

PRISM

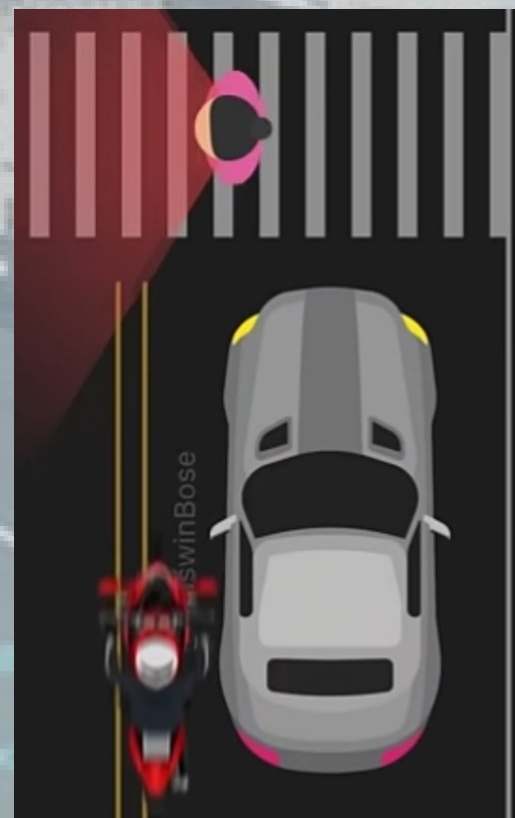
(Pedestrian Risk Insight & Safety Matrix)

Overview & Objectives of the Project

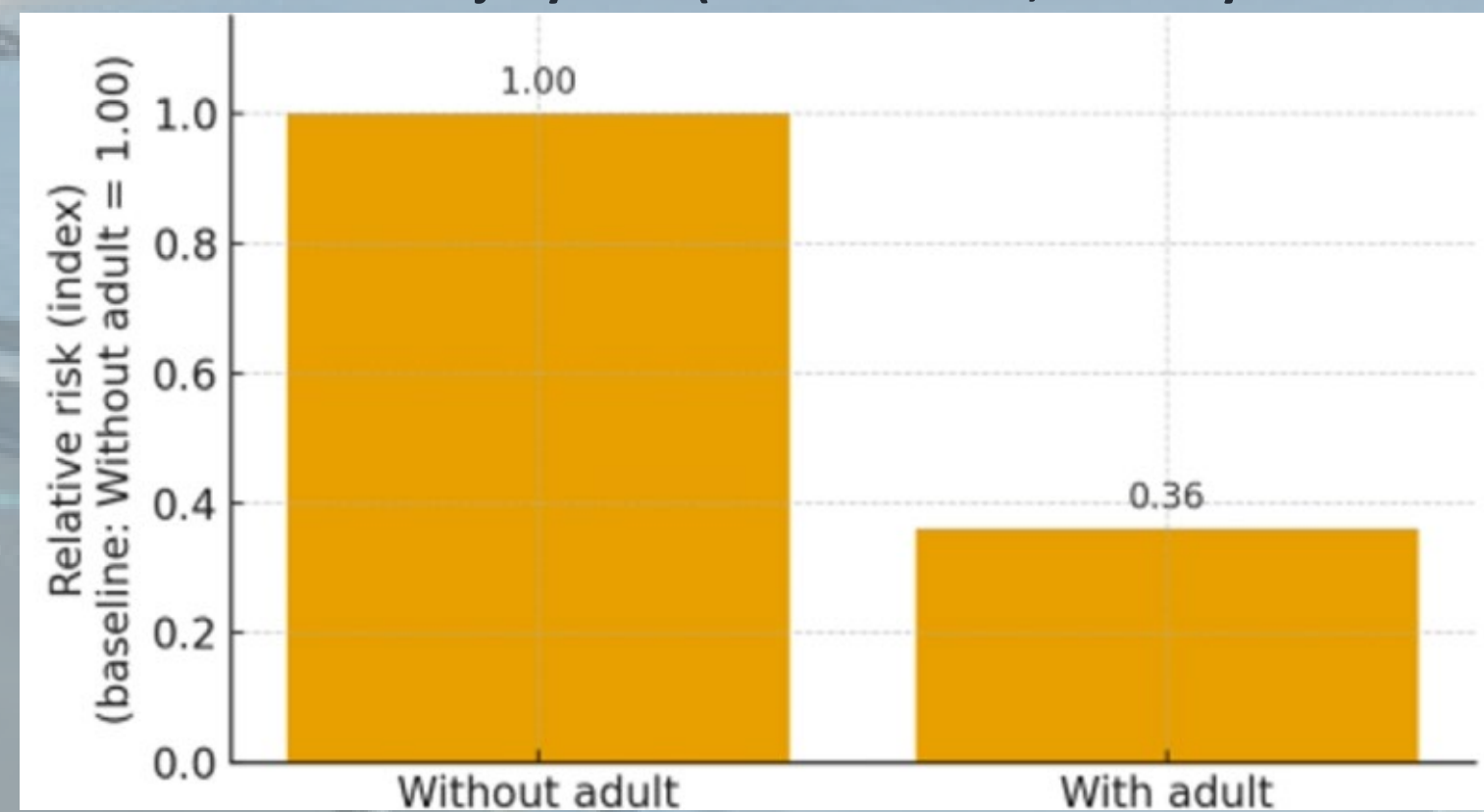
This program is an intelligent driver-assistance system designed to prevent pedestrian collision accidents. Using Occupancy Grid-based trajectory prediction technology, it precisely calculates and provides the collision probability for sudden "dart-out" situations, where a pedestrian walking normally suddenly jumps into the traffic lane.

However, we questioned the conventional approach of applying the same level of risk to all pedestrians. This is because, in real traffic situations, children are significantly more likely to exhibit impulsive behavior than adults. To reflect this realistic difference in risk, our system utilizes YOLO-v5 to identify whether a pedestrian is a child or an adult and assigns differential risk weights accordingly.

"Dart-out" Situation



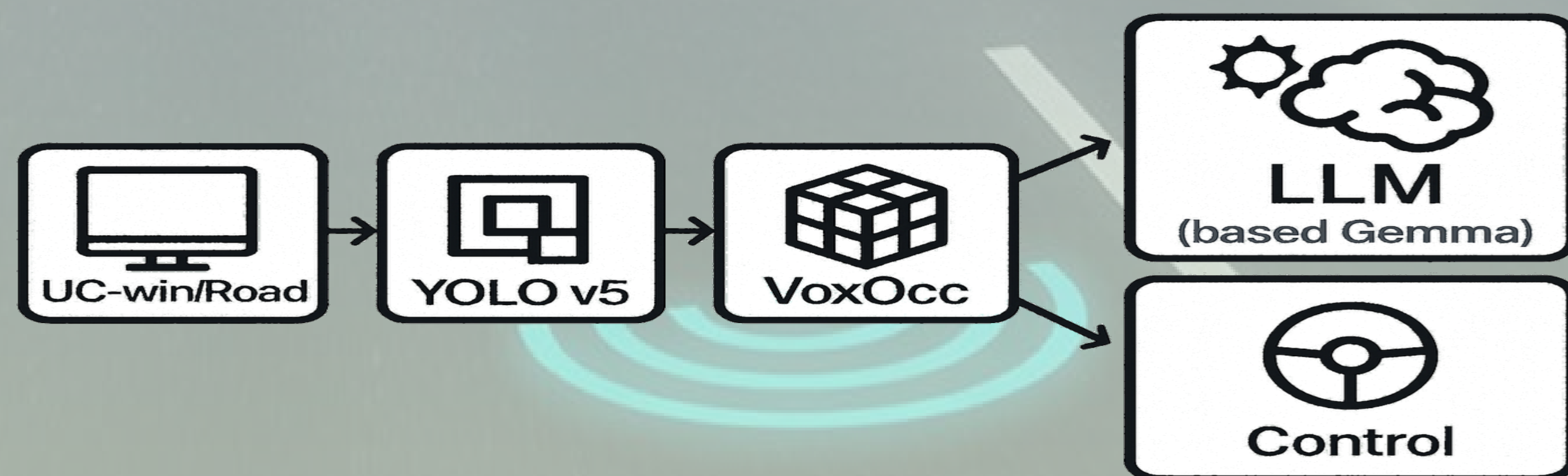
Child Pedestrian Injury Risk (Roberts et al., cited by APP 2023)



System Architecture

YOLOv5 detects objects and sends their details and positions as JSONL to VoxOcc and the LLM. VoxOcc predicts trajectories and, if a risk is detected, creates a JSONL file with collision risk and car/pedestrian locations for the LLM and the control system.

The control system reads the JSONL file from VoxOcc and applies braking when a hazard is detected. With the two JSONL files, the LLM issues warnings and situational guidance through the GUI.



PRISM Functions

1. Risk-Aware Automatic Braking
2. Braking Event Description
3. Perception Summary & Warning

When danger is detected, the control module recognizes it and applies braking. Then the LLM provides an explanation of the risk and the breaking action, while PRISM increases collision weighting when children are recognized.

When a Child Dashed Into the Roadway



Feature works

1. TTS, STT - We plan to add STT and TTS capabilities to upgrade the current GUI-based system so it can interact directly with the driver.
2. V2X - With V2X, vehicles share their perception data to prevent blind-spot accidents more effectively.

