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IMPLEMENTATION OF AN AUTONOMOUS DRIVER ASSISTANCE SYSTEM USING SWARM INTELLIGENCE

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Road traffic congestion is a major issue which leads to a considerable amount of time and energy waste as well as environmental pollution. This project is about the application of swarm intelligence to form an autonomous driver-assistance system to address these issues. Swarm intelligence is a segment in Artificial Intelligence which is used in land mine detection, Nanobots, etc. In the simplest form, swarming is a form of distributed control for entities that work autonomously, achieving a desired orderly behaviour collectively. Mere enhancement of traffic light systems would not provide an adequate solution for the following reasons: firstly, the traffic light system at any given junction does not help the driver in assessing traffic density before entering a busy route segment, secondly, the control it has over driver behaviour is limited to allowing/disallowing access to routes at the junction, and thirdly, traffic light control does not have a way to obtain and hence, to include, individual travel destinations of vehicles in its logic. These and other limitations prompted us to search for solutions which would address the issues cited. Such a system would necessarily be individual vehicle based and should take into cognizance the characteristic problems associated with distributed problem solving. Our problem was then to design such an Autonomous Driver Assistance system with the necessary communication mechanisms among individual vehicles. A Swarm of vehicles maps well to these requirements. We modelled them as a Swarm Intelligence System with the actor model for individual decision making entities and two modes of communication: blue-tooth based intra-colony and internet based inter-colony. The data model is simple and what each vehicle gets as a result is a map of the road network indicating real-time traffic intensities on relevant road segments on a graphic display. This solution has been software tested and in the next phase it will be integrated into small intelligent devices mounted on each vehicle or cellular phones. The solution will be portable to more advanced/cheaper devices and communication technologies.