

Road Safety System For Fog Using PLC

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ABSTRACT

According to the National Crime Records Bureau (NCRB), in 2014, 9039 road crashes took place as a result of unfavourable weather conditions, especially fog, killing 5,300 people. With no system for mandatory driving skills training before issuance of a license, most commuters remain unaware of the hazards posed by such conditions. Simple measures such as speed-control, following lane markings and keeping windows slightly down to hear traffic you cannot see, can prevent such tragedies. "Only Uttar Pradesh, West Bengal and Haryana put together had more than half of the total fog and mist-related road fatalities in 2016. Data show while fog-related deaths in UP decreased in 2016 as compared to the previous year, such fatalities increased five times in Haryana.

Here we are planning to develop a system in which we are trying to solve the problem. We will count the number of vehicles entering in this area and that vehicle. Passing through all the sensors so if the number of vehicles are less than entering into that particular area that means something is wrong inside and automatically an siron will be raised and signals before that area will be red and barriers will be closed automatically so that another vehicle will not enter and will prevent to bump again.

In this way the vehicle standing in the queue will be get notified that some kind of accident has been taken place ahead then they should slow down the speed, try not to overtake each other and maintain the distance between their consecutive vehicles..

Keyword: PLC¹, LED², SMPS³, IR Sensor⁴

1. Introduction

In today's modern world technologies has been developed very much and it is keep developing day by day but corresponding to it there are unfavourable significant climatical changes has been taking place in our environment. But our technologies cannot change these unfavourable changes in our environment. One of these unfavourable change in environment in fog. We cannot use our technologies to stop the occurrence of the fog but with the help technologies we can avoid their adverse effects on our society. One of the adverse effect due to fog is accidents of vehicles.

According to Piyush Tewari, Founder and CEO of SaveLIFE Foundation, "A family lost four members in the fraction of a second. The needs of the hour are better signages, mandatory safe-distance barricading of broken-down vehicles, and proper training of commuters to drive in fog. Simple measures such as speed-control, following lane markings and keeping windows slightly down to hear traffic you cannot see, can prevent such tragedies."

Government officials said since all these accidents and deaths happen in two-three months, there is a need to put special focus on managing the crisis. "Two factors—missing lane marking, signage's, signals and weak enforcement—are primarily response for the bloodbath on our roads. The three necessary features on our roads to guide drivers are missing and there is no enforcement on our highways, which account for 65% of the total road deaths," road safety expert Rohit Baluja said.

There are many incidents are occurred due fog in recent years which not only caused to loss of property but also harmed many lives. In India on 2017-11-08 a video has gone viral on social media claiming to show a shocking pileup on the Yamuna Expressway. The video shows the pile-up in action with more and more cars ramming into

each other even as people stand on the sidelines watching. Accidents are not a rarity on the expressway, on which cars can easily travel at 200 kmph.

We can see the severity of accident in figure 1 showing how the vehicles are piled up on the highway due to poor visibility due to fog.



Figure 1: 18 vehicles pileup due to fog on Yamuna expressway

In the article of “Dipak Dash, Fog-related crashes getting deadlier, January 8, 2018: The Times of India”. 16 people were killed daily in such accidents in 2014, it increased to 21 in 2015 while in 2016, more than 25 people died in similar crashes every day, according to the latest report of road transport ministry.

Below figure shows the accidents data in recent years due to fog.

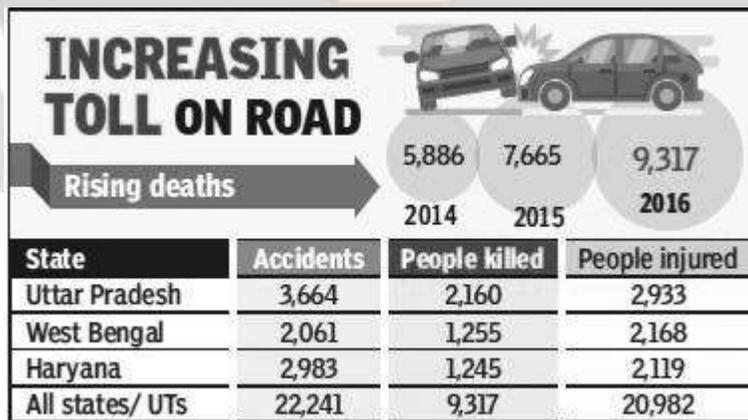


Table 1: Accidents due to fog

Despite this, even at around 40 kmph, drivers were clearly having trouble seeing the pile-up ahead of them and continued to ram into the cars one after the other almost at full speed and caused 18 vehicles pileup due to fog on Yamuna expressway, due to this incidents 1 got killed and 6 got injured.

This was just one accident but there are huge number of accidents had been taken place due to fog not only in India but all over the world. Even though fog occurrence period is for 2 to 3 months but it has raised a serious issue in our society.

Even transport ministry officials admit that proper lane marking and signages on roads can address the unsafe driving condition.

“We have no consideration for changes in the environment. The drivers are little aware what precautions they need to take and they commit the same mistake of speeding even after going through reports about vehicle pile up due to dense fog.” Baluja added.

Taking note of the need to have more enforcement to prevent such fatal crashes, the Punjab and Haryana High Court in November 2015 had issued a slew of directions including deployment of more police along stretches where more than three road deaths had happened and putting speed breakers to slow down the vehicles.

Hence here we are planning to develop a system in which we are trying to reduce the accidents on roads due to fog. In this system we are going to use the IR sensors which will be placed at some definite distance on road. These IR sensors will count the number of vehicles entering in the area and that vehicle passing through all the sensors so if the number of vehicles are less than entering into that particular area that means something is wrong inside and automatically an sirens will be raised and signals before that area will be red and barriers will be closed automatically so that another vehicle will not enter and will prevent to bump again.

For controlling these signals either input signals or output signals we are going to use PLC(programmable logic controller) due to its ruggedness property, easy to program, long lifespan and availability of large number of varieties depending on required number of inputs and output.

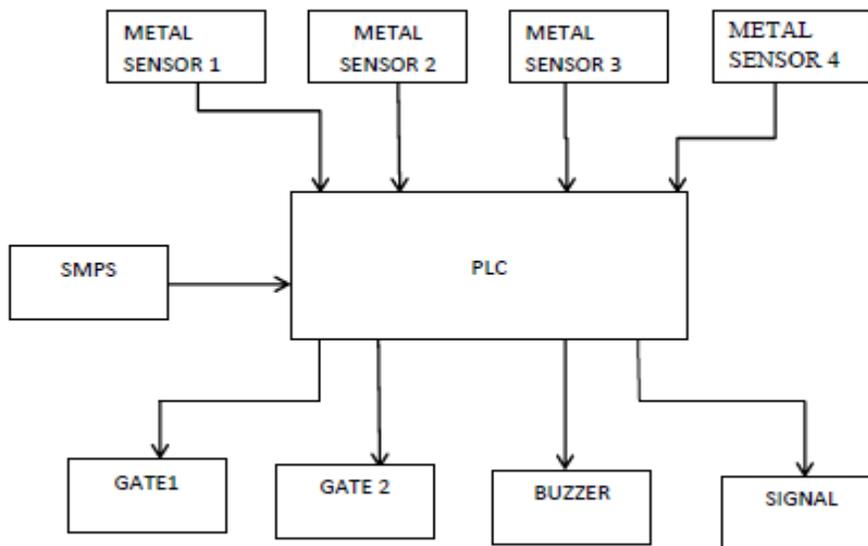
1.2 Necessity

- To aware the people regarding density of vehicles in the foggy area.
- To prevent the accidents due to fog.
- To control the traffic in case of accidents.

1.3 Objective

- To make healthy and safe transportation during fog.

2. BLOCK DIAGRAM



3. WORKING

In this system we have used metal sensors to sense the vehicles so that we will sense the vehicles entering on the road area and another sensor is placed at the end of the road so that both side vehicles will be sensed. We have used counters on both sides so that we will count the vehicles entering on the road and going out from the road and a counter comparator is used in the PLC so that we will continuously compare both of counters and the difference of both counters should be less than 10. If it is greater than 10 then estimatedly there is something wrong on the road and a signal is generated so first the buzzer will get high around one KM before the area so that upcoming vehicles will get alert and second we will change the signal from green to red so that by the signals drivers can get alert and after few seconds the barriers at the enter side of the road will get close so that another vehicles coming at the site will be stopped and the bump accident chain can be prevented.

Here accidents occurs due to fog and continuous cycle of accident is prevented and also in normal condition if there is fog at any site than we will sense the fog by using laser sensor and make a alert before that particular area. If the condition occurs when there are so many vehicles entered inside the foggy area and outgoing vehicles from that area is less than the barriers will get close and as the vehicles come out automatically the system comes normal. That means gates will open and automatically the buzzers will off and signal will get green so there is no need to reset the system. The whole system is labour free there is no need of human efforts in entire system and process.

4. CONCLUSIONS

An intelligent road safety system for fog had successfully been designed and developed. This project can easily be implemented in real life situation. With the help of an early warning system and the indication system the accidents can be reduced. The sensors were interfaced with SLC 500 PLC module. Increasing the no. of sensors to detect the presence of vehicles can further enhance the design of the system. We used DC motors to open and close the gates automatically by its rotation in anticlockwise and clockwise directions respectively. When there is increase in the vehicle density in any particular section a warning system alerts the incoming vehicles in the foggy area and if entering vehicles count is not equal to the exiting vehicles it indicates something has been happened in that section then comparator goes high the buzzers operates and the gate gets closed.

5. FUTURE SCOPE

The existing system can be enhanced more using a fog sensor placed in the mid region of the highway where fog is present. This fog sensor senses the intensity of fog, the fog intensity can be categorized into three level(dense fog, medium fog, low fog), depending on the level of fog intensity an early warning system indicating the intensity of fog through the different LED color to the incoming vehicle before the foggy region so as to warn the drivers regarding the foggy condition. For example consider dense fog, medium fog and low fog is indicated by red, yellow and green LED respectively. And PLC can be reprogrammed easily according to the statistic of the road.

6. REFERENCES

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