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Nambur (V), Pedakakani (M), Guntur (Dt.), Andhra Pradesh – 522 508
[Branch Program: Computer Science and Engineering (Internet of Things) – CSO]

MAJOR PROJECT

Batch: B-1

EMERGENCY ROUTE FINDER.

Project Guide

S. Saida Rao
Assistant Professor
Department of CSE (IoT)

Project Team

M. Balaji(21BQ1A4929)
M. Prabhas(21BQ1A4924)
U. Ganesh Sharma(22BQ5A4909)

Project Overview:

- Emergency vehicles are specialized vehicles used by first responders, such as police, firefighters, paramedics, and other emergency services, to quickly and effectively respond to emergencies and provide assistance in critical situations.

- In any emergency, it is crucial to reach the location quickly, and for that, the chosen route must be efficient in all aspects.

- There are multiple existing models to serve this necessity but there are many aspects to be considered to provide an efficient route.

Business Need / Opportunity:

- In the face of escalating traffic congestion, individuals are finding it challenging to meet time constraints during crucial situations. Our project aims to address this unmet need by leveraging Vehicular Ad Hoc Networks (VANETs) data to identify optimal routes.
- Some of the key factors taken into consideration by the customers are time efficiency, faster emergency response, improved quality of life.

Target Segment / Market Size:

- Our project aims to benefit emergency services, delivery services, public transportation, and individuals by optimizing routes for efficiency and reducing response time, using previous traffic data of Vehicular Ad Hoc Networks (VANETs).
- It is also replicable in any geographical position. The market size depends on the swift adoption by companies seeking efficient services, anticipating exponential growth as we integrate with government and private sectors.

Solution / Idea in Nutshell:

- Our solution leverages Vehicular Ad Hoc Networks (VANETs) data to optimize routes for emergency vehicles by using of Existing algorithms in a better performance. Algorithms such as Heuristic and Ant Colony helps to determine the best routes.
- Utilizing real-time traffic data from vehicles and roadside units, VANETs offer more accurate understanding of current traffic conditions compared to traditional methods. Unique benefits such as real time traffic adaptation, risk free journey and majorly for emergency service.

Business impact/ Measure of success:

- Our customers will witness a transformative shift in their travel experience, characterized by significantly reduced travel time and cost. Whether it is an emergency services responding to it swiftly, delivery operations streamlining routes, or individuals navigating through traffic more efficiently, the impact is evident.
- We aspire to elevate the entire transportation system by ensuring its efficacy in all possible situations for everyone.

EXISTING MODELS:

1.Geo-Based Routing:

- Geo-cast Protocol.

2.Position-Based Routing:

- Greedy Perimeter Stateless Protocol.

3.Proactive and Reactive protocols:

- LSR , AODV.

4.Prediction-Based Routing.

5.Cluster-Based Routing.

Disadvantages:

- Limited precision.
- Dependency on positioning systems.
- Constant overhead.
- Latency.
- Accuracy and dependency.
- Inefficiency.

Swarm Intelligence Routing:

- Swarm intelligence is a branch of Artificial Intelligence that draws the collective behaviour of social insects such as ants, bees etc..

- In routing, this intelligence can play a crucial role in selecting optimal routes, even in a complex environment, through the application of simplified local rules.

- Eg: 1. Ant Colony Optimization.
  2. Particle Swarm Optimization.

Ant Colony Optimization(ACO):

- Ant Colony Optimization (ACO) is a nature-inspired optimization algorithm that is based on the foraging behavior of real ants. It was introduced by Marco Dorigo in the early 1990s. ACO is commonly used to solve combinatorial optimization problems.

- The Ant Colony Optimization (ACO) algorithm emerges as a powerful tool in Vehicular Ad Hoc Networks (VANETs), enabling the generation of efficient routing paths over complex regions. By mimicking the foraging behavior of real ants, ACO takes into account dynamic factors such as traffic congestion, varying weather conditions, and unexpected accidents

Key components:

- Ants : In ACO, artificial ants are used to represent agents that traverse a solution space. These ants build solutions by moving from one solution component to another.

- Pheromones : Ants deposit a chemical substance called pheromone on the components of the solution they traverse. Pheromones serve as a form of indirect communication among ants.

- Solution Construction : Ants construct solutions by probabilistically selecting solution components based on the amount of pheromone present. Higher pheromone levels make a component more likely to be chosen.

- Pheromone Update : After all ants have constructed solutions, the pheromone levels on the solution components are updated. Shorter or more optimal paths receive higher pheromone reinforcement.
- Evaporation : Pheromone levels evaporate over time to mimic the transient nature of pheromones in real ant colonies.

$$p_{xy}^{k} = \frac{(\tau_{xy}^{\alpha})(\eta_{xy}^{\beta})}{\sum_{z \in \text{allowed}_x} (\tau_{xz}^{\alpha})(\eta_{xz}^{\beta})}$$

$$\tau_{xy} \leftarrow (1-\rho)\tau_{xy} + \sum_{k}^{m} \Delta\tau_{xy}^{k}$$

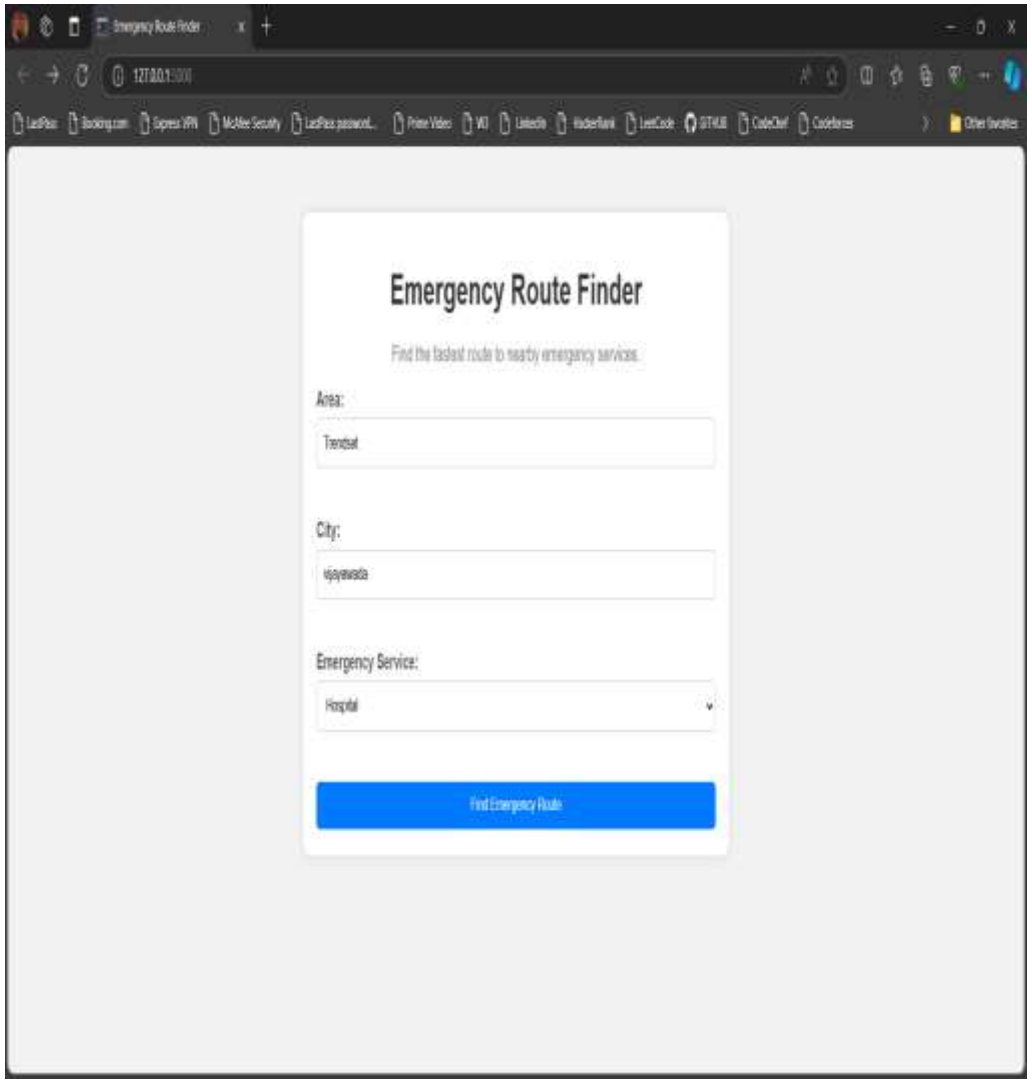
$$\Delta\tau_{xy}^{k} = \begin{cases} Q/L_k \\ 0 \end{cases}$$

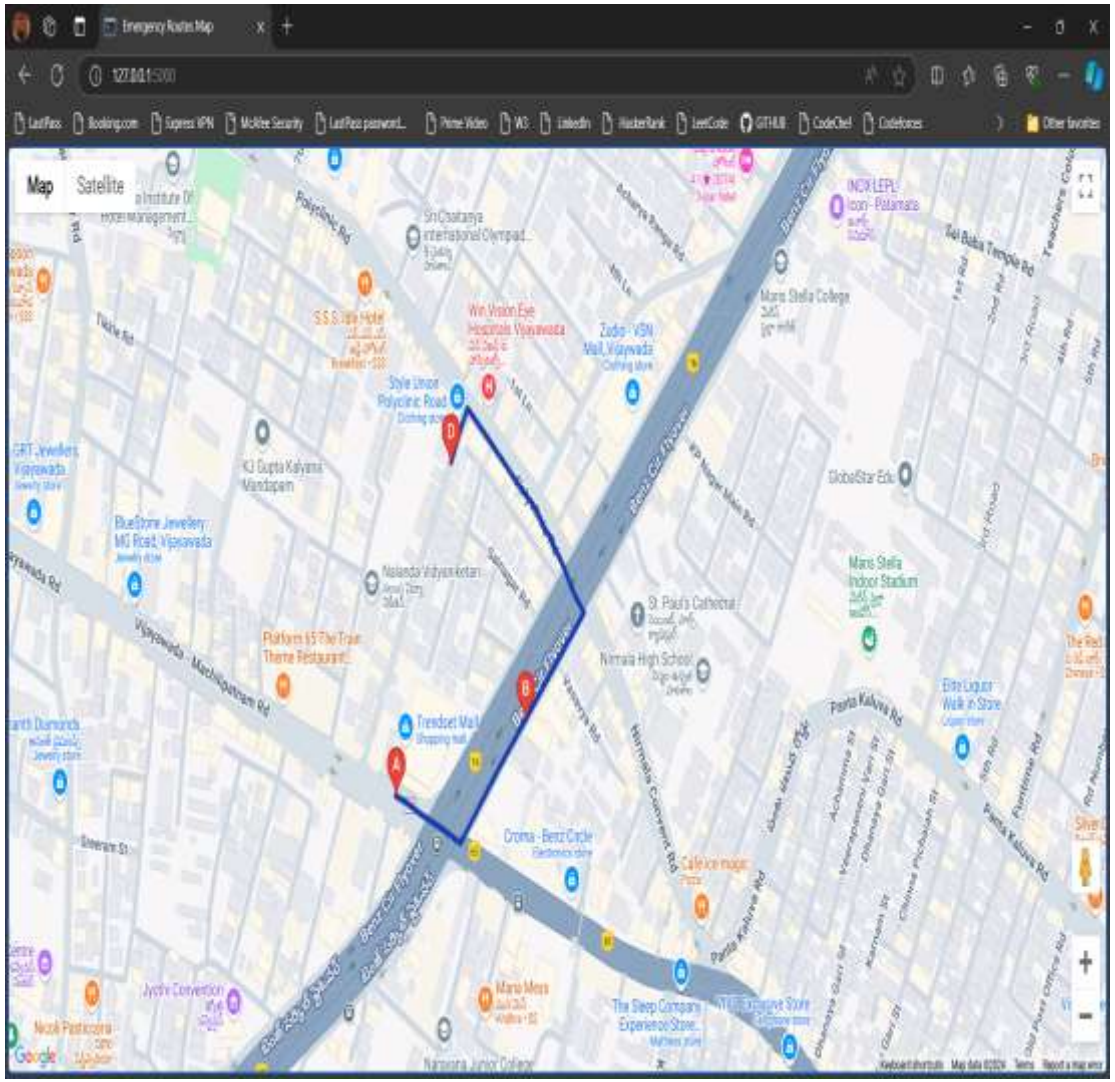
Optimization Goals:

- Dynamic Networking.
- Accuracy improvements.
- Energy efficiency.

These goals can be achieved by leveraging ML techniques into this Ant Colony Optimization (ACO) Algorithm. By adaptive routing, Fast decision making and Energy aware routing etc..

OUTPUT:


Emergency Route Finder
Find the fastest route to nearby emergency services.
Area:
Trendset
City:
vijayawada
Emergency Service:
Hospital
Find Emergency Route


Map
Satellite

THANK YOU