Topic: Maintience

Keeping the Vehicle in Operational Condition, Minimizing Unavailability

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Approach:

1. **Current State Analysis**
   Current Maintenance Process: Present the current vehicle maintenance process and extract key performance indicators (KPIs), such as maintenance time and failure rates.
   Identify Issues: Recognize deficiencies in the current process, such as long maintenance cycles or the inability to predict failures in advance.

2. **Intelligent Solutions:**
   Introducing Smart Vehicle Capabilities: Leverage the vehicle's smart functionalities (e.g., sensors, fault detection algorithms) for predictive maintenance and schedule repair services in advance to minimize downtime.
   Targeted Measures: Identify specific improvement measures, such as which modules can support more efficient fault detection and repair.

3. **Strategy Development:**
   Propose strategies to improve fault detection and repair processes while ensuring the vehicle can provide minimum service levels:

   - **Fault Isolation and Repair Architecture:** Suggest an architecture capable of detecting faults, isolating problematic modules, and allowing other modules to function normally.
   - **Function Classification:** Classify functionalities based on different modes (e.g., critical vs. non-critical functions, degraded modes).
   - **Degraded Mode:** Ensure the vehicle can continue to operate with limited functionality in case of partial system failures.

4. **Architecture Design:**
   Design an architecture to address the above issues, such as supporting fault isolation and repair through modular design while optimizing the overall maintenance process.

Team Member Roles:

Team Member 1: Current State Analysis and Key Indicators

- **Expectations:** Clearly identify key issues in the current vehicle maintenance process and quantify maintenance efficiency (e.g., fault repair time).
- **Concerns:** Whether the data collection is comprehensive enough and whether problems can be accurately pinpointed.
- **Tasks:**
    - Analyze inefficiencies in the current maintenance process.
    - Extract maintenance KPIs (e.g., average repair time, failure rate).
- **Use Cases:**
    - Use maintenance data to create a performance report and highlight directions for improvement.
    - Identify key problematic modules to assist in subsequent intelligent design.

Team Member 2: Intelligent Solutions

- **Expectations:** Enhance predictive maintenance capabilities using smart functionalities (e.g., sensors and algorithms).
- **Concerns:** Whether the intelligent solutions can effectively reduce failure rates and whether there are technical or cost limitations.
- **Tasks:**
    - Research the application of smart vehicle capabilities (e.g., sensors, predictive algorithms) for fault forecasting and proactive maintenance.
    - Propose solutions to minimize downtime.
- **Use Cases:**
    - Integrate sensors for real-time vehicle condition monitoring and automatic maintenance reminders.
    - Implement predictive maintenance features and optimize repair scheduling.

Team Member 3: Architecture Design and Fault Repair Strategies

- **Expectations:** Design a modular architecture to support fault detection, isolation, and repair based on the current analysis and intelligent solutions, ensuring minimum operational status for the vehicle.
- **Tasks:**
    - Propose an architecture design supporting modular maintenance.
    - Ensure that the vehicle can provide minimum service levels in case of partial functionality loss.
- **Use Cases:**
    - Design a distributed architecture that allows functional modules to operate normally after isolating faulty modules.
    - Introduce a degraded mode to ensure essential driving capabilities (e.g., steering, braking) are maintained.