

Ghat Section Alert System to Reduce the Accidents

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Abstract - The Alerting system in the Ghats section system is able to communicate data utilizing a transceiver, a wireless transmission technology, that is sensed from the other side of the road. This method helps to detect the vehicles by Using the Ultrasonic Sensor and provides the knowledge about the vehicles coming from the opposite side of the road within the Ghats section. The system is fully integrated and may respond to the driver by using a buzzer and LED. Due to the lengthy curves of the roads in the Ghats portion, this strategy is useful when the driver cannot see the car on the other side of the road. As a result, the system offers the driving force security and protection. The proposed system can be used in a variety of locations, including hill towns, Ghat parts, and winding Ghats highways. Using BLYNK iot, we can even obtain the current temperature of that particular Ghats portion and a notification warning the driver of vehicles approaching from the opposite side of the road. Additionally, the Firebase database is used to determine how many vehicles are passing that piece of Ghat.

Keyword: Autonomous vehicle, sensor ,IoT ,Microcontroller, RFID.

I. INTRODUCTION

A very huge growth in vehicles has resulted in an increase of accidents every day. Accidents happen mainly due to carelessness, breaking traffic rules and bad conditions of the road. As a serious component of road geometric design, curved road segment, thanks to their alignment characteristics are most at risk of traffic crashes among all road geometric elements in keeping with a survey, crashes on curved segments accounted for 10% of total number of traffic crashes. Correspondingly, the amount of deaths accounted for 13% of total number of deaths. In Narrow roads, Hilly areas, Ghats sections', negotiating hairpin bends and curves is not an easy task. Driver has to be alert all the time while driving in such situations.

Accidents mainly occur thanks to over speeding of car while driving. While driving on roads at Ghats section many drivers faces accident which ends them into serious injuries or perhaps death is that the man reason behind this accident is curves and bends of roads while delivering Ghats. It becomes difficult to determine vehicles coming from other lane and turning drivers usually need to assume how for turning at such critical section.

II. OBJECTIVES OF PROJECT

Thousands of individuals and animals lose their lives every year due to this problem. Since we are talking about mountain roads here other side might result in a cliff and heavy cross junction in road tracks. the answer for this problem is alerting the driving force about the vehicles coming from opposite side in Ghats sections.

The main goal of our project is to alert the vehicles in Ghats section and automatic detection of accidents. In order to attain the goal, the following objectives have been framed: 1) To provide safe & secure journey while travelling to the Ghats roads, Hill Stations, etc. 2) To take the immediate safety measures in case of increased traffic density at hairpin bend roads.

III. PROBLEM IN EXISTING SYSTEM:

Vehicle horn: This is one of the conventional ways of arranging a hair pin curves. The drivers on the two sides judge the distance of each other in view of the powers of sound from their separate horns and furthermore in the blustery seasons horn won't be heard. Certain individuals won't utilize horn itself. This technique despite the fact that being the least complex postures to be exceptionally wasteful likewise creating a great deal of turmoil between the drivers.

Headlights: blazing headlights during the night works like the vehicle horn making it one more wasteful technique. Additionally, this strategy is totally ineffectual in sunshine conditions.

Concave mirrors: this arrangement is most broadly utilized these days to give a brief look at any vehicle moving toward the hair clip twist from the furthest edge. However, these have their inadequacies, for example, the mirror should be kept clean consistently which is troublesome in uneven regions as its generally cold and dim, in this way lessening its perceivability.

Minimum Software Requirements to implement this proposed system is Windows Operating system, Embedded C, HTML, JSON, Arduino IDE and Firebase. Minimum Hardware Requirements 40 GB and above Hard disk, 64 bit i3 Processor 2.2GHz and above and 4GB RAM.

IV. SYSTEM ARCHITECTURE

In the below figure 1, the BLYNK application is directly connected to proposed system via cloud. This application will give the alerts for the opposite curve about the vehicle. When any vehicle wants to cross the Ghats section, there will be one QR code, driver just have to scan the QR code. After scanning the code, driver will get notification if any vehicle is coming from the opposite direction. Driver will also get the notification about the temperature and humidity information as well as any natural disaster information.

System Architecture Layout

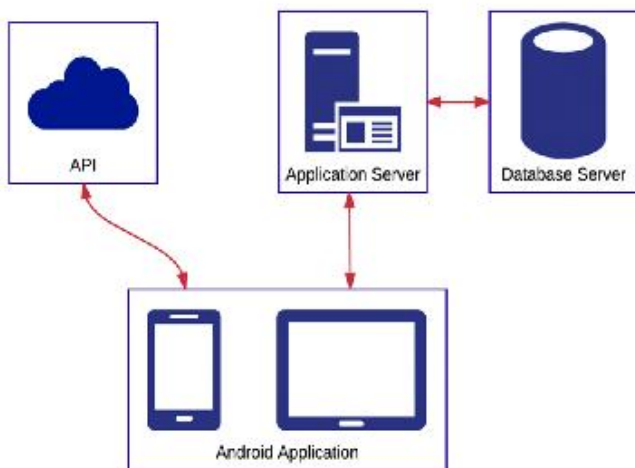


Fig:01 obstacle avoidance car

In the below figure2, shows the overall architecture of the proposed model with the require hardware or software such as ATMEGA328P, RFID, IR Sensors and IoT components with the Arduino IDE for programming using Windows operating system.

Main objective of Ghats section alert system is to avoid the accident due to less width and turn in the Ghats. Because of hair pin curve and twist, there is chances of accident occurrence. One more major factor of accident or collision is while taking the turn on twist curve, it's like blind spot. Where driver can't see any vehicle coming from opposite direction, id they see suddenly it's difficult to take decision because of up or down of the hill. To avoid the accident this proposed work will have installed at the fastener twist section.

Below figure 2 shows the architecture of the proposed system with front end, back end and hardware. Node MCU Board is integrated with WIFI module for the communication with

database and application. Microcontroller takes the input from ultrasonic and IR sensors, according to the sensor values. It takes the decision to switch ON or OFF the LED, Buzzer ON or OFF. This input will have processed by the microcontroller and send to the mobile application, so driver can check the details of Ghat before entering, it also parallel updates the real time database.

Flow of work is shown in the below figure 3, flow of data shows the step by step procedure to get the desired results

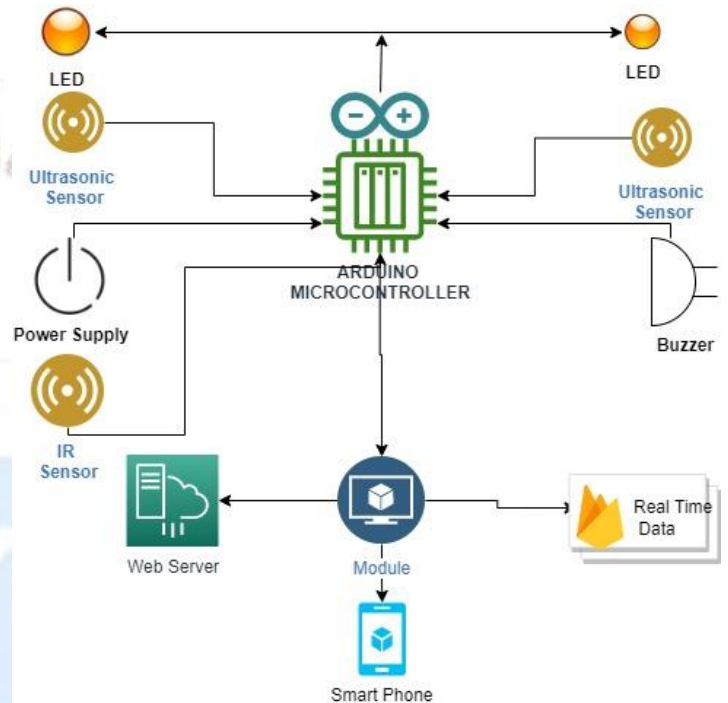


Fig2. Architecture diagram of proposed system.

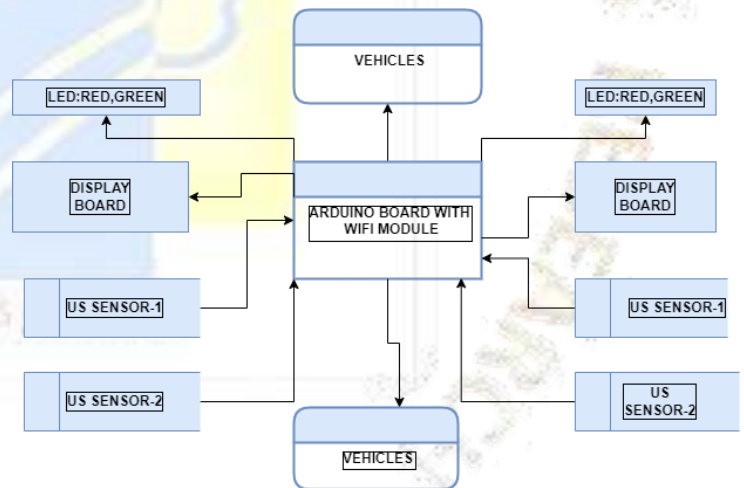


Fig3. Flow of data in the proposed system.

V. IMPLEMENTATION

In this the device or hardware modules are placed at both curve named as C1 and C2. This project is implemented with the modular approach, in which all the modules are designed, developed and tested properly with the help of unit testing, component testing, integration testing and system testing. List of components used to develop Ghats Section Alert System is listed below.

1. Node MCU board: This board utilized in our task to interface the gadgets through Wi-Fi.
2. Ultrasonic sensors: This sensor sense the vehicles coming on bend streets and sends the information to hub MCU board.

3. Driven lights: It shows the red light when the vehicle is coming from inverse side of the bend street.
4. Temperature sensor: It shows the current temperature.
5. Breadboard: It is utilized for normal associations

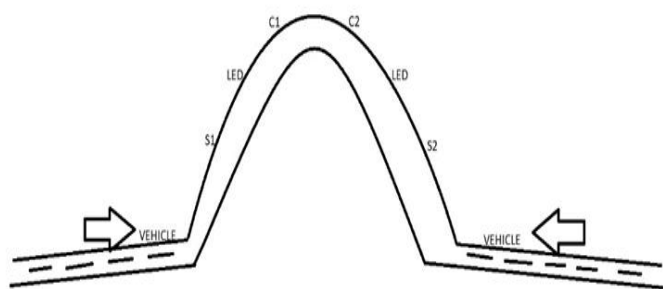


Fig4. Implementation of proposed system proposed place

Above figure 4, shows that there are two sections of Ghats, where proposed system can be placed to monitor incoming vehicle in Ghat area. This undertaking is tied in with forestalling mishaps in Ghat areas, slope stations, clip twists and so on Between the bend streets MCU microcontroller is deployed and interfacing ultrasonic sensors on each side of the bend. LED light is deployed on the top of each bend. At the point when vehicle comes on one side of the bend the sensors detects it and sends the information to hub MCU board which again sends the got information to the LED light of the contrary bend, when the LED light becomes red the vehicle coming from this side will see the light and stops the vehicle with the goal that the vehicle coming from the opposite side from the bend might go through and the rider will even get a caution in their portable with regards to the vehicle coming from the other way. Temperature sensor is deployed to get the current temperature , which can help to predict the rain or fire in the Ghat section. So before entering into the Ghat section driver can take precaution.

Implementation Methodology

The components used for the implementation are LED bulbs, buzzer, ultrasonic sensor, IR sensor, bread board for common connections, node MCU board.

Now, assume there is a curve and one side of the curve is called cross1 and other side of the curve is called cross2.

When a vehicle passes cross1, the sensor detects it and LED light is turned on in cross2 so that the vehicles coming from cross2 can slow down their vehicles so that the vehicles from cross1 can pass through.

And when a vehicle passes cross2, the sensor detects it and LED light is turned on in cross1 so that the vehicles coming from cross1 can slow down their vehicles so that the vehicles from cross1 can pass through.

When the LED light is turned on, at the same time a notification will go to driver’s mobile through BLYNK app saying that a vehicle is coming.

DHT11 sensor is placed which gives us the real time temperature of that particular region, temperature will display in BLYNK app And when it is raining in that region it sends the notification saying “It’s raining near Ghat section.

VI. RESULT AND DISCUSSION

Below figure 5 shows that vehicle is coming towards the Ghat section C2, when it reaches to the section C2. LED light will turn to green which is shown in figure 6. That means there is no vehicle coming from other side of Ghat section C1. So vehicle can enter into the Ghat section to complete the ride

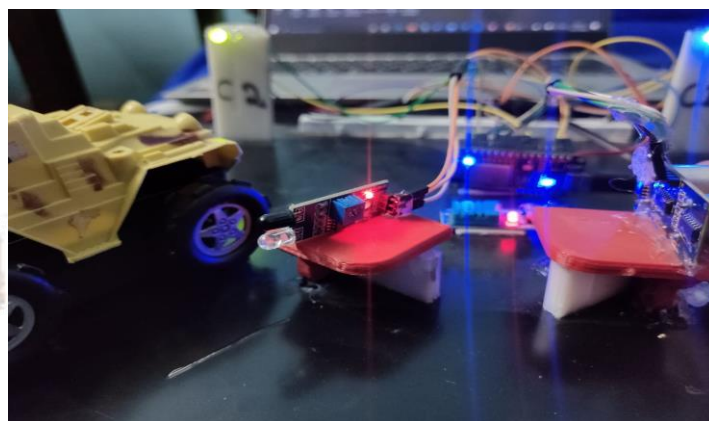


Fig 5. Working Module of Ghat Section Alert system

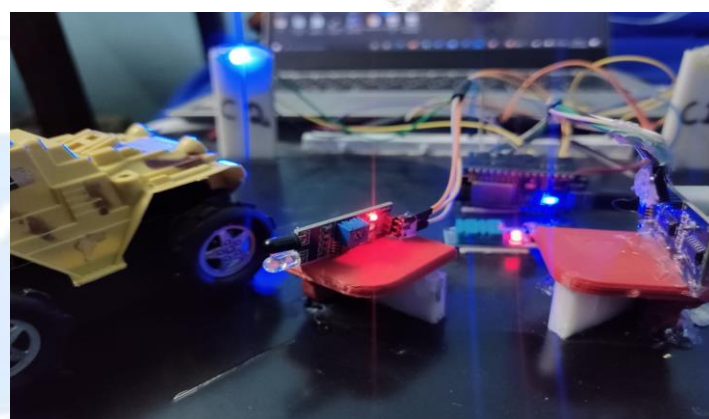


Fig 6. Working Module of Ghat Section Alert system with Green LED light

Real Time Data of vehicle entering into C1 and C2 of the vehicles will be updated and stored into the Firebase real time database. It shows the number of vehicle enter from each Ghat section C1 and C2.

Below Figure 7, shows the BLYNK app screenshot. This app gives the details of vehicle at Ghat section with the temperature and Humidity information. It keeps count of vehicles passing through both cross1 and cross2 and if it keeps updating the simultaneously in a second, then we can assume that something is happening in the Ghat section like a traffic jam or a smuggling. We have even created a web server for displaying real time temperature. The temperature keeps updating every 2sec and we can even give a delay of 1.5 hours for temperature updation. The database and web server is just for admin purpose. This system also provide the security with respect to the usages, only admin having privilege to change anything with respect to the database and other information.



Fig 7. BLYNK APP alert for driver before entering into the Ghat Section

Result of this Alert system can be also viewed from the web page, which can be accessed by the control room as shown in the below figure9. It can be accessed through the IP address or localhost.

Time
11:42:03 PM
11:42:00 PM
11:41:56 PM
11:41:53 PM
11:41:50 PM
11:41:47 PM
11:41:43 PM
11:41:40 PM
11:41:37 PM
11:41:34 PM
11:41:31 PM
Temperaure (°C)
27.60
27.60
27.60
27.60
27.60
27.60
27.60
27.60
27.60
27.60
27.60

Humidity (%)
62.00
62.00
63.00
63.00
63.00
63.00
63.00
63.00
63.00
63.00
63.00
63.00

Fig 8 . Web page used into the control room

Below table 1 having the 4 test cases and explained below:
 In TC-01 verify the operation of LED Lights by interrupting the sensor with physical object which gives the result the LED light glows and the user is alerted. In TC-02 verify the operation of LED by not interrupting the sensor in which the result is given as such the LED were not switched it stayed in a same state .

In TC-03 verify that the data is been properly appended to firebase database. In this sensor is getting interrupted by physical object the result is given as such that when valid interruption was made fire base database was updated.

In TC-04 verify that the notification was sent properly to all the drivers through blink app in this we give valid interruption and change in data values the result is that appropriate error message is displayed.

Below Table 2 having the two test cases to check the overall performance of the system to check the data updating and working of the model.

According the newspaper, in 2016 minimum average 1.5 serious casualties use to happen in the Ghat section per two kilometers as national average. If Ghat section is of 20KM that means 15 serious casualties. To overcome with police started awareness companion and started tracking with vehicle GPS for fast driving. This system helps each and every one including police department. After deploying of this module accident may be reduce to 0.1 average casualties or no casualties.

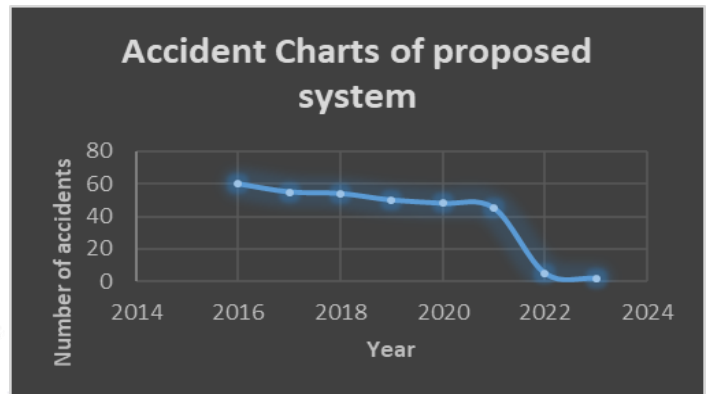
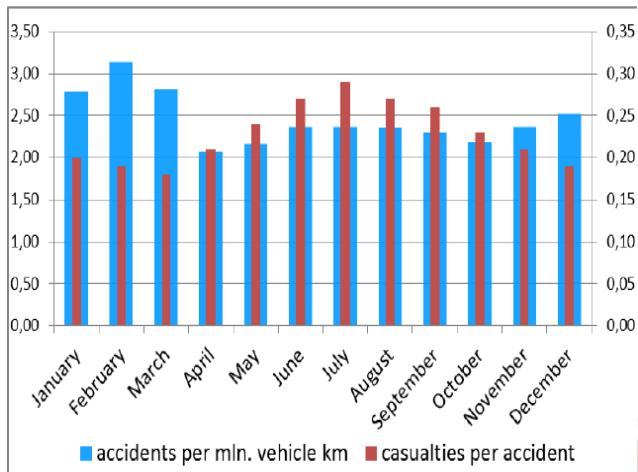


Figure 10: Accident year wise after deploying proposed model

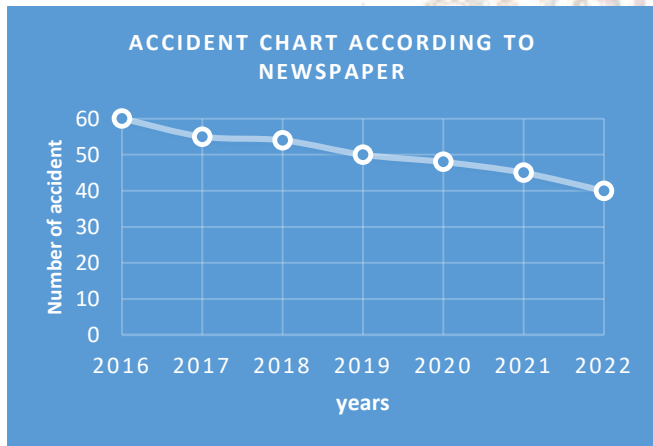
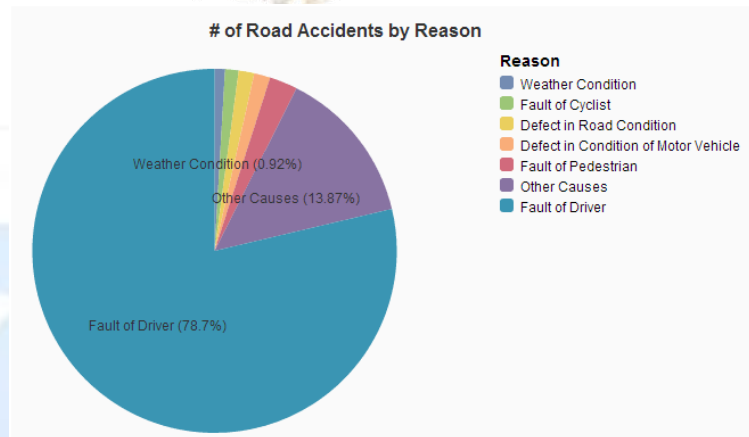


Figure 9: Accident year wise



Existing accident details from year 2016 to 2022 shown into the above figure 9. Once this prototype will deploy in Ghat section(2022 year), it will bring the accident level as zero with less traffic as shown into the above figure 10. Below graph shows how accident rate will declined with proposed prototype.

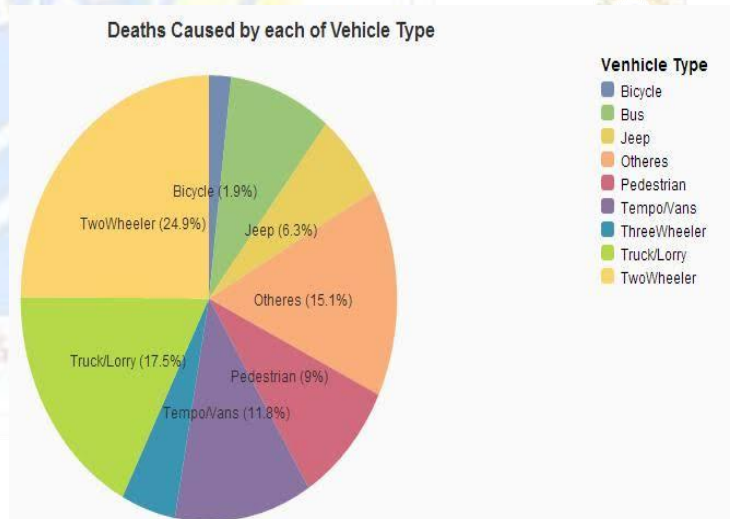
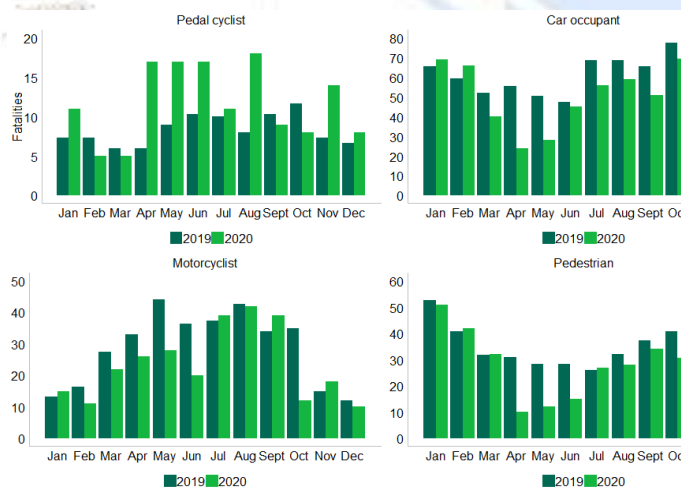


Table1: Test Cases of all the devices and system

Test case ID	Test case name	Test case description	Test steps				Test status P/F
			Step	I/p given	Expected o/p	Actual o/p	
TC01	Manual Alert of vehicles using LED	Verification of LED operations	Interrupt the sensor by a physical object	Valid Interruption	LED's should glow and user should be alerted	Switching of LED's took place as soon as the sensor was interrupted	Pass
TC02	Automatic Alert of vehicles using LED	Verification of LED operations	Interruption is not carried out	No Interruption	LED's should not switch it should stay in the same green state	LED's were not switched it stayed in the same state	Pass
TC03	Firebase Real-time Database	To verify that data is being properly appended to firebase database	Interrupt the sensor by a physical object	Valid Interruption	When valid interruption is made firebase should be updated with vehicle count	When valid interruption was made firebase database was updated	Pass
TC04	Realtime BLYNK Notification	To verify that all the notification were sent properly	User notification alert	Valid interruption and change in data values	Appropriate error message is displayed	Appropriate error message is displayed	Pass

Table2: Test Cases of the system

Test ID	Test Cases	Test Description	Expected Result	Actual Result	Status
01	Update data	If the data is updated status to be changed	Displays successful message	Displays successful message	Pass
02	Execution	Run the application	Application should run without any interrupts	Application is executing properly	pass

VII. CONCLUSION

The reason for this project is to minimize the number of mishaps in Ghat segments bend streets then on this is often finished by notice the driving force through drove light which gleams where vehicle comes from the other side of the bend. The vehicle is recognized by the help of ultrasonic sensors which is communicated to the hub MCU board. By utilizing this framework, can save huge number of lives in Ghat areas, bend streets and so forth we perceive the causes and impact of mishaps and afterward discover an answer by acquainting another procedure with keep away from such mishaps. This new procedure comprises of two ultrasonic sensors to caution the vehicle of the contrary street. Proposed system is successfully defend from mishaps which occur in the Ghat areas, slope stations and so forth since we are utilizing hub MCU board installed with Wi-Fi module, the driver will even get an alarm in the versatile with regards to the vehicle drawing nearer the other way.

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