

## INTELLIGENT BUS MANAGEMENT SYSTEM- A REVIEW

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### ABSTRACT

*The classical transportation problem is one of the many well structured problems in the mathematical programming literature that has generated considerable interest. This paper presents a review of the state of the art on intelligent transportation system. The main purpose of this paper is to study the achievements attained in the last years and to give an overview of possible directions towards future research.*

**Keywords:** Intelligent Transportation system (ITS), GPS, RFID Tags and Readers.

### 1. Introduction

Transport is a life line of a country. It is an important part of India's economy. Public transport is the leading mode of motorised local travel in cities. The first evidence of road development in the Indian subcontinent can be traced back to approximately 4000 BC from the ancient cities of Harrapa and Mohenjodaro of the Indus Valley Civilization. India has a road network of over 4,689,842 kilometres (2,914,133 mi) in 2013, the second largest road network in the world. At 0.66 km of roads per square kilometre of land, the quantitative density of India's road network is similar to that of the United States (0.65) and far elevated than that of

China (0.16) or Brazil (0.20). However, qualitatively India's roads are a mix of modern highways and narrow, unpaved roads, and are being better. As of 2011, 54 percent – about 2.53 million kilometres – of Indian roads were smooth. Motor vehicle infiltration is low by international standards, with only 10.3 million cars on the nation's roads. In addition, only around 10% of Indian households own a motorcycle. Despite this, the number of deaths caused by traffic is amongst the highest in the world and is still increasing. The automobile industry in India is currently rapidly growing with an annual production of over 4.6 million vehicles, and vehicle volume is expected to rise greatly in the future.

A short-lived early public bus line (known as a "carriage" at that time) was launched by Blaise Pascal in Paris in 1662. It was quite popular until fares were increased and access to the service was restricted to high-society members by regulation and law. There are many types of buses like single-decker bus, double-decker bus, articulated bus, bi-articulated buses. There are also some smaller mini buses which have a lower capacity and open-top buses are typically used for leisure purposes. Devoted city bus services are known to operate in at least 25 cities with a population of over one million in INDIA. The share of buses is negligible in most Indian cities as compared to personalised

vehicles, and two-wheelers and cars report for more than 80 percent of the vehicle population in most large cities. Buses take up over 90% of public transport in Indian cities and serve as a convenient & economical mode of transport for all classes of society. A bus is a road vehicle designed to carry many passengers. Buses can have a capacity as high as 300 Passengers. Public/ private service vehicle or educational institution bus or omnibus the gross vehicle weight of any these always exceed 12000 kilograms.

One can observe part of the history and growth of operational research just through the transportation problem : its origins in applications, the theoretical development and an increasing degree of sophistication, a parallel development with advances in computer technology, and generalizations to more complex problems.

## **2. Literature survey**

Bus monitoring and management system intelligence studies fall under the category of Intelligent Transportation Systems (ITS), and ITS includes a public transportation control framework ,road traffic management ,and the application of traffic control .There have been a number of earlier studies addressing intelligent transportation and vehicle monitoring systems.

There are different types of transportation problems and the simplest of them is standard in the literature was first presented by Hitchcock (1941)[13]. The work done earlier by Hitchcock,the typical case is often referred as the Hitchcock-Koopman's transportation problem.

Kantorovich (1942)[12] published a paper on a continuous version of the problem along with a constructive solution and, later independently, by Koopman (1947)[11]. Koopman began to spearhead research on the potentialities of linear programs for the study of the problems in economics. His historic paper "Optimum Utilization of the Transportation Systems" was based on his war time experience and later with Gavurin[10], an applied study of the capacitated transportation problem (Kantorovich and Gavurin 1949).

Estimates of bus passenger demand have always been important to bus operators and to transport planners. Recently they have taken on a new importance with the discussion of the subsidies, interest in improving public transport and the need to formulate transport policies and programmes. The need for a clear understanding of the impact of the determinants of demand, the manner in which patronage reacts to changing fares and services, the manner in which social groups are affected and so on are issues fundamental to the definition for public transport development. Recent developments of the conventional model such as the models of individual demand (Richards and Ben Akiva, 1974) or "strategic" models of the "CRYSTAL" type (Tanner et al, 1974) have taken into account many of these problems, particularly by extending trip generation to include walk and cycle trips. Nevertheless they are still relatively expensive exercises involving much data collection and complex models[9].

The recent energy crisis has forced all levels of government to become more responsive to the pressures of public

transit interest groups promoting the revitalization of public transit systems in urban areas. Intra-city bus systems are important components of the entire passenger systems. Compared with subways and rail passenger systems, bus systems offer greater access to more residents living near urban routes connecting shopping and work places. However, because of declining patronage, local bus transit systems typically operate with huge deficits, and bus transit is increasingly being looked upon as a public good to be provided by society in a fashion similar to police and fire protection. The purpose of this paper is to provide empirical estimates of the factors affecting the demands for bus service in large, medium and small urbanized areas[8]. In 1996, Axelrad [7] mentioned about the signal multipath problem in GPS, which occurs when a signal faces obstacles along its way to the GPS receiver on ground. GPS functions were further enhanced when Lundberg [6] presented two new closed form algorithms as an alternative for the GPS static positioning solution

Xu [5] method was put forward on error compensation of velocity and position coordinates by the GPS using neural network. The error factor in the GPS based station reporting system was analyzed by Bo [4].

In a study by Rashad and Aboelmagd [3], artificial neural networks (ANN) was utilized. In 1997, FHWA and its partners began development of the ITS Deployment Analysis System (IDAS), which is a tool designed to help planners better address these issues (Cambridge Systematic, 2002). Cambridge Systematic, Inc. led the development team and the software is now

available for use. According to product documentation, IDAS is designed to assist public agencies and consultants in integrating ITS in the transportation planning process. IDAS offers the ability for a systematic assessment of ITS with one analysis tool and is used for determining the benefits and costs of various ITS deployments. IDAS provides users with the comparison and screening of ITS alternatives, estimation of impacts and traveller responses to ITS, identification of cost-sharing opportunities, sensitivity and risk analysis and ITS deployment and operations/maintenance scheduling.

Wang [2] integrated RFID with GIS and GPS with Visual Basic.Net and Visual Earth as the software platform to build a real-time vehicle management system. A mobile RFID system had also been realized to ensure the safety of vehicles, in which RFID technology is embedded with Web-GIS. RFID is also used to track vehicles in parking lots. Sudhakar V.J., Arunsankar N. And Karpagam T.[1] gave a new approach for finding an optimal solution for transportation problems.

### **3. Discussions**

The results of this review have shown that Intelligent Bus Monitoring System is a broad field which covers many technologies and they play a significant role in the tech savvy era. Intelligent Bus Monitoring System deployments have the possibility to offer the following benefits: improved safety, competence, mobility, accessibility.

The intelligence implemented in the bus monitoring system can be achieved by

compiling and feeding all the proposed theories and algorithms for RFID and other sensing technologies into the system. The capability of the system to act on its own can reduce the manpower required at the monitoring center. Since few problems such as overcrowding, smoking, ticket cheating, availability of seats, location of the bus etc are not overcome by this system, hence, study in this field will continue for many years to come.

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