

【Abstract】**【Invention Title】**

TWO-STEP DROWSY DRIVING PREVENTION APPARATUS THROUGH MOTION,
FACE, EYE AND MOUTH RECOGNITION

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Disclosed therein is a two-step drowsy driving prevention
apparatus through motion, face, eye and mouth recognition. A
driving judging unit which includes a GPS device to detect a driving
state of a vehicle and a drowsiness judging unit which receives
10 image and three-dimensional depth information from a photographing
unit including an infrared depth sensor and an infrared camera
mounted at positions to observe a driver's face judge a cycle of a
yawn, a speed and a cycle of nodding the head and a speed and a
cycle of a blink of the eye as a first step judgment. When it is
15 judged that there is a drowsiness prelude action, the apparatus
outputs a "preliminary warning". After that, a warning unit outputs
a "main warning" when there is a drowsiness execution action by
inspecting a closed state of the eye, a forward looking state of
the eye and an angle of the head as a second step judgment so as
20 to accurately judge only a drowsy driving action except the closed

state of the eye and the case that the driver does not look at the front or bends the head other than drowsiness through the two-step stepwise judging method based on various judgment criteria, such as the driver's motion, face, pupil and a mouth shape, thereby preventing traffic accidents, human casualties and economic loss due to drowsy driving.

Fig. 1.