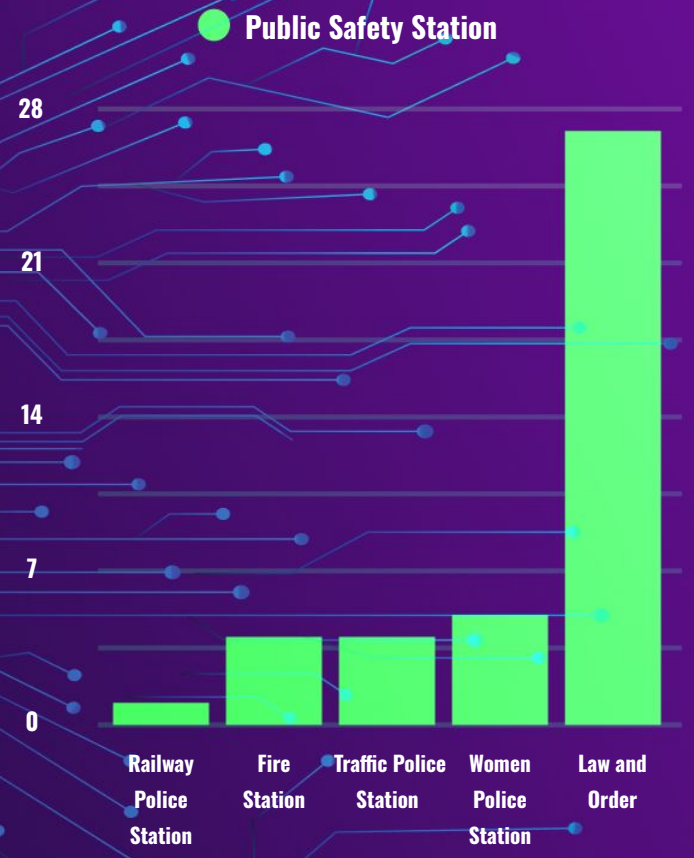
Landslide Hazard Risk Zones by Taluk

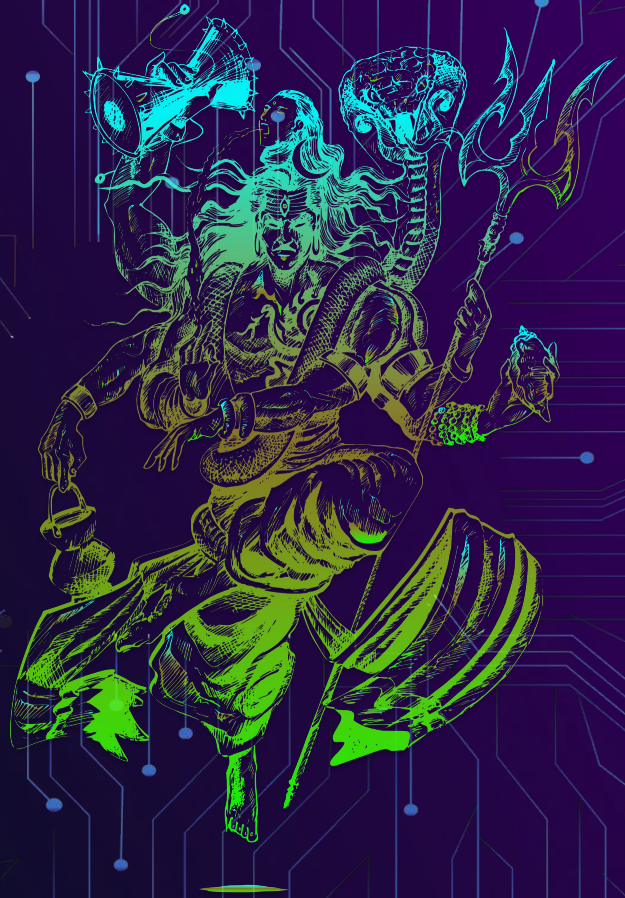


Effectiveness of HNT Network Implementation




Healthcare Network
200
150
100
50
0
Nursing Homes
Hospitals
Primary Health Centers
Dispensaries
Health Sub-centers


Public Safety Station
28
21
14
7
0
Railway Police Station
Fire Station
Traffic Police Station
Women Police Station
Law and Order



My Sincere Thanks !

"Yatha pinde
Tatha brahmande "