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EA-430

USER MANUAL

Version 2014.03.27

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I. Product introduction

The EA-430 driver fatigue alarm system is the most advanced non-contact method to capture infrared images of people's eyes and the PERCLOS algorithms alerts the driver in time to protect your life and property.

The EA-430 is small and intelligent, it does not block your vision, the base rotates as needed, the installation is very easy, and it can be installed right on the dashboard. The EA-430 has a highly integrated infrared camera, a computer, image processing unit and alarm.   The EA-430 has a GPS system built in to prevent false alarms when travelling below a programmable speed. The EA-430 technology is protected by over ten patents.

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II. Alarm theory

 A driver may not be aware that they are in danger due to fatigue. A driver might feel they must continue driving. Our driver fatigue alarm system reminds the driver that he/she is in a dangerous state.   The EA-430 uses a PERCLOS algorithm to analyze the driver's fatigue level.

The state of the driver's eyes is constantly analyzed. The human retina reflects infra-red light in a manner that can be used to determine the eye's condition. This varies just prior to falling asleep. The EA-430 knows you are falling asleep before you close your eyes.

If the EA-430 determines the driver is in a dangerous state a sharp voice will alert the driver.

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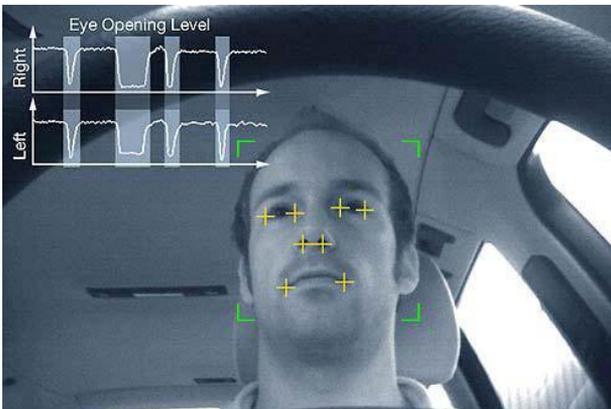
III. Features

- Works around the clock, both in the dark or the sun.
- Works with sunglasses or prescription glasses.
- Leading face recognition technology, patented PERCLOS algorithms to warn the driver.
- Built in GPS system to prevent alarms when the vehicle speed to below a programmed threshold.
- Patented mesh membrane pupil detection technology detects open but sleepy eyes.
- In addition to fatigue driving, if the driver does not focus on driving the system will respond.
- Intelligent high-speed recognition, the system can identify when you are in an urban areas or on the expressway, the system will automatically raise the alarm sensitivity on expressway.
- Compact, easy to install, will not affect the driver's field of view.
- Logic output signals for data collection.
- Automatic sensitivity control, when the driver barely moves, the system will automatically raise the sensitivity. If he often turns his head, the alarm sensitivity will be automatically lowered, to reduce false alarms.
- Facial feedback indicator, the green light is on when the angle between lens and human face is proper.

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IV. Functional process

Two seconds after power is turned on, the green light will flash. At night the red infrared LEDs can also be seen. After 30 seconds, the system goes into the active state. The green light means your eyes are open, the light is off when your eyes closed, or not in view. When it is first installed, you adjust the position according to green light.

The EA-430 will remind the driver before entering a dangerous driving status. The human retina will become less and less sensitive to the light outside, the artificial intelligence software inside the system is detecting the status continuously, and it will give an audible alarm to remind the driver take a rest.

The EA-430 can also detect a distracted driver, such as talking with back-seat passengers, adjusting dashboard controls, reading, texting, picking up items on the floor, and give audible reminders to prevent accidents .

The EA-430 response time is typically 2-3 seconds. Detecting items like looking at the mirror for too long, the alarm reaction time is longer and then the alarms will sound.

TUNING
While sitting in the normal driving position, power up the EA-430. After two seconds the EA-430 will emit a power-on tone and light the STATUS INDICATOR for one second, after which the STATUS INDICATOR will either dim, flicker, or go off -- depending upon the extent to which the EA-430 recognizes the driver's eyes. Adjust the pan and tilt of the EA-430 unit to maximize the amount of time that the STATUS INDICATOR remains on.

ALERT STATUS

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To be able to perform its function, the EA-430 requires a brief period to become familiar with the driver's face before entering ALERT status. For most drivers, the EA-430 will enter ALERT status after about a minute or so of normal driving. For drivers that wear eyeglasses, the unit may take as long as 5 minutes to enter the ALERT status. Thereafter, the EA-430 will respond within two seconds to signs of fatigue or inattention. If the EA-430 is unable to recognize the driver's gaze, it will set the PORTRAIT output low after 30 seconds, letting the monitoring center know that the unit's view of the driver has been obstructed.

WARNING METHOD
Upon detecting signs of fatigue or distraction, the EA-430 warns the driver to "Pay Attention to the Road" while simultaneously sending a message to the server.

If the driver brings his gaze back to the road or to the EA-430 immediately, the EA-430. However, if the driver fails to respond quickly to the warning, the EA-430 will set off an audible alarm sufficient to startle the driver.

During initial testing the EA-430 may at first seem less responsive than expected. The EA-430 uses Video Analytics to recognize the characteristics of fatigue and distraction, taking into account conditions such as facial motion and pupil dilation together with eye closure. The unit will not respond as quickly to eye closure where conditions associated with fatigue or distraction are not present. (i.e., significant movements or continuous talking immediately preceding eye closure). Under other eye closure conditions the unit will warn in about 4-7 seconds. The sensitivity and speaker volume are preset by the server for typical conditions. If local conditions require different settings, please contact technical support.

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V. Power requirements

- Automobile power can range from 8 to 36 Volts, suitable for both 12V and 24V car batteries.
- Very low power consumption, average current is less then 100mA in 12V systems and 60mA in 24V systems, similar with leakage from the battery.
- Power should be disconnected when the vehicle is off.

VI. Attention:

- Do not open or repair the device.
- Do not operate the system while driving.
- Please handle carefully, do not drop.
- Do not use cleaning agents to clean the machine.
- Keep away from water or moist conditions.
- Do not rip, bend or squeezed the wiring.
- The EA-430 does not recognize a person who has only one eye, white eyebrows, rough scars or wrinkles around eyebrows.
- If the temperature in the car is too high the EA-430 may enter a sleeping mode to avoid damage, the system will re-start when cool.
- If the temperature is well below freezing, the device may not start immediately; wait for the cabin to warm up.

VII. Product History

Researchers at Carnegie-Mellon University, working with the National Highway Traffic Safety Administration, developed the PERCLOS algorithm to measure eye closure rates.

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Status	Data PORTRAIT	Data WARNING
Power Off	Low	Low
Eyes not detected	Low	High
Distracted	High	Low
All OK	High	High

SUSPEND (input) – Each contact closure to ground triggers the SUSPEND function cumulatively for two minutes. Five successive closures will trigger the maximum suspend interval of 10 minutes, after which the unit will resume normal operation.

WARNING (output) – The output signal level is normally at ~4.3 volts relative to vehicle ground. WARNING drops briefly to ~0 volts each time the EA430 gives an audible warning for the driver to "Pay Attention to the Road".

PORTRAIT (output) – The output signals level is at ~4.3 volts when the EA430 unit is continuing to recognize the driver's gaze. After 30 seconds of the EA430 being unable to lock to the driver's gaze, PORTRAIT drops to ~0 volts.

VIII. Special legal statement:

Driver fatigue alarm system is only a warning product, and does not absolutely guarantee your driving safety. Please be advised that EA-430 is not responsible for any driving accident.

EA-430: Made In the USA and China
Booklet: Printed in USA

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