



Python Based Sensor Platform for different Driving Status

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ABSTRACT

Two wheelers are used widely than other mode of transportation because of simplicity and cost efficiency, Safety is the major concern of all riders. The safety of delivery boys who works for online business and travels across areas using two wheelers, where the safety of bike rider counts. Hence to track such rider activities and to provide safe riding this project has been proposed.

This Project aims for avoidance of accidents, there are number of accidents take place daily, main causes behind these road accidents are lack of training institutes, unskilled drivers, poor road conditions, use of cell phone during driving, consuming alcohol while driving, overloading. This research provides a solution for most of this problem with a vehicle. Preventing road accidents. By using sensor and Logistic Regression Machine learning are used in this Project. PIR sensor is used to detect Human, Temperature sensor is used to detect engine temperature, Alcohol sensor is used to detect Alcohol Content in Breath, Accelerometer sensor is used to detect speed of vehicle and Machine Learning is used to predict the outcome of the dangerous driving recognition of delivery boys.

KEYWORDS: Machine learning, Logistic Regression, Passive Infrared sensor, Temperature Sensor, Accelerometer sensor, Infrared sensor, Alcohol sensor

I. INTRODUCTION

As the number of accidents is increased due to increase in the number of vehicles. Traffic safety has become one of the main issues for the government. A large number of accidents are taking place every day. Main causes are lack of training institutes, unskilled drivers, poor road conditions, using cell phone during driving, consuming alcohol while driving, overloading. 16 die on the Indian road every hour. 1214 road crashes occur every day in India, 377 people die every day, 2

people die every hour in UP. The death ratio increases continuously. There are a lot of factors leading to accidents in the cities Among them natural factors, mechanical factors and human factors are dominating with the development of science and technology, The main reason are Bad driving, lax traffic control, and poor road condition.

The project aims to provide total safety for car riders. Pune. when it comes to four wheelers riders Pune ranks first in the city. In the last few years, there has been

rapid increase in number of road accidents. Due to rise in road accidents, it has now become necessary to generate system to limit accidental deaths. With respect to vehicle safety, safety standards in India are met by two out of seven vehicles by the World Health Organization (WHO).

STRUCTURE OF PAPER

The paper is organized as follows: In Section 1, the introduction of the paper is provided along with the structure, important terms, objectives and overall description. In Section 2 we discuss related work. In Section 3 tells us about the methodology. Section 4 tells us about the process description. Section 5. Tells us about the Results and Outputs. Section 6 tells us about the future scope and concludes the paper with acknowledgement and references.

OBJECTIVES

This research provides a solution for most of this problem with a vehicle. Preventing road accidents. By using sensor along and deep learning are used in this Project. PIR sensor is used to detect Human. Temperature sensor is used to detect engine temperature. Alcohol sensor is used to detect Alcohol, Accelerometer sensor is used to detect speed of vehicle and Machine Learning is used to predict the outcome of the dangerous driving recognition of delivery boys.

II. RELATED WORK

There are numerous works that have been done related to Python Based Sensor Platform for different Driving Status .

Smart helmet with sensors for accident prevention , Rasli, Mohd^[1] et al . IEEE 2018
 Method adopted is Radio Frequency Module, This paper is specially developed as to improve the safety of the motorcycle's rider RF module has some limitations which only provide one way data transmission .
 On the Detection of Vehicular Crashes System Characteristics and Architecture, Ching-Yao Chan ^[2], IEEE, 2002 , sensor reliability is reviewed with various system architectures. This paper deals with crash sensing systems that detect a collision and evaluate the severity of crash

Wireless Advanced Helmet and Accidental Free Transportation System , Seetha P L , Dr. Vijaykumar T ^[3]. International Journal for Research in Applied Science & Engineering Technology, Method adopted GPS and GSM technology, This system also detects accidents and location of accidents. This system will detect the traffic status and hump ahead

III. METHODOLOGY

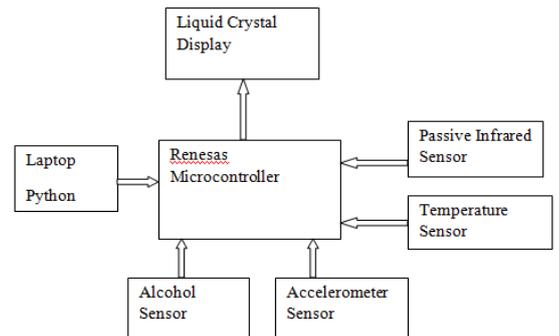


Figure 1- Block Diagram

The block diagram of proposed work is shown in figure 1. The block diagram explains about the overall construction of system. RENESAS is the main microcontroller, which controls all the programs in the system.

The block diagram consists of

1. Passive infrared sensor :this sensor used to detect motion by receiving infrared radiation , this sensor is used to detect the human coming close to the bike
2. Temperature Sensor : The temperature of engine of the bike is detected by this sensor
3. Alcohol sensor : this sensor is used to detect the alcohol in the air, when a drunk person breathes near the alcohol sensor it detects the ethanol in his breathe and provides an output based on alcohol concentration.
4. Renesas Microcontroller : this is the main microcontroller which controls the entire program of the system, Microcontroller has stronger embedded security, high-performance, and ultra low power consumption
5. Laptop Python :Machine learning is a type of artificial intelligence by using an algorithm or method that extract patterns out of raw data. The main focus of machine learning is allowing computer systems learn by experience without being explicitly programmed or

by human intervention, Logistic Regression is used and common useful regression method for solving binary classification problems, the outcome or target variable is dichotomous in nature, code is written in python, as python is the most popular language for machine learning and data science because of its following strengths

- a. Easy to learn and understand
- b. Multi-purpose language
- c. Support of open source community
- d. Scalability

A. Python

According to studies and surveys, Python is the fifth most important language as well as the most popular language for machine learning and data science. It is because of the following strengths that Python has:

1. Easy to learn and understand: The syntax of Python is simpler; hence it is relatively easy, even for beginners also, to learn and understand the language.
2. Multi-purpose language: Python is a multi-purpose programming language because it supports structured programming, object-oriented programming as well as functional programming.
3. Huge number of modules: Python has huge number of modules for covering every aspect of programming. These modules are easily available for use hence making Python an extensible language. Support of open source community: As being open source programming language, Python is supported by a very large developer community. Due to this, the bugs are easily fixed by the Python community. This characteristic makes Python very robust and adaptive.
4. Scalability: Python is a scalable programming language because it provides an improved structure for supporting large programs than shell-scripts.

B. Logistic Regression

Classification techniques are an essential part of machine learning and data mining applications. Approximately 70% of problems in Data Science are classification problems. There are lots of classification problems that are available, but the logistics regression is common and is a useful regression method for solving the binary classification problem.

Logistic regression model members of supervised classification algorithm family. Logistic regression measures relationship between dependent variables and independent variables by estimating the probabilities using a logistic function.

For example, the shop owner would like to predict the customer who entered into shop will buy play station (for example) or not. There would be many features of customer – gender, age, etc. which would be observed by the shop keeper to predict the likelihood occurrence, That is buying a play station or not. logistic function is sigmoid curve that is used to build function with various parameters.

C. Infrared sensor

IR sensor is consisting of transmitter and receiver. If any object is detected, then light hits back and received by the receiver. And the output of the sensor is digital low when it detects the obstacle.

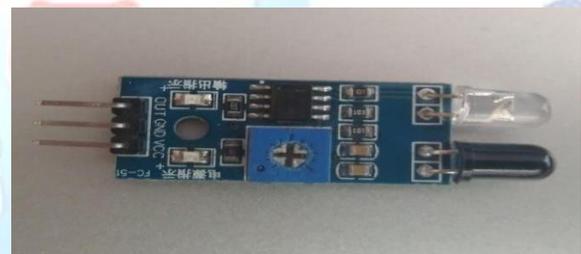


Figure 2 : IRsensor

1) Principle of operation:

IR sensor is consisting of transmitter and receiver. The transmitter emits IR radiation, when it hits the object it reflects back and is received by IR receiver. And this output is given to comparator circuit. When the receiver does not receive signal, the potential at inverting input goes higher than that noninverting input of comparator. Thus, output of comparator goes low, LED does not glow. When the receiver receives signal, the potential at inverting input goes low. Thus, output of comparator goes high, LED starts glowing.

D. PIR Sensor

Passive Infrared. PIR sensors are used for PIR-based motion detectors. The sensor measures infrared radiation emitted from objects in its field of view. It is usually infrared radiation which is invisible to human eye but can be detected by electronic devices designed for such

,scikit-learn ,xlrdxlwt, pyserial libraries is imported.

- Train/Test data test- The 60 % of data is used to train the algorithm and 40% is used od data is used to test the data.
- Machine learning Classification – logistic regression model one of members of supervised classification algorithm family. Logistic regression measures relationship between dependent variables and independent variables by estimating probabilities using a logistic function
- Output - Logistic regression is statistical method used to predicting binary classes. The outcome or target variable is dichotomous in nature. Dichotomous means there are only two possible classes. Based on the errors created by the delivery boy bike rider the real time data will be stored in the system and effective measures can be taken.

A. Dataset Explanation

- BikeID→ Data is collected based on the vehicle id. For Demo, we can consider, two different Id for reference.
- EngineTemp→ Bike Engine Temperature. Normal level will be below 30°C, Medium level temperature will be 30°C to 38°C, High level will be above 38°C. If Engine temperature is more, than the Bike Vehicle is used from longer time.
- Alcohol→ 0 means alcohol not detected. 1 means alcohol detected. If 1, then ErrorLabel will be high ie 2 or 3.
- Human→ 0 Human not detected. 1 means, Bike is moved very close to human. We Bike Speed Level 2 or 3, moving close to human, will increase ErrorLabel to 2 or 3.
- SpeedLevel→ 1 means Low speed ie default position, 2 means medium speed and 3 means high speed.
- AccelatorError→ 0 means no error in bike riding. 1 means Continuous high speed bike riding. 2 means continuous or sudden change in speed ie Low to High or High to Low.
- ErrorLabel→ This is the output parameter wrt to the

all input parameters. 0 means no error (mistake) in Bike riding. 1 means less mistake, 2 means medium mistake and 3 means high mistake done in bike riding.

The sensors collects the data and sends it to microcontroller , further the microcontroller performs the action based on the logistic regression, python coding is used in this project. Based on the input provided by the sensors the output is predicted as No error,less error, medium error and high error , By this we can understand the driving recognition of the Bike rider

V. RESULTS AND OUTPUTS

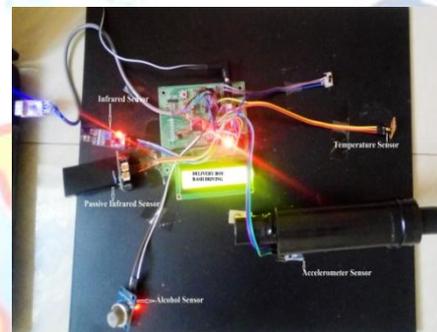
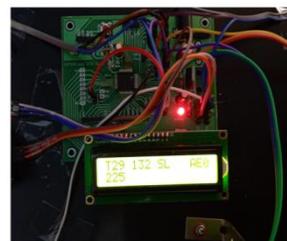


Figure 7 – Hardware prototype

A. Hardware outputs



```
Wait for prediction
 1 30 0 0.1 1.1 0.2
0 2 40 1 1 3 2
1 1 29 0 0 1 0
 30 0 0.1 1.1 0.2
0 40 1 1 3 2
1 29 0 0 1 0

Output Prediction Hardware Data = [3 0]
[0]
No Error Detected

Project End
```

Figure 8 – No Error Detected



```
Wait for prediction
 1 30 0 0.1 1.1 0.2
0 2 40 1 1 3 2
1 1 37 0 0 2 0
 30 0 0.1 1.1 0.2
0 40 1 1 3 2
1 37 0 0 2 0

Output Prediction Hardware Data = [3 1]
[1]
Less Error Detected
```

Figure 9 – Less Error Detected



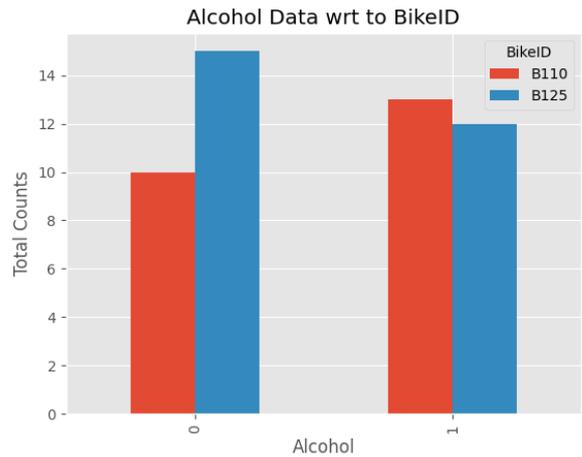
```

Wait for prediction

  1 30 0 0.1 1.1 0.2
  0 2 40 1 1 3 2
  1 1 43 1 1 2 0
  30 0 0.1 1.1 0.2
  0 40 1 1 3 2
  1 43 1 1 2 0

Output Prediction Hardware Data = [3 2]
[2]
Medium Error Detected
  
```

Figure 10 – Medium Error Detected



Graph 3 – Alcohol Data with respect to Bike ID



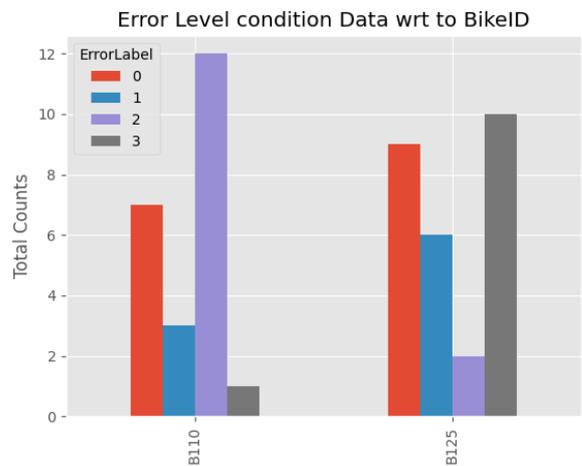
```

Wait for prediction

  1 30 0 0.1 1.1 0.2
  0 2 40 1 1 3 2
  1 1 75 0 1 3 0
  30 0 0.1 1.1 0.2
  0 40 1 1 3 2
  1 75 0 1 3 0

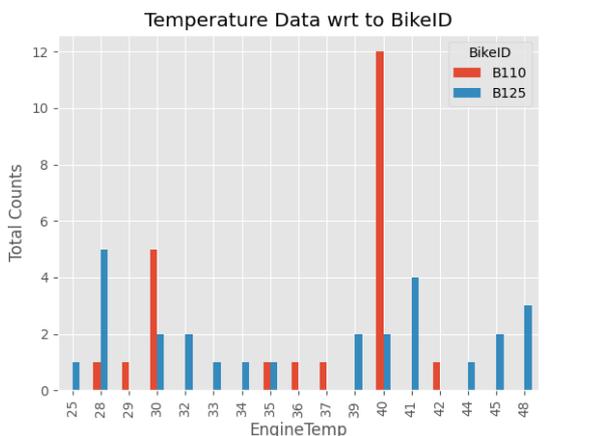
Output Prediction Hardware Data = [3 3]
[3]
High Error Detected
  
```

Figure 11 – High Error Detected

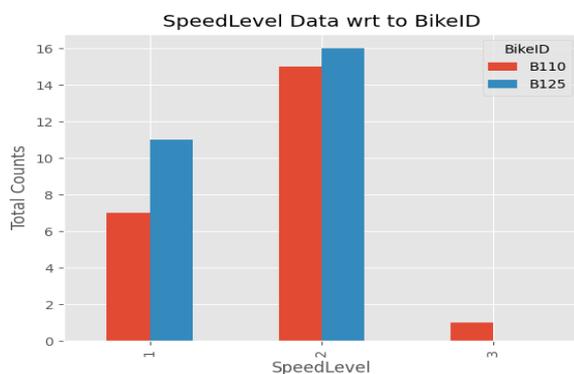


Graph 4 –Error Level condition Data with

B. Graphs



Graph 1 – Temperature with respect to Bike ID



Graph 2 – Speed with respect to Bike ID

VI. FUTURE SCOPE AND CONCLUSION

The project is designed by using structured modeling and able to provide desired results. It can be successfully implemented as a Real Time .Most of the units fabricated on a single along with microcontroller, making the system compact thereby making the existing system more effective. A prototype module will be developed for the project. It includes individual renesas microcontroller board for all interfaces according to the block diagram. Jumper wires are used for inter-Connection in Microcontroller. LCD is utilized to demonstrate the whole project.The proposed method shows the rash driving concept, and also to avoid rash driving in the city. To avoid rash driving it maintains accurate distance to stop the vehicle in front of pedestrian,PIR sensor is used detect the human motion in front of the vehicle.Accelerometers are used as

accelerator and break of the vehicle. Commercial purpose government would provide Yellow boards to the Bike riders in future so the government would monitor the speed and distance travelled by the bike rider. Stress imposed on the bike rider can be reduced based on his health concern

REFERENCES

- [1] Rasli, Mohd, et al. "Smart helmet with sensors for accident prevention." *Electrical, Electronics and System Engineering (ICEESE), 2013 International Conference on.* IEEE,2013.
- [2] Chan, Ching-Yao. "On the detection of vehicular crashes-system characteristics and architecture." *Vehicular Technology, IEEE Transactions on* 51.1 (2002): 180-193.
- [3] Seetha P L, Dr. Vijaykumar T "Wireless Advanced Helmet and Accidental Free Transportation System" *International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887 Volume 6 Issue V, May 2018.*
- [4] Hemavathi R shilpa subray Bhat, "Temperature control and compensation of Mems gyroscopes", vol 2, *International Conference on Convergence of Science, Engineering & Management in Education and Research – A Global Perspective.* 2013
- [5] H Prasanna Kumar Baby chithra, Hemavathi R ." Driver Assistance system with Automated Traffic Signal Recognition And safe overtaking guidance using ultrasonic sensor and fuzzy logic controller", *International Journal of Advance Research in Electrical, ,Electronics and Instrumentation Engineering, vol 6 ,pages 7046-7411 (IJAREEIE)*
- [6] Han-Shue Tan, Fanping Bu Member, ASME and IEEE, and David Nelson "Application of Vehicle Lateral Control – Automated Snowblower" *Conference Paper in Proceedings of the American Control Conference · July 2006.*
- [7] Wu, Xinye, et al. "Research on vehicle rollover and control." *Advanced Computer Control (ICACC), 2010 2nd International Conference on.* Vol. 2. IEEE, 2010.
- [8] Jianyun Ni; Jing Luo; , "Microcontroller-based engineering education innovation," *Educational and Information Technology (ICEIT), 2010 International Conference on , vol.3, no., pp.V3-109-V3-112, 17-19 Sept.2010*