Presentation Outline

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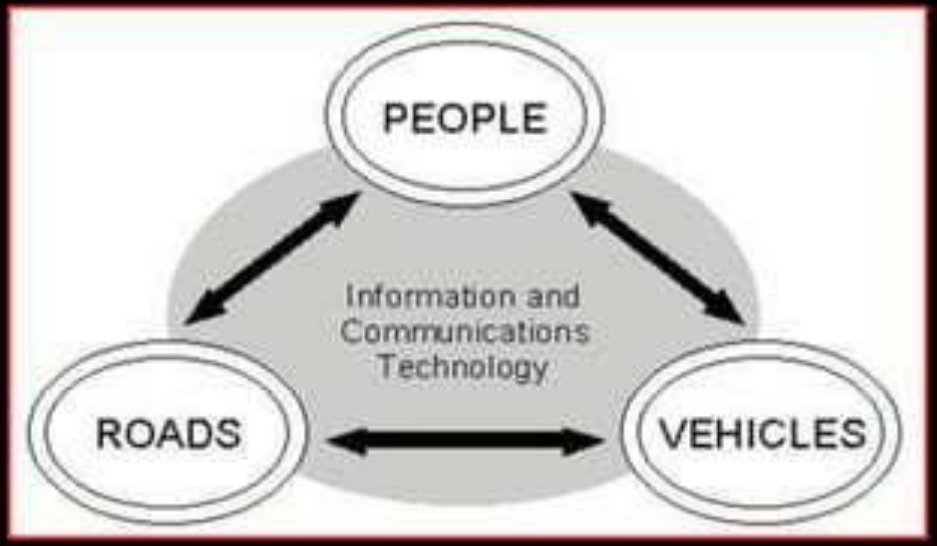
- References

Introduction

ITS is an emerging transportation system which is comprised of an advanced information and telecommunications network for users, roads and vehicles.



ITS is the integrated application of advanced Technologies using electronics, computers, communications, and advanced sensors. These applications provide travelers with important information while improving the safety and efficiency of the transportation system.

Background Situation of Promoting ITS

- To Solve Social Problems caused by Road
- To activate the Economy
- To reach an Advanced Information and Tele – communication Society
- To Co-ordinate different Transport Modes
- To reduce Driver's run

Significance of Promoting ITS

- Breakthrough for Solving Road Transport Problems
- Creation of New Industries
- Leader of an Advanced Information and Telecommunications

Intelligent Transportation Technologies

(1) Wireless Communications :

Dedicated Short-Range Communications (DSRC) :

It offers communication between the vehicle and the roadside in specific locations (for example toll plazas) Applications such as Electronic Fee Collection (EFC) will operate over DSRC. It is a sub-set of the RFID - technology (Radio-frequency identification).

Continuous Air interface Long and Medium range (CALM) :

Continuous Air interface Long and Medium range (CALM) provides continuous communications between a vehicle and the roadside using a variety of communication media, including cellular and infra-red links.

CALM will provide a range of applications, including vehicle safety and information, as well as entertainment for driver and passengers.

(2) Computational Technologies :

The CTS (*Computational Transportation Science*) fellows will develop technologies in which sensors, travellers computers , in-vehicle computers, and computers in the static infrastructure.

The installation of operational systems and processors in transportation vehicles have also allowed software applications and artificial intelligence systems to be installed. These systems include internal control of model based processes, ubiquitous computing and other programs designed to be integrated into a greater transportation system.

(3) Floating Car Data/Floating Cellular Data :

Available Floating Car Data Detection Techniques

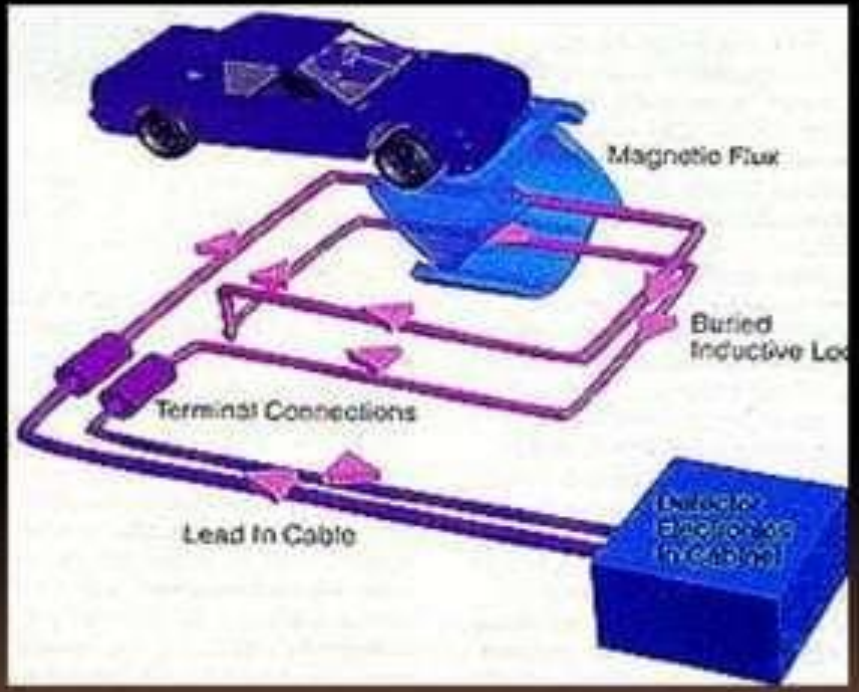
- Non Real-time:
  - Manual surveys.
  - Video recording and manual search.
  - In-vehicle data recording.
- Real-time:
  - Not inductive loop (without transponder).
  - Automatic Number Plate Recognition (ANPR).
  - GPS trace + mobile comms e.g. GSM.
  - Radio Signal Triangulation.
  - Roadside beacon + dedicated short range tag.

(4) Sensing Technologies :

Sensing systems for Intelligent Transportation System are vehicle and infrastructure based networked systems, e.g., *Intelligent vehicle technologies*

Pavement loops are use to sense the presence of vehicle demand at intersections and parking lot entrances.

Pressure pads are use to sense the presence of pedestrians waiting to cross a roadway.



Car passing over inductive loop burled in pavement

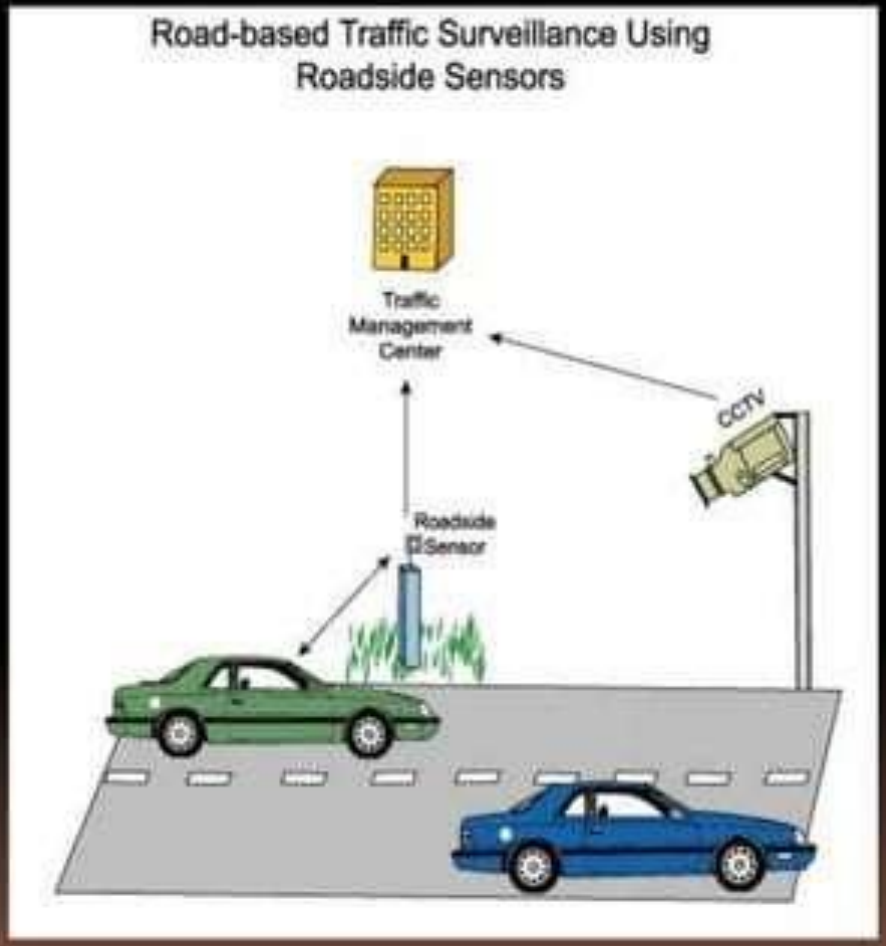
Radar and acoustic sensors are also used for detecting vehicles in the roadway.

How it works:

- Transmits radar pulses
- A portion of the energy is reflected or scattered from the vehicle and roadway back toward the sensor
- This energy is received and interpreted.

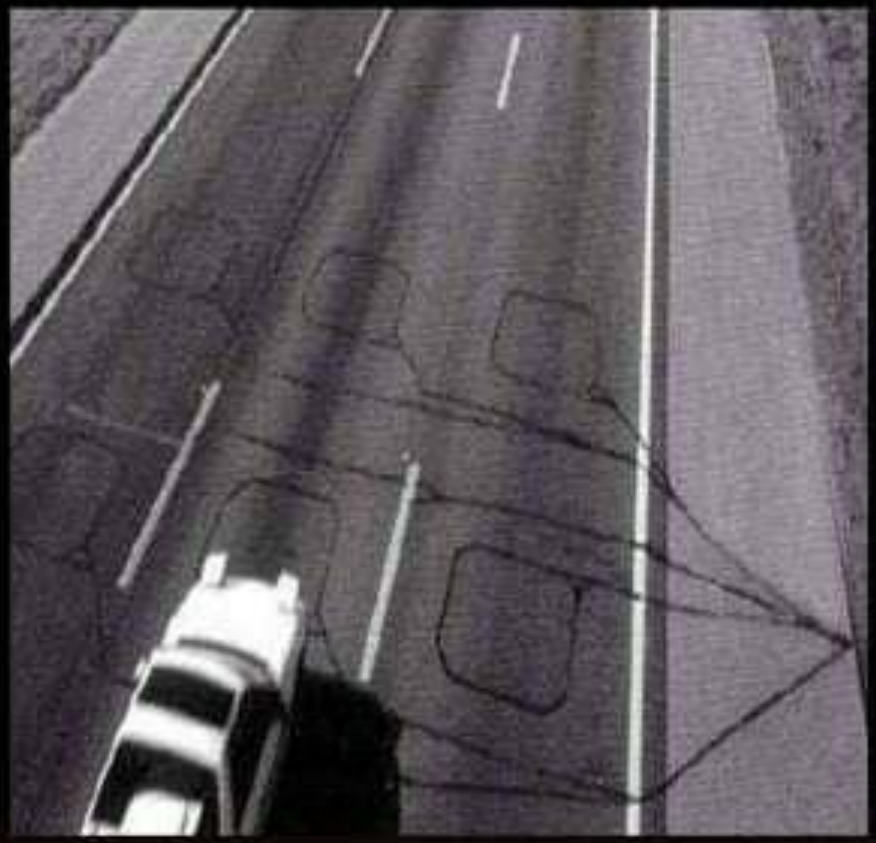
Benefits

- Low Power
- Most accurate technology for detecting speed
- Traffic Count accuracy
- Easy installation



(5) Inductive loop detection :

- one or more loops of wire are embedded under the road & connected to a control box.
- When a vehicle passes over or rests on the loop, inductance is reduced showing a vehicle is present.



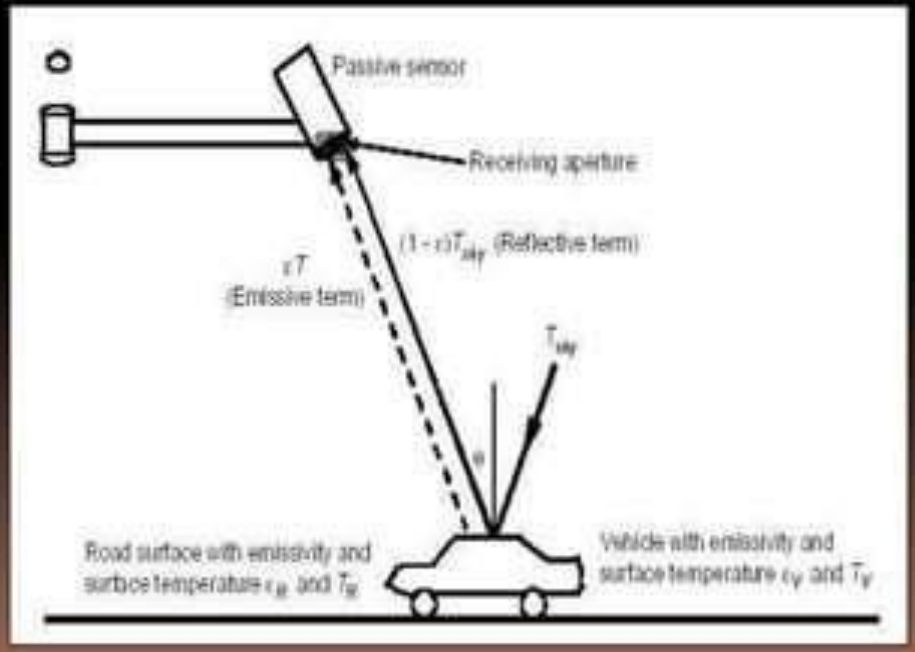
Benefits :

- Established Technology
- Not impacted by environmental conditions
- Accurate in detecting vehicle presence
- Performs well in both high and low volume traffic.

(6) Video Vehicle Detection :

Video vehicle detection (VVD) is the One of the most widely used method. Video detection is an image processor. It consists of a microprocessor-base CPU and software that analyzes video images. Using a mouse and interactive graphics, the user places virtual "detectors“ on the video image displayed on a monitor.

Statistics can be progressively transmitted to a server for real-time analysis.



Intelligent Transportation Applications

(1) Electronic Toll Collection :

Today, most toll roads are equipped with an electronic toll-collection system, like E-ZPass, that detects and processes tolls electronically.

E-ZPass uses a vehicle-mounted transponder that is activated by an antenna on a toll lane. Your account information is stored in the transponder. The antenna identifies your transponder and reads your account information. The amount of the toll is deducted and you're allowed through.

(2) Emergency vehicle notification systems :

Intelligent transportation systems particularly the FCD (*Floating Car Data*) model can also be used to provide advance warning to motorists of traffic jams, accidents and other emergency situations. This system can then provide alternative routes or recommendations to motorists so as to avoid congestion and travel delays.

(3) Cordon zones with congestion pricing :

With the intelligent transportation system, cordon zones can also be enforced where mass transportation systems are available and their use encouraged. Cordon systems make it possible to collect taxes from those entering city areas with high traffic while encouraging the use of mass transit.

Congestion pricing gantry at North Bridge Road, Singapore.

Sign indicate the boundary of the congestion charge area

Global developments in congestion charging in over 30 years :

1970s: Singapore cordon charge, full electronic road pricing (ERP) in 1996.

1986: Bergen, Norway, toll ring.

1990-2003: Oslo, Trondheim and other Norwegian cities adopt toll rings.

1995-96: Southern California high occupancy toll lanes.

2000: Congestion pricing of NY bridges.

2002-2004: Swiss, Austrian truck tolls.

2004: London cordon charge.

2005: Germany tolls autobahn trucks.

2006: Stockholm congestion charge.

(4) Automatic Road Enforcement :

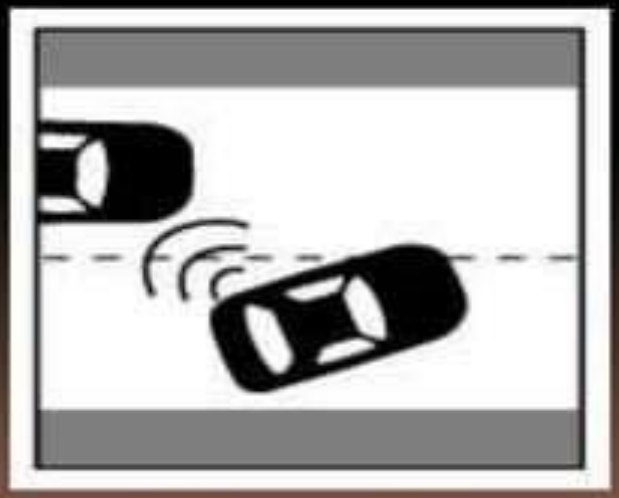
A traffic enforcement camera system, consisting of a camera and a vehicle-monitoring device, is used to detect and identify vehicles disobeying a speed limit or some other road legal requirement and automatically ticket offenders based on the license plate number. Traffic tickets are sent by mail. For Exam :-

- *Speed cameras* identify speed limit.
- *Red light cameras* detect vehicles that cross a stop line.
- *Bus lane* cameras identify vehicles traveling in lanes reserved for buses.

(5) Collision Avoidance Systems :

Intersection Collision Warning

Obstacle Detection



Lane Change assistance

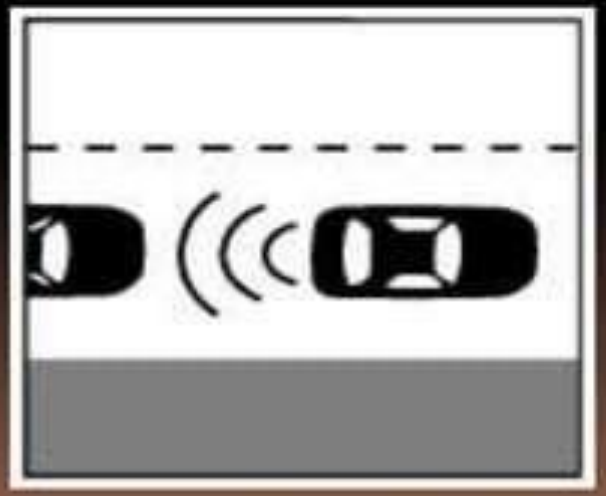
Lane Departure Warning

Collision Avoidance Systems .....

Rollover Warning

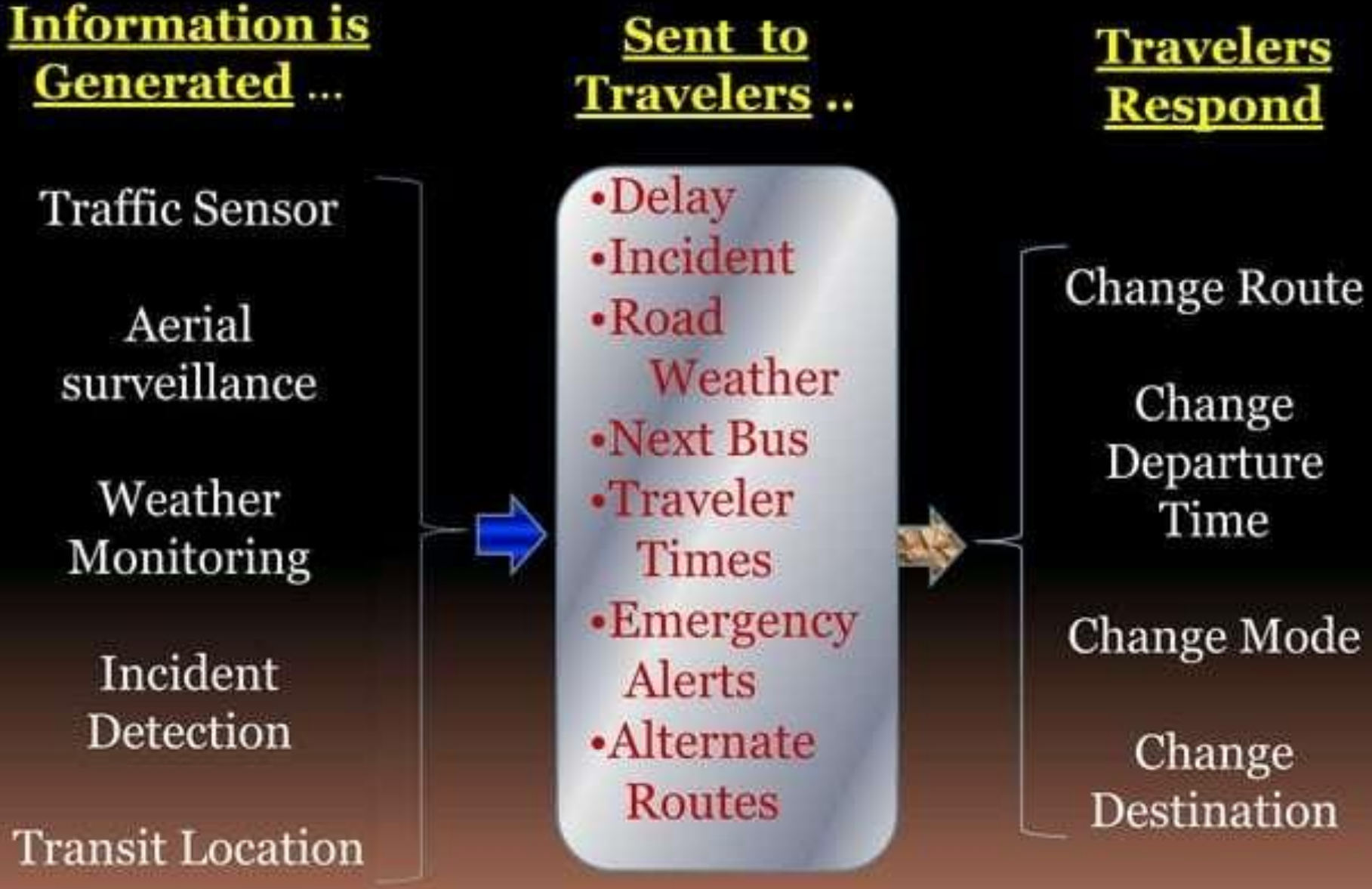
Road Departure Warning

Forward collision Warning



Rear Impact Warning

(6) Traveler Information Service :



(7) Emergency Management Services :

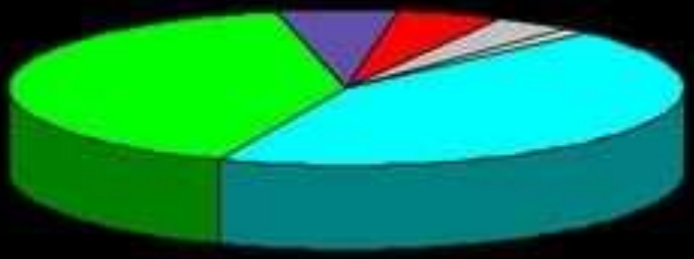
Emergency Management Services are greatly enhanced by traffic control centers that continually monitor roadway conditions.

When an incident occurs, the nearest emergency service vehicle is located electronically and dispatched to the scene. Highway managers then alert other drivers of the incident through dynamic message signs. These services reduce response times, help save lives, and reduce the occurrence of secondary incidents.

Benefits of ITS :

- Time Savings
- Better emergency response times and services
- Reduced Crashes and Fatalities
- Cost Avoidance
- Increased Customer Satisfaction
- Energy and Environmental Benefits
- Decreasing of probability of congestion occurrence

Projected ITS Infrastructure Benefits (1996-2015)



- Accident Cost Savings (44%)
- Time Savings (41%)
- Emissions/Fuel (6%)
- Operating Cost Savings (5%)
- Agency Cost Savings (4%)
- Other (< 1%)

Source : Apogee Report on Global ITS Benefits

References :

www.wikipedia.com

www.answers.com

www.howstuffworks.com

www.tech-faq.com

www.thetravelinsider.info

http://www.itsoverview.its.dot.

http://www.transport systems.com

http://www.mountain-plains.org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