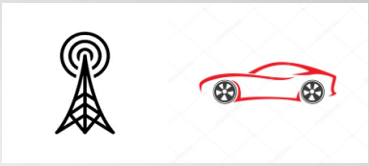
TITLE OF THE IDEA :

Road hazards precautionary Automated Vehicle using RF transmission

DOMAIN : IoT (Internet of Things)

SUB-DOMAIN : ITS(Intelligent Transportation System)



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PROBLEM STATEMENT :

- Speed breakers and road signs are critical for ensuring **road safety**, especially in accident-prone areas. Conventional warning methods like static signboards and painted road signs are not always effective, especially during night time, foggy weather, unfamiliar locations or due to **distraction** and **negligence**.
- As a result, they often continue at high speeds without slowing down in designated **go-slow** zones, increasing the risk of accidents. These High-speed impacts often lead to heavy damage, causing severe injuries, fatalities, and financial losses , not only endangering the riders themselves but also pose a significant threat to **pedestrians** and **other vehicles** on the road.

MOTIVATION AND BACKGROUND :

- There is a need for an automated, technology-driven approach to alert riders in real-time and enforce **speed reduction** near speed breakers and other hazardous zones.

NOVELTY OF THE PROPOSED APPROACH :

- **Zone-Based Wireless Warning System:** Unlike traditional physical signboards or passive reflectors, our system actively **notifies** vehicles using **wireless communication** 200 meters before the speed breaker arrives. 
- **Gradual Speed Control Mechanism:** Instead of sudden braking, our prototype automatically reduces the vehicle's speed **gradually** upon entering the warning zone, enhancing both safety and realism. 
- **Acceleration Restriction Logic:** Even if the user continues to press the acceleration, the system **restricts** the vehicle from **over speeding** until the speed breaker is passed, preventing accidents caused by human error. 
- **Restoration of Normal Speed:** Once the vehicle exits the signal zone, normal driving control is **automatically restored**, simulating smart vehicle behavior. 
- **Scalability and Multi-Vehicle Compatibility:** The system supports **multiple vehicles** using the same transmission signal without conflict, making it scalable for real-world multi-vehicle scenarios. 
- **Cost-Effective Prototype:** Built with **affordable** and easily available components. This solution demonstrates how **low-cost** IoT tech can improve road safety. 

METHODOLOGY :

1. **Signal Transmission Setup:** A roadside transmitter (nRF24L01) is implemented to send the signal, **200 meters** range before a speed breaker or any other hazard.
2. **Vehicle-Based Receiver:** An RC car is made for a real time moving prototype with a control application, and a **receiver** is set that detects the signal and activates the speed control.
3. **Speed and Acceleration restriction:** Upon detection, Arduino **limits speed** gradually using the motor driver and the RC car is to be observed to **move slower** than normal inside the signal range. Speed is **restricted** even if acceleration input is given in the control application.
4. **Zone Exit:** Once out of range, vehicle **regains** normal speed when acceleration command is instructed.

MARKET POTENTIAL :

- **Rising Need and scalability:** With increasing road accidents near speed breakers, there's a **growing demand** for intelligent alert systems. This **low-cost** prototype can be scaled using automotive-grade modules for two-wheelers and cars.
- **Applicability:** Smart Cities fits well with these smart infrastructure projects focused on autonomous traffic regulation. High potential in Government and Private Adoption, for deployment in **schools**, **hospitals**, **highways**, defense zones with minimal installation cost.

CONCLUSION :

Our innovative approach reimagines road safety with intelligent automation. By integrating IoT, real-time communication, and adaptive speed control, we've built more than just a prototype. We have laid the foundation for a scalable, smart mobility solution. This system doesn't just warn; it acts, ensuring safer journeys and setting a new benchmark for future-ready transportation.

- Alert today ! Alive tomorrow !!

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