Abstract

The increasing statistics of road accidents in Egypt continue to raise successive warnings about a flaw in the body of the traffic system, although in the past few years, Egypt has raised the efficiency of roads significantly, but despite the huge amount of spending that Egypt has made during the past years in the road development process, the official statistics figures indicate an increase in the number of road accident victims, according to what was dealt with in the report of the Central Agency for Public Mobilization and Statistics issued in July 2022, which reviews the results of car and train accidents in 2021.Whereas, the attempts of the researchers tried to find A solution to this problem, but the solutions mostly focused on self-driving methods for vehicles, but they are ineffective solutions due to the lack of the necessary infrastructure for them on all roads and axes, and here was the proposed solution, which was built on the basis of using AI techniques and FOG computing technology to find a radical and effective solution to this problem in order to achieve the first goal of the 2030 Agenda for Sustainable Development.

Most of the car accidents are caused by human error, throughout the researches the general consensus among experts is that human error contributes to at least 90% of the auto accidents. The main cause to these errors is that, the driver may fall into a fainting state for any medical reason such as pressure problems, heart attacks, diabetes, etc. Also, the driver may fall asleep due to lack of sleep. Accordingly, these accidents cause traffic congestion for a long time and sometimes people pay their lives for it. The proposed solution is based on building a hybrid system of self-driving technologies for vehicles and remote driving through the control centers of the Department of Traffic Emergency Situations. Specifically, in the event of an emergency, the proposed system does one of two scenarios; the ***first scenario*** is that the self-driving system takes over driving the vehicle based on the decisions taken by the main control unit that relies on AI and the IoT in analyzing the driver's vital indicators data such as pulse, pressure, sugar, etc. to know the driver's health condition on which his ability to drive depends, as well as analyzing his facial features to determine if the driver lost consciousness or fell asleep.

The ***second scenario*** is that the remote driving system takes over driving the vehicle through the command-and-control centers of the Department of Traffic Emergency Situations. This as a result of the presence of circumstances that prevented the self-driving system from carrying out its mission, such as the lack of the necessary infrastructure for the self-driving system, which is common on most roads and hubs in Egypt. In this case, the car can be controlled remotely by sending a live broadcast from the car to the web page of the remote central control. Through this direct broadcast, the traffic officer responsible for this emergency situation can drive the car until it reaches the nearest safe point and avoid any accidents which can be occurred due to this emergency situation. Experiments conducted using the initial model of the project showed that the proposed solution is highly efficient and effective in solving the problem of road accidents caused by human error.