NEC IDEATHON

DROWSINESS DETECTION

TEAM PENNY: Netaji Subhash Engineering College
Somdev Basu

Themes

PUBLIC SAFETY
SMART TRANSPORTATION

Drowsiness Detection Model

PROBLEM STATEMENT & TIME-FRAME

What problem do we aim to solve?

Drowsiness among drivers leads to road accidents more often.With our project we try to eradicate this issue making a drowsiness alert

Why this problem is happening?

The root cause of drowsiness is over-working my drivers and also consumption of liquor.

The process and time-frame

Camera is on when driving -> Camera continuously detects the eyes of the driver to see if they are drowsy or not -> if the camera sees that the driver is feeling drowsy an alert is be played to awake the driver so that no accident follows.

Brief Summary

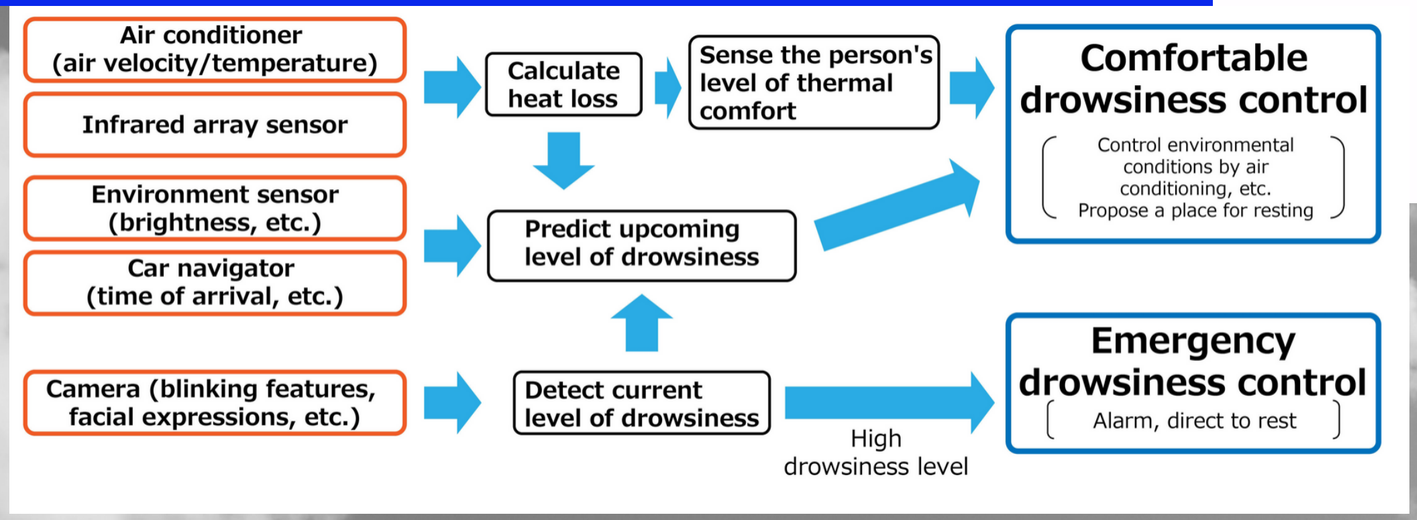
HERE'S THE SOLUTION

A computer vision system that can automatically detect driver drowsiness in a real-time video stream and then play an alarm if the driver appears to be drowsy. The system first gets feed with real-time videos of driver. If the system detects that for 20 frames the driver is feeling drowsy (using Eye-Aspect-Ratio which is a metric to detect if eye is closed) then a sound will be thrown by the system to later the driver and help us avoid any mishap.

What of NEC's technology we plan to use

PHYSIOLOGICAL INFORMATION RECOGNITION

By using facial video technology and wearable device, human internal states (emotion, motivation, fatigue) are understood from physiological information (sweat, heart rate)



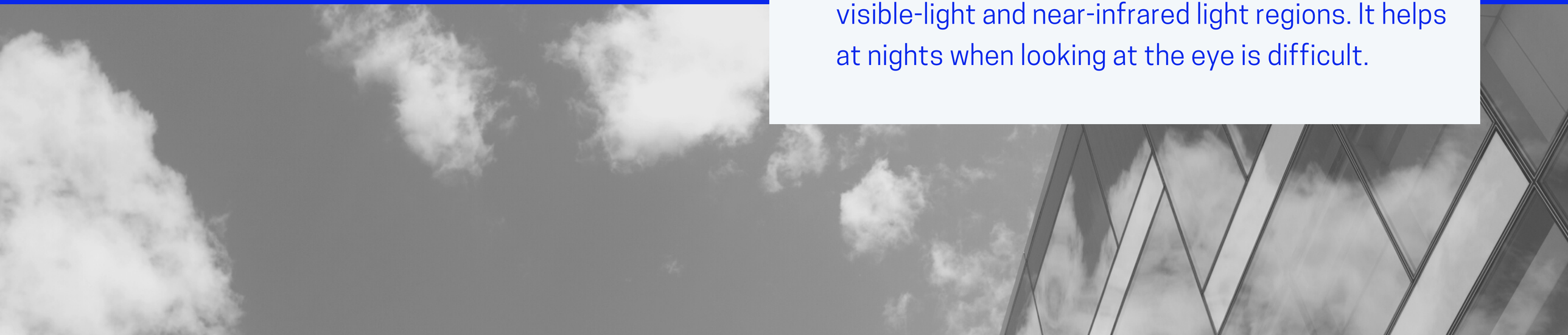
What of SSS's technology we plan to use

PREGIUS GLOBAL SHUTTER PIXEL TECHNOLOGY

Pregius Global shutter pixel technology is based on Sony's low-noise CCD structure. It realizes high-speed and high-precision performance

STARVIS

Back-illuminated pixel technology used in CMOS image sensors for surveillance camera applications. It realizes high picture quality in the visible-light and near-infrared light regions. It helps at nights when looking at the eye is difficult.



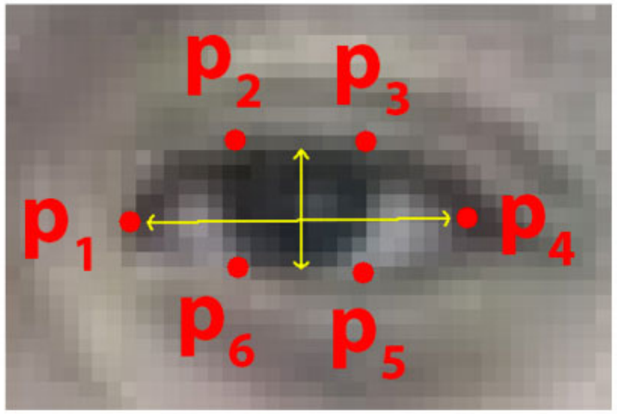
Our Approach

HOW WILL WE SOLVE IT

The solution is mostly based on Computer Vision to detect eye-lids i.e if the eye-lids are open or closed for 20 continuous frames and if so the set an alert.

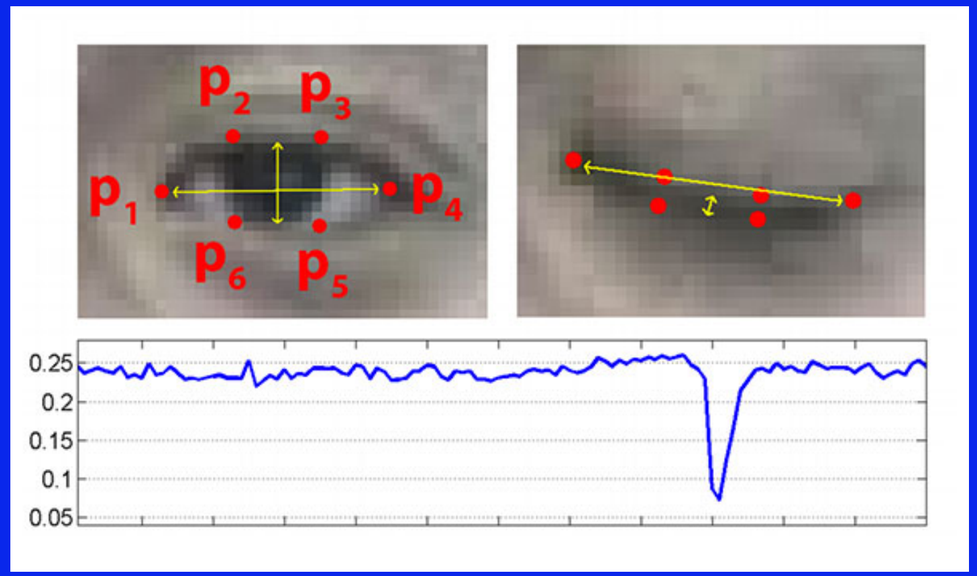
Physiological Information Recognition: By using facial video technology and wearable device, human internal states (emotion, motivation, fatigue) are understood from physiological information (sweat, heart rate)Pregius Global shutter pixel technology based on Sony's low-noise CCD structure. It realizes high-speed and high-precision performance.

Algorithm: Each eye is represented by 6 (x, y)-coordinates, starting at the left-corner of the eye (as if you were looking at the person), and then working clockwise around the eye.



It checks 20 consecutive frames and if the Eye Aspect ratio is less than 0.25, Alert is generated.

$$\text{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$



CURRENT GROUND SITUATION

- While there is a lack of data pertaining to accidents caused by drowsy driving, studies by health organizations and universities in some low to middle income countries with driving conditions similar to India have detailed the prevalence of driver drowsiness. Data from these studies show that 75%, 44%, and 22% of commer□cial truck drivers have experienced drowsiness while driving in Thailand, Argentina, and Brazil respectively (Herman et al., 2014). In India, the only category drowsy behavior could fifit into is fault of driver, which is split into two categories: speeding and intake of alcohol or drugs.

HOW OUR SOLUTION WILL HELP IMPROVISE THE SITUATION

The issue of drowsy driving is multifaceted and relatively complex, so no single solution will permanently address the problem for every driver on the road. However, we believe that our set of recommendations and prototypes sufficiently addresses the main aspects of the issue: the underly□ing cause of drowsiness, methods of drowsiness detection, and alert strategie

MARKET SIZE

The ADAS Market (advanced driver assistance system) is estimated to be USD 30.0 billion in 2019 and is projected to reach USD 134.9 billion by 2027, at a CAGR of 20.7% during the forecast period. ADAS technology improves the driving experience, while enhancing the vehicle and pedestrian safety. It is becoming an integral part of modern automobiles and is being adopted in passenger cars as well as commercial vehicles.

Demand for Safe, Efficient, and Convenient Driving Experience is Expected to Drive the ADAS Market, 2019–2027

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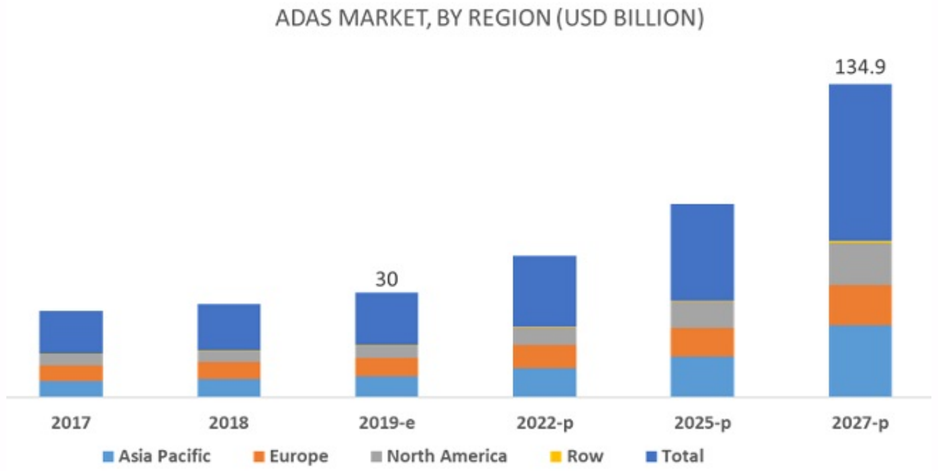
Asia Pacific Estimated to Witness the Highest Growth in ADAS Market



BUSINESS MODEL

FULFILLMENT OF CLIENTS WITH PRODUCTS

Our solution will be serving at a national scale. We intend to capture the market of whole nation by selling the system as a standalone product as well as collaborating with various established companies in the vehicles market as they can incorporate our system in their products which would provide an edge to that company over their competitors.

We are also trying to incur government support for EuroNCap or the indegenous, Bharat New Vehicle Safety Assessment Program, a proposed New Car Assessment Program for India. Cars sold in the country will be assigned by star ratings based on their safety. This will be possible only if we get proper incubation with mentoring support.