Fast, Single Camera System for Real-Time Monitoring of Driver Fatigue

Advantages
- Non-intrusive monitoring of driver alertness
- Less expensive and complex than previous methods
- Operates in both daylight and nighttime
- Provides quick, real-time monitoring of driver fatigue
- Alerts fatigued drivers

Invention
This patent provides the means, methods, and apparatus for the creation of a driver alertness/vigilance monitoring system. The system makes use of a single dashboard mounted camera that observes and records eye occlusion, blinking, yawning frequency, and head movement. [U.S. Patent 6,927,694]

Background
UCF scientists have developed a system for monitoring driver fatigue and alertness. This system functions in real time and records several parameters, including but not limited to: eye occlusion, blinking, yawning, and head movement. This method works in both daylight and nighttime conditions. The invention makes use of a single camera mounted on the dashboard to compute feature points, rotation, blinking, yawning, and occlusions. The information is then used to generate a response such as an audio or visual alarm to alert the driver. This system works equally well in cars, planes, boats, and heavy machinery (cranes, cement mixers, forklifts, bulldozers, etc.). Not only does this device work to alert fatigued drivers but can also detect impaired (or intoxicated) drivers. In this instance, the system could be used to relay information to the relevant authority or some other action such as automatically slowing down and/or stopping the vehicle.

Safety while operating motor vehicles, airplanes, and heavy machinery is paramount. Fatigued drivers falling asleep at the wheel are responsible for approximately 240,000 accidents per year. Sleep-related accidents cost both the government and businesses an estimated $46 billion a year. A system that detects driver fatigue or impairment and responds by alerting tired drivers would save lives and money. Several attempts have been made at developing such a system. Unfortunately, all of these current systems have various problems and drawbacks. Many of the systems are incapable of operating in real-time. Other systems only check a single parameter, such as blinking, head movement, or yawning. Many systems require multiple cameras, complicated setups, and additional lights shining on the drivers face for illumination. In addition to most of these systems being expensive and complicated, many also require intrusive sensors be attached to the drivers head, face or eyes. The least intrusive of these devices record changes in vehicle operation, such as, swerving and changes in acceleration. The problem with this method is the driver is only alerted after the vehicle is operated in an unsafe manner.

Application
The technology would be of use to airline, trucking, and construction companies for monitoring operator vigilance in order to reduce accidents. The technology can be used by automakers to provide an additional feature to their vehicles, which can be used by drivers personally or by interested third parties (such as law enforcement and insurance companies).

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