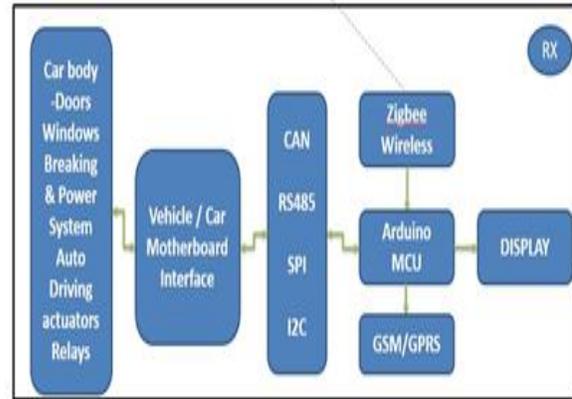


# Driver Health Monitoring & Alert System using Wearable Sensors Devices

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**Abstract-** This paper describes work regarding to automobile vehicle driver's health indication using dedicated embedded system based on wearable sensor devices. This research combines data mining technique with embedded system development technology. I use wireless node, wearable sensors and GSM/GPRS based system to check & monitor driver/patients health remotely. Small embedded system log the driver's health related data ex. Pulse, temperature etc. on particular interval, microcontroller based system pass the data to the data mining algorithm & after all drivers health related information will be transmitted to the remote user by the GSM/GPRS system.

**Index Terms-** Data Mining, Wearable Sensor, Embedded system.



METHODOLOGY

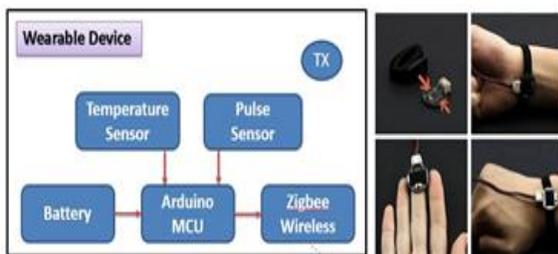
## I. INTRODUCTION

As per the standard Accident survey, in many cases drivers are more responsible in halted accidents on road or highway, governments strictly prohibited drunk & drive, but due to some lack of awareness of driver's health now days this will happened frequently.

In this paper an embedded system based solutions are given for the accident privation by the bad health of drives.

The proposed system are given in below block diagram,

1. Transmitter part, which is wearable sensor based system
2. Receiver part which is directly connected with exiting car motherboard system, or it may work standalone system.



## II. DATA MINING TECHNIQUES

Data mining is used for extract the knowledge from large amount of data. Data mining is the fundamental step in the process of knowledge discovery in databases. Various algorithms and techniques are presently available in data mining, which includes Classification, Clustering, Regression, Artificial Intelligence, Neural Networks, Association Rules, Decision Trees, Genetic Algorithm etc. are used for knowledge discovery from databases.

### A. Classification

Classification is a simple data mining technique based on machine learning. Classification is used to classify each item in a data set into predefined set of either classes or groups. It is possible to build a classification model to categorize. For example student's bank loan applications into safe or risky.

### B. Clustering

Clustering is the grouping a set of objects in such a way that objects are in the same group they referred as clusters, they are more similar to each other than to those in other group of clusters. It is used in many fields, including machine learning, pattern recognition, image analysis, information retrieval,

and bioinformatics. Popular notions of clusters include groups with small distances among the cluster members, dense areas of the data space, intervals or particular statistical distributions. Some important clustering methods are partitioning methods, hierarchical methods, density based methods, grid-based methods and model-based methods.

C. Prediction

The prediction is one of a famous data mining techniques that discover relationship between dependent and independent variables. For instance, the prediction analysis technique can be used a prediction model to predict the expenditures in rupees of potential customers based on their income and occupation. It is possible to draw a fitted regression curve that is used for profit prediction. Regression technique can be applied for predication. There are different regression methods which include linear regression, multivariate linear regression, nonlinear regression and multivariate nonlinear regression

IMPLIMENTATION & RESULT

Here, We are using Naïve Bayes algorithm for our project work. Now, let’s see all about this theorem.

What is Naive Bayes algorithm?

It is a classification technique based on Bayes’ Theorem with an assumption of independence among predictors. In simple terms, a Naive Bayes classifier assumes that the presence of a particular feature in a class is unrelated to the presence of any other feature. For example, a fruit may be considered to be an apple if it is red, round, and about 3 inches in diameter. Even if these features depend on each other or upon the existence of the other features, all of these properties independently contribute to the probability that this fruit is an apple and that is why it is known as ‘Naive’.

Naive Bayes model is easy to build and particularly useful for very large data sets. Along with simplicity, Naive Bayes is known to outperform even highly sophisticated classification methods.

Bayes theorem provides a way of calculating posterior probability  $P(c|x)$  from  $P(c)$ ,  $P(x)$  and  $P(x|c)$ . Look at the equation below:

$$P(c|x) = \frac{P(x|c)P(c)}{P(x)}$$

Likelihood
Class Prior Probability  
Posterior Probability
Predictor Prior Probability

$$P(c|X) = P(x_1|c) \times P(x_2|c) \times \dots \times P(x_n|c) \times P(c)$$

Above,

$P(c|x)$  is the posterior probability of class (c, target) given predictor (x, attributes).

$P(c)$  is the prior probability of class.

$P(x|c)$  is the likelihood which is the probability of predictor given class.

$P(x)$  is the prior probability of predictor.

How Naive Bayes algorithm works?

Let’s understand it using an example. Below I have a training data set of weather and corresponding target variable ‘Play’ (suggesting possibilities of playing). Now, we need to classify whether players will play or not based on weather condition. Let’s follow the below steps to perform it.

Step 1: Convert the data set into a frequency table

Step 2: Create Likelihood table by finding the probabilities like Overcast probability = 0.29 and probability of playing is 0.64.

Weather	Play
Sunny	No
Overcast	Yes
Rainy	Yes
Sunny	Yes
Sunny	Yes
Overcast	Yes
Rainy	No
Rainy	No
Sunny	Yes
Rainy	Yes
Sunny	No
Overcast	Yes
Overcast	Yes
Rainy	No

Frequency Table		
Weather	No	Yes
Overcast		4
Rainy	3	2
Sunny	2	3
Grand Total	5	9

Likelihood table			
Weather	No	Yes	
Overcast		4	=4/14 0.29
Rainy	3	2	=5/14 0.36
Sunny	2	3	=5/14 0.36
All	5	9	
	=5/14	=9/14	
	0.36	0.64	

Step 3: Now, use Naive Bayesian equation to calculate the posterior probability for each class. The class with the highest posterior probability is the outcome of prediction.

Problem: Players will play if weather is sunny. Is this statement is correct?

We can solve it using above discussed method of posterior probability.

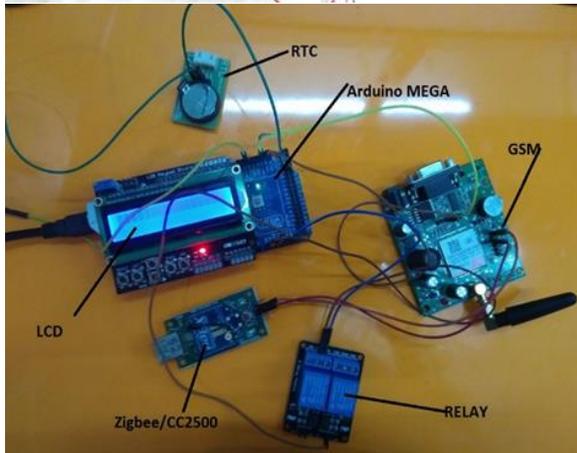
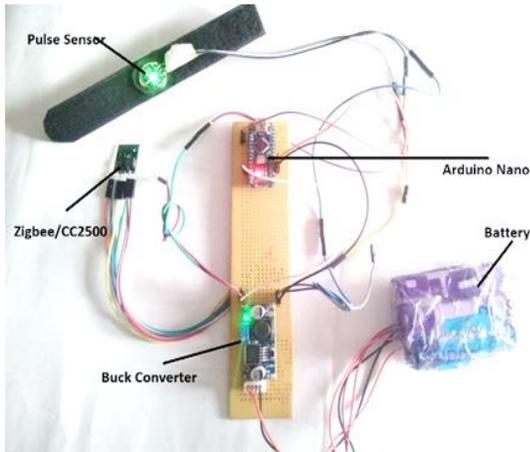
$$P(\text{Yes} | \text{Sunny}) = P(\text{Sunny} | \text{Yes}) * P(\text{Yes}) / P(\text{Sunny})$$

Here we have  $P(\text{Sunny} | \text{Yes}) = 3/9 = 0.33$ ,  $P(\text{Sunny}) = 5/14 = 0.36$ ,  $P(\text{Yes}) = 9/14 = 0.64$

Now,  $P(\text{Yes} | \text{Sunny}) = 0.33 * 0.64 / 0.36 = 0.60$ , which has higher probability.

Naive Bayes uses a similar method to predict the probability of different class based on various attributes. This algorithm is mostly used in text classification and with problems having multiple classes.

improving the industrialization of the developed prototypes and the accomplishment of the specific standards of the sector, to be the technological base of future driver Heart failure detectors. In future it is advisable to make these system compact using SOC, & more data mining algorithm can be implemented based on the practical analysis & classification. We can also used this system in auto driver mode. In future car we are having this concept in which any serious circumstances car went in auto driver mode and automatically all power goes from driver and car reach their destination which is decided from first. In future we can create smart car with driver as well as road safety.



### CONCLUSION & FUTURE WORK

This system captures the heart rhythm and respiration in a completely unobtrusive manner. The results of the tests show its feasibility as a potential tool to be integrated in cars in a near future. Thus the accidents percentage will be reduced and in future, there will be once the functional requirements of the sensing system have been met, the working will be based on