Intelligent Transportation System using Wireless sensor networks



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AIM OF THE ABOVE APPROACH:

- Gathering information about speed of vehicle
- Adaptive traffic light control i.e for controlling the traffic
- Better parking spots

Vehicle Parameters estimation

- We can estimate the density of vehicles and velocity of vehicle using the magnetic sensors which are placed on the road
- **Magnetic sensors**: senses change in earths magnetic field when vehicle enters the sensor zone because vehicle's chassis has ferrous material which produces the change .
- wireless sensors run on batteries that can last more than a decade





Reason for Usage of Magnetic sensors:



These are chassis of vehicles which are made up of ferrous materials which produce change in earths magnetic field.















Contains microchip which is programmed with unique vehicle identity and it has an antenna .It is powered using inductive coupling by RFID reader then it transmits the information to reader.



RFID reader gets information and then it can be transmitted to the Police server. So if we want to track a vehicle we need to have RFID readers at intermediate.

Communication Technologies:

- For communication between sensor and the processing unit we use IEEE 802.15 i.e WPAN which is for short range(up to 10m)
- Low power
- Low data rate
- Operating frequency-2.4 GHz
- We use WiFi for transmission of digital image to police server
- WIFI can support up to 20 meters (indoor) to 100m (outdoor) has 2.4 gigahertz (12 cm) UHF 5 gigahertz (6 cm) SHF as per ISM (The industrial, scientific and medical) radio bands.
- □ Has data rate of about 72mbps

Major components involved for Adaptive traffic control

- The major components :
- Synchronization module(SM): It provides intersection ID ,Road ID, frequency channel
- ➢ In-vehicle module: Contains vehicle ID and SM ID and some default values
- Road side unit (RSU): It acts as router for transmission of information to coordinator. Gathers information about the velocity and number of vehicles in the lane and provides information about the vehicles on particular lane to the coordinator
- Coordinator : Gathers information from different RSU and controls traffic accordingly
- Magnetic sensors :For vehicle presence identification



Communication Technologies

We use WPAN for communication with sync module and magnetic sensors

The other technology which we can make use for vehicular communication is:

- WAVE(wireless access in vehicular environments) or vehicle Ad-hoc network
- This includes data exchange between the vehicles and the Road side infrastructure in the licensed ITS band of 5.9 GHz (5.85-5.925 GHz)

Infrastructure vs Adhoc:



- Infrastructure allows for connecting systems using routers so a system transmit information to other through router.
- Adhoc refers to sharing the internet from one system to the other so they form a network .
- So when the vehicle enters internet is shared to it by the sync. Module and they both have communication.

Use of Channel Switching

- To reduce power consumption.
- To decrease connectivity delay
- To speed up packet delivery
- To avoid interference by providing with different frequencies for communication with RSU.



For communication between the multiple RSU and coordinator we use

□ **Token based communication**: Co-ordinator generates a token and provided to one of the RSU so it communicates and sends another token indicating its communication completion.

Timing based communication : Time is allocated for each RSU to communicate with coordinator.

Better Parking Spots

- Magnetic sensors: which gather information about the vehicle presence
- Routers: Provide wireless access between the sensors and processing unit
- Base station : Transmits the signal attained from the various sensors
- to the processing unit
- **Processing unit** : Gets the information about the vehicles and updates the led screen





CONCLUSION

So by this technology we can have efficient transportation system than regular approach i.e better parking spots, traffic control and accident avoidance.

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THANK YOU