



UNMANNED VEHICLES - TECHNICAL PERSPECTIVE OF AI APPLICATIONS AND SOCIAL IMPACT

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Abstract

Unmanned autonomous vehicles, driven by advancements in artificial intelligence (AI), are transforming numerous sectors including transportation, exploration, and public service. This paper reviews the technical and social dimensions of autonomous cars, boats, and drones, emphasizing their AI applications in perception, decision-making, and control. An autonomous vehicle requires a comprehensive sensor suite to perceive its environment, navigate safely, and make informed decisions. The sensor suite typically includes a combination of sensors such as LIDAR, RADAR, GPS, IMU, cameras, and depth sensors. These sensors provide vehicles with essential information about their surroundings, enabling them to operate autonomously and avoid obstacles. The essential modules and systems that enable autonomous navigation are Guidance, Navigation, and Control (GNC), Perception, and Prediction. The basis for transport automation is the GNC system that utilizes GPS and IMU sensors. Perception is the term used in robotics since a robot needs to perceive, be aware, sense the world / objects around it so it can avoid them if they are on its way. Prediction is a module that anticipates the future motion trajectories of the perceived obstacles. The output of this module gives information to a robot path planner which generates an appropriate trajectory to go around or avoid an obstacle (other traffic participant) that is on the way.

This abstract discusses the dual nature of AI in autonomous vehicles highlighting significant benefits such as improved safety, reduced congestion, and enhanced energy efficiency while addressing critical challenges including data integrity, safety reliability, ethical conflicts, and potential job displacement. Particular attention is given to unmanned aerial systems, detailing their diverse applications from aerial surveillance to disaster response, and discussing the accompanying technical hurdles in localization and navigation. The paper also examines ethical considerations concerning AI in autonomous vehicles, with a focus on decision-making algorithms, accountability, and societal impacts such as privacy and cybersecurity. In conclusion, while unmanned vehicles present remarkable opportunities for innovation and efficiency, they require careful regulation, rigorous interdisciplinary research, and robust ethical frameworks to fully realize their potential and safeguard societal interests.

Keywords: AI-driven systems, autonomous systems, ethical considerations, societal impact, unmanned vehicles.