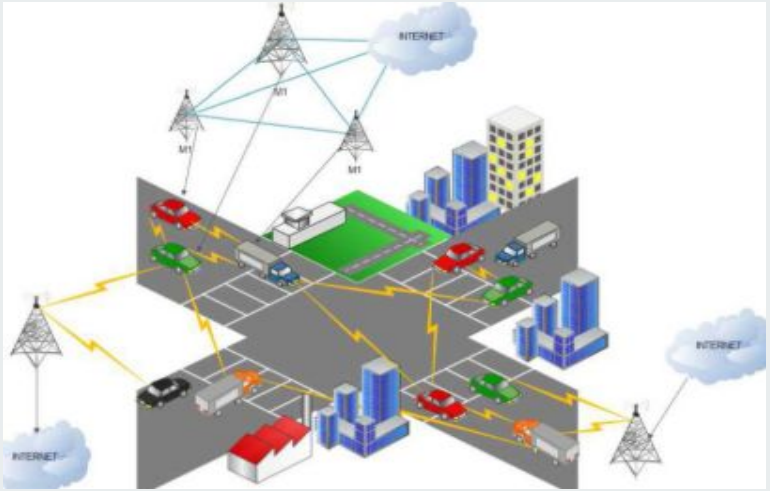


# DTN Use Cases | Automotive Industry

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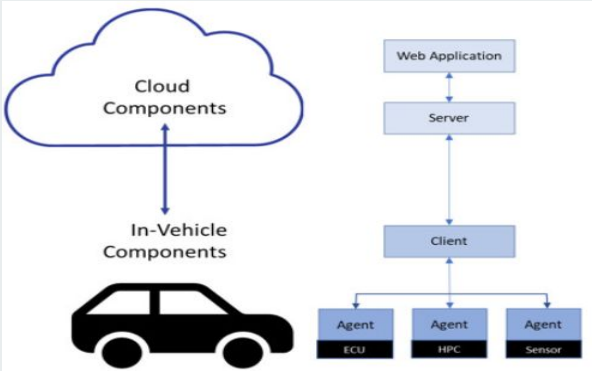
Software Engineer | Automotive

# Evolution From Mechanical To Intelligent System

Past: Mechanical System

Present: Full Intelligent System




Central brain processes data and make decision

Around Sensors:

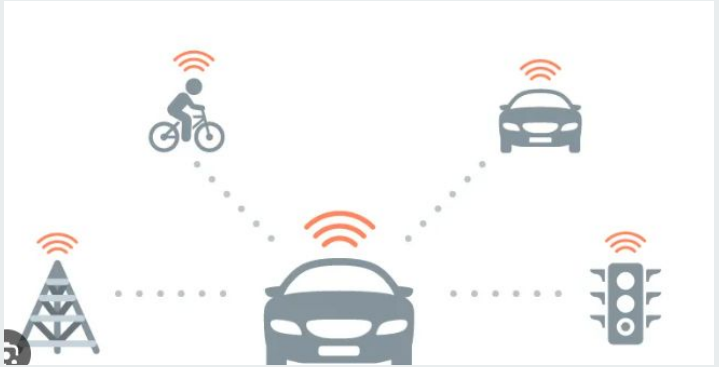
1. Radar : Object detection
2. Camera: Visual recognition
3. Laser Sensor: Precise distance Measurements
4. Ultrasonic Sensors: Close range detection

Fusion Network & Decision

# Use Case 1- VV/V2X Communication During Driving

Scenario:

Vehicles needs to exchange information like hazard warnings, road conditions and traffic updates.



Challenges:

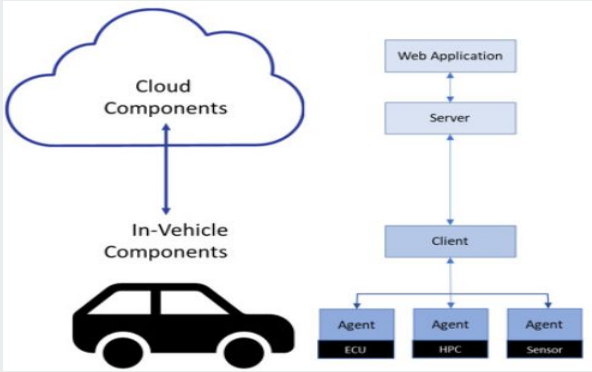
1. Lack of end -to-end connectivity within week internet connection.
2. Unpredictable communication paths.

DTN Solution:

1. Messages are encapsulated into delay-tolerant bundles.
2. Bundles are stored and forwarded when another vehicle in range.
3. Ensure reliable delivery even when direct paths are unavailable.

# Use Case 2 - Over The Air (OTA) Software Updates

Scenario:
Modern connected vehicles frequently requires software updates to either fix bugs or add  new features.




Challenges:
Since updates are often large and need to be delivered to vehicles that may be in motion or located in rural or low connectivity areas.

DTN Solution:
1. Split update into small bundles
2. Store carry forward module -> vehicle stores what it gets, wait for next opportunity
3. Bundles then can be transferred during next network availability
4. Safe install ->> Only when all parts are received and verified

# Use Case 3- Remote Diagnostics and Vehicles Health Reporting

Scenario:

Vehicle regularly collect data on different parts like engine and battery status


Challenges:
Since data has to be back to OEM center for future checks.
But real time upload isn't always possible; especially in remote or poor network environments.

DTN Solution:

1. Split update into small bundles
2. Store carry forward module -> vehicle stores what it gets, wait for next opportunity
3. Bundles then can be transferred during next network availability

# How DTN Would Work

Every Node (Vehicle ) to Store incoming bundles in the local cache
When two nodes meet they exchange summaries of stored messages the other doesn't have
They creates multiple redundant paths, Increasing delivery probability

Vehicle A
↓
Collects Data (e.g., hazard info, road condition)
↓
Stores Message (no connection available)
↓
Moves Closer to Another Vehicle
↓
Opportunistic Connection Established
↓
Transfers Message to Vehicle B
↓
Vehicle B Receives and Processes Data
↓
Takes Action or Forwards Message Further