Mobility of vehicle/Train/Ship/Airplane in fog season or foggy area

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***Abstract*: "Recently Indian Railway met with many major accidents due to fog & negligence of signals hence we developed" Advanced Railway Signal System" which enables to transmit all Railway Signals in the loco pilot's cabin before 2km by transmit using the principle of "Electronic Communication".**

During last few years many passengers lost their lives due to Railway accidents and collisions in India. It also caused a great economic loss. Many of these accidents were the outcome of negligence of railway signals due to fog as well as manual errors. That's why we developed '"Advanced Railway Signal System" to minimize accidents and maximize security. "Advanced Railway signal system" which enables to transmit all Railway signals in the loco pilot's cabin before 2km by transmitter using the electronic communication of principle".

In our India maximum death occur due road accident. It is one of serious problem caused by human error. These crashes occurred more prevalently on higher speed, undivided, no sidewalk and two-lane rural roads. Moreover, FS crashes tend to occur more likely at night without street light, which also leads to more severe injuries. Two factor-missing lane marking, signals and weak enforcement.

Index Terms: Fog and Smoke, Visibility, Crash risk, Signals.

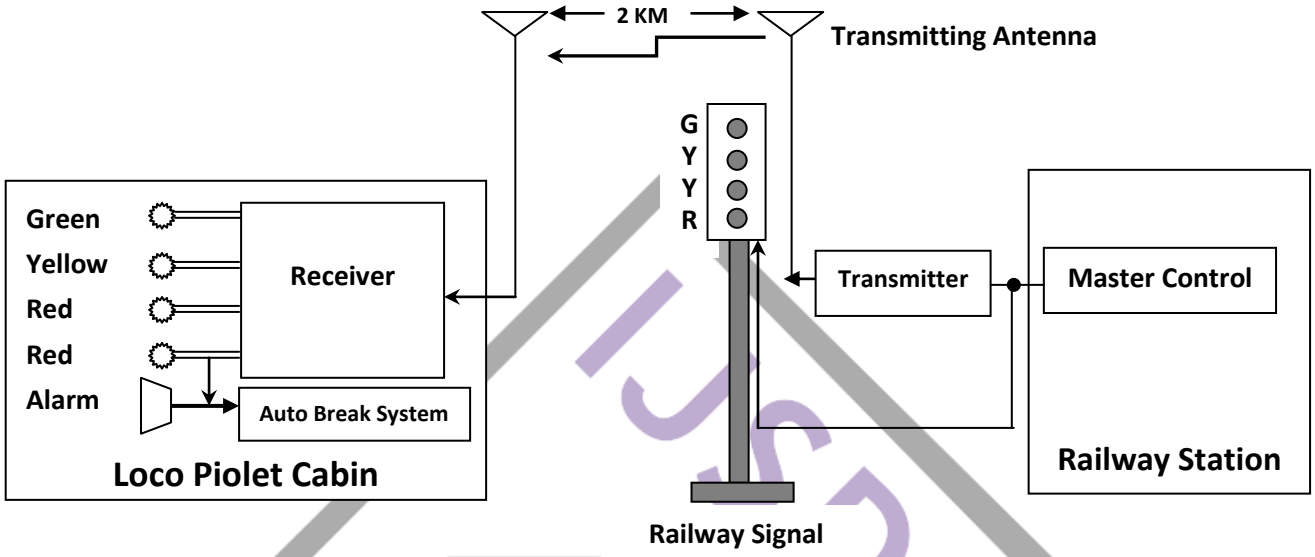
- ***INTRODUCTION:***

Road accident due to fog have increased significantly over the last some year. While 16 people where kills daily in such accident in 2014 at increase to 21 in 2015 while in 2016, more than 25 people death in similar crashes every day, according to large report of road transport ministry. Only UP, 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 death in UP decreases in 2016 as compare to the previous year, such fatalities increases 5 time in Haryana. The main causes for rod accident in foggy area in India are due to invisibility of Railway signals, obstacles on road. As per data, majority of death is been cause by invisibility of signals and various obstacles.

Previous researches have heavily focused on fog and rain related crashes in some northern states, however, there is a lack of comprehensive studies on the particular type of crashes that occur under the influence of fog or smoke. Another researcher mentioned in his study that fog is still considered the weather hazard that drivers fear most. Researches done on roadways in the UK (Moore and Cooper, 1972) concluded that despite a drop of 20% in the amount of traffic in dense fog there was an increase of 16% in the total of personal injury crashes.

Accidents are termed as unwanted occurrences which leainjuries, loss of production, fatalities, or damage to property and possessions. Road accidents are undoubtedly the most prevalent and, in general, the reason behind most of the damage. Road accidents has been take place will continue to be one each greater health hazards.There is an enormous rise in road crashes due to over speeding, low visibility due todense fog, road planning and construction, under age driving, drunk driving, lack of public awareness, ine_cient authorities and need for enforcement of existing laws to undertake the menace of discourtesy to rules and laws Weather.

ADVANCE RAILWAY SIGNAL SYSTEM FOR SAFETY DIAGRAM



I. WORKING:

- *Railway Signal:-*

When Railway signal post gives Red Alert Display, some instruction transmitter which generate code that is transmitted by transmitting antenna through air which will be picked by Receiving Antenna of receiver of loco pilot at a distance of minimum 2km before signal post that display red signal in cabin as well as alarm with delayed auto break system, hence train will stop at a safe distance from Railway station.

At the time of green signal same green/yellow signal will be in displayed cabin. But when wrong signal will be given to up/down train that time double red signal will be displayed in cabins of both loco pilots with Auto break system will be activated preventing accident collision.

In the recent past i.e. last 3-4 years, the cost of land in most of the states has increased manifold. In addition to this, the process of acquisition has become much lengthier and for the last about 2 years, land acquisition has practically come to a standstill. Some of the projects are suering due to delay in clearance from forest, wild life, etc. On many projects the problem of banning of mining and declaration of earth as minor mineral has created severe shortage of quarry products including earth work.

- *Electric Brake System:-*

Another braking system used in electric trains is electrical dynamic braking that convert the motor in to brakng generator dissipeting the kinetic energy as heat. Regenerative breaking used the generated electricity insted of dissipeting as a heat.

Principal of electrical traction dynamic braking and regenerative braking system. Although the traction motor drives and accelarate the traine , during braking its acts as unelectric generated insted forming part of circuit that consiste of maine rheostat armature and field system. Electric flows through the circuit an is consumed the kinetic energy of the train into heat and thereby act

as a break. Regenerative braking use the same type of the circuit but the electricity generated by braking not to be consumed by the resistor an its transmitted to the overhead line wire. The flow of electricity is controlled by controller under the pantograph that opens and closes with split seconds timing. Electrical break system are economical because they donot use friction element. The regenerative braking system even more economical because the electricity regenerated from the train kinetic energy is transmitted overhead wire. Electrical brake system is that economical mulfunction because thay have complex circuit.reason they cannot used as emergency brakes. In an electrical breaking system, the braking force of the traction motor is transmitted to the wheel via gear. The generated electricity is adjust to the control braking force.

- *V2V Communication:-*

Using vehicle-to-vehicle communication, a vehicle can sense the position and instant of other vehicles up to a quarter of a km away. I will Know where you are too meteorology it is in danger spots, stopped ahead on the highway but hidden from view, around a blind corner or blocked by other vehicles.

The radio system for the V2V Communication is derived from the standard also known as Wireless LAN. immdiately two or more vehicles are in radio frequency communication range, they connect automatically and establish an ad hoc network. As the range of a single Wireless communication link is limited to a few km, every vehicle is also router and allows sending messages over multi-hop to farther vehicles. The routing algorithm is based on the position of the vehicles and is able to handle fast changes of the ad hoc network topology.we can see that oil is there on the express way and the a vehicle got accident due to it, this motion is caught by the system and emergency condition are send to other vehicles about the danger area, it has to controls the speed of the vehicle to avoid accident.

- *Fog And Visibility Range:-*

According to the international denition in meteorology fog is de_ned as a cloud touching the ground. If the result is a visibility reduction of less than or equal to 1000m it is called fog, otherwise layer of fine droplets. The visibility range is thereby dened as the longest distance, at witch a black object of adequate size could be seen against the sky. Forour application this denition of fog is unrewarding, because a driver is not aected by fog until the visibility range decreases considerably more. Hence a fog detection system for driver assistance should also react on visibility ranges less than 1000m.

To derive a denition for fog in our application, we refer to the German road tracregulations. According to the road user is only allowed to drive as fast as he is able to control his vehicle. In particular he has to adjust his driving speed on the current road, trac, visibility and weather conditions.

- *Spectral Fog Detection:-*

Studies in scene perception have shown that observers are able to recognize real world scenes at a single glance. In an Rapid Serial Visual Presentation they were able to detect an image, just given a description like birthday party. The perseptible of perception everything at once, anyway of the visual sleave of the view, refers to the gist of a scene.In image processing dierent approaches were introduced to perform simple classication tasks based on the gist of the scene by using global image features. Further Oliva and Torralba presented a possibility to classify natural images in semantic classes.

It turns out, that the energy spectrum of an image, the squared magnitude of the Fourier transform, is a good choice for global features, because it doesnt contain any spatial information. clear weather conditions as well as the coherent power spectra. In the case of a fog scene the frequency components are concentrated at the zero frequency whereas in a fog free scene onends a broadly spread spectrum. The reason for that is contrast attenuation and blurring in the image caused by fog. While sharp edges are modeled by many low and high frequencies, smooth edges consist of only low frequencies. Now its a matter of working out these dierences in spectra by appropriate methods from image processing.

- *Evaluation:-*

We used the front camera of the current series mounted behind the erect mirror parallel to the vehicles longitudinal axis and showing in the driving direction. Based on this system we record images with morning fog situations on highways. Afterwards the single images were labeled in the categories3 Excluded, No Fog, Low Fog, Fog and Dense Fog.For the labeling we plotted in every image a horizontal line at a distance of 100m and 300m.

The pixel coordinates of these lines were calculated by perspective projection from the known camera setup and by assuming a at world, i.e. that the road is planar. The images are then by hand labeled to one of the categories in conformity with to the possibility to visually recognize any contrast above predened distances. In our case we labeled the image as Dense Fog if no contrast could not be observed above the 100 m distance. This was done for all recorded images.

- *Design of the Fog Sensor:-*

The density of the fog, which is intent of the visibility, can be measured inside the controlled environment. A portable optical fog sensor composed of an IR LED at a wavelength of 870 nm, a photo-detector with a peak response at 870 nm, and an optical band pass filter to block all background radiations is positioned at the centre of the atmospheric chamber.

The optical source and photo-detector separated apart by 13 cm are heated up to the room temperature using a heating wire mounted all over them. This is to assure that no water droplets will form, thus no further losses due to absorption and refraction of IR light beam. A modulated laser beam generated at one end is collected at the other end via a photodetector followed by a trans-impedance amplifier. Characterisation of visibility based on the fog density inside the chamber. A fog generator is used to fill the chamber with a control amount of fog from nether to dense fog.

***Advantages**:*

- *If there is a Red signal, sound alarm will be activated.*
- *If Red signal is not seen by loco pilot in cabin due to some reason, (Like heart attack, or attack by terrorist on loco pilot) Automatic Break System will be activated the train will stop automatically.*
- *Before 2 km from any Railway signal loco pilot can watch signals in his cabin control the train.*
- *Navigation and trac information systems - A vehicle equipped with a telematics unit can direct a driver to a desired location, while providing realtime trac information.*
- *Voice recognition and wireless Internet connection Drivers and their passengers can receive and send voice-activated e-mails while on the road.*

***Disadvantage**:*

- *It can be use for specific area.*
- *It can use in specific season only.*
- *The initial cost of the system is high.*

***Application**:-*

- It has used in traction systems.
- It is use in locomotive and electric car etc.
- It is use at foggy area and foggy season for prevent accident.

***Conclusion**:-*

- *A considerable amount of speed reduction by drivers is not recorded until there is drastic reduction in the visibility distance, however ability to maintain lanes across most of the range of visibility distances has been witnessed. Along with the obvious insignicant part of fog in annual road crash summary, a strong cyclic pattern has been noticed in fog related crashes. It is a great challenge to detect vehicles under various foggy climatic scenarios. Surrounding objects such as pedestrians, trucks, trees and bicycles distract the system and cause the results to deviate from the actual scenario.lider are often used to detect objects and distance, whereas a vision based detection is responsible for real object verication and classifcation. As compared with others, the benefit of this approach is to utilize the structural information to help vision based techniques for vehicle detection and classifcation. In this approach we are using low cost lider model which is made up of the combination of a camera and a laser. It is accurate and of low cost as compared to the lider.*

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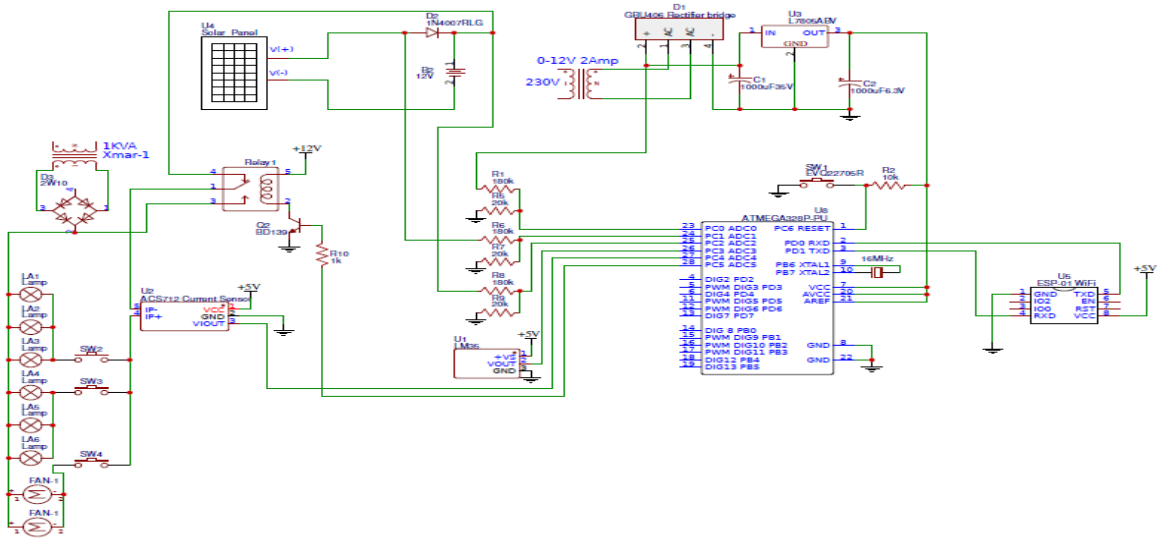
Purusothaman, SRR Dhiwaakar, et al. explain about the focus is on the DG agents, grid agent and Mu agents. DG agents like the distributed energy resources (DERs), load, storage and the grid agents. The Mu agent acts as the communication channel between the DG agents to the higher level agents such as the control agent. The implementation of the system has been done using an Arduino microcontroller. Author Kabalci, Ersan, AlperGorgun, and Yasin Kabalci, introduces an instant monitoring infrastructure of a renewable energy generation system that is constituted with a wind turbine and solar panel arrays. The monitoring platform is based on current and voltage measurements of each renewable source. The re lated values are measured with the developed sensing circuits and processed by an 18F4450 microcontroller of Microchip. The processed parameters are then transmitted to a personal computer (PC) over universal serial bus (USB) to be saved in a database and to observe the system instantly. The coded visual interface of monitoring software can manage the saved data to analyze daily, weekly and monthly values of each measurement separately. Jiju, K., et al. describes the development of an online monitoring and control system for distributed Renewable Energy Sources (RES) based on Android platform. This method utilizes the Bluetooth interface of Android Tablet or Mobile phone, as acommunication link for data exchange with digital hardware of Power Conditioning Unit (PCU).Goto, Yoshihiro, et al explained about an integrated system that manages and remotely monitors telecommunications power plants has been developedand has started operations. The system is used to operate and maintain more than200,000 telecommunication power plants, which including devices such as rectifiers,inverters, and UPSs, and air-conditioning plants installed in about 8,000 telecommunication buildings. Features of the system are the integrate the management andremote monitoring functions, into one system and improved user interfaces, whichuse information and communication technology such as web technology.Suzdalenko, Alexander, and Ilya Galkin identify the problem of the nonintrusive load monitoring method of load disaggregation into separate appliances.When some local generators based on renewable energy sources are connected to thesame grid, as they may be mismatched with loads variable in time.

II. CONSTRUCTION

COMPONENTS OF TRANSMISSION AND DISTRIBUTION SYSTEM

- AC SUPPLY
- TRANSMISSION TOWER
- TRANSFORMER (12V)
- SOLAR PANEL
- BATTERY
- MICROCONTROLLER
- LEDS & FANS
- SWITCHES
- PCB
- WIRES

Fig:-



Circuit Diagram

IV. WORKING

The system is designed to monitor and measure the parameters of the transmission and distribution system. In this system we have used a solar panel which generates the electricity power from the sun light and stores this generated power into the battery used in this system. We have connected three types of loads. First load consists of a group of three lamps connected with the microcontroller through a switch. The second load also consists of a group of three lamps connected through another switch as shown in the circuit of the system. The third type of load consists of two fans also connected with the controller through a switch. Initially the first and second loads are turned on as the system is powered. All the loads will be drive by the solar power stored in the battery. The system continuously measures the solar voltage and battery voltage through a voltage divider circuit. These measured values are then fed to the microcontroller. The microcontroller compares the measured value with the pre-defined values in the program. And also sends the data to the IOT application continuously. The system consists of a temperature sensor used to measure the temperature of the distribution transformer. If the temperature exceeds 60 degree Celsius then the fans connected in the system will turn on by the controller.

If the solar voltage drops down below the pre-defined value the system will send an alert message which will be sent to the IOT application for alerting the user. And when the solar power fails down the loads will be automatically shifts on the mains supply by the system to avoid the supply failure for the loads used in this system. To shift the loads from solar power to mains supply a relay is used in this system. The microcontroller triggers this relay to shift the loads on the mains supply. The system also designed to measure the load current continuously. For this we have connected a current sensor which measures the load current and sends the measured value to the microcontroller. The microcontroller will send all the measured parameters to the IOT application through Wi-Fi modem used in this system. When the load shifts on the mains supply due to failure of solar power the system will also measures the mains voltage for protection purpose.

V.ADVANTAGES

1. It prevents circuit from damage.
2. Avoid interruption in power supply.
3. Transformer safety.
4. Save time.
5. Save men power.
6. System can be monitor for anywhere.

VI. DISADVANTAGES

1. Circuit becomes bulky.
2. There is chance then software can be hacked and our personal information can be misuse hence all the safety risk become the consumer responsibility
3. Privacy is a bigissue for Iot.

VII. CONCLUSION

The remote monitoring system that has been developed was useful in understanding the conditions of the transformer. It also enables the operator to monitor the parameters far away from the transformer without the displacement of the crew. This system uses very little power consumption and has a long life. This system is cost effective and is easy to operate, to maintain, and to reproduce massively with low cost for applications in the field.

VIII. FUTURE SCOPE

We can also use a GSM modem to send alert message to the authorized person which will help in case of poor internet network.

COST ESTIMATION:

Component	Specifications	Cost(Rs)
Transformer	12-0-12V 2A	**200/-**
Resistor	2.2K,10K,470K,100E	**1/-**
Capacitor	1000uF, 100uF, 33pF	**5/-**
Diode	IN4007	**2/-**
LED	3mm	**5/-**
Switch	PUSH TO ON	**10/-**
Crystal	4MHz	**20/-**
Microcontroller	ATMEGA328P	**350/-**
Regulator	LM7805	**15/-**
LCD	16X2	**250/-**
Toggle switch		**20/-**
Wi-Fi	ESP01	**2500/-**
Battery	12V	**1000/-**
Solar Panel	12WATT	**500/-**
Temperature Sensor	LM-35	**250/-**
Current Sensor	ACS712	**550/-**
Potentiometer		**25/-**
Total Cost		**5703/-**