A SMART CAR: SYNERGETIC COMBINATION OF LOW COST MULTIPLE SENSORS FOR SAFETY AND ACCIDENT PREVENTION

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Abstract:- *Development and advances in the technology has revolutionized the field of automobiles. Many companies and technology experts have been modifying the cars and their features with much more interesting features [1]. With these cars coming up, people in a large numbers own the cars, which increases vehicle density on the road considerably. This high vehicle density on the roads has become a matter of concern, as the number of accidents because of it have been increasing rapidly. In this today's rapid advancing world, it has become much more essential to invent the things using the engineering technology and skills which can prove useful for the mankind in many ways. Frequently, we come across the accidents taking place due to numerous reasons which needs to be reduced. With the ever growing population all over the world, a special measure has to be taken in the near future to avoid the car accidents and lives of the people.*

Key Words: Physical and Physiological Sensors, Oxygen level, Arduino Processor, GSM system, GPS system.

I. INTRODUCTION

Sensors and transducers play a vital role in monitoring different parameters in an automobile system. The basic function of the sensor is to sense the different parameters and the role of a transducer is to convert the measured quantity into electrical quantity. This smart car introduces to the world of sensor technology which is used here to meet the desired requirements. Using various sensors the threats are predetermined and the method of accident prevention is described in this paper. A processing unit that controls and processes all the intended activities desired, is also being used. The sensors are interfaced with this embedded system to work as required.

II. PROPOSED SYSTEM

The main intention of this paper is to avoid different types of accidents which occur frequently and make the human existence safer. Our proposed idea includes the combination of many physiological sensors mounted in the car to avoid the accidents. This paper mainly focusses on following functions:

1] Monitoring the Oxygen level in the Car
2] Detection of Alcohol Consumption by the driver [2].

3] Speed Control of the Car.

Most often we come across the cases where the subject gets locked into the car due to some ignorance of the car owner, and this ultimately many times leads to fatality of the subject [3]. We have proposed here the usage of the appropriate sensors to detect and minimize this problem. Also, the most often accidents occur due to the drivers who consume alcohol and drive carelessly [4]. This paper discusses the necessary action to reduce these kind of accidents and avoid these harmful consequences. The third objective which this proposes is related to the speed control of the car [5]. The speed has to be necessarily controlled and monitored from time to time to avoid the accidents. This paper proposes a method to avoid such accidents by controlling the speed of the car and also helping the authorities to monitor the speed of the car, thus avoiding the major cause of car accidents. The paper also proposes to use GSM system to communicate effectively with the owner of the car and also the GPS system to track the location of the car [6]. It describes the use of the sensors such as oxygen level detection sensor, N2 sensors to detect the alcohol content of the driver, and IR transmitters and receivers to control the speed of the car [7].

III. WORKING MECHANISM

The working of this proposed system can be explained in three major functions which are as follows:

3.1 MONITORING THE OXYGEN LEVEL IN THE CAR

We come across many cases where the people face death because of the suffocation inside the car. The owner of the car forgets or sometimes loses the key of the car which is auto locked. There are the chances of the old age people or small children getting stuck in such situations. An oxygen level detection sensor will be mounted in the car to check the oxygen level in the car. Whenever the level of the oxygen in the car goes below 30%, the oxygen detection sensor detects this and sends the signal to the Arduino processor. The job of the Arduino processor is to send the signal further to the drive circuit. The drive circuit makes the passage of the fresh air inside the car, flushing out the deoxygenated air outside the car. Thus, this makes a way for the oxygen outside the car to get entered into the car, thus saving the precious lives of the people stuck in the car.

3.2 DETECTION OF ALCOHOL CONSUMPTION BY THE DRIVER

To serve the second objective, alcohol sensors such as MQ3 are placed inside the driver's console. The output of this sensor is connected to Arduino Board through the signal conditioning circuit. On detection of alcohol content through specialized sensors which detect the alcohol content by driver's breathing rate and the heart beats. As soon as the driver is detected with the alcohol content a message is sent to the owner of the car alerting him about the situation. A control signal is being sent from the Arduino processor to the GSM system, which sends a message to the owner of the car or the concerned person. Simultaneously the car is turned on to the off mode which implies that even if the driver tries to turn on the car, the engine will not turn on. The car also get locked automatically. This feature sheds the alcoholic drivers to drive and meet possible accidents [8],[9].

3.2 SPEED CONTROL

This aspect has two types specifically:

A) FOR THE AUTHORITY (RTO'S)/ OWNER'S SIDE:

We are using the very basic sensors such as IR transmitters and IR receivers to accept the external signals. The two sensors must be placed 100 meters apart from one another. A timer is used in the Arduino board in such a way that, the timer starts when it receives a low signal from the first sensor and timer stops when the timer receives a low signal from the second sensor. The speed is calculated using "Distance between the two sensors/ Time taken by the timer". This way the authorities can monitor the speed of the car and make the drivers aware to drive their vehicles in a controlled speed. And thus the chances of high speed driving reduces considerably which is an effective way of minimizing accidents [10].

B) FOR THE VEHICLE SIDE:

A desired speed will be set in the Arduino processor. Whenever the speed exceeds this value, it is detected by the speed control sensors. The processor is so programmed that it compares the set value and the operated value. Whenever the operated value goes beyond the set value, the owner or the concerned person of the vehicle is again informed through the GSM system. It is brought to the controlled level using the throttling and also the speed exceed case will be reported to the owner again through the GSM Technology.
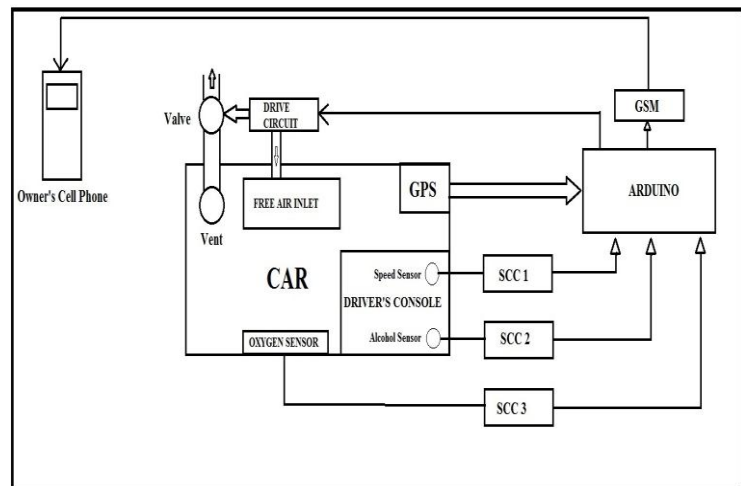
4. Advantages

The proposed system is a single integrated system intended to meet multi-requirements. The idea brings into notice the issue of accidents by suffocation in the car and also with a solution avoid this. The car avoids the alcoholic drivers form driving the car and also has a monitoring system to check the speed of the car. This smart car has also unique feature of updating all the important information to the owner of the car from time to time. The implementation of this discussed solution will not only reduce the accidents rates but also will mark a leading step in the field of advancement in automobile field.

5. Future Scope

This smart car can be also fitted with a camera, connected to the owner's cell phone which will provide the owner a view of his car whenever needed. This smart car can be extended and developed using Artificial Intelligence feeding the required information in the car artificially and making the car to operate it on its own without a driver.

6. CONCLUSION

Thus it can be concluded from this proposed idea that with the integration of the physical and physiological sensors, major causes for the car accidents can be minimized and also making it to drive the car more safely. This synergetic combination proves to be useful in making an automobile a completely smart and autonomous vehicle. The proposed system mainly marks its uniqueness of idea in controlling the oxygen level in the car, featuring the major innovation in the field of automobiles. As discussed a smart car proposed here carries out these three major functions, which is also affordable to implement in each and every automobile vehicle in the near future.

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