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USE OF UNMANNED TECHNOLOGIES IN AUTOMOBILES

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Nowadays, the automotive industry is actively developing, with new technologies emerging. From self-parking systems to fully autonomous vehicles, the integration of these technologies into human life is poised to revolutionize human interaction with cars.

Artificial intelligence (AI) plays a significant role in the development of autonomous cars. AI can significantly help self-driving cars assess their surroundings and make decisions in real time.

The process of predicting a car's movement begins with cameras positioned around the perimeter of the vehicle to capture a full view of its surroundings, including roads, pavements, traffic signs and pedestrian crossings. The visual data collected can then be processed using computer vision models. The AI model shifts its attention to classification once it identifies an object to determine its true identity.

After an AI system identifies something as a pedestrian it can predict what action that object will take next. A self-driving vehicle depends on prediction abilities to perform synchronized reactions between slowing down, stopping and directional changes for minimizing potential threats. The following sensors are used for this function: LIDAR and GPS. The automatic road sign identification system named Traffic Sign Recognition (TRS) enables self-driving vehicles to both detect and appropriately respond to stop signs and speed limit indicators in real time. Systems need to operate under various environmental conditions which include both heavy rain and reduced visibility alongside angled or low-lit sign visibility [1].

The vehicle system checks traffic regulations during operation to prevent collisions while maintaining safety for passengers through smooth driving conditions.

To understand the purpose of this technology, it's important to consider five autonomous driving levels defined by the Society of Automotive Engineers (SAE). They are:

- Level 0: no automation, i.e. the driver is responsible for his vehicle;
- Level 1: driver assistance, i.e. basic systems help drive the vehicle but still require human control;
- Level 2: partial automation, i.e. the vehicle can control both speed and steering;
- Level 3: conditional automation, i.e. the driver can hand over control to the car, but must be able to intervene in difficult situations;
- Level 4: high degree of automation, i.e. human intervention is not required in certain conditions, although in extreme conditions the driver takes control;
- Level 5: full automation, i.e. the vehicle operates under all conditions without the driver performing all driving tasks [2].

Nowadays, main automobile producers including General Motors, Volvo, Audi and Tesla produce numerous cars with Level 2 features currently available on the market. However, reaching Level 5 autonomy remains difficult because it requires sophisticated technology with exceptional driving condition interpretation capabilities.

Automatic vehicle cybersecurity protection ensures safety both for drivers and road users. The modification of existing roads that need to accommodate new technological advancements is required. Besides, there is a need for complex hardware components and specialized software programs alongside broad amounts of data.

Cars require extensive development before reaching Level 5 autonomy because self-driving capability must operate in all surroundings independently from human supervision.

References

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