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How Information Technologies Impact Transportation

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Better mobility improves the quality of our life and encourages individuals and organizations to contribute to the growth of the economy. Intelligent Transport Systems include many methods for enhancing the mobility of people and freight in all transportation modes.

Intelligent transportation systems vary in technologies applied, from basic management systems such as car navigation; traffic signal control systems; container management systems; variable message signs; automatic number plate recognition or speed cameras to monitoring applications, such as security CCTV systems; and to more advanced applications that integrate live data and feedback from a number of other sources, such as parking guidance and information systems; weather information; bridge deicing systems; and the like. Some of the constituent technologies typically implemented in ITS are described below.

Video Vehicle Detection. Traffic flow measurement and automatic incident detection using video cameras is another form of vehicle detection. Since video detection systems such as those used in automatic number plate recognition do not involve installing any components directly into the road surface or roadbed, this type of system is known as a *non-intrusive* method of traffic detection. Video from black-and-white or color cameras is fed into processors that analyze the changing characteristics of the video image as vehicles pass. The

cameras are typically mounted on poles or structures above or adjacent to the roadway.

Electronic toll collection (ETC). Electronic toll collection (ETC) makes it possible for vehicles to drive through toll gates at traffic speed, reducing congestion at toll plazas and automating toll collection. Originally ETC systems were used to automate toll collection, but more recent innovations have used ETC to enforce congestion pricing through cordon zones in city centers and ETC lanes.

Cordon Zones with Congestion Pricing. Cordon zones have been implemented in Singapore, Stockholm, and London, where a congestion charge or fee is collected from vehicles entering a congested city center. This fee or toll is charged automatically using electronic toll collection or automatic number plate recognition, since stopping the users at conventional toll booths would cause long queues, long delays, and even gridlock. The main objective of this charge is to reduce traffic congestion within the cordon area [1].

BelToll. The BelToll electronic toll collection system was implemented and operated by Kapsch TrafficCom in Belarus. The BelToll road network now comprises 1,189 kilometers. The system plays an important part in the efficient functioning of the traffic system. Not only do registered participants not need to stop at the toll gates, the electronic system also minimizes the risk of traffic back-ups and reduces emission levels. BelToll involves electronic collection of toll fees. The on-board units installed in the vehicles use microwave technology to communicate with the road-side infrastructure. Vehicles with a total weight of more than 3.5 tons as well as vehicles with a total weight of less than 3.5 tons that are registered outside of the customs union of Belarus, Russia, and Kazakhstan are required to pay tolls [2].

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 [1].

GPS. GPS, known originally as NAVSTAR GPS, is a satellite-based radio – navigation system designed and developed by the US Department of Defense as a navigational aid. This system allows an unlimited number of GPS receivers located anywhere in the earth's surface and in view of the GPS satellites to accurately determine position, velocity and time.

At present, GPS is used by numerous transportation agencies, country and local governmental agencies and transportation engineering consultants. GPS is increasingly being used for transportation applications by the private sector as well, with the invent of in vehicle navigation systems and fleet tracking systems [3].

Radio frequency identification (RFID) tags. Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source (such as a battery) and may operate hundreds of meters from the RFID reader. Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method for Automatic Identification and Data Capture (AIDC).

Yard management, shipping and freight and distribution centers use RFID tracking. In the railroad industry, RFID tags mounted on locomotives and rolling stock identify the owner, identification number and type of equipment and its characteristics. This can be used with a database to identify the

lading, origin, destination, etc. of the commodities being carried. RFID tags are used to identify baggage and cargo at several airports and airlines [4].

Information technologies have become an integral part of our daily lives, and the transport industry is no exception. Transport industry is becoming more and more computerized. Transportation companies have always been active in developing new software tools to improve transportation efficiency while reducing overall transportation costs.

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