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IoT Based Smart Traffic Density Alarming Indicator

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Abstract - *Traffic congestion is the major problem in many cities of India as well as in other countries. The paper proposes the use of infrared sensors placed on the roads for alarming the traffic status. There are various applications available for traffic management which includes wireless sensor networks, data analysis, etc. But, the problem with this applications is the cost required for its installation and maintenance. Hence to overcome such problem this paper focuses on the use of infrared sensors to provide drivers with an early warning of the existing traffic which will help the driver to choose another suitable route to reach his destination. Hence this system is very useful in emergency services like ambulance, fire brigade, etc. to reach their destination as early as possible without getting stuck in traffic.*

Key Words: *Internet of Things(IoT), Traffic congestion, Infrared Sensors, Traffic Monitoring*

1.INTRODUCTION

Traffic congestion is the major issue in many cities of India as well as in other countries. The traffic congestion occurs when the number of vehicles on the road exceeds the road capacity. This can also be termed as saturation. In a smooth flow of heavy traffic, incidents like accident or sudden braking of a car leads to traffic jams. While travelling on highways if sudden accident causes traffic jams and huge queues of vehicles has no option to escape from the jam but to wait for clearing of jam. The economic growth has a effect on the urban traffic. As the income of people increases they urge to travel through cars rather than two wheelers thereby increasing the traffic on roads. Due to the heavy traffic on roads people get frustrated or sometimes do not prefer to take a journey because of the traffic on roads sometimes leads to waste of time. Hence there is need to have a prior information about the traffic status and decide to take a journey or not.

2. LITERATURE SURVEY

While in last decades it has been proposed that the use of sensor networks for vehicle tracking in military applications and also the sensor nodes are deployed with the goal to improve the public roads. Due to the increasing traffic on roads people waste their lot of time in escaping from the traffic. According to the National Roads Authority, 41% of the accidents takes place due to travelling of vehicles wrong side of road and overtaking of the vehicles. These accidents or the sudden braking of the car leads to the traffic jams. People when caught in such traffic cannot escape easily from it. So our system will provide driver a early warning a few metres ahead of them. The warning will show the traffic status of the place few metres ahead of them. Density, speed, and flow are the three critical parameters for road traffic analysis. Intelligent traffic system for VANET suggest that creation for smart city framework for VANET consisting of Intelligent Traffic Lights which transmit warning messages and traffic statistic. In the Adaptive Traffic Control System which receive information from vehicle such as position and speed and then it utilize to optimize the traffic signal. The system specifies the use of onboard sensors in vehicle and standard wireless communication protocol Specified for vehicular applications. They implement various traffic Signal control Algorithms.

[1]This paper propose the concept of a smart road system, that is able to accurately track vehicles moving on national roads with ordinary road speeds. The system is to be deployed over long distances and actively respond to drivers' activity. The idea of the concept falls in the field of sensor networks, but the purpose of the system relates it in the area of ubiquitous computing and ambient intelligence. [2]An IoT-based System for collision detection on guardrails was designed and implemented on a real scenario using an IoT oriented architecture and standards. The sensor acquired data and the RF range tests performed on the real scenario revealed a good system's performance in detecting the collisions against the guardrails which was done using energy consumption model. [3]Also a driver monitoring and vehicle diagnostic system using the telematics provided by OBD2 port available in most of the contemporary vehicles. It proposed a concept that is able to provide real-time alerts such as rising coolant temperature and rapid fuel dropsat the vehicle using a CEP engine implemented on a mobile app. This proposed solution also assumes that a driver possess a smartphone. The main drawback of the it is its complete dependency on the data communication of the smartphone. If the driver does not allow data transmission via the smartphone the system will not be useful.

One of the paper proposes the management of traffic congestion which icludes the mechanism of the RFID tags. Traffic congestion in metropolitan cities is a major problem. Hence the system is designed for resolving such problems in metropolitan cities which is also very cost effective.

So as per the survey, we are developing a web application which will display the traffic density status. Also we we are on the way and if the traffic is high at the next few metres then The driver on checking the web application can choose the another suitable route to his destination pointed by our application. Hence the driver will not be caught in the traffic and he can save his time and reach his destination. The important part of our application it will automatically refresh the change in traffic density. User/Driver do not need to refresh the webpage all the time. This application is useful for emergency services like ambulance, fire brigade and also for VIP's.

3. EXISTING SYSTEM

3.1 Inductive loop detection

An 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. Inductive loop detectors can detect vehicles passing or arriving at a certain point, for instance approaching a traffic light or in motorway traffic. An insulated, electrically conducting loop is installed in the pavement. The electronics unit transmits energy in to the wire loops at frequencies between 10 kHz to 200 kHz, depending on the model. The inductive loop system behaves as a tuned electrical circuit in which the loop wire and lead-in cable are the inductive elements when a vehicle passes over the loop or is stopped within the loop, the vehicle induces current in the wire loops which decrease their inductance. The decreased inductance actuates the electronics unit output relay which sends a pulse to the traffic signal controller signifying the passage or presence of a vehicle. The main disadvantage of this includes poor reliability due to improper connections.

Fig -1: Inductance loop installed in the road for Cars and bikes.

2.2 Video Analysis

Video analysis is a technique used to get information about moving objects from video. At its highest level Video Analysis provides the capability of automatically analyzing video to detect and determine events. It consists of CCTV cameras, other sensors, processors and communication unit. The traffic is continuously monitored using CCTV camera. In order to make sense of this data and turn into information logical rules can be created to trigger events based on certain scenarios such as "send an alert when an object enters the work area and stays there for 2 minutes." Some of the challenges faced are- (I) when deploying video analysis technology are intrinsic to the way the technology works. (II) this technique can be complicated by environmental issues such as rain on the camera lens or windy conditions vibrating the camera /pole making it will difficult to distinguish the background. (III) the system is cost effective. (IV) proper street lighting required at dark.

3.3 RFID Tags

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source such as a battery and may operate at hundreds of meters from the RFID reader. Unlike a barcode the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method for Automatic Identification and Data Capture (AIDC). The disadvantages associated with RFID are - (I) RFID systems are more expensive (II) RFID technology is harder to understand can be less reliable (III) more than one tag can respond at the same time.

4. PROPOSED SYSTEM

4.1 System Overview

The objective of our system is to identify the traffic on roads and travel in less time by choosing alternate path. We propose a system in which we avoid a situation where people get stuck up in traffic and there is no chance to escape from such situation rather to stay there.

1. IR Sensors: The infrared sensors (IR sensors) are used to collect the infrared radiations which are emitted by the vehicles, road surfaces, and the objects nearby. The IR Sensors takes the infrared rays as input and converts these rays into electric signals.

2. Algorithm:

Sequence Step Algorithm:

A Sequence step algorithm is an algorithm implemented in discrete event simulation system to maximize resource utilization. There are two nested loops: Sequence step loop and Replication loop. For each sequence step, each replication loop is a simulation run that collects crew idle time(the resulting time crew does not perform work during its total period of employment) for activities in that sequence step. The process of collecting the crew idle times and determining

crew arrival times for activities on a considered sequence step is repeated from the first to the last sequence step.

The first step is to simulate the network and collect crew idle times (CIT) for each activity in each project replication. After performing a number of replications, the collected CIT samples are arranged into histogram-like intervals based on relative frequency. Crew lead time (CLT) is the chosen lead time by which the first start date of the corresponding activity is delayed. Crew idle time (CIT) is the resulting time a crew does not perform work during its total period of employments.

4.2 System Architecture :

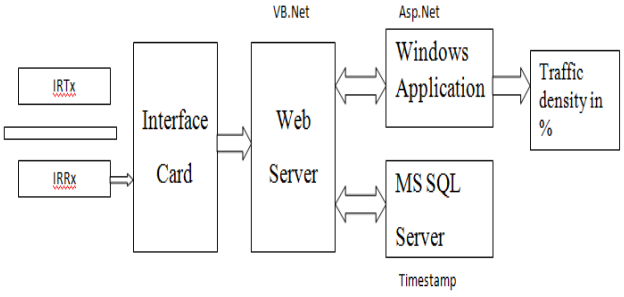

Fig-2: Architecture of the proposed system

In our system the transmitters (IRTx) and receivers (IRRx) are placed on the road sides at a particular distance in a traffic prone areas which will sense the input radiations and convert it into electric signals. these signals are given to the interface card in the form of digital(binary) bits. this data is transferred to the web server. users request is executed by the server communicating to the private database maintained which updates its data after certain timestamp. The windows application contains multiple links through which user can login and continues further processing. If the application detects traffic, it informs the particular user that the jam is detected and is shown in the form of percentage to the user and also suggests the alternate solution(path) to that user so that they can reach the destination in less time. For eg. In case of emergency cases such as ambulance and VIP cars. The web servers in the various areas are interconnected to each other so that they can communicate with each other internally and updates the data after particular timestamp. This gives the accurate density at that time. Hence, this will help to avoid the traffic congestion and the westage of time.

Advantages:

1. Less time consumption.
2. Proper decision making as per alerts.
3. Useful in emergency cases.

3. CONCLUSIONS

We have concluded that this proposed system is user friendly and easy to handle. This system is simple & gives fast response to the user in need. Also the features of early warning of traffic status few metres ahead which helps user to take decision to choose another route. Our system also provides an alternate route to his destination which will help user to reach his destination as early as possible. The user has to simply visit our web application and get the traffic status in his route to his destination. Our system is useful for emergency services like ambulance, fire brigade, VIP'S, etc. which can be helpful in saving one's life. As we will get the traffic status in advance there is less chance to get stuck into traffic and waste our time, fuel, etc. Since time is an important factor today, our system is very useful in today's speedy life.

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