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Advance Car Crash Detection System

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Abstract— *In this fast moving world, the need to keep up the tight schedule and to travel from one place to another is a must. This is achieved by motor vehicles that are cars and bikes. Cars being one of the basic means of transportation in present day. Which helps most of the human population to travel from one place to another, hence one of the most important means of transportation. As there are millions of cars present around the world sometimes unfortunately they meet with accident. Advanced Crash Detection system deals with the aftermath of Hit and Run accident case. Advanced Crash Detection System enhances the present systems for detection of accident specially, Hit & Run cases. Whenever accident occurs, crash sensor gets activated and wakes up the entire system. Microcontroller activates the RFID reader to read other cars unique ID number and captures the scene as evidence. All this is achieved by very compatible software which is Audrino and can be easily programmed by embedded C.*

Key words: *Advance crash detection, Microcontroller.*

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I. INTRODUCTION

Maintaining a strict schedule and travelling from one place to another are necessities in this fast-paced environment. Motor vehicles were created as a result. This motor vehicle is now referred to as an automobile. Which makes it one of the most crucial modes of transportation because it enables the majority of the human population to travel from one location to another. Cars are a common sight and the primary mode of transportation; regrettably, they occasionally collide and result in accidents. This accident might happen owing to weather and road conditions as well as a driver's lack of attention to the road. And because the accident's perpetrator is terrified to face the authorities, they flee the scene. The term "Hit and Run accident case" refers to this kind of incident. Therefore, the goal of this initiative is to identify and apprehend the accident's perpetrator before they leave the site of the crime. When a person is careless in driving it results in an accident. The person responsible for accident would not want to face the law as it would bring lot of trouble to him so the best and easy way for him to escape all this is to evade the accident scene. In short this whole scenario is known as Hit and Run accident case. The person who is the victim of hit and run case won't have any evidence to file a complaint against the person who actually caused the accident and escaped the accident scene it would be very difficult for the police to catch the person who is responsible for all this mishap.

II. METHODOLOGY

Whenever accident occurs, crash sensor present in various locations of the car gets activated which sense the impact on car and sends signal to microcontroller denoting that accident has occurred. As soon as the microcontroller detects the signal it activates whole system and sends the signal to RFID reader to read the RFID number, also microcontroller activates the camera to capture the first scene of accident. Simultaneously LCD display will show that accident has occurred. RFID reader reads the unique RFID number of other vehicle and stores that RFID number in microcontroller. Stored RFID number is compared with the RFID number's present in data base and maps the RFID number to the registration number. Microcontroller will display the registration number of the vehicle on screen. Image of the first scene captured by camera is stored in memory which can be used as evidence.

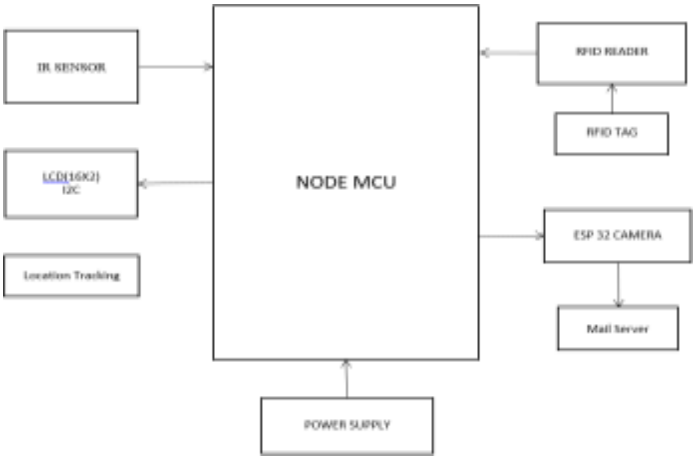

Fig 1: Block diagram of car crash detection system

Block diagram of the system is shown in Figure 1. Whole system works on two voltage levels, 5V and 12V generated by voltage regulator. Microcontroller controls and co-ordinates the whole system. Whenever accident occurs crash sensor senses the accident and activates whole system. When system becomes active, RFID reader reads RFID number of opposite vehicle and camera is activated to capture the image of environment where accident has happened and first evidence of the scene is obtained. Microcontroller processes the entire data and displays the RFID number of opposite vehicle on LCD display. As soon as crash occurs, the crash sensor sends a signal to microcontroller and if no crash then crash sensor remains idle. Microcontroller monitors the signal from the crash sensor. When there is no signal from the crash sensor, then the microcontroller keeps the whole system in inactive state. If any signal from the crash sensor, then microcontroller activates the whole system to fetch the data of accident. Microcontroller sends the signal to RFID reader to read the RFID number of the vehicle met in accident. RFID number obtained is mapped with the registration number by comparing the database present. Display the registration number which is mapped by RFID on LCD display through AVR microcontroller. Activate the camera by sending pulse to a relay to capture the image of first scene. Camera captures the image of first scene of accident which would serve as first evidence for accident. Store the RFID number and image captured by the camera in system memory. Deactivate the system after 1 minute so that power can be saved and also to avoid reading the data of other vehicle.

i) Node MCU

The NodeMCU (Microcontroller unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.

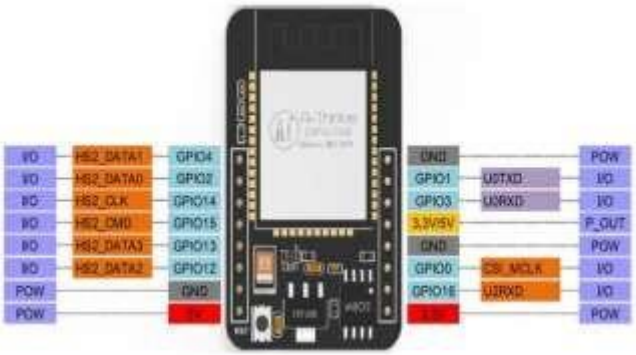

Fig 2: Node MCU ESP8266 pins

iv) ESP32-Cam

Camera is used to capture the image of first scene of accident. The image can be used as the evidence for the victim. Camera will be activated by AVR Microcontroller by sending a pulse to it, when accident is detected by the crash sensor.

ii) IR Sensor

IR sensor immediately recognizes when an accident occur and helps the vehicle's occupants to get out of the cabin as swiftly as possible. The crash sensor overrides the central locking system, unlocking all the doors and allowing the driver and occupants can leave the vehicle speedily or assistance from outside to get into the cabin faster.

Fig 3: IR Sensor

iii) RFID

RFID stands for Radio Frequency Identification. RFID module is used in advanced crash detection system to read data of opposite vehicle with which accident has occurred. RFID is activated by AVR microcontroller when crash sensor sends thesignal to it.

Fig 4: RFID Trans-reciver

vi) IOT location Application

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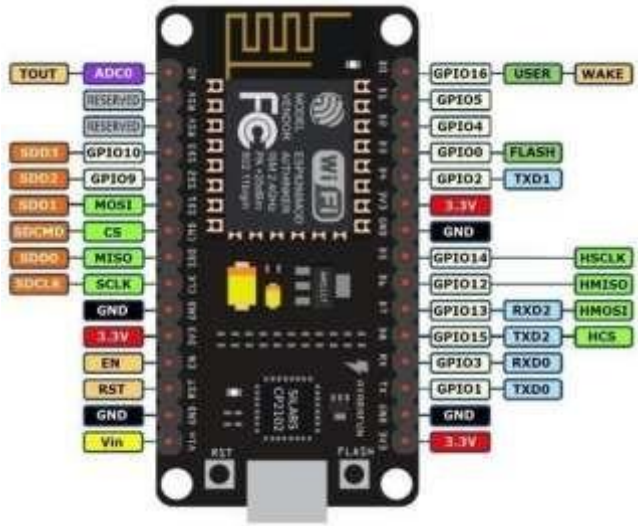

Fig 5: ESP 32-Cam

v) LCD Display Module

Liquid Crystal Display (LCD) is used to display the vehicle registration number when accident has occurred. When an accident has happened, the vehicle registration number is displayed on a liquid crystal display (LCD). When the crash sensor provides a signal to the AVR microcontroller, the LCD display will turn on. LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications.

A 2x16 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom character animations shown in Figure 6

Fig 6: I2C LCD Display

vi) IOT location Application

Where it helps us to find the exacte current location of ghevechicle.

III. RESULT & CONCLUSION

A. Result:

There are many safety measures applied in car such as Airbags, ABS (Antilock brake system), Seat belt etc implemented for the safety of the occupants. But, sometimes knowingly or unknowingly things go wrong. And most of the time people, who cause accident, get away with it. This is known as hit and run case, and in hit and run case it is difficult to identify the culprit, and no one attends to the victim. So in this project a system is used in which it can identify the culprit and also safeguard the life of victim by attending them.

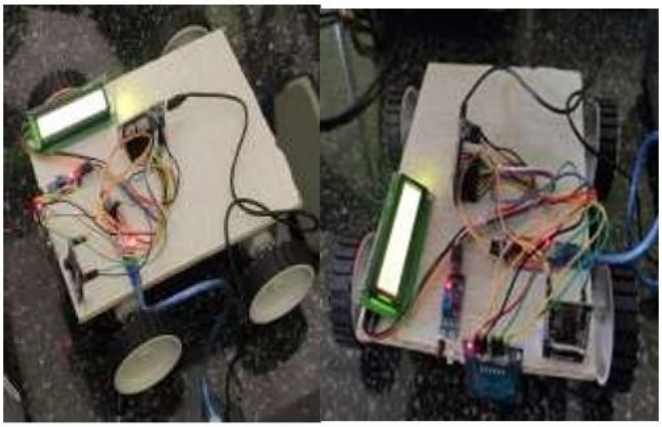

Fig 7: Proposed Model

Automobile details like registration number, driver's name, chassis number, make of the vehicle will be storedin database which is maintained in RTO. GPS system is used to monitor vehicle location and updates the co-ordinates for preset intervals of time. At normal function,GSM module and RFID module will be in sleep mode. Itonly comes to active mode only during vehicle meets collision whenever accident occurs, crash sensor present in various locations of the car gets activated which sense the impact on car and sends signal to microcontroller denoting that accident has occurred. As soon as the microcontroller detects the signal it activates whole system and sends the signal to RFID reader to read the RFID number, also microcontroller activates the camera to capture the first scene of accident. Simultaneously LCD display will show that accident has occurred. RFID reader reads the unique RFID number of other vehicle and stores that RFID number in microcontroller. Stored RFID number is compared with the RFID number's present in data base and maps the RFID number to the registration number. Microcontroller will display the registration number of the vehicle on

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B. Conclusion:

As of now, there are many precrash survivability techniques like automatic collision notification, GSM based alerting system etc. The theme of this project is not only to safeguardthe driver and occupants but also to catch the culprit who is responsible for hit & run accident cases. So, here after collision the system will get to know the details (registration number, position of the vehicle etc) of collided vehicle and those details are used by the police to solve the hit & run caseas it provides hard evidence for the case and also it may help in claiming the insurance from insurance company for car repair purpose. Main goal of this project is to develop a new low cost technique which helps bring justice to the hit and runaccident cases.

By using Advance Crash Detection system. The government can solve many cases and the innocent person to get the benefits and it will help in the implementation of traffic rulesby punishing the culprit.

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