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Malfunctions detection of the brake pedal and clutch pedal while driving for all type of automotive vehicles

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ABSTRACT- *The detection of brake pedal and clutch pedal malfunctions while driving is critical for ensuring vehicle safety and performance. This system aims to provide real-time monitoring and identification of issues related to both the brake and clutch pedal systems in automotive vehicles. By integrating advanced sensors and control systems, the vehicle can continuously monitor the operation of these key components, detecting any malfunctions such as pedal failure, improper engagement, pressure loss, or sensor faults. The brake pedal system utilizes sensors to monitor pressure levels, fluid status, and pedal position, while the clutch pedal system focuses on monitoring pedal engagement, sensor readings and clutch fluid levels. When a malfunction is detected—whether due to a hydraulic failure, sensor misalignment, or mechanical fault the system triggers a visual or audible warning to alert the driver. This can include warning lights on the dashboard, text-based messages on digital displays, or audible alerts. The proposed detection system ensures that critical issues with the brake and clutch pedals are identified early, allowing drivers to take timely corrective actions. This contributes to maintaining vehicle safety, preventing further damage to the vehicle, and avoiding hazardous driving conditions caused by malfunctioning pedals. Additionally, it serves as an essential feature for modern automotive vehicles with automatic safety protocols and driver assistance systems, enhancing overall vehicle reliability and safety*

Key Words: Malfunctions. Clutch Pedal, Brake Pedal, sensors Automotive vehicles.

1. INTRODUCTION.

To help drivers recognize malfunctions in the clutch or brake pedal systems, modern vehicles are equipped with advanced diagnostic features such as warning lights, digital displays, or other indicators within the instrument cluster. These systems continuously monitor the performance of the clutch and brake mechanisms—detecting issues like hydraulic pressure loss, sensor malfunctions, or pedal engagement problems. When a fault is identified, the vehicle promptly notifies the driver through visual cues (e.g., warning lights or messages) and, in some cases, audible alerts, ensuring timely awareness and promoting safer driving conditions.

2. POSSIBILITIES FOR BRAKE PEDAL MALFUNCTION

- A brake booster that is unable to sustain vacuum pressure is considered defective.
- A malfunctioning power steering pump or vacuum pump. Different types of brake boosters are found in some vehicles.
- The vacuum hose is cracked.
- The brake lines have sludge in them.

3. POSSIBILITIES FOR CLUTCH PEDAL MALFUNCTION.

- It will be difficult to engage the clutch pedal if it is broken or overly stretched. You will have to press the pedal much harder to engage and disengage the clutch.
- Go under the vehicle and check the condition of the clutch cable or hydraulic lines. Make sure that the cable is tight. If you have a hydraulic line, make sure that there are no leaks
- Check the slave cylinder if your vehicle has a hydraulic clutch pedal Brake pedal Press hard

4. CLUTCH PEDAL MALFUNCTION INDICATORS.

- Clutch Pedal Warning Light: In some vehicles, especially those with electronic clutch systems or clutch position sensors, the clutch pedal warning light will turn on if there is a malfunction in the clutch system (like improper disengagement, clutch sensor failure, or fluid leaks in the hydraulic system).
- Clutch Pedal Position Sensor: Some cars have a clutch pedal position sensor, and if it detects an issue (like the pedal not engaging fully or Author improperly calibrated), a warning light might appear on the dashboard
- No Start Signal: In vehicles equipped with a clutch start switch, the car will not start if the clutch pedal is not pressed. If there's a malfunction with the

switch or sensor, the car may refuse to start, or a "Clutch Pedal Malfunction" warning will appear on the display.

- Display Messages: On some modern vehicles with advanced digital displays, a message such as "Clutch Pedal Issue" or "Clutch System Malfunction" might appear on the dashboard.

5. BRAKE PEDAL MALFUNCTION INDICATORS.

- Brake Warning Light: This is the most common warning light for brake-related issues. It can be triggered by: ⁞ Low brake fluid levels. ⁞ Faulty brake system sensors (e.g., brake pressure sensors). ⁞ Worn-out brake pads (in some vehicles with brake pad wear sensors).
- Malfunctioning brake light switch. When you press the brake pedal and the brake system is malfunctioning, this light will illuminate to alert the driver.
- Brake Fluid Warning: A low brake fluid level, which could be due to a brake fluid leak or worn brake components, can also cause a warning light to appear on the display. This can be a sign of a brake pedal issue, as the pedal may feel spongy or soft if the fluid level is low.
- Parking Brake Warning: If the parking brake is engaged while driving or if the brake pedal system is malfunctioning, an indicator light will alert the driver. If this light stays on after releasing the parking brake, there may be an issue with the brake system or pedal.

6. FLOW DIAGRAM

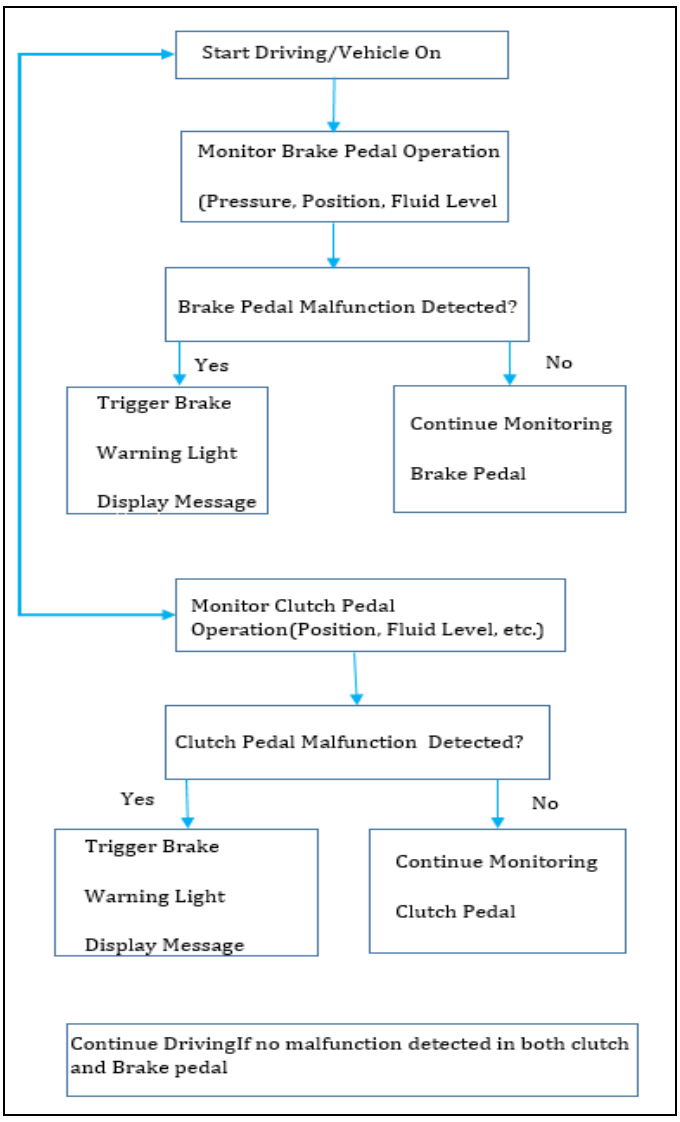

Fig 1-Work flow diagram of Clutch/Brake malfunctioning Function.

Process of the Flow diagram:

Start Driving/Vehicle On:

- The system begins monitoring when the vehicle is in motion or the engine is running.

Monitor Brake Pedal Operation:

- The vehicle constantly monitors the brake pedal's performance, focusing on its pressure, position, and fluid levels (using sensors)

Brake Pedal Malfunction Detected?

- The system checks if a fault in the brake pedal is detected (e.g., low brake fluid, malfunctioning sensors, or pressure loss).
- If yes, a warning light or display message will appear on the dashboard. ⎮ If No, the system continues to monitor the brake pedal.

Monitor Clutch Pedal Operation:

- Simultaneously, the system monitors the clutch pedal's position, fluid levels, and sensor status.

Clutch Pedal Malfunction Detected?

- If a malfunction (e.g., improper pedal position, fluid issues, or sensor failure) is detected, a warning light or display message will appear.

- If No, the system continues to monitor the clutch pedal. End Process: ⎮ The driver continues driving with alerts if necessary. If any malfunction is detected, the system helps the driver take corrective actions. This flow diagram illustrates the process of monitoring both the brake and clutch pedals while driving, detecting any malfunctions, and notifying the driver of potential issues through warnings. It ensures the vehicle's safety and functionality by providing immediate alerts for necessary actions.

End Process:

- The driver continues driving with alerts if necessary. If any malfunction is detected, the system helps the driver take corrective actions.

- This flow diagram illustrates the process of monitoring both the brake and clutch pedals while driving, detecting any malfunctions, and notifying the driver of potential issues through warnings. It ensures the vehicle's safety and functionality by providing immediate alerts for necessary actions

Refer Fig1 for More details.

7. CONCLUSION

Driver's excessive speeds and brake failures are the main causes of traffic accidents, which frequently result in property damage or even fatalities. Given this, all drivers are required to follow road safety procedures, particularly in areas where there is a greater chance of property or human casualties. Despite all the precautionary measures taken to prevent major accidents, such as implementing traffic laws and attempting to regulate speed with speed limiters and check that clutch and brake pedals are functioning properly.

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