

EDGE-BASED V2X EFFICIENT TRAFFIC EMERGENCY RESPONDING PROTOCOL (TASK SCHEDULING)

CONFERENCE: DIVANET '21
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GROUP 12 -
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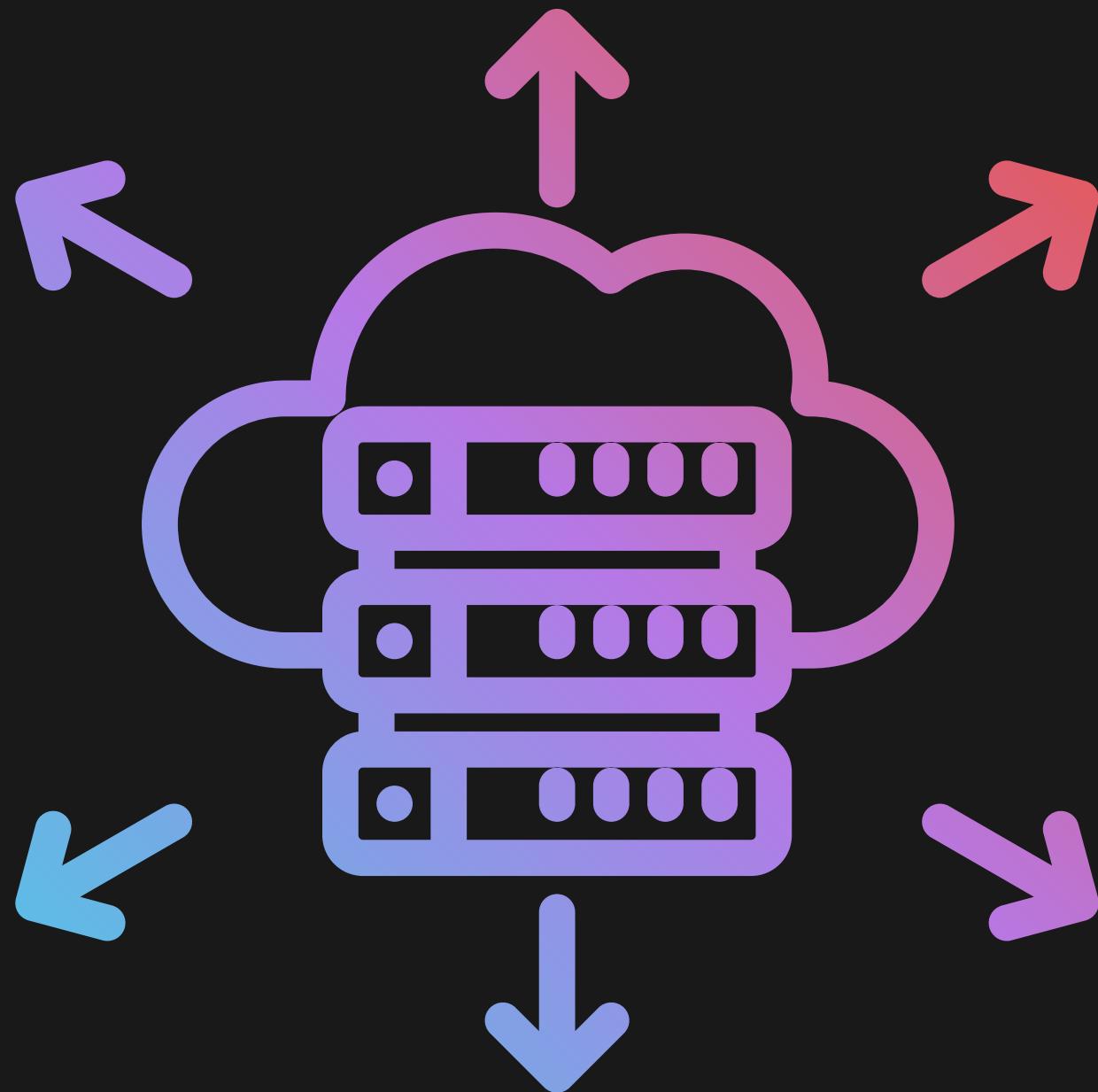
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UNDERSTANDING THE PROBLEM STATEMENT

“When accidents happen on the road, emergency vehicles often get delayed – this project solves that by quickly finding and guiding the nearest rescue vehicle using smart road-side edge devices.”

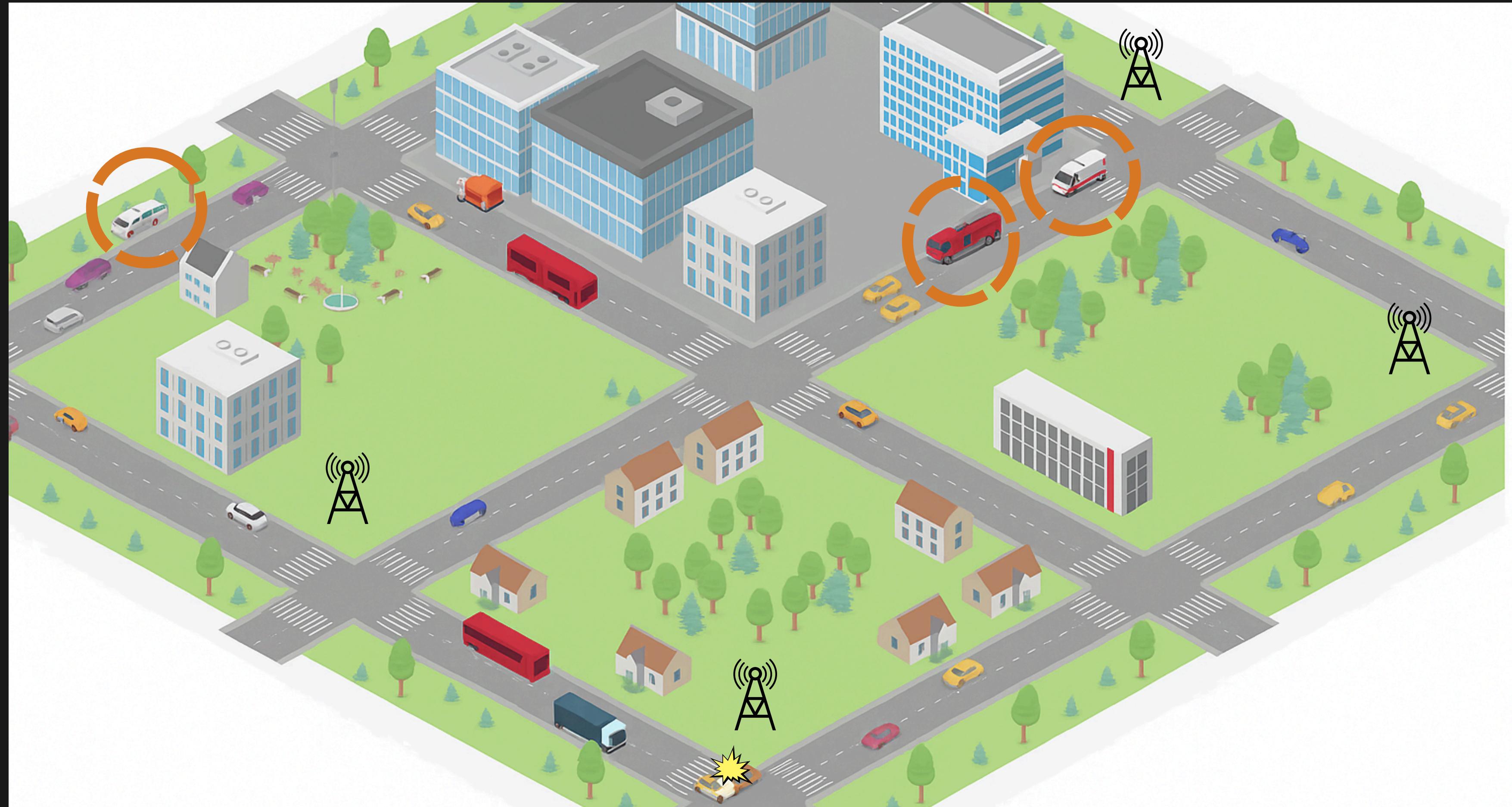


WHY EDGE ?



- EDGE NODES = PROXIMITY = REDUCED LATENCY
- REAL-TIME AWARENESS OF ACCIDENT ZONES VIA EDGE DATA COLLECTION AND FASTER RESPONSE
- IDEAL FOR DECENTRALIZED, DYNAMIC TRAFFIC ENVIRONMENTS , REDUCED CLOUD DEPENDENCY

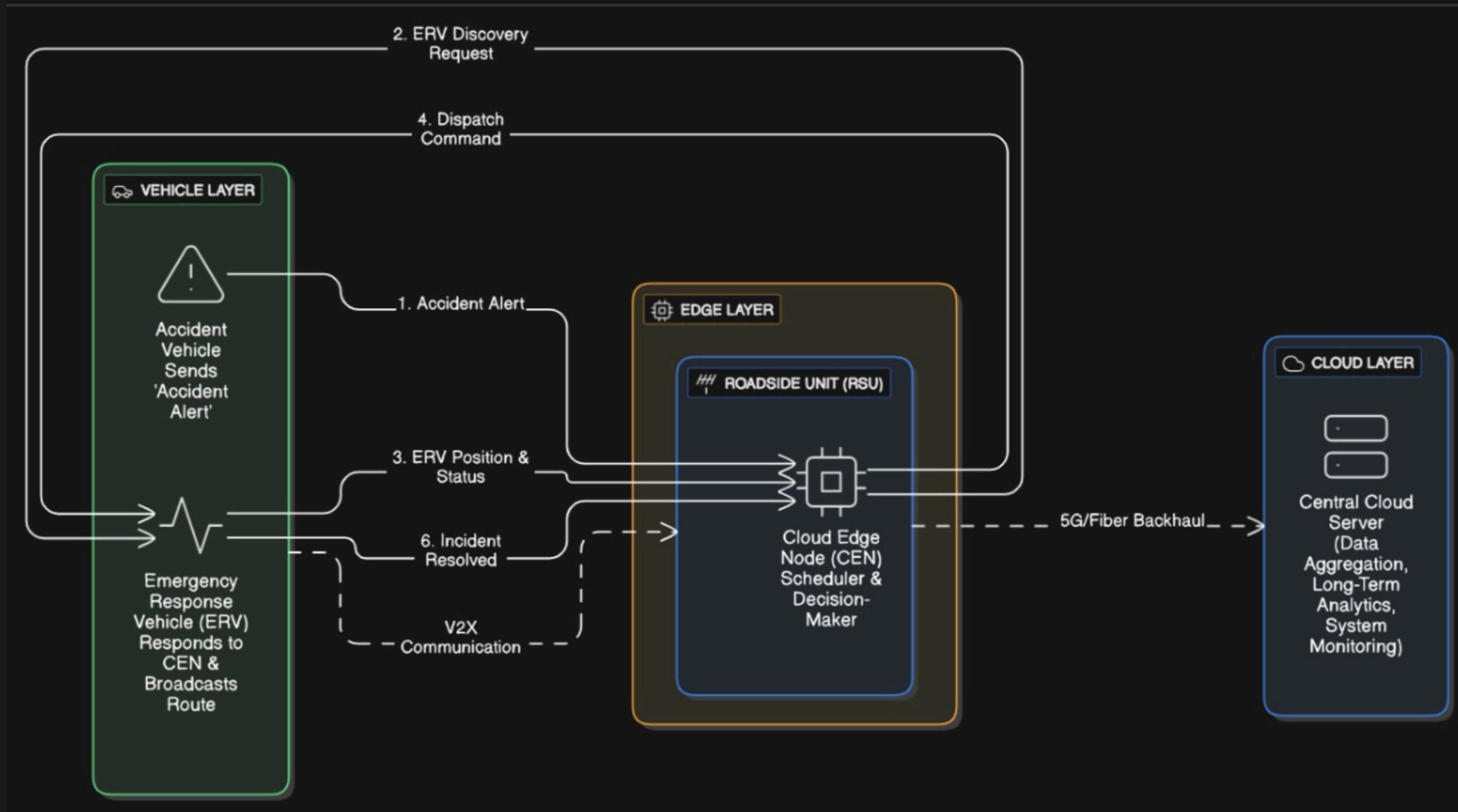
OVERVIEW



ALGORITHM



ARCHITECTURE



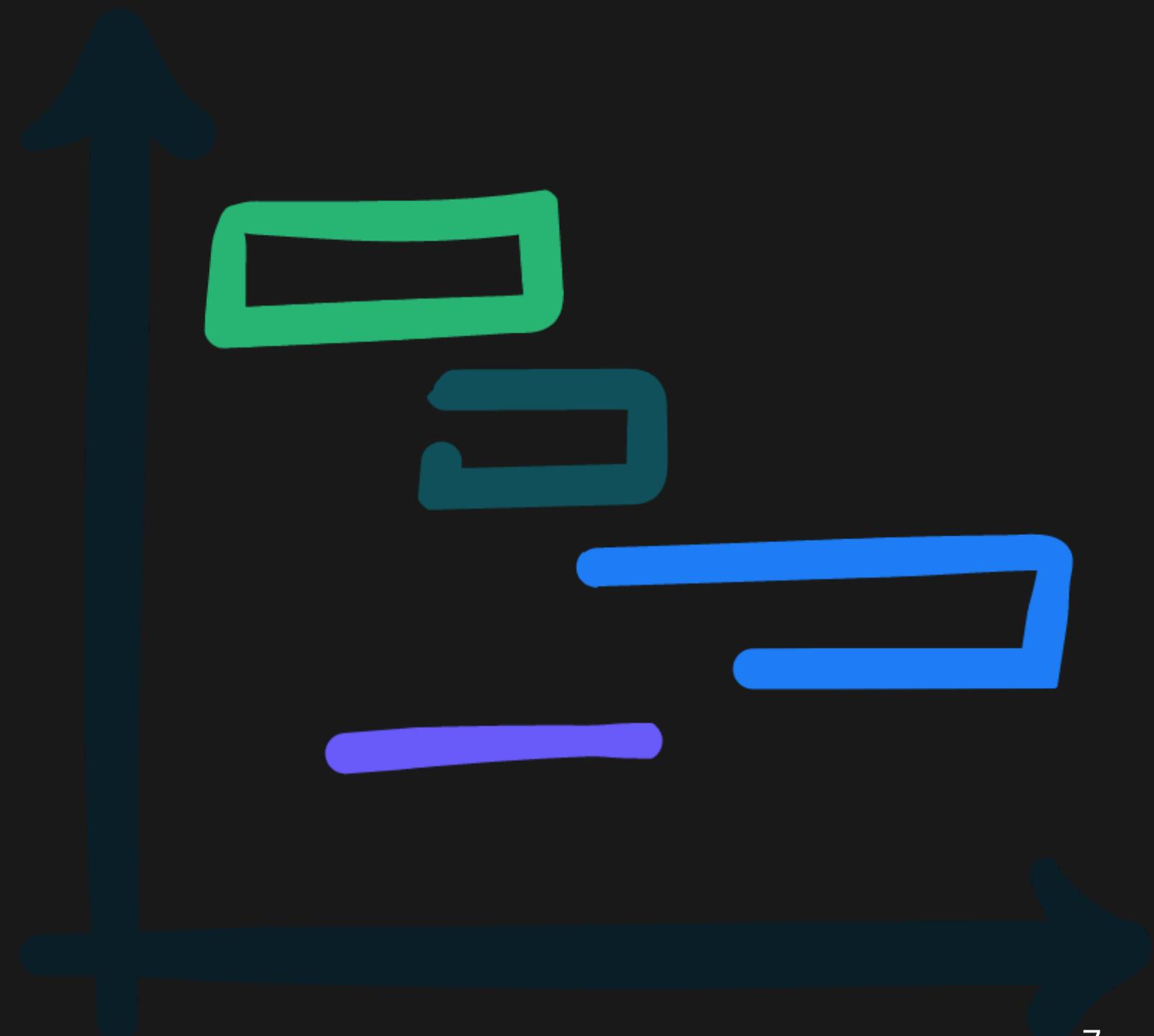
TASK SCHEDULING

WHY IT'S CRUCIAL

- PREVENTS MULTIPLE ERVS FROM RESPONDING TO SAME ACCIDENT
- SELECTS THE BEST-FIT ERV (FASTEST ROUTE, AVAILABILITY)
- MAINTAINS ERV STATE (BUSY/FREE)

HOW IT'S DONE

- CEN COLLECTS ERVS
- APPLIES POLICY (SHORTEST/FASTEST PATH)
- DISPATCHES BEST ERV
- TRACKS STATE CHANGES (TASK START → TASK COMPLETE)



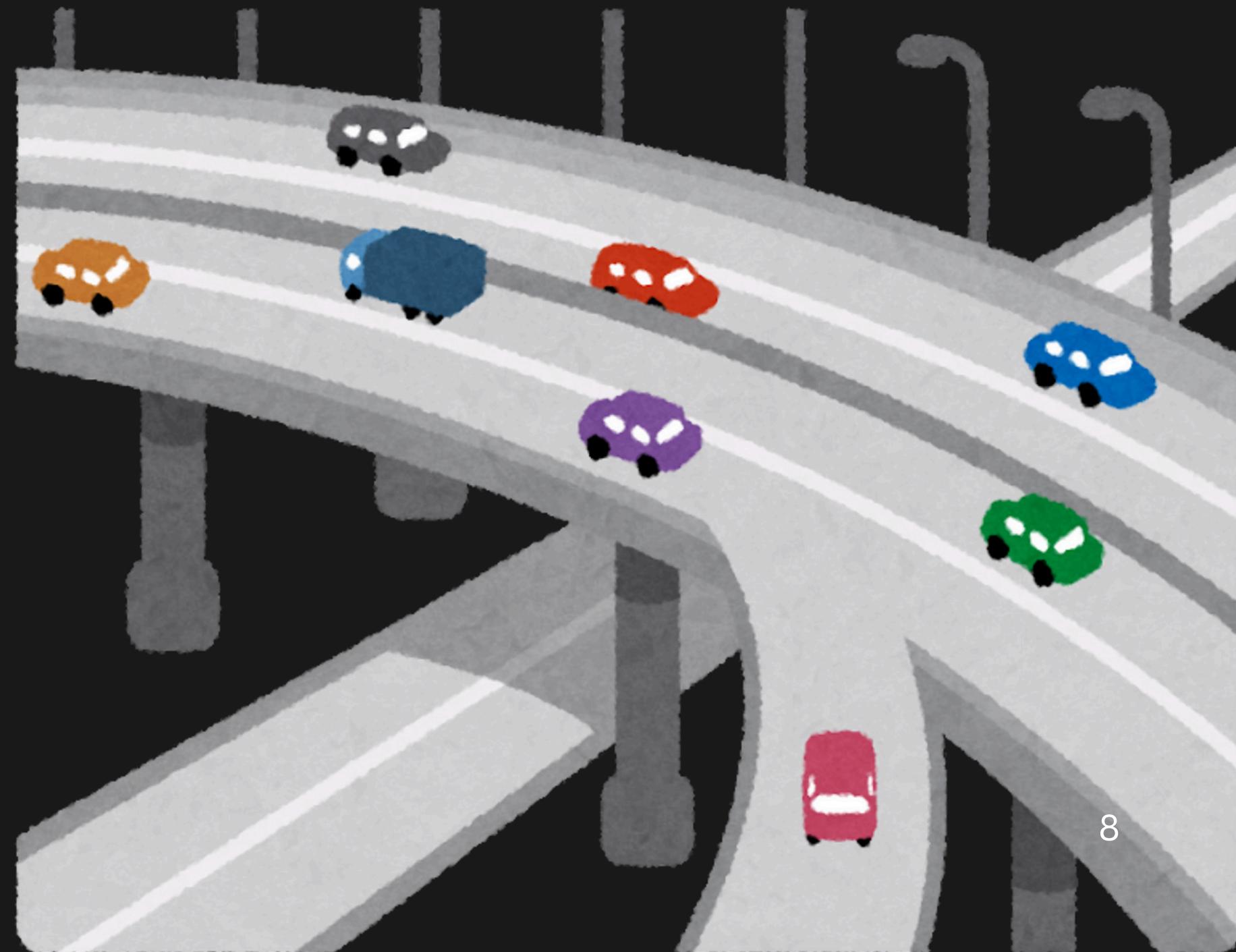
IMPLEMENTATION PLAN

Tools

- SUMO (traffic)
- OMNeT++ (network)
- Veins (integration)
- OpenStreetMap (real-world maps)

Modules to Build

- Vehicle (regular + ERV)
- CEN logic
- V2X message simulation
- Dynamic route updates
- Visual logs and outputs



STATE-OF-THE-ART LITERATURE

Related Work	Purpose	Approach	Why less suitable than the proposed protocol
HRTM + LRTM (edge/cloud multilayer)	City-wide traffic & emergency routing	Cloud-edge + RSUs	Slower reaction, centralized
Clustering-based emergency messaging	Broadcast optimization for safety	Clustering, energy-efficient broadcasts	Doesn't dispatch ERV or coordinate path clearance
SafeSmart (V2I + traffic lights)	Priority via traffic lights	Infrastructure manipulation	Requires smart traffic lights; limited by infrastructure

- Title: Managing Emergency Situations in VANET Through Heterogeneous Technologies Cooperation
- Title: Emergency Message Dissemination in IoV Networks (EMD-IoV)
- Title: SafeSmart: A VANET System for Faster Responses and Increased Safety in Time-Critical Scenarios

TASK SPLIT

Isha

Accident & Vehicle Logic

- Implement Algorithm 1 (accident detection & dissemination)
- Code vehicle rerouting logic when ERV path is received
- Unit testing for vehicle-side behaviors

Keerthi

CEN Scheduling Logic

- Implement Algorithm 2 (ERV discovery & selection)
- Code shortest/fastest path policy
- Manage accident tracking at edge node

Raghav

ERV Behavior & Coordination

- Implement Algorithm 3 (ERV response, route broadcasting)
- Handle ERV-to-vehicle communication for lane clearing
- Implement ERV task completion messages

Akshar

Integration and Building

- Build SUMO/OMNeT++/Veins scenario
- Integrate all three algorithms into simulation
- Implement visualization features (color change, message logs)

THANK YOU & Q/A

CITATIONS

- [HTTPS://WWW.MDPI.COM/290262](https://www.mdpi.com/290262)
- [HTTPS://WWW.RESEARCHGATE.NET/PUBLICATION/350486240 VANET-BASED TRAFFIC MONITORING AND INCIDENT DETECTION SYSTEM A REVIEW? UTM SOURCE=CHATGPT.COM](https://www.researchgate.net/publication/350486240)
- [HTTPS://WWW.RESEARCHGATE.NET/PUBLICATION/269327220 IMPACT OF VANET-BASED TRAFFIC SIGNAL CONTROL ON THE RESPONSE TIME OF EMERGENCY VEHICLES IN REALISTIC LARGE SCALE URBAN AREA?UTM SOURCE=CHATGPT.COM](https://www.researchgate.net/publication/269327220)