# Smart Platform and Tunnel Ventilation

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## ABSTRACT

*With the growing urban population and the concern for traffic congestion and pollution (emissions control), public transportation is becoming more and more attractive to both city dwellers and managers. To gain access to the central area of the city, the subway remains the most viable alternative, despite its higher cost when compared to above ground or elevated transportation systems. There are relatively few regulations and criteria for subway ventilation, particularly when compared with mine ventilation. The main document that provides guidance and general recommendations for subway ventilation and environmental control is the Subway Environmental Design Handbook, published in 1976 (2nd edition) by the U.S. Department of Transportation, Office of Research and Development. Many of the subway systems in existence today have been designed and built with ventilation features adequate for normal train operation, but their design does not consider stringent criteria for such emergency conditions as a train fire in a tunnel.*

**Keyword :** *IR-Sensor, Relay, Light Emitting Diode, Microcontroller AT89S52*

## 1. INTRODUCTION

The mobile platform has a red/green Signal indication so that the pedestrians can know whether train has come. The signal automatically turns to red when the train comes and becomes green when the train leaves the station. IR1 Sensor is used to sense train to turn on alternate platform LED Lights, 1,3,5,7 and 2nd IR Sensor is used to turn on Platform LED Lights 2,4,6,8 respectively. 3rd IR Sensor is used to detect train and using relay3 tunnel platform light fan will turn on.

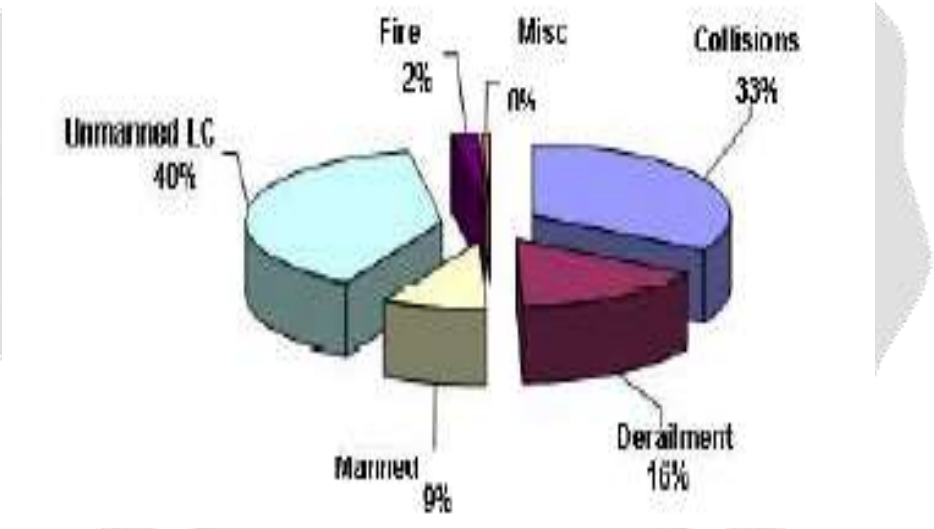
For railway tunnels, the space to be secured above the rail level is settled by the loading gauge (clearance profile) and by the free section, depending on the train speed, the safety and the comfort of the passengers . For high speed trains, over about 160 km/h : numerical simulations with an aero dynamical model including the shock wave occurrence and the tunnel length are necessary to design the free space, eventually combined with decompression shafts. A ventilation concept should be integrated in the preliminary studies for the construction and for the operation phases. The profile must include the air ducts for fresh and waste air, usually with a ceiling and a partition wall above the clearance section in horseshoe profile. In a circular profile, the space for ventilation ducts can be organized with fresh air in the invert and waste air in the roof. The need for a cable duct or a utility duct should be carefully studied and planned in the invert, especially for horseshoe profile where space adaptations are often required. This is equally valid for railway tunnels.

From 80's of last century, flood control departments started to deal with flood control information, forecast flood control information and research dispatch program with computer. They have proposed a lot of schemes, build many models, and also much application software was developed for data processing and flood control solution, such as Decoding Hydrological Information program, flood forecasting, analysis and calculation of flood control operation, etc. Historical hydrologic database of the whole country has been built at the beginning of 90's, which is the important fundamental database of country's development, and it has serviced many departments. After the cataclysm in 1998, with the direction of design brief of National Flood Control and Command Systems, Flood

Control Decision Support System (FCDSS) was built in many cities and provinces. Through automatic collection, realtime transmission, comprehensive analysis, and intelligent processing of different flood prevention information which is based on computer technology, network communications technology, geographic information technology, remote sensing technique and etc, we could make decision of Emergency Service and Disaster Relief promptly and accurately Flooding is a disaster that occurs in many places on Earth. The main causes of flooding are heavy rain, hurricanes and undersea earthquakes.

## 2. LITERATURE SURVEY

Railway is lifeline of India and it is being the cheapest modes of transportation are preferred over all other means of transportation. When we go through the daily newspapers we come across many accidents in railroad railings. Railroad-related accidents are more dangerous than other transportation accidents in terms of severity and death rate etc. Therefore more efforts are necessary for improving safety. Collisions with train are generally catastrophic, in that the destructive forces of a train usually no match for any other type of vehicle. Train collisions form a major catastrophe, as they cause severe damage to life and property. Train collisions occur frequently eluding all the latest technology.[1]




The existing conventional signaling system most of the times relay on the oral communication through telephonic and telegraphic conversations as input for the decision making in track allocation for trains. There is large scope for miscommunication of the information or communication gap due to the higher human interference in the system. This miscommunication may lead to wrong allocation of the track for trains, which ultimately leads to the train collision. The statistics in the developing countries showing that 80% of worst collisions occurred so far is due to either human error or incorrect decision making through miscommunication in signaling and its implementation. IR sensors are also used to identify the cracks in the railway. IR sensors have limitations due to the geographic nature of the tracks [2].

The Anti-collision device system also is found to be ineffective as it is not considering any active inputs from existing Railway signaling system, and also lacks two ways communication capability between the trains and the control centers or stations. Later geographical sensors have also been used which makes use of satellites for communication. But the system is costly and complicated to implement [3].

At present laser proximity detector is used for collision avoidance, IR sensors identifies the cracks in the railway track and gate control is done by manual switch controlled gate. But there is no combined solution for collision between trains, train derailment in curves and bends and the automatic control of railway gate.

## 3. Block diagram

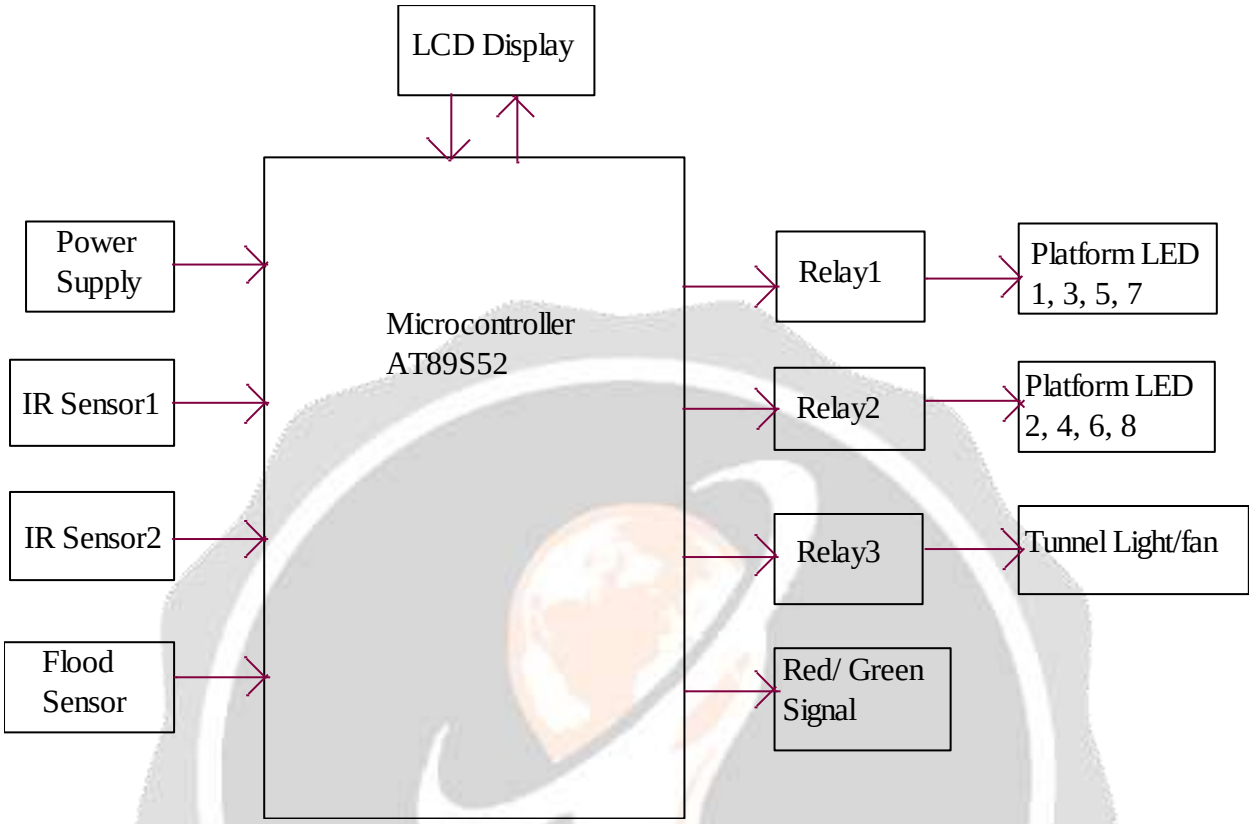



**Figure: Block Diagram**

The Microcontroller will sense the presence of trains by using Infrared sensors. So on sensing the train on one path, using relay platform LED lights will TURN ON/OFF Alternately. The mobile platform has a red/green Signal indication so that the pedestrians can know whether train has come. The signal automatically turns to red when the train comes and becomes green when the train leaves the station. IR1 Sensor is used to sense train to turn on alternate platform LED Lights, 1,3,5,7 and 2nd IR Sensor is used to turn on Platform LED Lights 2,4,6,8 respectively. 3rd IR Sensor is used to detect train and using relay3 tunnel platform light fan will turn on.

As shown in fig. when there is water present at input side on two wires then there a short circuit will occurred due to this a 5volt supply is passed to transistor and transistor gets turned on, as transistor is on LED will also get turn on, we get output as 0v And it will indicate that there is water. And if there is no water then short circuit will not appear then output we get as 5v and LED will not get turn on because of transistor is off and GND will not present to LED.

Block diagram consists of following components,

1. **Microcontroller AT89S52:** Microcontroller AT89S52 IC is the heart of the system. It controls all the functions.

2. **ULN2803:** It is used for current boosting as controller IC produces 1A only, but relay requires 200A of current hence to on and off relay we used ULN2803 IC.

3. **Power Supply:** 5V power supply is required in our system it supplies voltage to microcontroller IC.

4. **LCD Display:** here we used 16*2 LCD Display, on LCD Display the status of train is shown.

5. **IR Sensor:** IR Sensor is used to sense the presence of train. IR Sensors are implemented to both sides i.e. to turn LED Light and tunnel fan on/off.

6. **Relay:** SPDT relay is use in our project it is use to switch on/off the circuit.

7. **LED:** LED's (red and green) indicates either to cross the platform or not. If red LED glows then people have notified to stop don't cross the platform as train is going to arrive. And when green LED is on peoples get notified that train has gone and they can able to cross the platform.

## 4. CONCLUSIONS

Railway platform air quality is markedly influenced by the power setting of tunnel ventilation fans and whether or not the platform air is being introduced by impulsion or removed by extraction. At neither night when neither trains nor platform ventilation fans are operational, platform air quality improves when tunnel fans are working at lower power, whether or not they are operating on impulsion or extraction. The resulting reduction in air movement from tunnel to platform.

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