scale sensitive and lighting sensitive. Multiple frames and channels based approaches provide extra information but have to process two or more times the amount of data with respect to a single frame approach. A combination of different approaches could be used for improving localization of an eye in a robust manner.

In order to address issues related to the back-end of the present invention, the utilization of the graph in FIG. **9** is required. It can be considered as a signal similar to an EEG or EOG signal. It is the visual equivalent that can be used to observe sleepy patterns. This graph contains two different curves. The T-curve shows the tracking and the D-curve indicates the frame difference. One blink around frame **3** or **4** can be observed from the D-curve. At the 25th frame, there is a large jump on both the D-curve and the T-curve. This indicates that the target has had a relatively large movement (In this example, the person leaned backward slightly). A new reference image at this moment may be required in order to obtain a good D-curve for blink detection.

When a person is fighting sleepiness, some of the following patterns will occur. An individual may try to wide-open, blink, or squint the eyes. The blink rates of these patterns are quite different from the blink rates of an awake state. For example, FIG. **10** shows a normal eye blinking and the corresponding T and D curves. FIG. **11** shows a sequence when the person is sleepy and its corresponding T and D curves. By analyzing these curves, it is obvious that there is some difference between these two graphs. When such a difference occurs, a warning signal from a warning system will be sent to the individual. A personal profile, which characterizes the behavior of the person in consideration, could be used to improve the reliability of detection.

When an individual's eyes are covered by sunglasses or glasses with high reflection, special active light sources could be used to penetrate these glasses and special imaging sensors could be used to record the image from the reflected light. One of the requirements of the active light source is that the frequency should be outside of the visible color spectrum. Another alternative is the following. Since the person is wearing glasses, one could put a tiny light source and sensor on the inside rim of the glasses to get a normal image and perform the tracking as described above.

The non-invasive nature of the present invention makes it more attractive for the commercial marketplace. A small camera a few feet away from the driver is far more acceptable as compared to EEG electrodes attached to the driver's head. The eventual market for a non invasive sleepiness/fatigue monitoring system would encompass a wide variety of settings involving monotonous and tiring jobs such as those of assembly line operators, air traffic controllers, airline pilots, medical residents, etc.

It is not intended that the present invention be limited to the hardware or software arrangement, or operational procedures shown disclosed. This invention includes all of the alterations and variations thereto as encompassed within the scope of the claims as follows.

We claim:

1. A system for monitoring eyes for detecting sleep behavior comprising:

human interface means for non-invasive monitoring of said eyes of an individual, for providing scanned images and for providing feedback to said individual; and,

processor means connected to said human interface means for receiving said scanned images from said human interface means, for processing said scanned images and for providing processed data back to said human interface means for providing said feedback to said individual, wherein said human interface means comprises:

imaging means connected to said processor means for monitoring said eyes of said individual; and,

warning system means connected to said processor means for receiving said processed data from said processor means and for providing a warning to said individual, and wherein said processor means comprises:

eye localization means connected to said human interface means;

eye tracking means connected to said eye localization means;

eye motion signal generation means connected to said eye tracking means; and,

analysis means connected between said eye motion signal generation means and said human interface means.

2. A system for monitoring eyes for detecting sleep behavior as claimed in claim **1** wherein said eye localization means comprises:

horizontal-contrast computation filter means;

horizontal-contrast density determination filter means connected to said horizontal-contrast computation filter means;

facial geometry reasoning means connected to said horizontal-contrast density determination filter means; and,

eye position determination means connected to said facial geometry reasoning means.

3. A system for monitoring eyes for detecting sleep behavior as claimed in claim **2** wherein said eye tracking means comprises:

search means for correlating an image-block with an image in a current frame at varying displacements from an original location.

4. A system for monitoring eyes for detecting sleep behavior as claimed in claim **3** wherein said eye motion signal generation means comprises:

measurement means for measuring correlation between a new tracked image block and a very first initial block where an eye is open.

5. A system for monitoring eyes for detecting sleep behavior as claimed in claim **4** wherein said analysis means evaluates a tracking T curve and a frame difference D curve.

6. A system for monitoring eyes for detecting sleep behavior as claimed in claim **5** wherein said processor means further comprises:

greyscale correlator means connected to said human interface means.

7. A system for monitoring eyes for detecting sleep behavior as claimed in claim **6** wherein said processor means further comprises:

video display chip means connected to said human interface means.

8. A system for monitoring eyes for detecting sleep behavior as claimed in claim **7** wherein said human interface means further comprises:

controller means connected to said imaging means for allowing said individual to adjust viewing angle and direction of said imaging means.

9. A system for monitoring eyes for detecting sleep behavior as claimed in claim **8** wherein said human interface means further comprises:

track/lost-track indicator means for informing said individual that said imaging means needs adjustment.