Global Science Research Journals

Global Educational Journal of Library and Information Science

Extended Abstract OpenAccess

Autonomous Off-road Vehicles Challenges and Opportunities

JavadTaghia

University of New South Wales, Sydney, Australia

Introduction

For a car to be autonomous, the car requires sensors to gather information about the road and a central processing unit to analyse all the info and make decisions appropriately. The sensors needed will include lidars, radars, cameras, GPS and ultrasound; these sensors are going to be wont to recognise the vehicles' surroundings and measure the space between the vehicle and nearby objects therefore the central processing unit can evaluate them and respond accordingly (see figure 1). This technology already exists, as an example GPS systems and cameras for park assist appear in many level 1 cars, although for level 2 and above there are many problems with consistently identifying objects, for instance , rain, snow, road works, complex city driving and other obstacles can prevent the vehicle from completing the right driving action. subsequent big challenge is that the software and algorithms; it'll be very difficult to write down a program to spot every possible situation; the vehicle may have the power to find out to reply to events it's not been specifically programmed for, essentially be artificially intelligent. to figure efficiently the vehicles will need to be ready to communicate with one another (vehicle to vehicle (V-to-V) communication) via a network or directly via temporary connections between vehicles in close proximity. this suggests that vehicles will constantly transmit information on direction and their speed during journeys, for instance a car driving into a holdup would be deaccelerating and sending signals. All vehicles behind would detect these signals and reduce their speed or alert the driving force to try to to so. It's believed that the technology could reduce crashes in situations that don't involve human drivers.

Vehicles also will got to communicate with the infrastructure (V-to-I communication) so as to remember of speed limits, traffic updates and route optimisation; many of those features are already available. Several level 1 cars currently on the market can read road signs, satellite navigation systems are plugged into traffic monitoring networks and may alter routes when traffic is heavy along a preferred route. These features will probably need further investment to form them more reliable and capable of handling larger data flows. this may require significant investment from governments. Parts of the united kingdom are being upgraded to "smart motorways" [8] which use technology to actively manage the flow of traffic. this might rather be the primary step in creating the environment for autonomous vehicles. subsequent steps to supply both V-to-V and V-to-I communication are going to be installing 5G. Highways England is exploring improving Wi-Fi[9] and 5G connectivity, as a part of the governments ambition to possess "self-driving car on UK roads by 2021". For real time V-to-V communication, LTE-V (Long term evolution-vehicles) communication technology is being compared to WLAN 802.11p in various situations by Audi on the A9 autobahn in Germany, allowing the industry to specify the wants for standardisation of future 5G communication [10]. One potential side effect of this is often that autonomous vehicles could collect an outsized amount of knowledge .the info might be wont to create personalised services and products but could even be used for monitoring our movements and lifestyle,

our cars could become spies and there's hence an ethical dimension about data, its ownership and use. This software also brings with it the danger of hacking, perhaps making autonomous vehicles the right tool for terrorists. Issues like, kidnapping, or deliberately causing an accident could occur. this is often a replacement problem for the auto industry, although these are issues that are being debated within the wider world with companies like Apple and Google being central to the talk , coincidentally both are entering the sector of autonomous vehicles. to stop these problems the auto industry will need to invest heavily in cybersecurity. one among the most important challenges for autonomous vehicles is public perception, if autonomous vehicles are labelled disruptive like gene-splicing , which took years before proper debates were possible, then autonomous vehicles won't progress, showing that resistance publicly opinion can bring technology to a standstill. To avoid this from happening industry and government will got to discuss the problems surrounding autonomous vehicles openly and honestly. the present discussion within the media shows that folks are conscious of the possible dangers but there's less emphasis on the potential benefits, as an example in 2016 a Tesla on autopilot drove a person 20 miles to hospital, saving his life; an example of autonomous driving giving mobility to people who cannot drive. the issues with cybersecurity could change people's perception, and make some unwilling to embrace the new technology, it's likely there'll be a split between those willing to adopt the technology and people that refuse.

Abstract

Control of autonomous off-road vehicles is getting more and more attention in the trend of self-driving vehicles.

Off-road vehicles are widely used in different industries such as mining and farming. Off-road vehicles experience various ground conditions and should be able to work sufficiently accurately on undulating, sloping and very uncertain terrain. When off-road vehicles are autonomous, the guidance and control of them are challenging due to significant disturbances. In order to consider these disturbances in the guidance of an off-road vehicle, lateral and longitudinal sliding velocities are incorporated into the modeling and the control design. This makes control of autonomous off-road vehicles more challenging. There are a variety of vehicle types. Among them are wheeled vehicles, tracked vehicles, wheeled and tracked vehicles towing trailers and four-wheel steer and four-wheel drive vehicles. There are robust control methodologies to tackle the disturbances in driving off-road vehicles successfully. Moreover, in moving towards full-scale autonomous vehicle commercialization, there are obstacles such as laws and regulations as well as insurance policies on one hand and opportunities such as less direct contact with people and working in known environments such as farms and mines on the other hand.

Conclusion

Whatever happens within the future one thing is for certain, autonomous vehicles will fundamentally change the way we travel, as people move faraway from the drivers seat to the passenger seat. What once only appeared on the silver screen as Herbie or Johnny Cab will soon become reality; Ford Motor CEO said that Ford plans to possess a “level 4 vehicle in 2021”. The questions we as a society got to address are both ethical and financial. can we want to take a position within the infrastructure for this technology and what are the implications if we do? Ethical issues as an example the liability for accidents and subsequent harm, data usage et al. . These issues must have clear solutions before we will derive the advantages like improved mobility, increased safety, decreased traffic jam and more free time. These decisions will govern and determine the course which humanity takes because it constructs the longer term of automobile transport. Ultimately, simply because we could roll in the hay , should we?

Biography

Javad holds PhD in Mechatronics from University of New South Wales, Australia and MSc in automation and information from Bremen University, Germany. His research interest is on path tracking control of autonomous vehicles. He has extensive experience in modelling and control of nonlinear systems, filtering and data fusion in guidance systems with application in autonomous vehicles, robotics and collision avoidance. He has published peer-reviewed articles in the top-ranking journals and conferences. He is the main author of the book "Applied Guidance Methodologies for Off-road Vehicles".

He has more than 12 years of industrial experience, his industrial experience is on high-level control of complex logistics systems and leading technologies in robotics and control.