Integrating Technology in Multi-Modal Transportation for a Sustainable and a Smart Development

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Abstract:
The integration of diverse and efficient transport in a single journey chain in a unified manner is imperative towards achieving greater sustainability in urban transportation. The smart transportation management’s key role is to optimize traffic by managing the mobility patterns through information collected. This is the core idea of multimodal urban transport system which integrates public transport with other modes including non-motorized modes of transport with a distinct take on vehicle ownership. With technological innovation and integration into the transport system, it seeks to provide information and access to all the modes of public transport through smart phones and mobile apps. The solution is ICT based which incorporates web based information platforms, transport/mobility assistance, multimodal transport control systems etc. Such application forms a system of systems which could be effectively managed through interoperability with integration of IoT. A successful smart transportation system, data-centric approach with combination of bottom-up system approach with top-down-service development is required. The multimodal system involves development of new transport modes to include new transport sharing systems and the solution proposed is quite diverse and depends on the intrinsic and levels of innovations. Therefore, a strong emphasis has to be on user needs and possible impediments to provide a unified multimodal transportation system with solutions to traffic congestion, pollution, carbon imprint, and energy consumption. Hence, solution development with an integrated approach will help reduce problems of the citizens with success of the ‘city’s operational structure: the multimodal integrated transportation system.’

Introduction:
- The world population has exponentially grown over the years and is currently growing at a rate of 1.3% per annum mostly in urban areas.
- With urbanization at such a rapid scale there has been a rapid increase in the demand of energy, water, sanitation, health care, education and transportation.
- With increase in mobilization and transporation means, there has been a 12-15% increase in the CO2 emission in the atmospheres.
- The cities can be made smarter and more sustainable by effectively integrating the Information and Communication Technology (ICT) in the transportation system. The success of the ICT lies in connecting people and technology at micro level where information can be shared real time and dynamically. This concept brings to the core concept of the ICT in transportation - Internet of Things or the IoT.

Aims:
To propose an ICT based transportation system with integration of IoT which helps to analyze the transportation behaviour of the citizens and provide a framework for a sustainable multi-modal transportation system with end-to-end connectivity thus optimizing transportation of smart cities by responding to the behavior pattern of its citizens with regards to transportation.

Data & Results:

Transportation pattern and needs

For effective integration of technology in transportation, it is imperative to understand the micro-level needs of an individual to assess the framework under which transportation optimization is feasible and applicable.

Effect:
The entire impact of the technological integration should consider the users and the citizens to make use of optimum and alternative means of transport for a safer, secure and more reliable and efficient trip.

To achieve this, a series of calibrated measures have to be taken to collect, analyze, and interpret the impact of the events and citizens’ transportation behaviour and how technological integration will solve this problem through incorporating specific technology aimed at making travel safer with real-time analysis.

Concept of end-to-end transportation:
- IoT in transportation is an advance level application, which aims to provide innovative measures for different transportation modes and efficient traffic management system.
- Would help users to be better aware, safe and make coordinated use of smart transportation network through extensive use of IoT through IoT.

Concept of IoT in end-to-end transportation:
- The end-to-end transportation system concept is based on the Intelligent Transportation Management System (ITMS).
- It integrates the concept of smart services and solutions in multi-modal transport planning to provide customized travel and transport experience to the users from end-to-end.
- The ITMS provide solutions to problems like real time traffic information sharing, driver assistance, route optimization and better and efficient transport options.

Impacts:
- Sensationising of things and equipments
- This technology and end-to-end connectivity can lead to the implementation of Transit Oriented Development (TOD), a form of urban development.
- The last mile connectivity is enhanced and all modes become accessible.
- Fare payment across different modes of transport can be made through one ‘smart card’ only.
- This system of systems lead to the formation of an Intelligent Network.
- This network defines the flow of technological integration in transportation.

Value Proposition:
The use of ICT in making urban transportation smart and sustainable in smart cities.
This addresses the problem of: Transportation system in smart urban cities by providing end-to-end connectivity by optimizing the travel time through the use of multi-modal transportation system to provide end-to-end connectivity.

Economic
- Growth
- Economic Welfare
- Investment
- Market Share
Social
- Cohesion
- Health
- Employment
- Quality of Life
- Green house gas emission
Technical
- Innovation
- Research craftsmanship
- Product development
- Mobility of personnel
Value Proposition for this research

- The real time information collection and analysis helps to analyse the transportation behaviour of the people at micro-level.
- Sensors placed across the city in a systematic loop. The sensors may be either static (i.e. like RFID tags) or mobile sensors including cell phones.

- Systems collects and analyses detailed parameters like time, safety, cost efficiency, eco-efficiency, noise, weather, passenger comfort and convenience.

- The IoT analyses the impact of those factors on the selection making criteria of people and realizes a system that would help citizens to optimize their transportation methods.

- For an efficient system it is important to identify the transportation parameters that define the selection behaviour of people with regards to transportation.

- The pyramidal model shows the relationship between cost, eco-efficiency, convenience and safety.

- Therefore important to find the optimum balance of transportation journey incorporating information and managing the trade-offs between time, cost-efficiency, eco-efficiency, safety, convenience and realistic information sharing for decision making.

Results:
- Increasing driver and pedestrian safety
- Improving the operational performance of transportation network
- Enhancing mobility & convenience
- Delivering environmental benefits
- Boosting productivity, economic and employment growth

Value Proposition:

- The use of ICT in making urban transportation smart and sustainable in smart cities.
- Transportation sector in smart cities.
- Services
- Transportation sector in smart cities.
- Product’s Value

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