Chapter 16
Sustainable Solutions for Autonomous Vehicles Using Deep Learning and IoT

Shantala Devi Patil
https://orcid.org/0009-0003-6032-5923
School of Computer Science and Engineering, REVA University, Bengaluru, India

Jerzy Ryszard Szymański
https://orcid.org/0000-0002-9493-8424
Department of Electrical Drives and Industrial Electronics, Casimir Pulaski University of Radom, Poland

Marta Żurek-Mortka
https://orcid.org/0000-0002-4804-8172
Department of Control Systems, Lukasiewicz Research Network Institute for Sustainable Technologies, Poland

Mithileysh Sathiyanarayanan
https://orcid.org/0009-0003-1456-2709
MIT Square, London, UK

ABSTRACT

The rise of self-driving cars shows promise to make getting around easier, but also brings big challenges when it comes to being eco-friendly. This paper lays out a plan to create lasting solutions for self-driving cars by combining deep learning, the internet of things (IoT), and car networks. This approach aims to boost efficiency cut

DOI: 10.4018/979-8-3693-5448-3.ch016

down on energy use, and make driving safer and more productive. IoT allows cars, roads, and checkpoints to share info in real time, which helps streamline travel and reduce harm to the environment. The car network ensures that self-driving cars stay and linked to all parts of their ecosystem. This paper looks at how these technologies can work together in the self-driving car industry to tackle green issues like using less energy, lowering carbon output, and using materials more . It zeros in on how this tech can shape what's to come.

INTRODUCTION

Self-driving cars also called autonomous vehicles (AVs) or driverless vehicles, are changing how we think about transportation. Regular cars need people to drive them, but AVs use advanced sensors, actuators, and AI systems to see what's around them and drive on their own. People are working on AV technology because it could make roads safer, help those who can't drive or don't have easy access to transportation, and make getting around more efficient. AVs use a mix of sensors like radar, lidar, cameras, and GPS to check their surroundings. These sensors create a live all-around view of what's near the car letting it spot lane lines, traffic signs, people walking, cyclists, and other vehicles (SZELE & KISGYÖRGY, 2018).

At the heart of how AVs work is the AI-powered decision-making system. This system processes sensor data to make driving decisions as they happen. Machine learning algorithms help AVs learn from huge amounts of data they collect while driving. This helps them get better at handling tricky traffic situations and spotting possible dangers. This learning is key to making AVs safer and more reliable over time. We group AVs into levels from 0 (no automation) to 5 (full automation). Level 1 and 2 AVs still need some human help, like steering or controlling speed. Levels 3, 4, and 5 mean the car can drive itself more and more, with less or no human help in certain situations or in all driving conditions (Chehri & Mouftah, 2019).

Major players in the self-driving car world include car makers, tech firms that focus on AI and sensors, government regulators, city planners, and insurance companies. These groups need to work together to tackle tech issues set rules, build needed structures, and get people to accept self-driving cars. Self-driving cars can do more than just make life easier for drivers. They can help society in big ways. These cars might cut down on traffic jams by finding the best routes and driving close together at steady speeds. This helps cars use less fuel and move through air more . Also, as more people use self-driving cars, we could see fewer crashes caused by human mistakes. Right now, these kinds of crashes are a top reason for road deaths around the world (Bahamonde-Birke et al. 2018).