Aq Zhol: Multifunctional Device With Advanced Road Safety Monitoring System

Kali, Asylkhan (School: Nazarbayev Intellectual School of Physics and Mathematics in Kokshetau)

Purpose: This study addresses road accidents caused by driver fatigue and drowsiness. With a slight level of fatigue and a desire to sleep, a person's reaction drops by almost 16%, causing the driver to react late or overlook objects such as road signs, pedestrians, or traffic lights. The aim was to create a system that prevents road accidents due to driver drowsiness and fatigue. Procedure: The research involved training neural networks for driver face tracking, recognition, and road object identification. The network was programmed and underwent experiments, data analysis, and error correction to optimise recognising drivers' drowsiness and fatigue levels. Results: The program analyses yawning, head direction, and posture in 3D space to detect drowsiness or sleepiness of drivers. If detected, it triggers an auditory warning. An external camera detects and analyses road objects, assisting the driver in following traffic regulations. The program uses a built-in GPS module to calculate the car's speed, notifying the driver if they exceed the speed limit. If the driver fails to slow down before a red traffic light, road signs prohibiting passage, or objects ahead, an alert is played. Conclusions: The study successfully created a DVR system that monitors driver condition, behaviour, and road sign recognition. The neural network-based approach detected driver drowsiness and fatigue, demonstrating the feasibility and potential impact of this method. The camera, interpreting and recognising the driver's face, determined the state of drowsiness, fatigue, and alerted the driver.

Awards Won: