

## PREVENTION OF ACCIDENTAL LOSS

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**Abstract—** In recent days modern cars use various technologies to prevent accidents, out of them this technique is used to prevent accidents by using automatic open-close airbags in cars. Nowadays modern cars use open and close airbags to prevent accidents and to save people's lives. These airbags get opened when the car is on verge of the accident. When the car goes faster and if it hits any object the accelerometer gets initiated and the information is sent to the drive system and the airbags gets opened. In this technology we implement a camera and a load cell which is used to predict the presence of the persons and weight of the person respectively in the car. The airbag gets opened in accordance with the presence of the person and it opens with the considerable and required pressure. This is to prevent unwanted opening of airbags in all places and opens in the pressure amount that is bearable by the person. This is achieved by using CNN methodology.

**Keywords—** Raspberry-pi module, Pi-camera module , CNN methodology.

### I. INTRODUCTION

Nowadays with the advancement in technologies, work has become more tetchy and more and more safe and easier. In accordance with this technical improvement we are doing enormous work to save our lives. Nowadays modern car technology involves various accident prevention technologies .Among all air bag open close technology is used in common in all cars. In this project we use CNN methodology for detection of the face of a person and a raspberry pi camera. This is used to avoid extra usage of air bags and extra usage of pressure in air bags. As in normal air bags it opens in all places in the car .It doesn't see whether the person is present at that particular place or not, but in this project we introduce a method that through CNN technology the person is detected and then the airbags gets open only when the person is present at that place. As similar the airbags open in common weight and common pressure for all age group persons. This prevention

method can also lead to the accidental accident, air bags open in the same pressure for adults and also for an infant, hence with the help of it detects the opens the air bag for required size. This is completely based on the welfare of the humans and for the welfare of society. The coding technology is implied in this development process, hence this project is the combination of both hardware and a software base. This project is implementation of technology in the existing technology. As we people are growing and running towards technological development in this current world, we people have no time to sit for these older developed technologies. Currently we are in need of many new innovative technologies on a daily basis. We youngsters are in search of new technologies and we run towards modern developments. We are doing this work on the basis of developed technology to make this developed technology for further developing technology. This work is suitable for all modern cars which have all developments like driver drowsy detection, modern cars using IOT technologies, and cars even using smart parking technologies. The major advantage of this work is that this work is done on the developed technology so called as developing the existing technology or the existing solution.

### II. LITERATURE SURVEY

There are various literatures surveyed for the accidental prevention of humans and their lives. Among all some of the literature reviews helps us to design and get a clear identification and information about this project. There are most clear pictures and information is seen in some of the papers, among them the paper titled, "In-vehicle occupancy detection with convolution the networks on thermal images", was published by Farzan Erlik Nowruzi, Wassim A.EI Ahmar and Robert Laganieri University of Ottawa published on 2017 May, in the computer vision foundation. Here in this method the occupant present inside the car is detected using a famous algorithm methodology

called R-CNN algorithm. They used the method called thermal images to detect the occupants present in the car. Through this paper basic information about CNN technology is identified and gives an idea to work in CNN technology. The additional information is given in the following paper titled "Occupancy Detection in Vehicles Using Fisher Vector Image Representation" which is published by Yusuf Artan, Peter Paul published in 2013 in month Dec in the computer vision and the pattern recognition. Here in this method shows and examines the state-of-the-art local aggregation based image classification using bag- of-visual-words and Fisher vectors (FV) methodology. Through this paper we get the information about the image classification, as our project is based on the image identification ,with this information we get an clear cut information and idea of the image classification Loo GT ,Siegel JH, Discharge PC, Rixen D,Burgess AR,Addis MD, et al. In this paper the information is identified the information about the conversation between the airbag with its protection versus compartment intrusion of the effect determines this pattern of the injuries in multiple of trauma motors vehicle accidental crash, this paper was published by J Trauma in the year 1996 in May month. This gives the information about the working of the air bag technology, which helps to design the idea of the air bag design for the requirement of the project. Further development made by many people around this world helped us to have a deep look into this work among them one had done the cabin system check which made us to look forward for this in cabin occupant detection system .this was found by Pham, L, the Molden, N, Boyle, S. the Johnson, K. ,Jung, H. Development of the standard testing methods for the vehicle cabin air quality index. SAE Int. J. Commer. Veh in the year of 2019.

### III. METHOD OF EXPERIMENTAL STUDIES

The existing methodology for this project is the airbags get opened when the car is in verge of an accident. When we have a close look at the working of the airbag in modern technology cars, it works in the form of opening of the airbags for all areas in cars. As the technologically developed cars usually have ten air bags approximately. Ten airbags are placed in accurate positions as in the front seat, driver seat, and back windows. These airbags are placed to make the persons seated in the

car prevent them from the urge of accidental attacks. As the car hits these airbags get opened. The problem in this existing system is that air bags open for all places even if the person is not present there. When the person is seated in the front seat or in all positions, a sudden hit may cause injury. Sudden hit of the person hits the car's air bag and causes the injury. This paves the way for this project work, even this injury happens for a child or infant seated in that seat. The pressure for the airbag given for the airbag is same for both adults and the infant/child. To avoid these accidental accidents we use the technology and improve for better safety purposes. The figure 3.1 pictures the accident caused by the airbag to the child. This picture shows a mild injury that happened, there exists major injury and even leads to death of the persons. This orange marker shows the injury parts for the persons seated in the seat

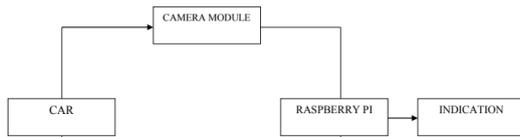


Figure 3.1 Injury to person

### IV. PROPOSED METHODOLOGY

#### A. BLOCK DIAGRAM

The design of this in cabin occupant detection system involves both hardware and software part of combinations. Here the software part includes python software, face detection using CNN technology, hardware part includes car, raspberry pi camera. The design of this project is a simple and a compact structure where it is designed for this purpose.



The CNN technology is incorporated in this technology for the identification of the individual images of the persons present inside the car. The code for image detection or identification developed using python language.

**B. HARDWARE DESCRIPTION**

**CAMERA MODULE**

A camera module is fixed in the car with the hardware setup. This camera module is trained with YOLO V3 methodology, where it detects all the images individually in a group. This module helps to identify the individual images of each and every person even if they are present in a group. YOLO is called as simple as object detectors and as detection networks. YOLO is extremely fast and it's accurate in its output. The camera module output using YOLO methodology. This type of methodology gives accurate images for further featuring of the images.

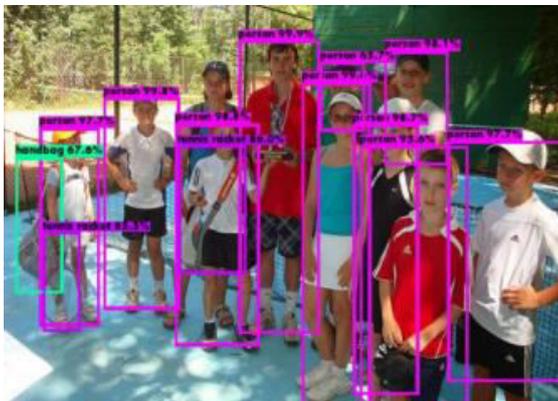


Figure 4.1 Camera module output

**RASPBERRY-PI**

The Raspberry Pi is a forty pinned one board computer which runs the Linux. These modules consist of GPIO which are General Purpose Input/output pins which are used to connect the monitor, keyboard, power supply and in addition the mouse is connected and used. The languages used in this are python, C, C++, scratch, java, ruby, R. One of the special versions of software called Raspbian software which is especially built for Raspberry Pi. It is lower in cost but higher in performance.



Figure 4.1 Raspberry pi module

**C. SOFTWARE DESCRIPTION**

Python is a high leveled performing and programming language which is a general/common purpose programming language. These are used in developing both the desktop and web applications. This is necessary to make this language usable to make the code a readable and maintainable code. This language, unlike other languages, emphasizes code readability, and it allows us to use English keywords instead of usage of punctuations. Python always supports object oriented programming languages. In this project the YOLO is trained with the help of this python coding. Like other languages, python has its own special shortcomings. In this project we use the CV library in software. Since face detection is done using these codes CV is installed, for the first face detection needs to satisfy more than 6000 parameters. Hence this python code is used to satisfy the initial conditions where basic requirements for face detection are done and it is allowed for further processing.

**V. IMPLEMENTATION OF PROPOSED METHODOLOGY**

Initially the working of the air bags is considered for the first. When the car is on the road and if it is in active form and it is in an accident, if the car hits some object or any other car, it starts to decelerate (decrease in speed) very rapidly. Then the accelerator which acts as an electronic chip which measures the acceleration or force of the car will detect the speed of the car. If this decrease in speed is more than enough then the accelerometer triggers the airbag circuit, this circuit doesn't get activated for n normal braking activity. This activated air bag circuit passes the electric current through the heating element. This heating element is like a wire. Then this heating element ignites the

chemical explosive and the airbag gets opened. In older days the air bags used the sodium azide as the explosive, but nowadays we use a considerable amount of nitrogen or argon gas which is harmless for humans. The air bags are made of nylon material which is acceptable for humans. Once the airbags expand then it gives a puffy blow to the plastic cover off over the steering wheel and it gets inflated in front of the driver who is seated. The airbag is coated with the chalk like material, like talcum powder which is used to provide a smoother surface for the persons to be sighted. At the end of this process once if the car stops completely then the airbags gets deflated completely and comes to normal position. Figure 5.1 shows the step by step working of airbags in car.

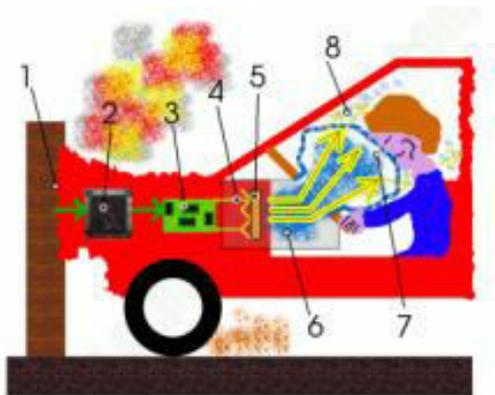


Fig. 1. Working of airbag

The major algorithm used in this project is CNN (Convolutional Neural Network). This algorithm is a common method for neural networks. This Convolutional Neural Networks can be used for various classifications of problems. In this project we use CNN for featuring the images. Where the camera module captures the images and this image is processed for the CNN algorithm, this helps to feature the images in the finest way. This CNN technology is constructed in such a way that it consists of five layers: input layers, convolution layers, pooling layers, fully connected layers, and softmax layer. The entire working of the methodology CNN.

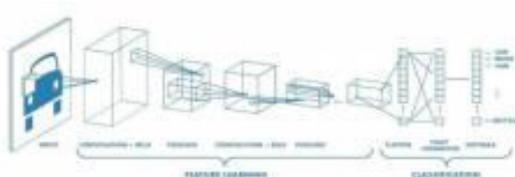


Fig. 2. Working of CNN

**Input Layer:** This input layer is the one which is literally an RGB form of image which is width\*depth\*height. The important role of this CNN is to reduce the image in the form of which are much easier to process without losing their important features for obtaining a better observation/prediction of the image.

**Pooling Layer:** As such, this pooling layer is used to reduce the total available amount of the data. Once it is done with the convolution, it will end up with a high collection of data, so compress the data using the pooling function. This pooling includes two different types of pooling such as Max pooling and the Average pooling. Convolution layer is further followed by the pooling repeating this process to obtain some important information and features from the input images.

**Fully connected Layer:** Here output from the pooling layer is fed into this fully connected layer for further processing of the image. Here we need to send the input data in one by one process to obtain important features. We technically flatten the existing data into the fully connected layer as a vector input for the next layer for further processing.

**SoftMax Layer:** The outcome which we get from a fully connected layer is given into this SoftMax Layer. The output called neuron passes through the SoftMax layer, so that the output of each individual neuron shows the probability between zero (0) and one (1). The obtained data values which are very close to one (1) are considered as the actual outcome of the actual class for the given input images. Figure 6.3 shows the detailed working of CNN methodology.

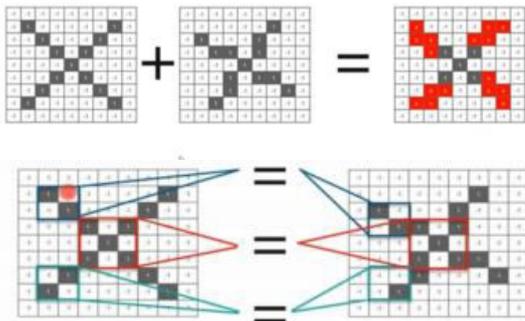


Fig. 3. Working of CNN in detail

## VI. RESULT AND OUTPUT

The usage of these techniques paves the way for the output of the project. As here the pressure is allowed in considerable amounts which is bearable for the humans. The bearable pressure of humans is approximately 5psi. Even a high amount of pressure can also cause death of the human, hence to avoid this we detect the weight and the amount of pressure is fed to the air bags. Here child and adult is detected and it is classified on their based on the trained CNN model

## VII. CONCLUSION

The result of this project is shown above. This project concludes as if the individual sat in the correct position there is no issue with the position of the individual, but if the person has their wrong position it shows an indication that the person is seated in the wrong position, this helps the individual to make sure that they are in the correct position. If they are seated in the wrong position this indication helps them to give prior indication that they are meant to be safe. This is a sign of saving a person before an accidental attack. This development from the existing system makes the technology grow in a higher position thus, further developments in this methodology reflect the reflection of enormous development of future technology. This gives the way for the future scope of the accidental prevention of the car technology. As, in recent days we are looking forward to the development of technology in all fields, among all the essential and foremost duty and need is safety and prevention of humans from accidental death. Surviving is the best challenge. This project will help the most advanced system to save the life of humans by preventing them from accidental accidents. Future scope of this project will be more

useful for all humans and also for technology development.

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