Iov Based Intelligent V2V and V2U Communication

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Abstract: ***Internet of Things (IoT) is a technique that can be used for the communication between vehicles and also for the interaction between vehicles and user. Vehicles can easily exchange safety, efficiency, infotainment, and comfort-related information with other vehicles and infrastructures using vehicular ad hoc networks (VANETs).Every vehicle on the same road will get an idea of what other vehicles are doing- Details like last brake time, horn, indicator, accelerator etc will be available to other vehicles through cloud server. If the driver of the vehicle using alcohol then the lock section will lock the vehicle from moving. When an accident happens the vehicle id along with GPS location is sent to Police and also to nearby vehicles who can come and rescue the accident victim. When the owner finds that his vehicle is robbed, he can call the police and file a complaint using his id. Police can access the vehicle remotely and can lock it so that vehicle cannot move.***

Keywords: GPS-Global Positioning System, iCAR-II-Infrastructure-based connectivity aware routing, IoT-Internet of Things, IoV-Internet of Vehicles, MOT-Ministry of Transport, NSTIC-National Strategy for Trusted Identities in Cyberspace

1. Introduction

The development of a reliable routing protocol to route data packets between vehicles and infrastructure gateways is still a challenging task due to the high mobility and frequent changes of the network topology.This system uses Social Internet of Vehicles as an inevitable case of Social Internet of Things. A structure of the interaction message is provided that can support safety, efficiency, infotainment and comfort application for the SIoV. We envision that the SIoV would be an integral part of intelligent transport systems in the future smart. Vehicular communication allows many appealing infotainment and traffic management applications that require Internet access.

In VANETs, Roadside Units (RSUs) can work as Internet gateways for passing vehicles providing a low-cost drive-thru Internet. With enabling multi-hop routing, vehicles forward Internet packets to extend the coverage of RSUs and Internet-based services. This service, however, highly relies on the existence of forwarding vehicles and a reliable routing protocol.

2. Related works

Using multi-hop VANETs routing for Internet access and mobile data offloading is a recent research focus and only few works have considered its various challenges, and study Internet access in VANETs. In the throughput of drive-thru Internet is studied considering one-hop vehicle to-infrastructure scenario. In a Chain Cluster scheme is presented for a cooperative content download and distribution among vehicles passing RSUs on highways.

In a strategy for RSUs placement is designed to enable multi-hop Internet access. Moreover, and consider data offloading in the vehicular environment. In challenges and possible solutions of offloading vehicular and cellular data traffic via drive-thru Internet are presented, while provides an analytical study to evaluate the potential of VANETs for cellular traffic offloading. For the routing challenge in VANETs, many protocols have been proposed.

One of the leading protocols that deploys PBR for mobile environment is GPSR. GPSR uses Greedy forwarding where packets are forwarded to nodes that are closer to the destination. When this strategy fails, GPSR uses Perimeter forwarding as a recovery strategy, where packets are forwarded around the perimeter of the failing region. In addition to the geographic location required by GPSR, other protocols consider the availability of further network information for better routing performance.

GSR is an intersection-based routing that uses street maps and source routing, where the shortest path, by the means of intersections, is attached to each packet. A-STAR uses a statistically rated map for street-traffic aware routing. TIGeR GyTAR and iCAR deploy real-time vehicular traffic information for traffic aware intersection-based routing, where routing decisions are made at intersections based on local vehicular traffic information obtained from each road. Most connectivity-aware routing protocols relate vehicular traffic density with connectivity, and tend to select dense roads in routing paths for better network connectivity.

Only few works consider studying key connectivity metrics, such as link duration and connection lifetime, for urban VANETs routing. presents a prediction model to estimate link duration between two communicating vehicles considering relative speed, inter-vehicle distance, and the impact of traffic lights.

In a framework to analyze the network connectivity of urban VANETs based on link duration, connectivity duration, and re-healing time is provided. The framework considers relative velocity, traffic lights, and turning vehicles as the

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main causes of link breakage. In a link duration estimation method is presented using cross-layer metrics. Physical layer information is used for better link duration estimation and long lifetime route construction in VANETs.

3. Technology Used in the System

The Internet of Vehicles (IoV) is an inevitable convergence of the mobile Internet and the Internet of Things. It's comprised of all new and current vehicles, either fitted or integrated with two-way RF equipment. It is a converged technology that encompasses information communication, environmental protection, energy conservation, and safety. Viewed from the network perspective, an IoV system is a three-level "Client-Connection-Cloud" system.

Client system – The client system is a vehicle's intelligent sensor, which gathers vehicular intelligence and detects driving status and environment. It is a ubiquitous communications terminal that features intra-vehicle, inter-vehicle, and vehicle-network communication. It is also a device that enables IoV addressing and attainment of a trusted vehicular identity in cyberspace.

Connection system – This layer addresses V2V, V2R, V2H and V2I (vehicle-to-Internet) interconnectivity to realize communication and roaming between ad-hoc vehicular networks (VANETs) and other heterogeneous networks. It ensures real-time network ubiquity in terms of functionality and performance. It is also a merging of public and private networking.

Cloud system – The IoV is a cloud-based vehicle operation information platform. Its ecosystem covers ITS, logistics, cargo/passenger transport, hazmat transport, vehicle repair/fitting, vehicle manufacturing, vehicle dealership, vehicle supervision, insurance, emergency rescue, and mobile Internet, making it a nexus for a variety of copious data sources.

Cloud-based functions such as virtualization, authentication, real-time interaction, and mass storage are therefore required. Its application systems also integrate vehicle data gathering, computing, scheduling, monitoring/control, management, and applications.

4. Block Diagram

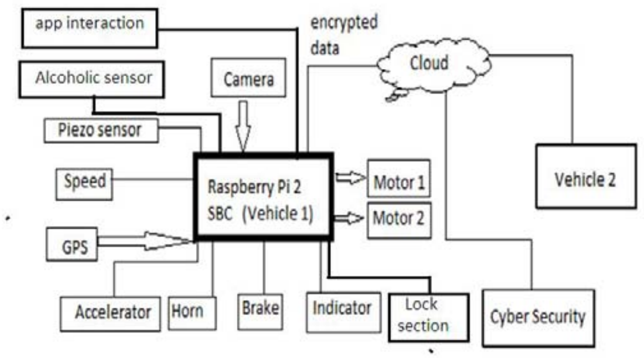

Figure 1: Block diagram

5. Requirements

As per the basic block diagram we will require

- Raspberry Pi SBC
- Camera
- GPS system
- Sensors for detecting speed and collision
- Smart Phone
- Motor for vehicular movement
- Computer for cyber security
- Python language
- Embedded C
- Shell Scripting
- Linux OS
- LM358 IC
- L293D IC
- Alcoholic sensor

6. Evaluation

- The system contain a lock section which will lock the device when the driver uses alcohol.
- There is an alcoholic sensor which will detect the presence of alcohol.
- Automatic Theft Lock: At once if the vehicle seems to be theft, the owner just has to send an SMS to Police Control Room with vehicle number. Police authorities send signal to Vehicle through IoT so that vehicle will be stopped by cutting the ignition. The current location of the vehicle is send to Police control room through IoT.
- Parking Problem elimination: If any vehicle makes hindrance to ours, we can message to vehicle number in number plate with MOVE command. The module inside the vehicle receives the message and it gives indication message to user through IoT. User can move his vehicle which makes hindrance to others through commands over the mobile phone connected to IoT.
- Data Store on Accident: The cause of accident can be discovered by knowing the previous state of the vehicle before the occurrence of the accident. Here the status of horn, indicator, brake and accelerometer of four wheeler is continuously monitored and stored by Raspberry Pi and data logger system. A camera is also interfaced to know about the people sitting inside the car also to know about the condition of the car before the accident has occurred.
- Automatic Ambulance calling on Accident: Once accident occurs the vehicular system itself message to ambulance service and police control room through IoT and GPS location is indicated.
- Vehicle to Road Communication (V2R): System automatically communicates with road side sign boards, and controls the speed in accordance with speed zones (Hospitals, Schools etc.).
- Vehicle to Vehicle Communication (V2V): Once the vehicle in front side is brake applied, the information is passed to vehicle at back side and it slow down automatically.
- Automatic dimming of high beam in night time.

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- Data Encryption: Data encrypted using AES algorithm for secure communication through IoT for safety.
- Accident Data Logger: If any vehicle hits our vehicle and try to escape without stopping, memory device in ours will store the number of other vehicle, So that even when a vehicle tries to escape from the proximity before noticing will not be issue.

7. Conclusion

the development of a reliable routing protocol to route data packets between vehicles and infrastructure gateways is still a challenging task due to the high mobility and frequent changes of the network topology. internet of things (iot) is used to equip real-life physical objects with computing and communication power so that they can interact with each other for the social good. a key member of iot, internet of vehicles (iov) has seen steep advancement in communication technologies. vehicles can easily exchange safety, efficiency, infotainment, and comfort-related information with other vehicles and infrastructures using vehicular ad hoc networks (vanets).

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