

Multicell Wireless Access Gateways and Wireless Access Points for real-time traffic monitoring, surveillance and For Drowsiness Detection.

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ABSTRACT : Intelligent Transportation System (ITS) applies advanced technologies of communications, in all kinds of transportation system in order to improve monitoring, safety, efficiency and service, and traffic situation through transmitting real-time information. Economical solutions for intelligent transportation system are significant for developing countries. Multicell Wireless Access Gateways And Wireless Access Points For Video Sensor networks along with wireless network becomes an important economical tool to the traffic monitoring and control because of the increasing traffic in terms of congestion and safety. Use of wireless access gateways and wireless access points in Intelligent Transportation System (ITS) can improve the monitoring and security of road transport using high speed broadband internet [1]. Use of Global positioning system receivers can improve chances of finding location of vehicle in particular region. It is proposed to use IP camera for surveillance using wireless media and remote monitoring of location is possible using wireless gateways and access points in multiple cell locations. Images or videos thus captured can further be used for detection of drowsiness of drivers.[2]

Keywords - Drowsiness detection, Multicell wireless gateways, real time traffic monitoring, surveillance, wireless access points

I. INTRODUCTION

With increasing world population, population in developing countries of Asia and Africa and scarcity of resources for traffic especially road traffic it has become cumbersome for travelers to travel on road and also to the administration to manage the road traffic efficiently and effectively. Intelligent Transportation System (ITS) applies advanced technologies of electronics, communications, computers, control and sensing and detecting in all kinds of transportation system in order to improve safety, efficiency and service, and traffic situation through transmitting real-time information. Intelligent Transportation System (ITS) is classified into various systems according to their functions. The ITS project aims to reduce congestion on check points through real time communications between traffic management centers and Traffic Signals, IP Cameras.[3]

One of the system of ITS is Advanced Traveler Information System, ATIS- With advanced communication and networking technology, road users can access real time information in the car, at home, in the office or outdoors as the reference of choosing transportation modes, travel trips and routes. The system mainly includes Highway Advisory Radio (HAR), GPS, the internet connection, telephone, fax, cable television, information Kiosk and mobile etc.

In this particular project, we are trying to configure multicell wireless access gateways and wireless access points for monitoring traffic at check points and trying to find out location of vehicle with GPS receiver in a particular region

ITS helps to improve traffic safety, to improve transportation efficiency, to relieve traffic congestion, to increase the energy efficiency, to promote the development of related industries. Generally, ITS is classified into various systems according to their functions. . [4]

1. Advanced Traveler Information System, ATIS with advanced communication technology, makes road users can access real time information in the car, at home, in the office or outdoors as the reference of choosing transportation modes, travel trips and routes. The system mainly includes changeable message signs, Highway

Advisory Radio (HAR), GPS, the internet connection, telephone, fax, cable television, information Kiosk and mobile etc.

2. Advanced Vehicle Control and Safety System, AVCSS applies advanced technologies in vehicles and roads, and helps drivers control vehicles in order to reduce accidents and improve traffic safety. The AVCSS mainly includes anti-collision warning and control, driving assistance, automatic lateral/longitudinal control, and the long-run plans of automatic driving and automatic highway system.

3 Advanced Public Transportation System, APTS applies the technology of ATMS, ATIS and AVCSS in public transportation in order to improve the quality of service, and increase efficiency and the number of people who take public transportation. The system mainly includes automatic vehicle monitoring, VPS, computer scheduling and E -tickets.

4. Commercial Vehicle Operation, CVO applies the technology of ATMS, ATIS and AVCSS in commercial vehicle operation such as trucks, buses, taxis and ambulances in order to improve efficiency and safety. The system mainly includes automatic vehicle monitoring, fleet management, computer scheduling and electronic payment.

The current technology in digital computer system allows researchers around the world to study the fatigue behavior. Although the current technology of drowsiness detector has been created, it is lack of efficiency since the detection is used ordinary sensor. This paper is aim to develop a driver drowsiness detection system and then sending an alert signal to someone who can assist the driver. It is known that a driver is under drowsiness influences by looking at the eyelid. The result may not be accurate because analysis analyzed the whole image. Therefore, if the analysis area is not specified, the result will be not accurate and efficient. The retina movement shows the fatigue level of the driver. For example, if the driver's eyes are closed about more than 5 seconds in the last 60 seconds, the system draws the conclusion that the driver is falling asleep and issues a warning signal, considered as drowsiness. Based on the fact that driver's eye movement can be used to recognize the level of drowsiness, a sensor can be developed by using image processing analysis in MATLAB. The image processing analysis will send the alert signal to the predesigned number. This system will be developing only on software part by using the MATLAB and the alertness part will be done by some Android application in the Smartphone so that the signals can be transmitted.

The increase in number of vehicles causes constraints in existing communication infrastructure, which in turn generates accidents, environment degradation and loss of money and time. It is in this perspective Intelligent Transport System (ITS) having become a focus of attention as they can provide solutions to these problems. An ITS is a system that integrates information and communication technology; these include data storage and processing equipment, wire line and wireless communication systems, global positioning systems (GPS), sensors, etc . The entire solution requires a mobile phone placed in vehicle and with accelerometer and orientation sensor. A program installed on the mobile phone computes accelerations based on sensor readings, and will automatically alert the driver or call the predefined number for help well before accident actually happens. Use of Global positioning system receivers can improve chances of finding location of vehicle in particular region especially in hilly areas like uttarakhand in India. In this paper we are proposing Multicell Wireless Access Gateways And Wireless Access Points for real traffic monitoring, surveillance and For Drowsiness Detection.[4]

II TECHNIQUES

Wireless Local Area Networks (WLANs) are cellular computer networks that transmit and receive data with radio signals instead of wires. Here innovative concept of using Wireless LANs for monitoring of traffic, drowsiness detection is used and it may be cost effective solution in hilly areas for intelligent road transport and to communicate more efficiently and with increased mobility and flexibility .The absence of cabling and other fixed infrastructure have proven to be beneficial for users and cost effective for service providers.

Wireless adapter cards used on laptops or tabs support the same protocol as Ethernet adapter cards. It may sometimes be desirable for mobile network devices to link with conventional Ethernet LANs to connect with servers, printers or the internet supplied through the wired LAN.A wireless Access Point (AP) is a device used to provide the link.

Wireless LAN technology is used for many different purposes:

1. Mobility

In, monitoring vehicles within a limited location by creating a multi cells is possible within the operating range of the WLAN. Management decisions based on real –time information can significantly improve effective monitoring of roads to avoid accidents in hilly regions where roads are circular and with slope.

2. Low Implementation Cost

If we consider cost effective technology for intelligent road transport, WLANS are easy to set up, manage, change and relocate. Networks that frequently change and relocate. Networks that frequently change can benefit from the ease of WLAN implementations. WLANs can operate in locations where the installation of physical wiring may be impractical.

III. INSTALLATION AND NETWORK EXPANSION

For road monitoring and getting input for image processing ,installing a WLAN can be fast and esy and can eliminate the need to route cabling through walls and ceilings. Wireless technology allows the network to go where wires cannot go- even in difficult terrains.

IV. INEXPENSIVE SOLUTION

For,, Wireless networking devices are as competitively priced as conventional Ethernet networking devices. WLAN solutions are less costly than GSM solutions.

5. Scalability

For ITS, WLANs can be configured in a variety of ways to meet the needs of specific applications and installations. Configurations are easily changed and ranger from small number of users to larger infrastructure networks that can accommodate many users depending on the number of wireless devices deployed.

Tri –mode ,dual band access point provides the most expanded user bandwidth .Wireless clients can connect to Access Gateways using available overlapping channels to transfer data .Access Gateways operates seamlessly and simultaneously in the 2.4GHz frequency spectrum supporting the 802.11b and faster up to 54 Mbps 802.11g wireless standards, while some access gateways also operates in the 5 GHz spectrum supporting the 802.11a wireless standard at speed up to 54 Mbps-effectively eliminating interference by other devices that may be operating in the 2.4 GHz frequency range.

Both 802.11a and 802.11g wireless standard utilize OFDM (Orthogonal Frequency Division Multiplexing) technology. OFDM works by splitting the radio signal into smaller sub-signals that are then transmitted simultaneously at different frequencies to the receiver. OFDM reduces the interference in signal transmission allowing transferring large files quickly without any noticeable delays. By offering transfer rates up to 54 Mbps,Access gateway enables large data packet to travel from the router desktop or roaming laptop PC at faster speeds.

For monitoring vehicles on road, Access gateways which adheres to IEEE standards can be used which is compatible with most popular operating syatems, including macintosh, windows, linux and can be easily integrated into a large network. Access gateways moreover should allow users to securely access the data especially video data.

Optimizing Performance

Network administrators can partition system usage by segmenting the users on on the wireless network according to the frequency band.

Real Time Vehicle Tracking system

Using GPRS (General Packet Radio Services) technology we develop vehicle tracking system.SMS and Email facilities can be extended. A real-time vehicle tracking system can be installed in any vehicle (car, bus, truck,

motorbike, etc.) and allows owners, logistic teams to keep track of where their vehicles are at any time. This electronic circuit is easy to install in any vehicle and even easier to use and take advantage of its features once up and running. Tracking data is uploaded via GPRS connection to a database server that stores the location, speed, temperature and other vehicle information every 30 to 60 seconds.

Distance Travelled Report, speed report, track log can be stored on the server for future reference. For SMS based query we have to send SMS to a particular code which in turn forwards SMS to particular server and we get reply from the server. WI-Fi embedded webcam is designed with MRF24WB0MA Wi-Fi Module, PIC Microcontroller and a camera module using the TCP –IP protocol. The camera captures live video from remote location, which is transmitted wirelessly.

Limitations

GPS Antenna should have some line of sight with sky.

Tracking and update rate is depended on reception to mobile network connectivity, server load and latency.

Drowsiness Detection system using Matlab

In our proposed technique a camera along with some sensors will be installed at the steering or some other location inside the car that shows the status of the driver and broadcast the signal or message to the predefined number in case of any problem. Following figure show the task performed by the Drowsiness detection System. Once the drowsiness is detected an alert signal will be send through some server to the predefined number.

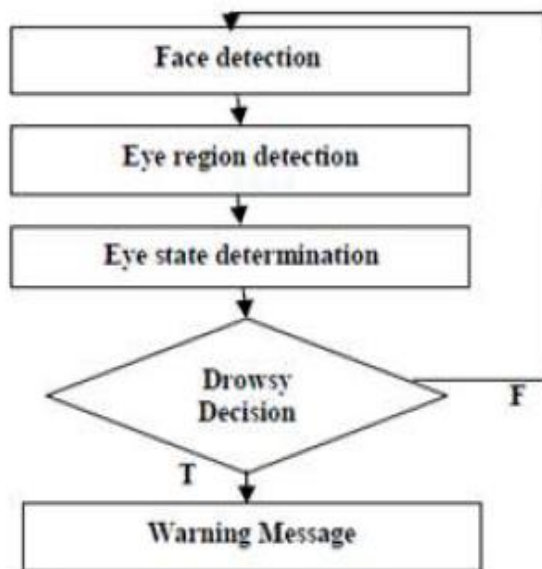


Fig.1 Flow chart for proposed drowsiness detection system

V. CONCLUSIONS

This paper presents a innovative frugal engineering approach to monitoring of vehicles in Intelligent road transport. It also tries to find out location of the vehicle. It also presents complete non intrusive approach for monitoring driver's drowsiness, based on computer vision techniques, installed in a realistic driving simulator. The proposed drowsiness detection method has demonstrated to be valid, showing an 85% of awake state recall rate considering only PERCLOS i.e. percentage of Eye closure.

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