

# APPLICATION OF AUTOMATED TRAFFIC SYSTEM

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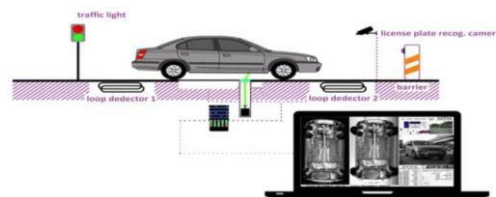
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**Abstract:** To make traffic light controlling more efficient, we exploit the emergence of new technique called as "Intelligent traffic light controller". This makes the use of Sensor Networks along with Embedded Technology. The timings of Red, Green lights at each crossing of road will be intelligently decided based on the total traffic on all adjacent roads. A present aim of study on Raipur area is to manage the traffic requirements and its goals is achieve in different locations as per Indian road congress, WHO organization. Also Road traffic injuries have become a serious health burden all over the world in general and in cities of low and middle-income countries in particular. The major percent of these injuries are occurring on national and state highways built across India. This project focuses on analysis of road accidents occur on NH-6, That is, "Tatibandh Square to Telibandha Square" passing through outer ring road of Raipur and prevention measures adopted to make this highway safe for travelling.

**Key Words:** traffic injury , signals ,intelligent traffic system.

## 1. INTRODUCTION:

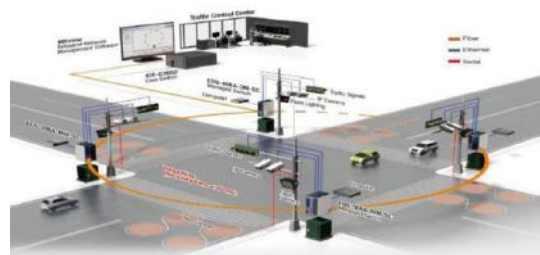
Automated traffic system is a system in which we make use of different devices and sensors to detect the traffic and control accordingly. It also helps to control the over speeding vehicles and decrease the chances of accidents, reduce traffic jams, reduce fuel consumption, reduction in pollution, time saving, etc.



**Fig:1 Working mechanism in ATS**

The Advanced Traffic Management System (ATMS) field is a primary subfield within the Automated Traffic System (ATS) domain. The ATMS view is a top-down management perspective that integrates technology primarily to improve the flow of vehicle traffic and improve safety. Real-time traffic data from cameras, speed sensors, etc. flows into a Transportation Management Center (TMC) where it is integrated and processed (e.g. for incident detection), and may result in actions taken with the goal of improving traffic flow. The National ATS Architecture defines the following primary goals and metrics for ATS:

- Increase transportation system efficiency,
- Enhance mobility,
- Improve safety,
- Reduce fuel consumption and environmental cost,
- Increase economic productivity, and
- Create an environment for an ATS market.

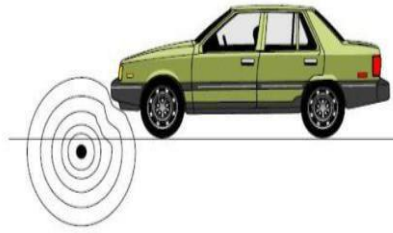


**Fig:2 Overview of ATS**

## 2. METHODOLOGY

### LOOP DETECTOR

An **induction** or **inductive loop** is an electromagnetic communication or detection system which uses a moving magnet to induce an electric current in a nearby wire. Induction loops are used for transmission and reception of communication signals, or for detection of metal objects in metal detectors or vehicle presence indicators. A common modern use for induction loops is to provide hearing assistance to hearing-aid users.



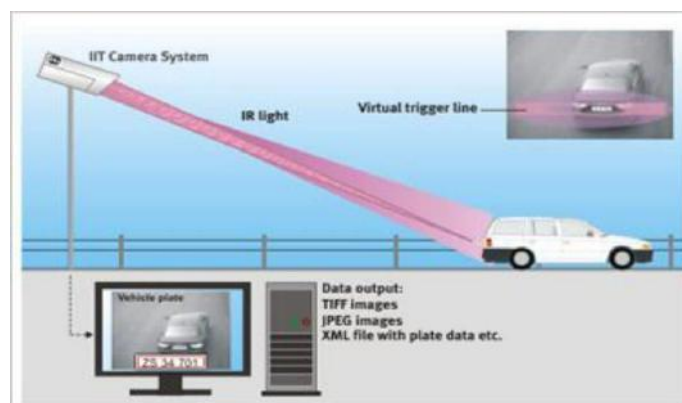
**Fig: 3 Loop Detector Mechanism**

There are a number of ways to detect vehicles, ranging from hose style detection to ultra-sonic, to inductive loop. For traffic control or drive-thru, inductive loop technology is the most reliable, bar none. An inductive loop vehicle detector system consists of three components: a loop (preformed or saw-cut), loop extension cable and a detector. When installing or repairing an inductive loop system the smallest detail can mean the difference between reliable detection and an intermittent detection of vehicles. Therefore, attention to detail when installing or troubleshooting an inductive loop vehicle detection system is absolutely critical. In general, a compact car will cause a greater increase in frequency than a full size car or truck. This occurs because the metal surfaces on the under carriage of the vehicle are closer to the loop. Also, it is interesting to note that the frequency change is very consistent between two vehicles of the same make and model, so much so that a detector can almost be designed to determine the type of vehicle over the loop.

#### 4. TRAFFIC ENFORCEMENT CAMERAS:

A traffic enforcement camera (also red light camera, road safety camera, road rule camera, photo radar, photo-enforcement, speed-camera, safety camera, bus lane camera, flash for cash, Safe-T-Cam, depending on use) is a camera which may be mounted beside or over a road or installed in an enforcement vehicle to detect traffic regulation violations, including speeding, vehicles going through a red traffic light, unauthorized use of a bus lane, or for recording vehicles inside a congestion charge area. It may be linked to an automated ticketing system.

The latest automatic number plate recognition systems can be used for the detection of average speeds and raise concerns over loss of privacy and the potential for governments to establish mass surveillance of vehicle movements and therefore by association also the movement of the vehicle's owner. Vehicles owners are often required by law to identify the driver of the vehicle and a case was taken to the European Court of Human Rights which found that human rights were not being breached. Some groups, such as the National Motorists Association in the USA, claim that systems "encourage ... revenue-driven enforcement" rather than the declared objectives.



**Fig:4 Traffic Enforcement Cameras**

#### 5. OFFSET OPTIMIZATION TECHNIQUES:

The normal function of traffic lights requires more than slight control and coordination to ensure that traffic moves as smoothly and safely as possible and that pedestrians are protected when they cross the roads. A variety of different control systems are used to accomplish this, ranging from simple clockwork mechanisms to sophisticated computerized control and coordination systems that self-adjust to minimize delay to people using the road. Offset Optimization Technique is technique in which if the vehicle is running in a given speed limit then it will get green signal in all the squares. Attempts are often made to place traffic signals on a coordinated system so that drivers

encounter a green wave, a long string of green lights (the technical term is progression). The distinction between coordinated signals and synchronized signals is very important. Synchronized signals all change at the same time and are only used in special instances or in older systems. Coordinated (progressed) systems are controlled from a master controller and are set up so lights "cascade" (progress) in sequence so platoons of vehicles can proceed through a continuous series of green lights. A graphical representation of phase state on a two-axis plane of distance versus time clearly shows a "green band" that has been established based on signalized intersection spacing and expected vehicle speeds. In some countries (e.g. Germany, France and the Netherlands), this "green band" system is used to limit speeds in certain areas. Lights are timed in such a way that motorists can drive through without stopping if their speed is lower than a given limit, mostly 50 km/h (30 mph) in urban areas. This system is known as "grüneWelle" in German, "vague verte" in French, or "groene golf" in Dutch (English: "green wave"). Such systems were commonly used in urban areas of the United States from the 1940s, but are less common today. This method is applied in several parts of India also. In modern coordinated signal systems, it is possible for drivers to travel long distances without encountering a red light. This coordination is done easily only on one-way streets with fairly constant levels of traffic. Two-way streets are often arranged to correspond with rush hours to speed the heavier volume direction.

## 6. ELECTRONIC ROAD PRICING:

Single Electronic Payment Mechanism is used to pay for fuel, tolls, public transport fares, parking and variety of other charges by internet. This system is an electronic toll collection scheme adopted in Singapore to manage traffic by way of road pricing, and as a usage-based taxation mechanism to complement the purchase-based Certificate of Entitlement system. The ERP was implemented by the Land Transport Authority in September 1998 to replace the Singapore Area Licensing Scheme after successfully stress-testing the system with vehicles running at high speed. Singapore was the first city in the world to implement an electronic road toll collection system for purposes of congestion pricing. The system uses open road tolling vehicles do not stop or slow down to pay tolls. The LTA (Land Transportation Authority) reported that road traffic decreased by nearly 25,000 vehicles during peak hours, with average road speeds increasing by about 20%. Within the restricted zone itself, traffic has gone down by about 13% during ERP operational hours, with vehicle numbers dropping from 270,000 to 235,000. It has been observed that car-pooling has increased, while the hours of peak vehicular traffic has also gradually eased and spread into off-peak hours, suggesting a more productive use of road space. In addition, it has been noted that average road speeds for expressways and major roads remained the same, despite rising traffic volumes over the years. According to a paper presented in the World Roads Conference 2006, the Land Transport Authority has been testing a system based on the Global Positioning System that may eventually replace the current Electronic Road Pricing system. The proposed system overcomes the inflexibility of having physical gantries, which "are not so flexible when it comes to re-locating them

The increasing road accident on major roads in Raipur is a cause of concern. Considering the urban expanse, population growth and increase trends of vehicles on the City roads; the safety of the commuters is equally vital. There are many reasons for the growth in the number of accidents in Raipur. Accidents are caused not merely due to the increase in population and rise in vehicle ownership. They are also caused due to the casual approach of road users in observing driving rules, adhering to safety precautions and regulations. Rush and negligent driving have proved to be a frequent cause of serious and fatal accidents. Similarly, poor road geometry and inadequate street lighting also increase the incidence of accidents on urban roads. One of major causes of pedestrian safety is endangered by extended trading activities of shops and commercial activity on footpaths and sidewalks. This compels pedestrians to clog the road space, hence give a chance to accidents. An insight into the trends and type of accidents observed in the Raipur City and Raipur District indicates a total of about 2770 road accidents have taken place in Raipur District in year 2011. There has been increase in total accidents from last three years because of lack of safe and efficient transportation system in Raipur. Involvement of trucks, cars and two-wheeler is more in road accidents.

Raipur City road traffic is heterogeneous in character. It is a mixture of fast moving motor traffic and extremely slow traffic such as animal drawn vehicles. Motor traffic consists of mainly cars, light vans, light commercial vehicles, jeeps, different kinds of mopeds, scooters and motor cycles, different kinds of commercial vehicles, buses, auto rickshaws etc. In addition to these, there are a considerable percentage of cycles plying on the city roads. Pedestrian traffic is found to be very heavy in the market areas of the city **due to high commercial activities and customer's movement. The wide variety of** traffic units with their great disparity of size and speed creates a number of problems viz., delay, congestion, accidents and areas of conflict. The outputs from the analyzed data have been used to identify the major problem areas, problem types and quantification of problems in the Study Area in short term perspective. The demand-supply ratios of various transport facilities has been undertaken to give an insight into the type and extent of problems in various areas, corridors and junctions. Analysis of accident black spots in and around the City reveals that maximum accidents are on GE Road. This is due to High Speed of vehicles and Vehicles moving in wrong direction to enter the Petrol Pump. Top ten accident-prone locations are observed at SRP Square, Near ManaBasti, Devri, Near Local Alcohol Shop (ManaBasti), Pachpedi Naka, Siltara, Old over Bridge Khamtarai, SwarnaJayanti Three Arm Intersection (Civil Lines), Near Dumartarai, New over Bridge Khamtarai. In the CBD area,

Shastri Square and Ghadi Square on GE Road are also accident-prone. It is also observed that main causes of accidents in the city are high speed of vehicle, on street parking and the drivers are not following Traffic Rules. The behavior of road users plays a major role in the smooth movement of traffic and ensuring traffic discipline and safety. The behavior is something that comes naturally to the road users and cannot be really enforced by the Traffic Police and other regulatory authorities. In general, the road user behavior in Raipur is not fair and this is the reason why so many Controlled & uncontrolled intersections are not functioning well. Most of the Drivers do not have patience and always try to break the signal causing disturbance to the people going in green phase this causes Congestion and sometimes become cause of accident.

The behavior Para-transit transport drivers (auto rickshaw / taxi) however, require significant improvement. These drivers work with the primary objectives of completing their journey faster and making more money and, therefore have very little regard to the traffic rules and discipline. They do not follow the lane driving discipline, stop their vehicle without proper indication (for boarding/alighting of the passengers), stop at any place without worrying about the disruption of traffic flow and take turns without following the rules of priority. The registered vehicles in Raipur have increased significantly over the years. The number has climbed from 0.19 to 3.76 lakh in last ten years. This high density and rapid growth of vehicles have worsened the transport situation to a significant extent. The growth has been phenomenal registering a growth of 8.34% p.a. in last 5 years. The share of two wheelers is highest (about 75%). It is significant to note that 7% of the vehicles now in Raipur are cars and jeeps. About fifteen thousand cars have been added in the City since last 5 years. In the past decade, the vehicles 463538 new vehicles have been registered. It is nearly 10% of the total vehicles registered in the state (1658570). The growth has been maximum for two wheelers – moped and scooters (134375) which is nearly 80% of the total share of vehicles. The sharp increase of two-wheelers and cars could be attributed to the improved economic status of people and deficient public transport supply. The phenomenal increase of cars - demand more road space, has resulted in dense concentration of traffic on roads. This trend in context to the congested urban road system and the cost these impose on users demands a careful consideration.

## 7. CONCLUSION

From engineering aspects the road safety take place into following stages:

### Planning Stage

Through land use control policies, providing by-passes for congested towns and linking them by spurs; and creating Self Contained zones to avoid non-essential traffic in the neighborhood. Planning is the most important stage of road safe

### Design Stage

**Designing “Self Explaining Roads” and “Forgiving Road Side” by selecting the most desirable design standards (and NOT the minimum standards) involving:**

- Design speed
- Horizontal and vertical geometry
- Cross-sectional elements
- Design of at-grade and grade separated junctions
- Provision of service roads for segregation of slow and fast traffic Designing effective road furniture, with guard rails, traffic signage, roadside illumination provisions, etc

### Construction Stage

Proper separation of the construction zone through effective barricading. Construction of proper traffic diversions; provision of road signage; environmental controls for reducing noise, dust,

### Maintenance and Operation Stage

Providing an Automated Traffic Management System (ATMS) for safe operation of Traffic and Incident Management. This includes providing Mobile Communication Systems, Variable Message Signs, Weigh-in-Motion System, and Central Control Room .The key to Safe Road Infrastructure Design is consistency of standards so that road users do not encounter unexpected situations. While road crashes are overwhelmingly caused by human failings, the greatest untapped potential to prevent death and injury is through the roads themselves. For example, there has to be a clear distinction between inter-urban roads for high speeds and urban roads for lower vehicle speeds and priority for vulnerable road users. By making the roads more predictable, consistent and forgiving, we can produce a long-term solution that helps save lives and reduce injuries. For example, between 1980 and 2000, in Sweden, the Netherlands and the United Kingdom, infrastructure treatments combined with speed management measures reduced the number of deaths of vulnerable road users by around a third. In this regard, it is important for all road engineers to acknowledge the key elements of safe road infrastructure design.

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