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Supervised vehicular operation using WAN

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ABSTRACT

The need for vehicular supervision system is of the utmost need due to the sheer number of vehicles plying every day on our roads. With the rise in numbers of vehicles, there is also an increase in the need to prevent potentially fatal on-road incidents. Drowsiness and fatigue are large contributors to most on-road accidents. Prevention of such accidents can be achieved using a drowsiness detection system and drivers emotion recognition. Such a system employs recognition of facial expressions to identify emotions using a camera. The feed from the camera is processed to obtain instances of drowsiness or stress. Accordingly, tasks can be triggered such as slowing down or stopping the vehicle.

Keywords— *Drowsiness, Fatigue, Emotion recognition, On-road incidents*

1. INTRODUCTION

An essential physiological need for human beings is sleep. Sleep deprivation or lack of rest, reduces agility of the motor functions, can worsen inefficiency, reduces reaction time and wakefulness, and hinders attention spans and can cause distractions from task at hand. Overall, a lack of sleep or quality rest can drastically effect the performance of even mundane activities. This can not only reduce productivity but can cause harm or an accident while operating power or heavy machinery.

According to many researches drowsiness is related to thousands of traffic accidents each year, the accidents produces approximately 50% of death or serious injuries [1], as there is a tendency for impacts at high speed to do so, with common reasons being that the driver of the vehicle has fallen asleep and is unable brake, control speed, or divert the vehicle to safety. To prevent such incidents a drowsiness detection systems that recognizes signs of possible drowsiness, alerting the driver to their condition [2] can be developed. Such a proposed system will require a camera to capture continuous feed of driver's face. The images are parsed and analyzed to recognize the facial expressions, which in turn gives resultant emotions. The Eye Aspect Ratio (EAR) is used to identify drowsiness. Based on detected scenario a precautionary task or operation is triggered.

2. EXISTING SYSTEM

Driving with sluggishness is one of the fundamental driver of auto collisions. Driver weariness is a critical factor in countless mishaps. The advancement of innovations for recognizing or anticipating sluggishness in the driver's seat is a noteworthy test in the field of mishap evasion frameworks. Because of the peril that sleepiness introduces out and about, techniques should be produced for checking its effects. Indeed, even every driver feels that he can control the vehicle exceptionally Ill in whenever, there still are a few dangers happened on account of the drivers' tiredness, sluggishness, or heedlessness. So as to avert their being worn out in the driving, some driver help frameworks have been created to bring the consideration of a driver. There are three sorts of procedures utilized for identifying a driver's cognizance. The above all else is to distinguish the driving state [3] [4], for example, the difference in speed, the recurrence of turning wheel, or the recurrence of braking. Since the traffic cases are so intricate, it isn't right enough for genuine applications. In the second technique, I may recognize the driver's psychological status by the medicinal instruments. Indeed, even the recognizing results is superior to the primary strategy, be that as it may, the driver ought to be approached to wear a few instruments in their driving, which will impact their driving and is difficult to actualize. In the last technique, I may introduce a camera to catch the driver's picture persistently, and after that dependent on these pictures to identify their eyes squinting. This is on the grounds that a few examines [5] [6] demonstrate that eyes flickering have solid association with the therapeutic status. Likewise of that, this technique is more pertinent than the others referenced previously.

Since recognizing a driver's eye is more material than the others, there are numerous methodologies for eyes identification strategies proposed in the ongoing years. In this subject, face

recognition and eyes finding are regularly the two fundamental advances. For face identification, there are around three sorts of techniques could be used, for example, AI (neural systems, primary segment investigation, bolster vector machines, Kullback- Leibler boosting, Gaussian blends), shape fitting (circle fitting, geometrical demonstrating, layout coordinating), and shading examination. For reviews on face location, I may see and. In the above techniques, the AI strategies need many preparing information for applying, and the shape fitting techniques need more calculation than the others, so the shading investigation strategy is more relevant than the others. The main issue is that it could be impacted by the brightening, and the vehicle moving conditions can't confront this issue.

3. PROPOSED SYSTEM

The basic setup of the proposed system consists of Arduino based hardware. The camera is connected via WAN which interfaces with the Node MCU. The Node MCU is responsible for processing the images received.

The Node MCU has an inbuilt Wi-Fi adapter. Images are identified that have an EAR value lower than the threshold set The purposed algorithm is based on changes of eyes state. The camera feed, which continuously capture video is processed to obtain a series of stills in any image format. From these stand-alone images faces can be detected for further use.

3.1 Eye and drowsiness detection

The general flow of the proposed drowsiness detection system's operation is fairly straightforward. A camera needs to be setup that continuously monitors the facial region and stream a feed of video. If a face detected, facial landmark detection is applied. They are readily available datasets which can be used to detect faces. This is followed by the extraction of only the eye region. With eye regions, we can compute the eye aspect ratio to determine if the eyes are closed. The Eye Aspect Ratio is calculated using six coordinates mapped over each eye region. These coordinates map the edges of the eyes opening. These points can be used to determine if the eyes are open or closed. If the eye aspect ratio indicates that the eyes have been closed for a sufficiently long enough amount of time, any trigger action can be put into motion. These may include a warning system, slowing down of vehicle or an alarm to inform the driver. The implementation of the drowsiness detection can done using OpenCV, dlib, and Python

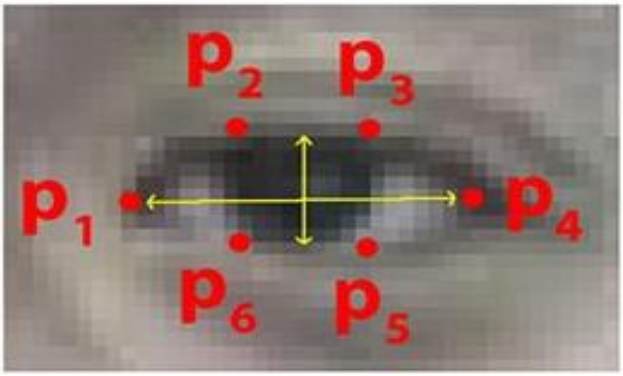

Fig. 1: Eye and drowsiness detection

3.2 Emotion detection

Another important aspect of the proposed system is the inclusion of face detection, followed by recognition of emotion on the face. There is a need for a camera setup that continuously monitors the facial region and stream a feed of video. If a face detected, facial landmark detection is applied. They are readily available datasets which can be used to detect faces. OpenCV is a tool that may be employed for this purpose. It has a few 'face recognizer' classes that can be applied for emotion recognition. There a number of different techniques, one of which is Fisher Face. The dataset against which any image is tested need to be organized properly for allowing optimal accuracy. Face finding can be automated using a filter to check only those images which fall into the parameters. The approach that can be used is to split the complete dataset into a training set and a classification set. We use the training set to teach the classifier to recognize the to-be-predicted labels, and use the classification set to estimate the classifier performance. After all the training is done we can simply compare sequential images against the dataset to detect emotions. Emotion recognition is a complex task as emotions and their expressions are subjective and may vary from person to person. To achieve a higher accuracy, the dataset needs to be further trained Emotion may be classified as neutral, positive or negative. Negative emotions can be – disgust, anger, confusion, etc. If negative emotions are detected for an extended period a trigger action is initiated.

4. CONCLUSION

The current form of the proposed system has presented a method for eye detection and localization along with facial emotion recognition. This system employs two pronged approach in the proposed system that can potentially prevent catastrophic vehicular incidents. With drowsiness detection and emotion recognition, the two major indicators of the state of a driver, accidents can be avoided in the nick of time. If parameters of the driver's state is found to be beyond the constraints of normal state a warning system issues an alarm or prescribed trigger.

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