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Effective Techniques Used for Accident Prevention and Alert System Using Image Processing

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ABSTRACT: The main objective of Image processing is to convert an image to a digital form and perform some operations on it,to get an intensified image or take some useful information from it. Image acquired in process is altered or analyzed to give features/characteristics useful for system. The main purpose of this paper is to explore the different image processing techniques used in accident prevention and alert system as well as to raise interest in this research area.

KEYWORDS: Image Processing, Voila Jones, Continuous Query Model,HAAR, MATLAB.

I. INTRODUCTION:

Image Processing is any form of processing using various computer algorithms on an image or series of images or videos, to enhance the image or to extract useful information.

There are mainly three steps involved in image processing:

1) Image Acquisition.
2) Analyzing the image.
3) Modified output.

Image Processing has a wide range of application including UV imaging, where the satellite scans the earth's surface from high altitude to obtain specific information. Image Processing is also used in pattern recognition to identify the objects in an image as well as it is used in video processing system for performing various operations on the fast movement of pictures. Sleep-deprived drivers remain responsible for about 40% of the road accidents, according to enforcement officers patrolling the highways and major roads

To reduce the number of accidents, Image processing is proving to be the best choice of action. It provides services like drowsiness detection, vehicle detection, accident detection and many more. This paper presents the analysis existing techniques and algorithms to detect eye of driver and analyze movement of eyelids, to identify sleepiness. Also, the system should have alerting mechanism to make drowsy driver conscious. The existing sophisticated vehicles monitoring and traffic surveillance systems can be used to prevent accidents from occurring. However, real-time observations are difficult with an enormous amount of surveillance data running continuously. With the emerging trends in the field of image processing, the use of innovative real-time technologies would help for accident prevention and detection.

II. LITERATURE REVIEW:

Venkata Krishna Kota et al.[1]In this paper, architecture is proposed to identify and react to road accidents. It uses Complex Event Processing based Continuous Query Model to identify and react to accidents. Data Sources: There are three types of live data. They are vehicle mounted sensors data, human wearable sensor data and multimedia data generated from data sources located at a geographical location where accident happened.Vehicle mounted sensors may send data bout vehicle speed, geographical GPS location with latitude, longitude and altitude, acceleration, shock information, vibration, rotation, etc. Human wearable sensors may send information about person's blood pressure, heart beat, breath rate, movement and other information. Other data sources may provide information at accident location like images, video captured, traffic related information, etc. All these kinds of live data streams are modeled as object streams. Accident Detection and Rescue: To identify that the accident has happened and to assess its impact, we need to correlate data from vehicle mounted sensors and data from passenger's wearable devices. Accident can be modeled as a complex event which is a

specific combination of simple events.For each complex event, appropriate action is identified. "CEP based Accident Identification and Rescue Engine" will continuously monitor the live data streams generated from vehicle mounted sensors, passenger's wearable sensors and check for the existence of any complex event (accident). If any accident is identified, it assesses its impact and triggers its associated action

M. Naeem Hussein et al. [2] The experiments were done on the Natural Visible and Infrared Facial Expression (NVIE) Database intended for facial expression recognition analysis. For this experiment, 1000 thermal images are used and the images obtained from 107 persons. In these experiments, cascade classifier is trained with labeled samples to predict the location of the bounding box which covers the double eyes region. The classifier use visual features extracted from the detection window sampled from the input thermal image. Feature descriptor plays an important role in determining the accuracy of the classification result. There are three types of feature descriptors 1. Haar features proposed by Viola Jones et al. is obtained by applying a set of masks to compute summed pixel intensities difference in a localized region in the detection window. 2. Histogram of Oriented Gradients (HOG) features proposed by Dalal et al. is obtained from computing edge orientation histogram over a block of cells. 3. Local Binary Patterns (LBP) features proposed by the Ojala el al., is computed by comparing the centerpixel value with the 8 surrounding neighboring pixels. The accuracy of the detection is measured based on precision rate (PR), Recall rate (RR) and F-Measure computed on the images in evaluation dataset.

AncyJohn,Prof.Nishanth [3] The proposed system is composed of two separate design units: transmitter unit and receiver unit. Transmitter module: Transmitter module is placed in the specific zone. Transmitter and receiver both operate at a frequency of 430 MHz Transmitter receives data serially and sends the data to the receiver continuously. Receiver module: The Radio Frequency(RF) module consists of RF transmitter and RF receiver. The RF module has an encoder in transmitter and decoder in the receiver. The RF receiver will be always in listening state, if it receives any signal of same frequency as of receiver, it will automatically indicate the micro controller which in turn reduces or limits the speed of the vehicle until the vehicle leaves that particular zone.The three main steps are identifying the accident, locating the position and transmitting the information for help. There are certain parameters that change during accidents which can be detected using sensors that measure these changing parameters.The position of the accident is located using Bluetooth module which connects to mobile phone wirelessly. When accident is occurred message will be displayed in the android phones having GPS and GSM in it.

Ratna Kaavya et al.[4]In the proposed system, instead of using the EEG, the ECG wearable devices the Raspberry Pi 3 is built into the car. A camera is attached to monitor the driver, and the buzzer will buzz if the driver is detected in a drowsy state. The gas sensor is positioned to detect the presence of alcohol and the vibration sensor to detect if an accident has occurred. The sensors and camera are connected to the Raspberry Pi which is built into the car and a notification message is sent using the IOT module. With which the server side is continuously informed about the driver status.

Sayanee Nanda et al.[5] The system first checks whether the person who is going to drive the vehicle actually has a driver's license or not. If the person has a driver's license, the next step is to check whether the driver's license is valid or not. The RFID reader integrated into the bicycle will have a maximum of 10 registered users authorized to use the bicycle. Thus, it helps to ensure that the bicycle will not be stolen and that the person riding the bicycle is not underage or inexperienced. Then when the user start riding the bike, the camera adjustment on the front of the bike will monitor whether the displayed traffic light is red or not, if so, the automatic brake system will gradually reduce the speed of the bike. This will automatically cause deceleration.

Adnan Bin Faiz et al.[6]Since smartphones have become an important part of our lives, it is possible to use smartphones in the death prevention system after accidents. This app uses the GPS receiver in the phone to detect the rapid change in deceleration that occurred at the time of the accident. It also takes the pressure change from the pressure sensor and the inclination change from the smartphone's acceleration sensor. By detecting these three situations as accident detection, this Android app sends accident location to help in emergency situations. An emergency switch option has also been added to this app which provides an opportunity for the driver to send an alert message without checking the accident detection status.

Harit Sharma et al.[7]This paper proposes a real-time automated accident detection system using smartphone sensors as the source for input stream. Thus, make the system cheaper alternative to expensive in-vehicle accident detection systems.

Such solution gives an easy access to the already established wireless network infrastructure, which can be used to notify emergency responders in case an accident is detected. Collected data from multiple sensors of smartphone is then analyzed for abrupt events (similar to a crash), by the Crash Detection algorithm and fed to the crash detector, where algorithm calculates Collision Index. Algorithm is designed in such a way that it promises to not to have any false negatives still is able to return all the relevant results. The results displayed are NHTSA Test Data Result. Proposed system has scope to use pictures/videos to identify and improve the accuracy of analyzing severity of an accident.

Elie Nasr et al.[8] This paper conveys a smart and reliable IoT system solution which instantly notifies the emergency medical services for rescue of accident victims. This paper starts with descriptive statistics about car accidents delivered by ASIRT. This system requires no user interaction during or after the accident, but it provides instant automated system to alert the emergency responders and SOS contacts. Passengers and Vehicle Registration is first phase of the proposed system on the IoT device. Bluetooth Low Energy (BLE) communication protocol can be used as an alternative to NFC, to signal the presence of the passenger inside the vehicle. In case of vehicle's accident, the airbag, or any shock detection mechanism triggers the shock sensor and consequently alerting information is generated after the occurrence of an accident and its geographical location is sent to the server. The server has previously recognized the passengers inside the vehicle, it can now spot the passengers that are in danger. A rescue team can then be sent immediately to the acknowledged location carrying out appropriate medical support since pre-medical info have already been identified. Reliability test showed that the system is robust, that is, available and serviceable.

Maninder Kahlon et al.[9] In this paper, driver drowsiness detection algorithm based on the state of eyes of the driver which is determined. MATLAB with image processing tools has been used to process the image provided by a camera. ViolaJones algorithm to detect the objects such as nose, mouth or upper body. A median filter was used to reduce the noise. The state of eyes is determined by using the iris visibility of the driver.First step in the process was to capture an image using a camera. Once the image is captured, next step is to find eyes in the image and then crop the rectangular image from the original image. Convert Image RGB to Grayscale Image Convert Grayscale image to Binary Image An image data in the binary format is stored in a matrix. It is clear that when eyes are open, each column has a greater number of 0's compared to the closed eyes. Open eye's image has more than 30 columns where each column has 12 or more black pixels. On the other hand, closed eye has at the most 5 black pixels in each of the column.Considering the number of pixels in each of the columns, the open or closed eyes are determined.The status of all of the sample eye's images were correctly recognized by each of the above explained methods.Closed eyes have very small black to white pixel ratio and black pixel length in comparison to open eyes. In addition, shape of closed eye is not round.If the image does meet either open or close eyes criteria, its result will be ignored and the next image will be processed.

Nicky Kattukkaran et al. [10] The proposed system has detected the bike accident and alerted the nearby medical center about the accident to provide Immediate medical aid to the patient along with the location of accident spot considering the tilt angle of vehicle and heart beat factor by using two main modules.The first module consists of an accelerometer, MSP430 micro-controller and a Bluetooth module - has detected the vehicle is fallen down or not considering the tilt angle of vehicle and the second module consists of a Heartbeat sensor MSP430 microcontroller, and Bluetooth module - has detected the heartbeat of the driver after fallen down. on the result of both the modules,decision of the seriousness of an accident is taken and it has further communicated with the Smart phone to alert the medical center.The application is designed where the information from both the modules have shared byBluetooth for activating GPS as well as for further contacting with patients closed ones for immediate medical aid.

Usman Khalil et al.[11]The paper haspresented the different methods of automatic road accident detection techniques and also proposed the cost-efficient automatic road accident detection technique based on ESIOT components in order to save accident faced person. The system has detected an accident dependingon two ultrasonic sensors (HCSR-04) placed on the front and back side of the roofs. They have measured distances from the placed sensors to front as well as back bumpers of the car which is named as predefined threshold distances. And depending on these distances the system has detected an accident. After detection of an accident the immediate call is given to GPS Module to turn on in order to determine the location of car and send the message

using the GSM module to the emergency department.

Nidhi Sinha et al.[12]The system is aimed to detect the drowsiness of the driver taking physiological factors of the driver in consideration with the use of modern technology like Digital Image Processing. The system has mainly focused on the recognitionof face and eye, consisting of four major sections: Image acquisition, pupil and face recognition, driver state recognition; activate alarm.InImage Acquisition part the system has captured high quality video images of the driver's face and eye. In next part of face and Eye Detection, the real time method - Viola-Jones algorithm have used for the accurate detection of face and eye movements.In blink detection, the system has checked for the Blinking of an eye and changing of black pixels in the eye area for the drowsiness check. And depending on the results of these three stages the system has decided for the activation of alarm.

III. CONCLUSION:

This paper represents analysis of existing techniques of image processing for drowsiness detection thus useful for prevention of such accident cases. Various efficient algorithms for the detection ofdriver sleepiness and patterns have been discussed. Voila Jones algorithm and eye aspect ratio determine the drowsy state. According to the survey efficient algorithms and accurate data lead to reduce the chances of accident.

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