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A Study on Implementing Autonomous Intra City Public Transport System in Developing Countries - India

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Abstract

The rise of autonomous vehicles (AV) will revolutionize the transportation industry and it will transform the society itself, much like the nineteenth century shift from horse-carriages to automobiles. The automobile industry as well as governments/authorities all around the world are trying to create vehicles and road traffic infrastructures to support this futuristic public/private transportation technology. In our paper we are putting forward a feasible method of implementing the autonomous vehicular technology in a developing country like India as a public transport system in itself or as a feeder system to public transport systems like metro by using the concepts of safe state and kill switch.

Keywords: Autonomous Vehicles(AV); Safe State ; Kill Switch; Feeder Road; Release issue;

1. Introduction

Fully autonomous vehicles (AV) are defined as vehicles capable of completing journeys safely and efficiently, without drivers, in all normally encountered traffic, road and weather conditions. The developed countries are the front runners in the research and implementation of this technology. The developing countries due to their lack in a

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well-organized road infrastructure have largely laid behind in this technological race both at the technological and government/authority level.

1.1. Need of AV's in Developing Countries

The AV technology when implemented will drastically reduce the number of road accidents, will provide better traffic flow, will have more efficient fuel consumption and also will reduce environment pollution. All these advantages will help the people of developing countries to have a better and healthier life. Available statistics show that most number of fatal road accidents happening in developing countries are caused by the negligence of drivers, which can be avoided or drastically reduced by using AV. In all the surveys conducted so far by different international agencies, people from developing countries are more willing to accept and try AV than their counter parts from developed countries. All these factors show us that the possibility of implementing AV in developing countries like India is something which needs to be considered and tested.

1.2. Difficulties in implementing AV in Developing Countries

The common difficulties faced by the government/authorities and private companies if they try to implement AV in developing countries are absolute lack of standardization in road infrastructure, poorly planned road network, lack of lanes and road barriers, lack of on-ramps and exit systems, lack of directional, informational and warning signals, abundance of potholes and random speed breakers, poor mapping of roads and locations of interest, free-for-all, democratic access to roads for motorized and non-motorized vehicles, animals and pedestrians . All the currently existing algorithms which are being used and under research in the field of AV require very structured set of road traffic/infrastructure to work as they are intended to be used in developed countries where everything is well structured. Another issue which is typical in developing countries like India is the possibility of unemployment due to an autonomous technology replacing a human worker.

1.3. Solution

The objective of any transportation system in a developing country should be to create a system with minimum cost that is safe and reliable and which minimizes its adverse effect on the environment [19]. The system is composed of various elements: the infrastructure itself, the norms for access and use of the infrastructure and the vehicles that move on the infrastructure [19]. The AV require a structured infrastructure of road traffic, which currently do not exist in most developing countries. To wait for such kind of an overall change in road infrastructure for implementing AV will not be practically feasible, so our suggestion is to use the existing infrastructure with minimum modifications at certain critical roads/lanes of the city road traffic to implement AV as a public transport mode of transportation. . This mode of public transport system can also very effectively be used as feeder transport system to other more huge public transport systems like metros and trains in bigger Tier I & Tier II cities [15] .This will help in improving the resident's quality of life in developing countries and will also aid in more creative research into this field of huge importance in developing countries. This kind of public transport system even though is autonomous and does not require human beings in its running, will create technical employment opportunities in the manufacturing and maintenance phase of AV. It will also require people as back up drivers and to coordinate the transport system when it is implemented.

1.4. Advantages

The advantage of this approach is compared to European or American cities where roads have a structured infrastructure which has to be considered when trying to implement such disruptive technologies like AV, the critical road/lane in a developing country can be modified or structured according to the infrastructural requirements of an autonomous vehicle which will run on it. This kind of public transport system can also reduce the huge investments which are planned in most of the modern developing Tier III cities [15] with completely new infrastructures like metros, hyper lopes, trams etc. Instead of this kind of new infrastructure based public transport systems, take a very