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A SURVEY FOR VEHICLE COLLISION AVOIDANCE AT INTERSECTION OF ROADS

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ABSTRACT

Internet of things is the internet work of devices, vehicles and other embedded objects to collect and exchange data. The intelligent transport system (ITS) with internet of things has become the solution for navigation of roads for vehicles, traffic signal control systems, and automatic number plate identification. It has been advanced in applications for providing ongoing data and feedback from various sources such as weather information, parking guidance and also the upgraded traffic information from time to time. The proposed system focuses on dynamic traffic light sequence based on the traffic density in order to reduce the accidents at intersection. The obstacles that may or may not occur at intersection are sensed and warned by usage of a alert system and a message. The traffic management is used to monitor and retrieve current status of traffic and violators are being identified. This is mainly done to deplete the traffic congestion and accidents at peak hours.

Keywords— Intelligent transport system, Red light Runner, HMM, SVM, hot spot

1. INTRODUCTION

The internet of things is connection of devices and various embedded objects to collect the data through sensors and process the data and provide the required output based on the data .The internet of things plays a vital role in traffic management such as monitoring the traffic, navigation of roads, signal controls. The intelligent transport system (ITS) is advancement in traffic applications for better traffic monitoring and safer, more coordinated and also a smarter way for transport system. The collision that occur at intersections may involve (1)Head-on impact when one vehicle crosses an opposing lane of traffic to run at intersection (2) Side impacts when one vehicle crosses the path of an adjoining vehicle at intersection (3) pedestrian Level crossing (4) High speeds of vehicle at intersection. The collision avoidance system prevents collisions between vehicles and vehicles colliding with pedestrian and other stationary objects. This system is used monitor, collect and record the information about the environment. The system mainly is used to protect from speeding vehicle violators and traffic rule violators to reduce and prevent traffic collisions. The system is used to alert the environment using alarms for violators and live information about the environment are reported. The collision avoidance system uses computer to monitor the emergency vehicle situation, pedestrian crossing and vehicle riders/drivers behavior and violators.

This [4] deals with the collision avoidance system and identifying RLR activity intersection. When the RLR activity is detected its informed to the nearby vehicles and are made to slow down immediately. Instead of using a infrastructure based system it uses on-scooter solution using smartphones of scooter riders. Using the GPS of smartphones the behavior of scooter rider is known and based on the analysis of that RLR activity a warning message is sent.

The prediction for avoiding the red-light running collisions is done using infrastructure based sensor and vehicle to roadside communication [5]. The RLR prediction scheme is used for both i.e. infrastructure based sensor and Intellidrive- based system. In an infrastructure based sensor uses a prediction algorithm to find the status of the vehicle. The RLR prediction scheme includes when to trigger and how to predict the RLR. The only way to predict the RLR vehicles is by the red phase the RLR vehicles trigger. The RLR vehicles trigger the extension phase right before the completion of the yellow phase or in the last second. This state is not always possible depending on various ways of vehicle detection. This can be done only through

continuous measurements and its not possible in case of infrastructure based sensors. The RLR predictor is normally used to predict whether vehicle goes through the intersection after the red light is turned on. This uses two approaches that are to set up a scenario to enhance the prediction rate and to do a test with intellidrive vehicle communication. The intellidrive vehicle communication is used to predict about the drivers, but its effective at certain distance and it's not very accurate and effective at rush hours.

The traffic congestion at double intersections is high at rush hours. These kinds of traffic that occur at double intersection include the intersections between prior and non-prior roads have a wide median strip. This type of intersections has a non-prior section in the middle to connect the prior road at the two sides , roads that are close to the banks of a river. The double-intersection should have a usual signalized intersection and for maximum capacity of vehicles there should be linked traffic signal control [7]. In this an offset is used to define the time lag from the upstream to the downstream junction. The offset value must not exceed zero so that there is constant flow of vehicles. The offset should make sure the link is not very full and also fix a timing that should not be too long or too short. The traffic congestion at double intersections can also be improved by the designing a typical intersection and signalized double intersection for maximum capacity. The methods used are not complex and are not suitable for current software's.

The ability to classify the driver's behaviour lays the foundation for the advanced driver assistance system. Improving the safety at intersection is done based on two algorithms that will classify the drivers either as compliant or violating [2]. The algorithms are based on Support vector machines (SVM) and Hidden Markov models (HMM).The algorithms are validated using the live data. These systems are used to warn drivers of their own potential violations as well as detect other potential violators approaching the intersection. The HMM is used to model the underlying patterns in a set of observation and its well suited for the classification of dynamics systems. The states of the HMM define different behavioural modes based on observations and the transitions between these states capture the temporal relationship between observations. The first algorithm is denoted as SVM-BF, combines SVM with Bayesian filtering which was used for other applications including text categorization, bioinformatics and database marketing. Appropriate kernel selection and feature choice are essential to obtained and the best results were obtained using Gaussian radial basis function and combines the following features such as intersection range, speed, and longitudinal acceleration. At the beginning of the measurement cycle it extracts the relevant features from the sensor observations. The SVM output contains whether the driver is either a complaint or violator. The collection of the current and previous classification SVM output are used to find the probability of them individually by the Bayesian filter. The estimates are providing the information about the driver's behaviour. Using the threshold detector a final classification is made out whether the driver's behaviour is complaint or violator based on the current step. The actual SVM-BF uses point based features, but in this it uses sliding window. When a new feature occurs its added to the window along with previous step features. This change doubles the number of features at each cycle. For improving the SVM-BF model it indirectly adds time dependency to the input. An alternative approach is based on the idea of learning generative models from a set of observations. HMM is used in other applications including speech recognition and part-of-speech tagging. Two sets of observations are used: one known to be the complaint and violating behaviours and other from violators. Each set of observation is considered as an emission sequence produced by HMM modelling vehicle behaviour. An unknown vehicle must be classified when it crosses some predefined threshold. It only considers only current observation not the history of observations. If the current observations is ignored then the driver is a considered as complaint.

The hot spot identification aims to identify the potential risks like segments of the roadway, intersections, cross walks, interchanges, etc. The hot spots are areas which are high at risk and black spots are low at risk [10]. Inefficient hot spot identification will make safe site as high risk (i.e. false alarm).Current hot spot identification suffer from issues like underreporting of minor injury and property damage only crashes. To identify hot spots in transportation network a combination of property damage equivalency calculation and Quantile regression technique are used. The hot spot identification means high risk sites or black spots or spots with promise or hot spots. The modified estimate of crashes across transportation system locations are used in hot spot identification. These techniques are mainly used for calculating the property damage and its effective for certain scenarios but not all that is not actual scenarios.

This [8] deals with exposure of traffic accidents. The exposure is considered as an event on the roadway and also the risk factor for traffic accidents. The risk factor for traffic accidents are analysed based on the observation of traffic. The risks are calculated based on the type of events i.e. scenarios. The exposure are analysed by the experiment of road users that involve more than one user then that event is called potential traffic conflict. The traffic exposure is calculated using the hyperbolic risk function. The hypotheses function

involves four cases of hypotheses. Each hypotheses focus on general, frequent and complex events.

The pedestrian crash increases when the traffic and the pedestrian exposure to data increase [11]. It mainly focuses on traffic flow, pedestrian crash and behaviour of road environmental vehicles. The random parameter negative binomial model is used for the observation of pedestrian in traffic and marked level crossing. this model is used for the investigation of pedestrian crashes and also for the analysis and prevention of pedestrian crashes. The analysis of pedestrian crash data are collected and analysed by grouping the data as sampled road segments. These sampled road segments are considered as scenarios. The pedestrian movements are collected for certain period of time.

The collisions between the motor vehicles and the pedestrians are higher in areas without traffic signals than areas with traffic signals [1]. The novel spatiotemporal approach is used to inherent road/crossing characteristics and also based on the surrounding neighbourhood characteristics.

To identify factors that support traffic safety for older drivers are done by the useful field of view test (UFDV) method [9]. This method is used for the enhancing the road safety for older drivers. This can be achieved by the study based on cooperation between older driver and co-passengers. This study will enhance the understanding for the older driver needs and a proper design will be given for the in-vehicle system and training will be given for the older drivers.

The prevention of vehicle to vehicle collision at intersections can be reduced by the usage of a smart traffic light system, calculating time for each vehicle passing through the intersection and delaying the red signal [6]. The smart traffic light system uses camera, controller and a signal.

This [3] deals in predicting the traffic signal violators of speed. This uses an algorithm for predicting the speed. This novel algorithm is displayed in the form of simulation. The vehicle's ID is found based on the usage of Radio Frequency Identification (RFID) technology.

2. PROPOSED SYSTEM

The proposed system incorporates the reduction of accidents that occur at intersection. It can be reduced by providing a dynamic control of signals based on the current capacity of vehicles. The obstacles that may or may not occur at intersection are warned to the neighbouring vehicles through a buzzer and warning message. The traffic management is performed using the internet of things so that the violators can be identified and the current status of the traffic can be monitored. This is mainly done to reduce the traffic congestion and accidents at peek or rush hours.

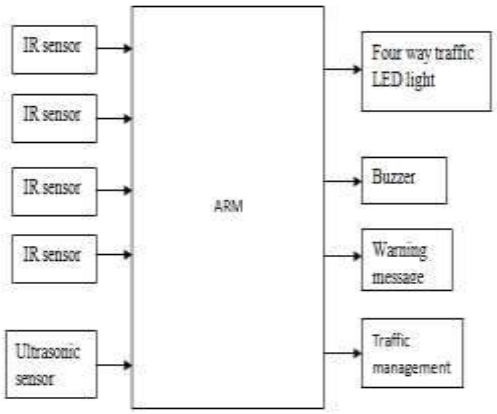

Fig:1.1 Architecture for dynamic control of signals and collision alert.

The traffic density is measured using IR sensor. Based on the traffic density the signal /traffic light are being monitored. The obstacles are detected based on sounds by using ultrasonic sensors. The traffic light is monitored and in the buzzer used to detect the traffic violators this wifi module is used to connect with a wifi network using hotspot The data is transmitted using UART. The website is used to display the current traffic details of the area .Lifi technology uses a LED light is connected to the vehicles front lights and back lights. The front lights acts receivers and back light acts transmitters. The vehicles condition or the vehicle riders/drivers details are transmitted among the vehicles.

3. CONCLUSION

The traffic system is used for reducing the accidents at intersection and the traffic is monitored. The traffic congestion and maximum capacity of vehicles are reduced by designing the signalized roads at double intersections and also by identifying the critical sites that have to monitoring in order to reduce the accidents.

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