Driver Alcohol Detection System

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Abstract- Nowadays every country is concerned about the accidents caused by the drunken driving. But still in many places the rules are being violated, hence to avoid these situations we need a more efficient system. In order to overcome this problem in a more economical way, an intelligent system has been imbedded, one in the key of the vehicle and the other in the steering wheel of the four wheeler or accelerator of the two wheeler which will constantly check the BAC of the driver while he/she is driving the vehicle. Furthermore, on national highways most of the accidents occur at the junction between the lanes or at the accident prone sites, to overcome this problem a RF receiver is introduced in the system which will receive the signals from the transmitters placed on the national highway junctions and the accident prone sites across the country which will alert the driver when he/she is approaching them.

Index terms – Black spots, accident prone sites**,** key, safety, BAC (blood alcohol concentration)

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1. INTRODUCTION

Now a day's road transportation has become a major source of transportation as a result of increase in automobile vehicles. Due to this rapid increase of vehicles on roads, the probability of accidents is rising steeply. The recent report by the ministry of road transport and highways of the government of India in the year of 2011 says that, the total number of accidents occurred on the Indian roads were 497,686 and the number of fatalities occurred were 142,845 [1]. Out of which 40% of the accidents occurred due to drunken driving which is becoming a major cause of accidents on Indian roads also drunken driving has been recognized as a world menace, based on the stats which reveal that road accidents cause 12 lakh deaths and 500 lakh injuries around the world each year. Some 480,000 of these deaths and 200 lakh of people get injured by drunken driving [2]. 60% of the road accidents occurred on the Indian roads faces front to rear collisions out of which 35% of the collisions occurred at the junction between the roads of national highways. The government of India have identified 325 accident prone sites commonly known as the black spots across the 15 states of the country [3]. Due to this there is a need of an effective system which stops drunken drivers to get on the roads also to alert the drivers when they are near accident prone sites.

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2. Existing technology

Saab Alcokey [4], Sweat sensors, straw like tube on driver seat are used to check the blood alcohol concentration of the driver. But these devices lead to misreading, inaccurate testing and circuit complexity is high. For two wheelers there are very few measures taken till date, one of which is a helmet consist of a MQ- 3 sensor detects the BAC of the driver by J. Vijay et al [5]. For detecting black spots and junctions on road we have till now Global Positioning System (GPS) that provides reliable location and time information in all weather, anywhere on or near the Earth. But in India this device is not been used by most of the automobile as it is a bit costlier.

3. Materials and methods

The paper basically focuses on drunken driving. So the system will not turn on the vehicle, when the user is in drunken condition. In addition to this it will alert the driver whenever the vehicle is near an accident prone area or near a junction. The system consist of three main parts they are 1) Key unit 2) Steering/accelerator unit 3) RF receiver unit.

3.1 Key unit

Mid Infrared sensor is suitable for detecting the alcohol concentration from the breath of the driver. So, it can be placed in the vehicle key itself. Generally the illegal alcohol consumption during driving is 0.08mg/L as per the government act, but it can be put much lower for the further precautions. The key consist of a MIR sensor, microcontroller and a piezoelectric material. This key is not an electronic key so that this system can be introduced in utility vehicles, low budget cars and two wheelers.
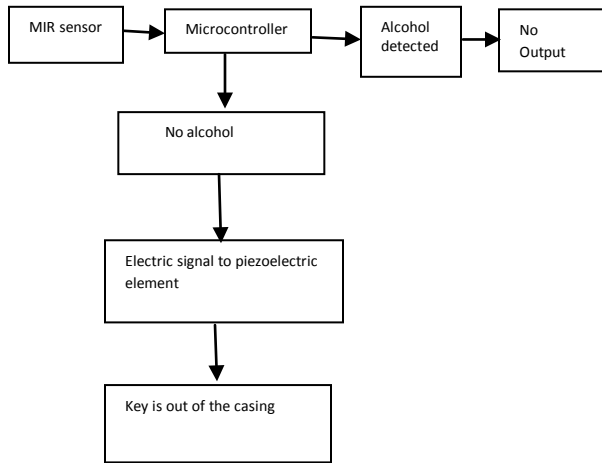
As the driver exhale into the key the MIR sensors will detect the alcohol concentration and then the signal will be passed to microcontroller which will check the concentration of the alcohol in the air and if it is lower than the pre-set value, microcontroller will send electric signal to the piezoelectric shaft which will extend and the key will get unlock as it will get out of the casing of the key. The main purpose of this type of key is that it can be used in every vehicle, it can be bikes, utility vehicles, etc. As the key is put in the lock it will turn on the ignition and as it is retrieved from the lock microcontroller will cut down the electric signal to the piezoelectric material and the key will be locked.

3.2 Steering/Accelerator unit

As the driver is driving the car there is a possibility that the driver can consume alcohol while he/she is driving. In that case, we need tissue spectrometry or skin sensors which can determine the BAC of the driver in every few intervals of time. During driving the thing which is in constant contact with the driver's skin is the steering wheel of the car or the accelerator of the bike. So it is appropriate to put a Near Infrared sensor in the steering wheel itself. With the help of it, it will constantly check the blood alcohol concentration of the driver, and in case if it detects the alcohol concentration more than the pre-set value it will ask the driver to park the car safely and if the driver still continues to drive, fuel and ignition cut off will take place.
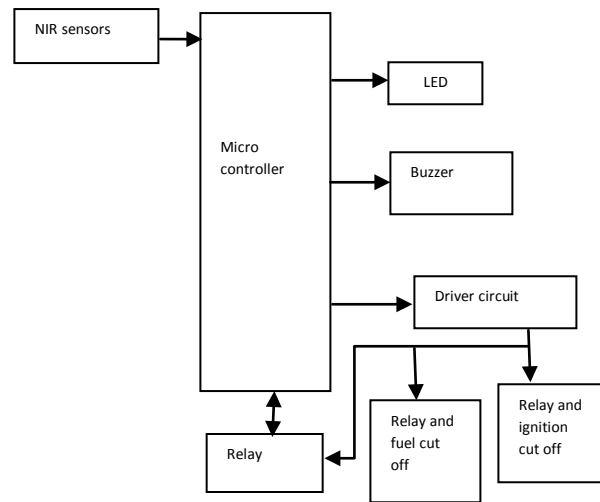
The same can be implemented in the two wheelers by just placing the NIR sensors on the accelerator of the vehicle and it follows the same circuit

3.3 Radio frequency receiver

According to the reports as discussed earlier 60% of the accidents are of front-rear collisions, of which 35% of it occurs on the junctions between the roads. The government has already introduced many reflective gears but none of them are good enough till now. Even many researchers have introduced many modules associated with global positioning system (GPS), but since it is a bit costlier it is not in use by the majority population of the country. Also, the root reason is that all the reflecting materials and equipments used by the authorities are not easily gaining attention of the drivers, what we need is something like GPS system which tells the driver inside the car that he/she is approaching accident prone zone. But it should not be expensive and easily affordable to everyone. To solve this problem we can have RF transmitters of a certain frequency and the range of approximately 150m which is installed at all the 325 black spot accident prone zones and also at the junctions of the highway roads. We also need a RF receiver tuned to the same frequency of that of the RF transmitter so that as the vehicle approaches near the black spot or junction a buzzer or a LED signal will be given to the driver which will make him/her precautious. This system is very cheap and can very beneficial to reduce the accidents at the accident prone zones.
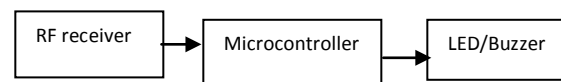
4. Conclusion and future work

This system effectively confirms that the driver is not in a drunken condition before driving and while driving the car. By implementing this system it is possible to safe journey by two wheelers as well as the four wheelers. This system also indicates the accident prone zones which are identified by the government. This system is solely focused to avoid the maximum accidents and fatalities eventually. It is not only helpful for the driver but to the pedestrians too which becomes the target of the drunk driving and who are crossing roads at junctions. The system is also very accurate and affordable and has lot of scope in future advancement. In future I planned to fabricate my intelligent system in a much compact size and in much cost effective way which will be affordable to every person who owned vehicle across the globe.

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