Blind Spot Detection Enhanced with IoT and ML

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## *See the Unseen, Drive Safely*

Problem Statement

- **Driving safety** is a paramount concern globally, with **blind spots [1]** being one of the most **persistent** and **dangerous** issues faced by drivers.
- **Number of blind spot accidents up 35% last year,** 29 July 2023. By **The Brussels Times Newsroom**
- In 2022, it concerned **212 accidents** – a figure that includes **all blind spot accidents** between **vulnerable** road users and **motorised vehicles**, as well as between two motorised vehicles.

Solution Statement

- **Blind Spot Detection System**, combining **IoT** and **ML** technologies with components like **Raspberry Pi**, **ESP32**, and **ultrasonic sensors**, provides real-time visual and auditory alerts to drivers.
- By using **YOLOv5s** for object detection and predictive algorithms, as mentioned in [3] our model can **significantly** help in **preventing collisions** in **blind spot** due to negligence.
- This integration significantly enhances driving, making roads safer for everyone.
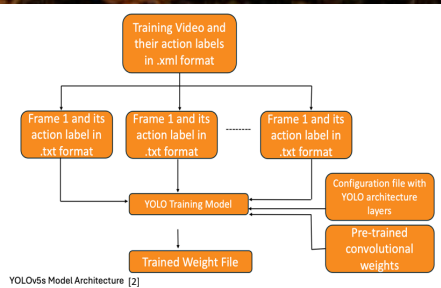
IoT Prototype
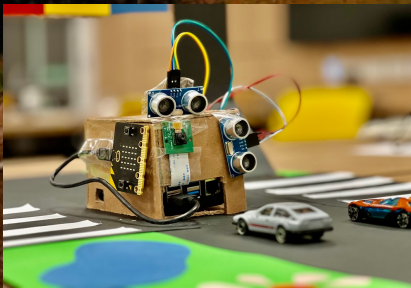
Software Applications

Machine Learning

YOLOv5s Model Architecture [2]

Conclusion & Future Scope

- Our **Blind Spot Detection System**, leveraging IoT and ML technologies, significantly **enhances automotive safety** by providing **real-time visual** and **auditory alerts** to drivers, reducing blind spot accidents.
- **Future scope** include **integrating** additional sensors such as **LiDAR** for more comprehensive environment mapping and improved detection accuracy & use of advanced machine learning models to handle diverse and complex driving scenarios.
- Explore **vehicle control integration**, enabling **automated braking** or steering adjustments in response to detected hazards, aiming for a **fully autonomous collision avoidance system**.
- Our technology can also be **adapted** for other modes of transport, **including aircraft, ships, and drones**, as well as in manufacturing warehouses with autonomous robots, enhancing safety and efficiency across various industries.

References

1. Arash Pourhasan Nezhad , Mehdi Ghatee , Hedieh Sajedi . Blind Spot Warning System based on Vehicle Analysis in Stream Images by a Real-Time Self-Supervised Deep Learning Model. *TechRxiv,* 2021.
2. YOLO: https://docs.ultralytics.com/yolov5/
3. Chang, I.-C.; Yen, C.-E.; Song, Y.-J.; Chen, W.-R.; Kuo, X.-M.; Liao, P.-H.; Kuo, C.; Huang, Y.-F. An Effective YOLO-Based Proactive Blind Spot Warning System for Motorcycles. Electronics 2023, 12, 3310.

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