Building a Better Backseat Driver - Emulating the Human Condition to Improve and Democratise Road Risk Intervention Technology

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The success of the author's 2023 accessible, nudge-based good driver app, with its novel speeding interventions, confirmed how to communicate risk effectively and modify behaviour. However, the system's understanding of what to communicate about, with its initial sensor method, was fundamentally limited. Excellent at communicating but blindfolded and in the backseat. Therefore, based on the principle that creating a good driver adjunct needs, at minimum, driver-like perception and process, the author's 2024 work developed digital "eyes," "ears," and "cognition" This involved creating a new cognitive framework: Human Faculty>Ability>Awareness>Indicator>(Nudge Theory: Risk Factor> Intervention) and building/testing the technical capabilities that enable it. Using developed algorithms and machine learning methods, the system now identifies road signs, reads speed limits/traffic lights, detects cyclists + pedestrians, understands depth and following distance, and even "listens" for critical environmental cues like emergency sirens or hazardous weather conditions. Field trials showed 62.5% increased speed-limit accuracy (primarily through temporary limit capture missed in author's 2023 static method). Concurrently, inward-facing cameras and analysis of blinking/yawning trends, head-pose, PERCLOS, and eye-rub indicators, enable comprehensive fatigue monitoring. Benchmarked against standard datasets (EyeBlink8, DMD, UTA-RLDD), blink/yawn indicators showed high efficacy (F1-Score: 94%/80%; Precision: 100%/71%; Recall: 80%/92%). Overall, integrated system reliably matched ground truth alertness across diverse conditions.This project doesn't simply democratise road safety tech, it pushes its limits. Designing a "Better Backseat Driver" for everyone, luxury car owners.

Awards Won: