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DRIVER DROWSINESS AND ALCOHOL DETECTION

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ABSTRACT
Majority of the road accidents are caused by driver drowsiness and alcohol consumption. Using technology as powerful as machine learning can prevent these two major causes of road accidents. Therefore, a real-time, low-cost, non-intrusive technology for detecting drowsy drivers that is also integrated with an alcohol detection system has been created. This system makes driving easier and prevents collisions. It consists of steering pressure sensor, alcohol sensor LCD module and microcontroller. The input and output modules are interfaced with the microcontroller. This study comprises of a Microcontroller based monitoring system combined with steering pressure sensors which is installed on the steering wheel, these sensors can be used to measure gripping force while driving. It also capable of detecting whether the driver is drunk or not by using Alcohol sensor. The sensor's output is sent to the microcontroller for further processing whenever it detects a hand grip pressure rate that is lower than normal or an alcohol concentration that is higher than the set threshold. If the device detects any signs of alcohol use above the specified limit, it will lock the engine. The microcontroller initiates necessary actions such as triggering alarm, LCD display and engine stop. Deaths from drunk driving will be drastically decreased if this is successfully implemented. Future applications of this kind of technology may include the safe landing of a car far from other cars.
Keywords—MQ3 sensors, Steering pressure, Machine Learning, Drowsiness detection.

1. INTRODUCTION
The welfare of the individual and the community, the economy, and the quality of life all heavily depend on transportation. The expenses that society bears include monetary costs (for purchases, functions, and support), social and environmental costs (for noise contamination and gridlocks), fines for unfavourable vehicle collisions, and so on. 1.25 million passings occur annually as a result of street vehicle crashes, according to recent World Health Organization investigations [5, 6]. Also, these accidents resulted in an annual cost of $518 billion USD worldwide, which results in a 1-2% GDP decline for all countries on the earth [6]. In order to move self-administered medication safely, it is crucial to track and acknowledge nearby traffic participants, such as pedestrians, vehicles, and bikers ([1], [9], [10], and so on).. The use of sensors like RADAR and LIDAR is another example. For the aim of finding and following. A fundamental element of advanced driving assistance systems is the evaluation of obstructions, way differentiating evidence, and the following field of view (ADAS [4]).

The goal of obstacle recognition and global positioning frameworks [1], [8] in relation to driver-assistance frameworks [2] is to identify and screen or analyse the dynamic behaviour of one or more deterrents in proximity to the host vehicle. Alcohol sensors make it simple to determine whether someone is drinking, while temperature sensors make it possible to determine whether someone has abused heat. Gas spills can also be identified by the gas sensors. Several techniques have been used to try to determine the driver's laziness. Yet, there is no actualized approach to allow the car to stop on its own if the weak or sluggish state is detected. Using the driver's face is the most well-known method of determining their mental state. Primarily concentrates on the facial edges where the weakness condition is attained. These techniques can prevent the majority of street accidents. An Alarm is generated in an effort to inform the driver of his condition. Either a beeping sound or a vibrating warning might be used. The LEDs might display the sign for the car in back. The driver's preoccupation is essentially the primary motive behind the roadway mishaps. It could be due to things like exhaustion, stress, alcohol use, mobile device use, etc. A predefined demonstration is created in an effort to avoid those distractions. Such a plan could be a proactive measure to reduce traffic accidents. According to the current report, the rate of street mishaps has increased in recent years across all countries. A driver's slight inattention can result in terrible catastrophe. That could be a problem with your health or your judgment.

2. LITERATURE SURVEY

H. G. Jung et.al. [27], proposed a sound system vision- based obstacle acknowledgment and distance estimation methodology. By introducing voyaging way-based ROI establishment, top acknowledgment by edge line, and edge feature relationship-based affirmation, they had the alternative to vanquish the issues of the past distinction histogram based technique and loosen up their applications to expressway sway notice/evading. Their system had less FP, FN cases stood out from their genuine models. Nonetheless, that presentation pick up required an additional computation load. They had the alternative to check the improvement of uniqueness histogram-based block acknowledgment by completing a basic way area methodology. These creator's investigation work [27] didn't zero in on distinctive such an Objects which are in closeness and their distinguishing proof outcomes exhibited affectability towards wild conditions.

Quin Long et.al. [28], Proposed another procedure for recognizing little items in the street dependent on sound system vision. They utilized multi-way Viterbi calculation to acquire thick profundity information of system stereo pictures. From the delivered 15 significance information, the interstate or street surface can be perceived. Items out and about can be planned to the 3-Dimentional space to decide their size and area. The author's research [28] can create denser outcomes, lower blunder rate, and quicker speed contrasted with the stereo system coordinating calculations broadly utilized in savvy vehicles society.

But their research work didn't consider more extensive and summed up AOE for spatial examination and didn't diagram any proposals.

Josip Cesic et.al. [29], the proposed framework tends to track and Detection items moving inside the setting of ADAS. They utilized a multi-sensor game plan containing radar and a sound system camera mounted on the vehicle's housetop and proposed to show the sensor's

vulnerability in polar ways on Lie- Groups and apply the thing's state sifting on Lie get-togethers. To clarify the multi-target following issues, they used a joint consolidated probabilistic- information connection channel and acquainted principal changes with use on Lie social events. The impediment of the author's proposed technique [29] is that it principally centers around object discovery and movement tracking yet doesn't focus on path examination and road spatial investigation to outline alarms and recommendations.

S. Decker et.al. [30], Proposed a framework reliant on fitting the model of a vehicle structure to both sound system significance picture and radar readings by Concerning radar and sound system vision blend. To begin with, the calculation fits a structure from sound system significance information and finds the closest feature the shape concerning the vision sensor. Second, it figures the closest motivation behind the radar's insight and wires both radar's, dreams nearest centers. By deciphering the from the outset fitted shape to the entwined closest point, the resulting structure is found and obtained. A long ways past this preliminary has extraordinarily restricted area of eye vision (AOE) for closeness alerts and 16 the proposed estimation is best sensible for fixed vehicles with a predefined object stream and all around cost included is more.

Alberto Broggi et.al. [31], introduced an Obstacle identification framework and was effectively utilized during VIAC (Vis Lab Intercontinental Autonomous Challenge), successfully arranging a wide assortment of situations. The author's proposed methodology [31] was demonstrated viable even within the sight of steep trips and rough terrain zones. Alignment stays a basic issue. Their exploration work incorporates a couple of issues: doesn't propose driving proposals for a more secure route and doesn't consider encompassing total front, back, left, right FOV, and requires a significant expense hardware setup. Tat-Jun Chin, et. al[32], Proposed, Seam driven image stitching methodology where they have assessed the finest transformation based on the resultant vision quality of the seem cut, instead of estimating a geometric transform which depends upon the best fit of feature correspondence. Seam- cut was used in masking misalignment artifacts. They use a conventional non-robust feature detection mechanism that would easily fail in extracting and matching key- points/feature pairs even in slight wild conditions; moreover, their proposed seam cut requires more latency time compared to other conventional projective stitching mechanisms.

Murtadha Alomran and Douglas Chai [34], Proposed a feature-based image stitching algorithm that consists of image acquisition, image registration, image blending, and compositing operations with two main approaches for image- stitching operation. The first approach was based on a direct technique, and the second approach was a feature-based technique. Their mechanism can successfully stitch input image sequences only if they are ideally conditioned, i.e., restricted to perform only on input image sets that have no exposure differences, enough overlapping areas, minimal lens distortions, no object movements, lens/device in variance restrictions & angular orientations.

3. EXISTING WORK

It suggests a comprehensive strategy based on the degree of mouth and eye closure (PERCLOS), as well as the computation of the newly proposed vector FAR (Facial Aspect Ratio), which is like EAR and MAR. This helps to detect the status of the closed eyes or opened mouth like yawning, and any frame finds that has hand motions like nodding or covering the mouth with hand as natural nature of people when trying to manage the sleepiness. The system

also included techniques and gradient patterns based on textural information to locate the driver's face in different directions and to identify sunglasses on the driver's face. Scenarios like hands covering the driver's eyes or mouth while nodding or yawning were also identified and addressed. With datasets like NTHU-DDD, the proposed work was tried. Only an objective detection method that uses indicators such as physiological signals (EEG, ECG, EMG, skin signals, etc.), physiological response signals (eye movement characteristics, face) (Ahlstrom et al., 2013, Lin et al., 2015), or driving behaviour specifics (steering wheel angle, lane deviation, etc.) can be used to monitor drowsy driving (Xuesong and Xu, 2016). Li and Chung (2015) used EEG signals to study drowsy driving as part of their research into physiological signals. They suggested merging the driver's head movements with a man-machine interface (BMI) detection system, which had an accuracy rate of 82.71%. As input variables for the fatigue discriminant model combined with the ECG signals, Guo et al. (2014) derived the pertinent heart rate variability characteristics. Niu et al. (2015) used an eye tracker to gather the eye movement parameters at various levels of weariness for their study of physiological response signals. Four eye characteristics were determined as input variables. The accuracy of the SVM model used to calculate driving weariness was 83.84%. In order to create a classifier based on driving fatigue, Friedrichs and Yang (2010) collected 18 eye movement metrics and chose the best feature subset using an artificial neural network's SFFS algorithm.

Image processing method

It offers a straightforward and reliable face detection technique that can be used to summaries videos. Because unexpected conditions like shadows or lighting can modify the characteristics of the face, processing the illumination- compensation first will help keep the face's structural elements intact. The skin colour is then determined by analyzing the color-based face region in YCbCr space. Use morphological processing as well to enhance detection efficiency and lower the frequency of erroneously detected facial regions.

By eliminating noise from the non-facial region, this technique identifies candidates in the face region. Create a correct face ratio based on the golden ratio to localize the face region. The algorithm is then assessed in each genre.

EOG based eye gaze detection

When the upper and lower eyelids are in contact and the eye is momentarily hidden, this is referred to as an eye blink. A normal blink lasts between 200 and 400 ms and has an amplitude of 400 V. Blink can be identified in the EOG by the EOG signal's abrupt peak and decrease. Blinks are facts are another name for the EOG signal's blinks. Drowsiness causes the blink duration to lengthen, the blink amplitude to decrease, and the blink frequency to increase. The speed of lid opening and closure slows down, and the delay in lid reopening grows. The EOG can identify these factors. When the blink duration rises, it becomes difficult for EOG measurements to distinguish between blinks and vertical eye movements since they resemble one other so much in shape. Nonetheless, the wave's crispness makes eye blinks stand out. Slow eye movements, which frequently occur later in the sleepiness process, are another sign of fatigue.

Vision based method

In recent years, a variety of applications have deployed video-based real-time feature

identification and face tracking algorithms. They include product marketing, psychological research, human-computer interfaces, and vigilance state monitoring. The analysis and development of video-based face feature detection and eye tracking systems have been sped up because to improvements in the power and accuracy of computer vision techniques and the accessibility of affordable ready-to-wear hardware like webcams with comparably sophisticated performance. Lately, companies have been developed that produce video-based systems for face feature detection and search for a wide range of applications.

Visual behaviour

The real-time video is initially captured with a webcam. To get a frontal facial shot, the camera will be placed in front of the driver. To create 2-D pictures, video frames are extracted. The frames' faces are identified using the Haar-Adaboost face identification algorithm. Face detection is followed by the marking of facial landmarks on the photos, such as the locations of the eyes, nose, and mouth. The position of the eyes and mouth are measured using the facial landmarks. The sleepiness of the driver is determined using these extracted features and machine learning techniques. Convolution neural network is used to classify eyes and identify driver drowsiness by considering eye blinking. The mouth opening ratio is calculated using the feature extraction approach as an additional attribute to the system, which also aids in determining whether the driver is simple. An alarm will be sent to the driver to warn him or her if drowsiness is found.

Challenges in existing work

Multiple face detection, Typically, the camera records the entire scene, including anything near the driver. As a result, in addition to the driver's face, the faces of the passengers and other nearby objects are also recorded. It is necessary to do the activity of identifying the driver's face among the many entities in the image. In order to forecast the situation and warn the driver, the face can also be cropped and analyzed.

Face orientation, the driver may turn to the side while yawning or attempting to stay awake when he is sleepy, therefore his face could be photographed in any direction.

Expression differentiation, A person's facial expressions vary based on the circumstance. These sentiments range from ecstasy to disgust to melancholy. They must be distinguished from one another for further processing from a research standpoint because they can readily divert the driver's attention. The distinct characteristics are extracted using feature extraction algorithms.

Illumination, as previously said the times of night driving and early morning driving are when most drivers tend to nod off more. It is noteworthy that this timing, in contrast to timing under normal lighting conditions, also occurs when there is little light available for the camera to collect photographs. As a result, the system that is being developed for drivers must also account for adequate lighting conditions through the use of LED lights or infrared cameras.

Components and its description Microcontroller

The AT89S52 is a low-control, overwhelming 8- bit Microcontroller with 4K bytes of Flash programmable and erasable read just memory. The device is made with high thickness non erasable memory development and is great with its efficiency. The on-chip Flash enables the program memory to be re corrected in-framework or by a standard nonvolatile memory programming. By joining convenient 8-bit CPU with Flash on a solid chip, AT89S52 is a

capable microcomputer which gives an astoundingly flexible and monetarily competent reaction for so m e inserted various control purposes. Atmel code memory demonstrates is changed byte- by byte in either programming scheme. To program any non blank byte in the on-chip Flash Memory, the whole memory must be deleted utilizing the clear mode.

LCD

A liquid diamond appear (regularly truncated LCD) is a scanty, device made up of any number of fading or single color pixels displayed before a light resource. It is routinely utilized as a part of battery- filled electronic contraptions since it uses little measures of electric power.

Every pixel of a LCD generally involves a layer of particles balanced among two direct terminals, and two channels, the tomahawks of sharing of which are (in most of the cases) inverse to each other. With LCD Display between the polarizing channels, light using the primary procedure will be obstructed by another polarizer. The surfaces of the cathodes that are overlapped with the liquid material are managed keeping in mind the end goal to modify the liquid diamond molecules in a particular heading. This method customarily includes a thin polymer layer that is single direction rubbed using, for example, a material. The heading of the liquid valuable stone game plan is then described by the course of rubbing.

Steering Pressure sensor

Steering Pressure sensor is used to demonstrate the Steering Pressure count of the people. On the off chance that the Steering Pressure count is reduced it can be shown by this sensor. This sensor has two sections. They are IR transmitter and Pressure beneficiary. These two segments are put parallel to each other. These sensors are set in the scenes. It is a comparative standard in all IR sensors. The main objective is to pass IR light into IR-LED, which is then reflected by any inquiry before the sensor. At that point you should essentially get the shared light. For perceiving IR light, we will use an amazingly remarkable strategy: we will use another Pressure point, to recognize the IR light that was transmitted from another determined of accurately the same is an physical property of LED, the way that a drove generate a power differentiate over it directs when it is fed to light just as it was a light cell, however with much smaller yield electrons. By the end, the power delivered by the LED's, which is used to make the power, it can be recognized. In the schematic, we will use an amplifier to decisively recognize little voltage changes.

Alarm

This novel bell circuit utilizes a transfer in arrangement with a little sound transformer and speaker. At the point when the switch is squeezed, the hand-off will work by means of the transformer essential and shut transfer contact.

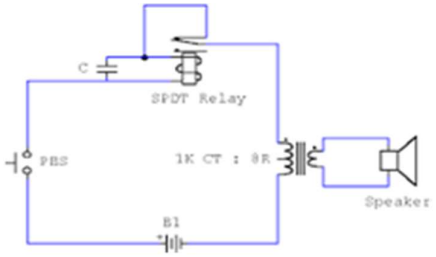

Figure 1. Alarm circuit

When the hand-off works the regularly shut contact will open, expelling power from the hand-off, the contacts close and the arrangement rehashes, all extremely quickly. so quick that the beat of current causes variances in the transformer essential, and henceforth optional. The speakers tone is along these lines corresponding to hand-off working recurrence. The capacitor C can be utilized to and quot; tune and quote the note. The ostensible esteem is 0.001uF, expanding capacitance brings down the ringer's tone.

Alcohol sensor

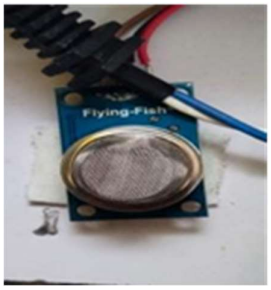

Figure 2. Alcohol sensors

An alcohol sensor detects the attentiveness of alcohol gas in the air and an analog voltage is an output reading. The sensor can activate at temperatures ranging from -10to 50° C with a power supply is less than 150 Ma to 5V. The sensing range is from 0.04 mg/L to 4 mg/L, which is suitable for breath analysers.

Power Supply

A power supply is a device that organizes various types of imperatives to acquire and arrange weights. This is frequently connected to electrical necessities supplies, occasionally to others' properties and infrequently to their own. 5 to 12 volts are being used here. The eye flicker sensor, alcohol sensor, temperature sensor, microcontroller, LCD display, hand-off, light marker, driver circuit, equipped engine, and LED are all included in this square chart in our model. If a driver's steering pressure decreases, a warning will be given to them via a vibrating alarm or beeping sound, and the vehicle will then back up and warn any vehicles approaching from behind about the condition of the driver. If the driver has devoured liquor, it will be recognized by alcoholic sensor and showed in LCD about the utilization. In our task the eye squint sensor is set close to the eye of the driver to detect the flicker check and this data is transmitted as heartbeats and is given to the Microcontroller. The Microcontroller utilizes the above data to contrast and the typical eye squint customized in the chip and if any strange circumstance emerges the vehicle is ceased with an alert sign, this activity is empowered by methods for

the driver circuit associated with the vehicle engine. This venture keeps the mischance because of liquor utilization. The liquor devoured by the driver is estimated by sensor. The yield from the sensor is given to the controller through the flag molding unit. On the off chance that any irregular condition happens the controller will caution and furthermore controls the speed of the vehicle. By utilizing gear engine close to the motor can back off the auto and show for the vehicle behind keeping in mind the end goal to stay away from setback in rush hour gridlock

areas. In our framework we are utilizing LED, LCD and rigging motor. LED is utilized to demonstrate the jumpers in rear of our vehicle. LCD is utilized to show the states of the driver's climate he is in sleepy condition or not. The driver's languor location is utilized to avoid mischances in street transportation. It is one of the security advancements made to prevent accidents on the road that are brought on by drowsy or drunk drivers.

4. PROPOSED SYSTEM

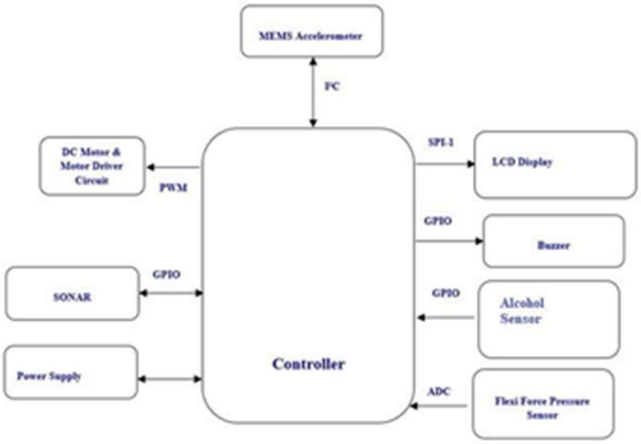

Figure 3. Block Diagram

Those who are reasonably aware when driving are continually turning the wheel or moving their hands along it. That pressure will decrease, and their hands will move less if they should experience fatigue/drowsy state or unconsciousness. A short circuit develops between the layers when pressure is applied, and the layers come into contact. A microprocessor uses the position, frequency, and strength of such shorts to construct a user's regular driving behaviour. They will receive a warning from the car to wake up and pull over when they considerably stray from it. This system employs a microprocessor with two input sensors that continuously track the driver's breathing and level of fatigue.

The technology locks the engine when a motorist tries to operate a vehicle while intoxicated or sleepy because it detects ethanol in the breath or tiredness. The AT89S52 microcontroller board controls all the associated devices.

Figure 4. Drowsiness Detection

The steering pressure sensor and alcohol sensor determine whether the driver has consumed alcohol or is feeling sleepy. The signal from the sensor is received by the microcontroller atmega328. The microcontroller serves as the overall circuit's CPU. When the microcontroller provides a strong pulse to the circuit, the buzzer turns on. In the same instant, the relay is also turned off. The effect is that the ignition is switched off on the car. The project adds an ignition key to the input and a DC motor to the output of the Alcohol and Drowsy Detection System with Buzzer Indication. The input ignition key is delivered to the microcontroller. It is up to us to find out if the automobile has been started or not.

Figure 5. Alcohols Detection

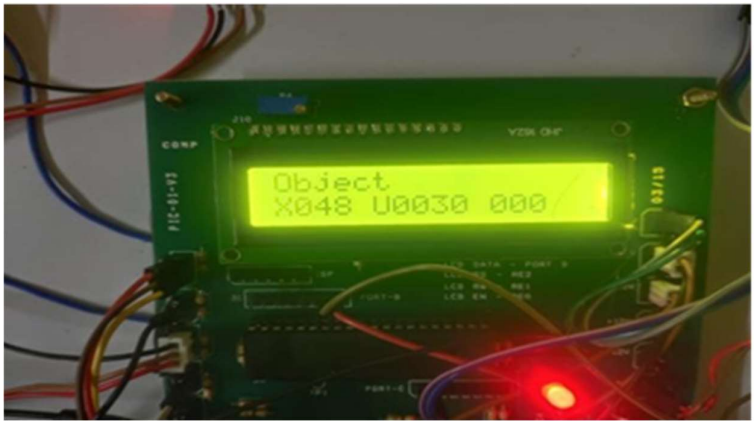

Figure 6. Object Detection

Figure 7. Implementation of system

The MQ3 sensor, steering pressure sensor, LCD, buzzer, DC motor, and relay utilized to drive the motor are the components interfaced with the microcontroller. When a driver who is intoxicated or drowsy attempts to operate a vehicle, the MQ3 alcohol sensor detects the alcohol concentration as soon as the person reaches the proximity of the sensor, which is installed in the vehicle close to the driver, where person breath and grip pressure are continuously reaching the sensor, and the steering pressure sensor detects the drowsiness. Both sensors send the recorded signal or value to the microcontroller, where a comparison is then made between the two. If there are any traces of alcohol above the predetermined threshold value, the system will automatically lock the engine by progressively reducing engine speed, display "ALCOHOL DETECTED" on the LCD, sound the buzzer, and display the engine locking mechanism.

The technology displays "DRIVER IS DROWSY" on the LCD and sounds the buzzer if there are even the slightest signs of decreased steering pressure than the set, usual value. The system will indicate "SAFE TO DRIVE" and the engine will continue to run if alcohol or sleepiness are not found. The algorithmic depiction of the work flow, in which its flow symbolizes the working activity of the system, makes it simple to comprehend how the complete system functions.

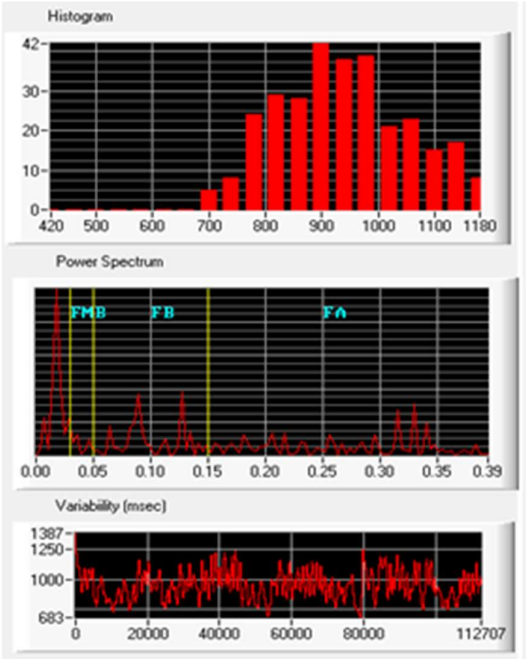

Figure 8. PRV analysis using Lab Windows. Top image is the fellow's PRV histogram Obtained during the driving. Below power spectrum and Pressure rate variability are shown.

Also, to simulate a conduction environment in the laboratory a small game has been created controlled with the steering wheel, in which objects that appears in the screen should be dodged. In this way we can detect the driver's normal variability during a normal conduction state and compare it with the one that we obtain of the same driver when it suffers drowsiness with the simulation system installed in a laboratory we are carrying out tests on people with a healthy Pressure in a comfortable environment to get to sleep. The final system that we are using at the laboratory uses Lab Windows to take samples of the pressure exercised on the steering wheel by each hand, of the electrocardiogram signal and of the steering wheel position every0.05 seconds.

Figure 9. Detection of the steering wheel movements.

The system, besides storing the samples for their later study, also has the capacity to analyze them presenting in graphic the signals that are being obtained as well as the power spectrum and the PRV signal histogram, and the mean and typical deviation of the steering wheel position. In figure 9 can be observed the PRV captured for the same person under conditions of extreme fatigue (24 hours without sleeping) and in different days. The test consists on

placing the user on the simulator and to try that this falls asleep driving. In PRV 1 and 2 the driver falls asleep although he wakes up immediately. In PRV 3 the driver doesn't fall asleep although due the fatigue he yawns continually. Using the captured files and after the analysis of that ones we could affirm that, in the case of a tired person, certain PRV variations belong together with the first drowsiness symptoms. As we relax ourselves, PRV increases (pulsations diminish). When the first nod off happen a considerable drop of the PRV takes place. In figure 10 can be observed that the PRV slope is growing, what it means that the driver is relaxed and that's involving a possible situation of danger in the highway. In the carried out tests, when the person is in an alert state, PRV oscillates showing the sinusal frequency (more or less), but when one gives the first nod off (first symptom of the drowsiness) PRV falls abruptly maintaining its value constant during about 10 beats approximately. Calculating the PRV frequency, it's observed that, after this nod off, the value of the frequency it's higher to their previous medium value. This fact can be appreciated in figure 10. When these two conditions take place simultaneously, then we could affirm that there are appearing the first symptoms of fatigue.

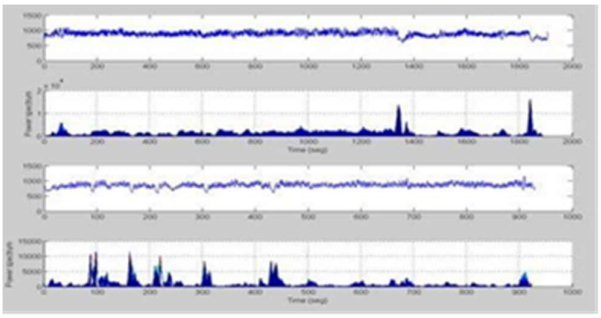

Figure 10. PRV examples under extreme fatigue conditions With sleep attack

5. CONCLUSION

In this way, it is assumed that the Force checking system is one of the quick ways to get a driver to alarm if they start to feel drowsy or exhausted while they are driving. It is one of the most effective strategies for reducing the number of fatal street accidents brought on by inattentive, drowsy, or exhausted drivers. With the intention of identifying laziness, we developed a framework that restricted and monitored the driver's Steering force developments. Confine the eyes the framework combines layout-based coordinating. When following, the framework will be able to determine whether the driver is looking ahead and whether the hand brakes are open or closed. A notice flag will be given as a bell or caution pack message when the will be closed for a very long time. Future versions of this project will be enhanced with a flying machine framework for swift and accurate execution. If someone who has consumed alcohol enters the vehicle, the buzzer will immediately sound. As a result, we have addressed the major factors that contribute to vehicle fatalities, and an embedded kit for drowsiness detection has been created and will be installed in vehicles.

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