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Autonomous air, sea, undersea, and land vehicles

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Abstract -*An autonomous vehicle is onewhich will drive itself from a start line to a predetermined destination in "autopilot" mode using various in-vehicle technologies and sensors, including adaptive control , active steering (steer by wire), anti-lock braking systems (brake by wire), GPS navigation technology, lasers and radar. Self-driving vehicles are cars or trucks during which human drivers are never required to require control to securely operate the vehicle. Also referred to as autonomous or "driverless" cars, they combine sensors and software to regulate,navigates, and drives the vehicle*

Key Words**:** *UAVs, AUVs, USVs, UGVs, Autonomous.*

1. INTRODUCTION

In recent years unmanned vehicles have grown in popularity, with an ever increasing number of applications in industry, the military and research within air, ground and marine domains. Especially, the challenges posed by unmanned marine vehicles so as to extend the extent of autonomy include automatic obstacle avoidance and conformance with the principles of the Road when navigating within the presence of other maritime traffic. An autonomous vehicle, or a driverless vehicle, is one that's ready to operate itself and perform necessary functions with none human intervention, through ability to sense its surroundings. An autonomous vehicle utilizes a totally automated driving system so as to permit the vehicle to reply to external conditions that a person's driver would manage [1-5].

What are the 6 Levels of Autonomous Vehicles?

There are six different levels of automation and, because the levels increase, the extent of the driverless car's independence regarding operation control increases.

At level 0,the car has no control over its operation and therefore the human driver does all of the driving.

At level 1, the vehicle's ADAS (advanced driver assistance system) has the power to support the driving force with either steering or accelerating and braking.

At level 2, the ADAS can oversee steering and accelerating and braking in some conditions, although the human driver is required to continue paying complete attention to the driving environment throughout the journey, while also performing the rest of the required tasks.

At level 3, the ADS (advanced driving system) can perform all parts of the driving task in some conditions, but the human driver is required to be ready to regain control when requested to try to so by the ADS. Within the remaining conditions, the human driver executes the required tasks.

At level 4,the vehicle's ADS is in a position to perform all driving tasks independently in certain conditions during which human attention isn't required.

Finally, level 5involves full automation whereby the vehicle's ADS is in a position to perform all tasks altogether conditions, and no driving assistance is required from the human driver. This full automation are going to be enabled by the appliance of 5G technology, which can allow vehicles to speak not just with each other , but also with traffic lights, signage and even the roads themselves. One of the aspects of the vehicle technology utilized in automated vehicles is ACC, or adaptive control. This technique is in a position to regulate the vehicle's speed automatically to make sure that it maintains a secure distance from the vehicles ahead of it. This function relies on information obtained using sensors on the vehicle and allows the car to perform tasks like brake when it senses that it's approaching any vehicles ahead. This information is then processed and therefore the appropriate instructions are sent to actuators within the vehicle, which control the responsive actions of the car like steering, acceleration and braking. Highly automated vehicles with fully automated speed control are ready to answer signals from traffic lights and other such non-vehicular activities[6-9].

What are the Advantages?

Autonomous vehicle technology could also be ready to provide certain advantages compared to human-driven vehicles. One such potential advantage is that they might provide increased safety on the road – vehicle crashes because many deaths per annum and automatic vehicles could potentially decrease the amount of casualties because the software utilized in them is probably going to form fewer errors as compared to humans. A decrease within the number of accidents could also reduce traffic jam, which may be a further potential advantage posed by autonomous vehicles. Autonomous driving also can achieve this by the removal of human behaviors that cause blockages on the road, specifically stop-and-go traffic [7-10].

Another possible advantage of automated driving is that folks who aren't ready to drive – thanks to factors like age and disabilities – might be ready to use automated cars as more convenient transport systems.

Additional advantages that accompany an autonomous car are elimination of driving fatigue and having the ability to sleep during overnight journeys.

UAVs (Unmanned Aerial Vehicle)

Drones are utilized in situations where manned flight is taken into account too risky or difficult. They provide troops with a 24-hour "eye within the sky", seven days every week. Each aircraft can stay aloft for up to 17 hours at a time, loitering over a neighborhood and sending back real-time imagery of activities on the bottom.

There are two of the medium-sized drones currently in uses in Afghanistan and Pakistan are the MQ-1B Predator and the MQ-9 Reaper.

These strange-looking planes carry a wealth of sensors in their bulbous noses: color and black-and-white TV cameras, image intensifiers, radar, infra-red imaging for low-light conditions and lasers for targeting. They can also be armed with laser-guided missiles.

Each multi-million dollar Predator or Reaper system comprises four aircraft, a communication system station and a satellite link.

Although drones are unmanned, they're not unpiloted - trained crew at base steer the craft, analyze the pictures which the cameras remit and act on what they see.

AUVs(Automatic Underwater Vehicle)

An autonomous underwater vehicle (AUV) is an unscrewed, untethered, underwater vehicle capable of self-propulsion. Such vehicles are mobile instrumentation platforms that have actuators, sensors, and on-board intelligence to successfully complete survey and sampling type tasks with little or no human supervision. An outsized number of AUVs are developed, ranging in dry weights from but 50 kg to just about 9000 kg, with the bulk of vehicles at the tiny end of the size .Within the last several years, acceptance of AUVs for oceanographic, commercial, and military missions has risen dramatically, resulting in a pointy rise in AUV operations.

By far the foremost common AUV configuration is as a torpedo-like vehicle, consisting of a streamlined body with propeller and control surfaces at the strict .Operational speeds for such vehicles range from 0.5 to five m s/1 , with most vehicles operating at a cruising speed of about 1.5 m s/1 . so as to stay controllable, torpedo-like AUVs must move forward at some minimum speed so as to take care of Sow over control surfaces, and thus aren't capable of station keeping. When a better degree of control over vehicle attitude and trajectory is required, vehicles are constructed with multiple thrusters. AUVs with multiple thrusters obtain greater maneuverability, but at a price of reduced range. Depth ratings of most existing AUVs fall under two categories: vehicles designed for depths on the order of 200 m, and vehicles designed with maximum ratings of 3000}6000m. The non-oceanographic applications for AUVs are important factors in determining depth rating. Shallow-water mine hunting has motivated the event of variety of vehicles within the 200m category. Deep-water applications are heavily issuance by the emergency of a deep-survey requirement within the oil and gas industry, which have encouraged the event of 3000m rated systems.

USVs (Unmanned Sea Vehicle)

Unmanned surface vehicles (USVs; also referred to as unmanned surface vessels (USVs) or (in some cases) autonomous surface vehicles (ASVs)) are boats that operate the surface of the water without a crew.

Autonomous Surface Vehicles (ASVs) are robotic vehicles that operate the ocean surface recording a variety oceanographic data. Differing types of ASVs use various methods of propulsion, principally wave-powered or propeller-driven.

ASVs are generally larger than autonomous underwater vehicles (AUVs) allowing larger payloads and greater battery capacity. By remaining on the surface, they will employ solar or wind generation to reinforce or completely provide their power needs. Wave powered vehicles are made by hobbyists since the 1950s, but these commercial craft - used for research project - are recent developments.

Surface vehicles pose unique challenges to the pilot, especially when working inshore or in congested waters. However they provide a spread of solutions to the issues posed. For trouble or when operating on the brink of commercial shipping, the challenges of being seen and keeping a watch are largely met by Automatic Identification System. An AIS transponder continuously transmits the vessel’s position and a few metadata on the vessel type, while receiving an equivalent from any AIS-equipped vessel. This is often relayed to the shore and allows the pilot to require a measure of avoiding action when encountering another AIS-equipped vessel. Admiralty law requires all vessels over 500 tones to hold AIS, but that's not a guarantee of its use. Although many smaller vessels also carry AIS, the system can't be relied upon completely, especially for yachts, fishing vessels and warships. a lively radar reflector may be a more direct way of being seen by larger vessels, and eventually navigation lights and day-marks should be visible to vessels of all sizes.

UGVs (Unmanned Ground Vehicle)

An unmanned ground vehicle (UGV) may be a vehicle that operates while in touch with the bottom and without an onboard human presence. UGVs are often used for several applications where it's going to be inconvenient, dangerous, or impossible to possess a person's operator present. Generally, the vehicle will have a group of sensors to watch the environment, and can either autonomously make decisions about its behavior or pass the knowledge to a person's operator at a special location who will control the vehicle through tele-operation.

The UGV is that the land-based counterpart to unmanned aerial vehicles and unmanned underwater vehicles. Unmanned robotics is being actively developed for both civilian and military use to perform a spread of lifeless, dirty, and dangerous activities.

Unmanned vehicles are employed by the military in air, on ground, and in water. for instance , the military uses unmanned vehicles for reconnaissance, attack missions, and as decoys. Unmanned vehicles are utilized in civilian applications also. Forinstance, fire-fighting and non-military surveillance activities are considered civilian applications. Unmanned vehicles are often driven using controllers that are specific to the unmanned vehicle or universal controllers. Forinstance, an SUGV® is often controlled by an SUGV® controller or by an Xbox® controller. A controller that's specific to the unmanned vehicle requires training for a user to find out the way to operate the controller. For users who operate multiple sorts of unmanned vehicles (e.g., military personnel), learning a replacement controller for every unmanned vehicle can become time consuming and dear. Users who operate multiple unmanned vehicles are susceptible to make controlling errors because they're likely to confuse the varied controllers during a high situation. Unmanned vehicle controllers are often large, bulky, and heavy, making it difficult to hold the controllers from place to put. An outsized controller typically requires an outsized amount of power, making battery life short. Additionally, unmanned vehicle controllers are often expensive. Therefore, a universal unmanned vehicle controller that's light weight and cheap is desirable.

Conclusion

We can conclude easily that, AV technologies can decrease the transportation cost and increase accessibility to low-income households and persons with mobility issues. This emerging technology also has far-reaching applications and implications beyond all current expectations. This paper provides a comprehensive review of the relevant literature and explores a broad spectrum of issues from safety to machine ethics. An indispensable a part of a prospective AV development is communication over cars and infrastructure (connected vehicles). A major knowledge gap exists in AV technology with reference to routing behaviors. Connected-vehicle technology provides an excellent opportunity to implement an efficient and intelligent routing system. To this end, we propose a conceptual navigation model supported a fleet of AVs that are centrally dispatched over a network seeking system optimization. This study contributes to the literature on two fronts: (i) it attempts to shed light on future opportunities also as possible hurdles related to AV technology; and (ii) it conceptualizes a navigation model for the AV which results in highly efficient traffic circulations.

REFERENCES

[1] Sheridan, T.B. (1992). Telerobotics, Automation, and Human Supervisory Control.

[2] Bainbridge, L. (1983). Ironies of automation. Autom., 19, 775-779.

[3] Kaber, D.B., & Endsley, M.R. (2004). The effects of level of automation and adaptive automation on human performance, situation awareness and workload in a dynamic control task. Theoretical Issues in Ergonomics Science, 5, 113 - 153.

[4] Emadi, A., Ehsani, M., & Miller, J.M. (2003). Vehicular Electric Power Systems : Land, Sea, Air, and Space Vehicles.

[5] Jones, P.D., Lister, D., Osborn, T.J., Harpham, C., Salmon, M., & Morice, C. (2012). Hemispheric and large-scale land-surface air temperature variations: An extensive revision and an update to 2010. Journal of Geophysical Research, 117.

[6] Nof, S.Y. (2009). Springer Handbook of Automation. Handbook of Automation.

[7] Massey, D.M. (1994). Space, Place, and Gender.

[8] Kaber, D.B., Perry, C.M., Segall, N., McClernon, C.K., & Prinzel, L.J. (2006). Situation awareness implications of adaptive automation for information processing in an air traffic control-related task. International Journal of Industrial Ergonomics, 36, 447-462.

[9] SM.Mohammed. 2016. Continuous Integration and Automation. International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.4, Issue 3, pp.938-945, July 2016.

[10] SM.Mohammed. 2018.Streamlining DevOps Automation For Cloud Applications. International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.6, Issue 4, pp.955-959, October-2018