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Fabrication of Vehicle Safety using Power Window Mechanism

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Abstract: ***The fabrication of a vehicle safety system using power window mechanisms aims to improve the safety features of automobiles by utilizing the existing power window mechanism and various sensors. The system is designed to provide additional safety measures in case of accidents, emergencies, or dangerous situations by automatically activating the power windows and opening the vehicle doors.The proposed safety system incorporates a tilt sensor, water sensor, air quality sensor, fire sensor, gas sensor, and a control unit that work together to detect and respond to various emergency scenarios. The tilt sensor can detect if the vehicle has rolled over or is at a steep angle, while the water sensor can detect if the vehicle is submerged in water. The air quality sensor can detect harmful gases or fumes inside the vehicle, and the fire and gas sensors can detect the presence of fire or dangerous gas levels. When any of these sensors detect an emergency situation, the control unit triggers the power window mechanism to open the windows and allow occupants to exit the vehicle quickly and safely. The proposed system is a cost-effective solution that utilizes the existing power window mechanism, making it easy to integrate into existing vehicle designs. Additionally, the system enhances passenger safety by providing a means of quick and safe evacuation in emergency situations.***
In conclusion, the fabrication of a vehicle safety system using power window mechanisms and various sensors is a promising solution that can significantly improve the safety features of automobiles and reduce the risk of injury in case of accidents, emergencies, or dangerous situations.
Keywords: Power window Mechanism , Vehicle Safety , Passenger Convenience.

I. INTRODUCTION

Vehicle safety is a top priority in the automotive industry. Despite the advancements in safety technology, accidents and emergencies can still occur. In such situations, the occupants of the vehicle need to exit quickly and safely. However, sometimes, due to certain circumstances like rolling over, being submerged in water, or toxic gas exposure, the doors may become inaccessible, making it difficult for occupants to escape. To address this issue, a vehicle safety system using power window mechanisms has been proposed, which is designed to activate the power windows and open the doors in an emergency situation, providing a means of quick and safe evacuation for occupants. The proposed system incorporates a tilt sensor, water sensor, air quality sensor, fire sensor, gas sensor, and a control unit that work together to detect and respond to various emergency scenarios. The tilt sensor detects the vehicle's angle and triggers the power window mechanism to open the windows in case of rollovers or steep inclines. The water sensor detects if the vehicle is submerged in water and activates the power windows to provide an escape route. The air quality sensor detects harmful gases or fumes inside the vehicle and triggers the power windows to provide ventilation. The fire and gas sensors detect the presence of fire or dangerous gas levels and trigger the power windows to open and allow for safe evacuation of the occupants.The proposed safety system is cost-effective and utilizes the existing power window mechanism, making it easy to integrate into existing vehicle designs. The system enhances passenger safety by providing a means of quick and safe evacuation in emergency situations. The system is designed to complement the existing safety features of the vehicle, such as seat belts and airbags, making it a comprehensive safety solution. In conclusion, the proposed vehicle safety system using power window mechanisms and various sensors is a promising solution that can significantly improve the safety features of automobiles and reduce the risk of injury in case of accidents, emergencies, or dangerous situations.

A. Parts

1) Power window motors
2) Window switches
3) Wiring harnesses
4) Control unit
5) Relay
6) Battery

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B. Sensors

1) Tilt sensor
2) Water sensor
3) Air quality sensor
4) Fire sensor
5) Gas sensor
6) Microcontroller or Arduino board

II. OBJECTIVE

The objective of using power window mechanism in vehicle safety is to provide convenience and safety to the passengers. Power windows allow the passengers to easily open and close the windows with the push of a button, without requiring them to manually crank the window up and down.

This convenience is especially important for drivers who need to keep their hands on the steering wheel and not be distracted by having to operate manual windows. In addition to convenience, power windows can also enhance safety.

III. LITERATURE REVIEW

A literature review is a critical analysis of existing research on a particular topic. It involves evaluating and summarizing the relevant literature, identifying gaps, inconsistencies, and research questions that need further investigation.A literature review is an essential component of research, as it provides an overview of the existing knowledge and helps researchers to refine their research questions.When conducting a literature review, researchers typically start by identifying relevant databases and search engines, such as Google Scholar, PubMed, and Scopus. They then use keywords and phrases related to their research topic to identify relevant articles, books, and other publications. Once the relevant literature is identified, researchers read and analyze the material to extract the necessary information.

The literature review process typically involves several steps, including:

1) Identifying the research question or topic of interest
2) Searching for and collecting relevant literature
3) Evaluating and analyzing the literature
4) Synthesizing and summarizing the literature
5) Identifying gaps and research questions for future investigation

A well-conducted literature review provides a comprehensive overview of the existing research on a particular topic and helps researchers to identify areas that need further investigation. It can also help researchers to refine their research questions, design their studies, and analyze their findings in a broader context. Overall, a literature review is a critical component of the research process, as it provides researchers with a deep understanding of the existing knowledge, identifies gaps in the literature, and guides the direction of future research.

a) Identifying the research question or topic of interest: The first step is to identify the research question or topic of interest. This involves developing a clear and concise research question that can be answered by the available literature.
b) Searching for and collecting relevant literature: Once the research question is identified, researchers use various databases and search engines to identify relevant literature. This can include journal articles, books, conference proceedings, and other relevant publications.
c) Evaluating and analyzing the literature: Once the relevant literature is identified, researchers evaluate and analyze the material. This involves reading and critically evaluating the literature to determine its relevance to the research question. Researchers should evaluate the quality, methodology, and relevance of each study to the research question.
d) Synthesizing and summarizing the literature: After evaluating and analyzing the literature, researchers synthesize and summarize the information gathered.
e) This involves identifying common themes, patterns, and findings across the literature and organizing the information in a way that is relevant to the research question.

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f) Identifying gaps and research questions for future investigation: Finally, researchers identify gaps in the literature and research questions for future investigation. This involves identifying areas where the existing literature is lacking or inconsistent and suggesting research questions that can help to address these gaps.

A well-conducted literature review should provide a comprehensive overview of the existing research on a particular topic. It should be systematic, rigorous, and transparent, and should clearly document the search strategies and criteria used to identify relevant literature. A literature review is an essential component of the research process, as it provides researchers with a deep understanding of the existing knowledge, identifies gaps in the literature, and guides the direction of future research.

IV. PROPOSED SYSTEM

The proposed system for this project "FABRICATION OF VEHICLE SAFETY USING POWER WINDOW MECHANISM" is a smart safety system designed to ensure the safety of vehicle passengers in case of hazardous conditions such as gas or fire. The system includes the following components:

Arduino Nano: The microcontroller unit of the system that controls and coordinates all the components of the system.

Gas sensor: A sensor that detects the presence of hazardous gases such as LPG, methane, carbon monoxide, etc., inside the vehicle.

Fire sensor: A sensor that detects the presence of fire inside the vehicle.

Water sensor: A sensor that detects the presence of water inside the vehicle.

LCD: A display unit that displays the status of the system and any alerts or messages.

Power window mechanism: A mechanism that controls the opening and closing of the vehicle's windows.

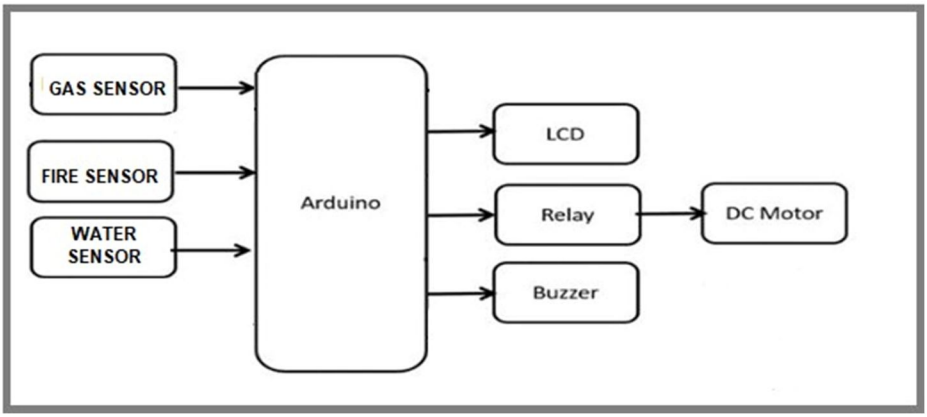
The system works by constantly monitoring the environment inside the vehicle using the gas sensor, fire sensor, and water sensor. If any hazardous condition is detected, the system sends a signal to the Arduino Nano, which then activates the power window mechanism to open all the windows of the vehicle. This provides ventilation and fresh air to the passengers inside the vehicle, reducing the risk of suffocation due to the hazardous condition. The LCD displays the status of the system and any alerts or messages to the passengers inside the vehicle. Overall, the proposed system provides an effective solution for ensuring the safety of vehicle passengers in case of hazardous conditions and can potentially save lives in emergency situations.

V. EXISTING SYSTEM

Existing systems for vehicle safety include smart safety systems that use advanced technologies such as sensors, machine learning algorithms, and internet connectivity to enhance the safety of vehicles. These systems constantly monitor the environment inside and outside the vehicle using sensors such as gas sensors, fire sensors, and proximity sensors. The data collected by these sensors is then processed by an onboard computer or microcontroller to detect hazardous conditions and trigger appropriate actions such as warning the driver or applying the brakes automatically.

Many car manufacturers offer smart safety systems as standard or optional features in their latest models. These systems can also be integrated with other smart vehicle technologies such as adaptive cruise control, lane departure warning, and parking assist to provide a comprehensive safety package for the driver and passengers. In summary, the existing systems for vehicle safety using smart technologies are widely available and provide a range of safety features to enhance the safety of the vehicle and its occupants.

VI. BLOCK DIAGRAM



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VII. WORKING PRINCIPLE

1) The Arduino Nano is the main controller of the system. It receives input from various sensors and sends output signals to the power window mechanism.
2) The gas sensor is used to detect the presence of harmful gases such as carbon monoxide inside the vehicle. If the gas sensor detects high levels of gas, it sends a signal to the Arduino Nano.
3) The fire sensor is used to detect the presence of fire inside the vehicle. If the fire sensor detects fire, it sends a signal to the Arduino Nano.
4) The water sensor is used to detect water inside the vehicle. If the water sensor detects water, it sends a signal to the Arduino Nano.
5) The Arduino Nano receives signals from the sensors and displays the status of each sensor on the LCD display. The LCD display shows the status of each sensor, such as "Gas Detected" or "Fire Detected".
6) If any of the sensors detect a hazardous condition such as gas, fire, or water, the Arduino Nano sends a signal to the power window mechanism to open all windows.
7) The power window mechanism is controlled by a motor driver, which receives signals from the Arduino Nano. When the Arduino Nano sends a signal to the motor driver, it closes all the windows of the vehicle.

In summary, the project is designed to detect hazardous conditions inside the vehicle and automatically close all the windows to prevent any further damage or harm. The Arduino Nano acts as the brain of the system and controls the entire process. The sensors detect any hazardous conditions, and the LCD display shows the status of each sensor. The power window mechanism is used to close all windows automatically when a hazardous condition is detected.

VIII. CONCLUSION

In conclusion, the project "fabrication of vehicle safety using power window mechanism" using arduino nano, lcd, gas sensor, fire sensor, and water sensor is designed to ensure the safety of vehicle passengers. The project is intended to open all the windows in the vehicle to provide fresh air to the passengers in case of hazardous conditions such as gas or fire. However, it is important to note that opening the windows may not be sufficient in all cases to address the hazardous condition, and the passengers should still take appropriate measures to ensure their safety. The project is easy to install and operate, and it provides an extra layer of safety to the passengers.

IX. FUTURE SCOPE

The project has a great potential for further development and improvement. Some of the future scopes for this project are:

1) Integration with an alarm system: the project can be integrated with an alarm system that will alert the passengers of the vehicle in case of any hazardous condition detected.
2) Integration with a gps system: the project can be integrated with a gps system that will automatically send the location of the vehicle to the emergency services in case of an emergency.
3) Integration with a mobile application: the project can be integrated with a mobile application that will provide real-time updates and alerts to the vehicle owner.
4) Integration with a camera system: the project can be integrated with a camera system that will provide real-time footage of the inside of the vehicle in case of any hazardous condition detected.
5) Integration with other safety systems: the project can be integrated with other safety systems such as airbags and seat belts to provide a comprehensive safety system for the vehicle passengers.

Overall, the project has great potential for further development and improvement to provide a safe and secure environment for vehicle passengers.

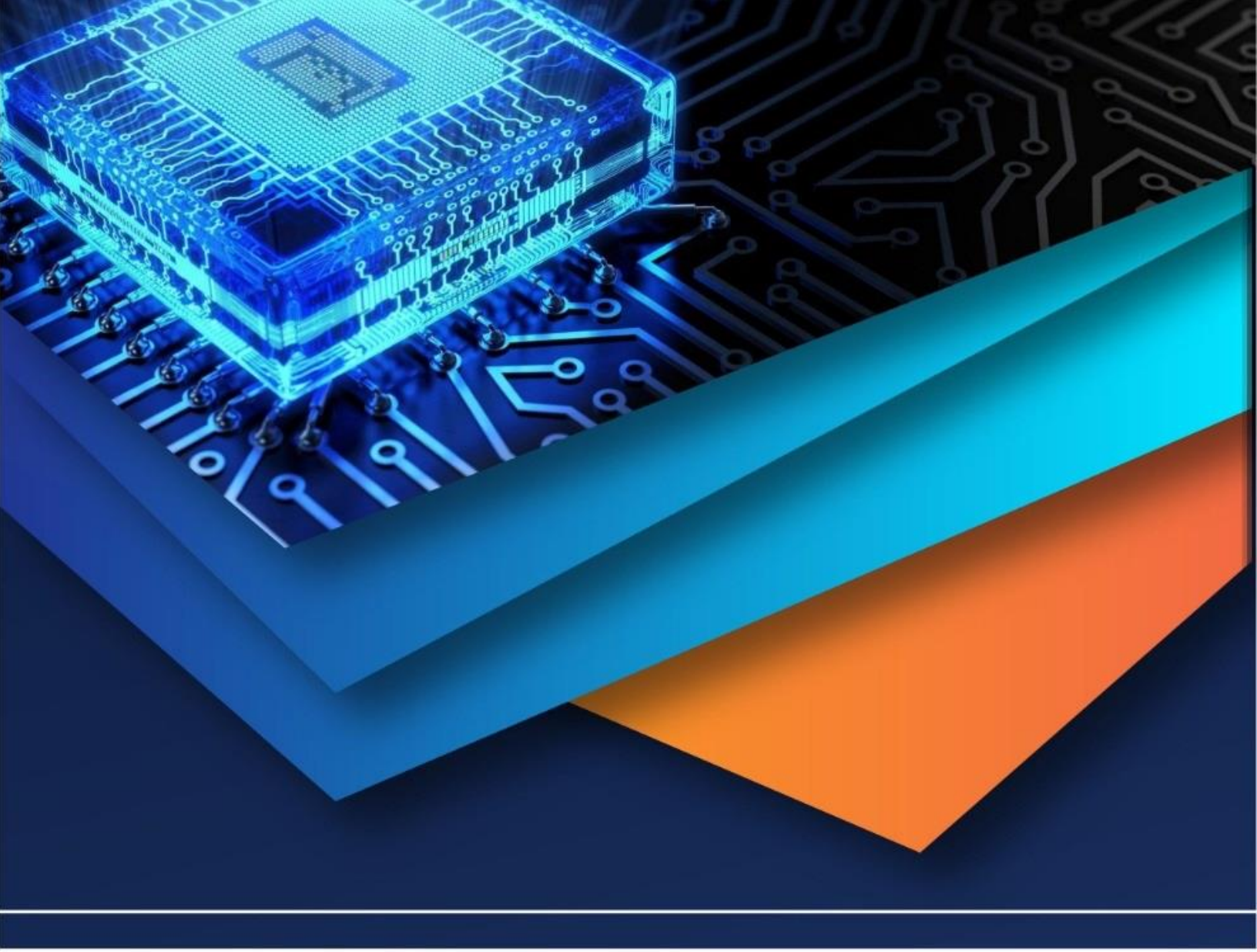
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