Proposal for project on

AUTOMATED HIGHWAY SYSTEM

Submitted by

Amlan Nanda
Ananth Benedict
Yatharth Wadhwa

Department of Industrial and Systems Engineering
Texas A&M University
Design of an Automated Highway System

Problem Statement: In spite of all the advancement in vehicular technology, increase in the number of accidents, clogged roads and fuel crisis continues to plague world’s transport system. Human error always has a cascading effect in highways (resulting in car pile ups, for example) and environmental causes are making road transportation a nightmare.

System Definition:

Automated highway system (or Smart Roads) is designed to provide for driverless cars on dedicated freeways. The pathways may be elevated along several floors (An ultra-futuristic design can include routing the roads along upper floors of skyscrapers to provide instant-travel). The roadways will have magnetized stainless steel spikes driven one meter apart in its center. The car senses this to measure its speed and maintain distance from other cars. The AHS system can place sensory technology in cars that can read passive road markings, and use radar and inter-car communications to make the cars organize themselves without the intervention of drivers. The cars move in a platoon with each maintaining a minimum distance (braking distance) between each other. This will reduce air resistance to travel as well. The cars will move in platoons and two platoons will have significant distance between each other so that in case of a mishap, the damage is limited to one platoon only. The car will employ computer operated power steering and advanced sensory and artificial intelligence to respond to variable circumstances and emergency.

1 (Painting by Joseph A. Barbetta, completed in 1990)
Advanced Technology Used: The technology requirement of this project is completely futuristic. Beginning with the laying of the roads, a GM prototype estimates that a five-story-tall, atomic-powered road-building machine would construct 1.61 kilometers (1 mile) of elevated, four-lane freeway every hour, 24 hours a day. Because of the stakes involved in malfunctioning of any such system, the sensory systems and artificial intelligence will require a quantum leap in existing designs. If the system encompasses preprogramming of vehicles by their owners before embarking on travel, the computer of the vehicle needs to be a connected a central database of road information and able to take remote orders from the user. Needless to say, all the data information will be wireless and hence a secure wireless data transfer technology needs to be developed.

Predecessor System: In terms of predecessor system, the design of current subways comes close to the proposed system. Although, even the subways are manually operated, they too run on dedicated pathways. A prototype has been tested in San Diego, California. Mercedes-Benz, GM, Toyota are involved in research for the development of such a system.

Societal Need: A study by a Californian project team shows that implementing such a system would improve the throughput of a highway to 4300 vehicles per lane per hour from existing 2000 vehicles per lane per hour. This will lead to efficiency in fuel consumption, less travel time and of course safety of travel. Less vehicular distance leads to less air drag on vehicles and studies at University of California, Riverside shows it will lead to 25% reduction in fuel consumption. As the pathways of vehicles are predefined, vehicles can also be made to run on electric power (system akin to subways). This will lead to elimination of carbon emission, addressing the issue of global warming to a large extent. As the system is fully automated, it takes out human errors out of the picture addressing the deaths on the roads problem. Hence, the systems provide a viable solution to many pertinent global and local problems.

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2 Futurama Exhibit, New York World Fair 1964
3 http://en.wikipedia.org/wiki/Partners_for_Advanced_Transit_and_Highways
4 http://www.path.berkeley.edu/PATH/Publications/Media/FactSheet/VPlatooning.pdf
5 http://www.benbest.com/lifeext/causes.html