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Enhancement of Landing safety for Autonomous Aerial Vehicle using Lidar Sensors.

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ABSTRACT:

Our future depends on technology, and technology is vastly enhancing with lot of inventions and innovations. This research deals with the problems facing by present generation in the context of traffic and mobility in cities. Intercity transportation in metropolitan cities. people don't have much time to waste in their cars waiting in traffic. People on earth are utilizing fossil fuels in full swing, for both domestic, commercial and transportation purposes. Petrol we use in cars and bikes is directly harmful to the environment, but unfortunately none of us are concerned. As a replacement to petroleum and diesel electric vehicles are in high demand now a days. Which bring us to our next innovation in creating electric drones which run completely on electricity that is provided by batteries. As an overview the perfect environmentally friendly and time saving vehicle is needed for current fast forward world. So solution to this problem is Autonomous Aerial vehicle (AAV). All the details regarding AAV's , their pros and cons along with few safety enhancements are clearly mentioned.

Keywords: Aerial, Autonomous, Environment, Pollution,Safety, Sensors

1. INTRODUCTION

Traffic now a days has been increased vastly, leading to excess pollution and highly time consuming. corporate people don't have time to waste, in that scenario aerial transportation is the best means of transport. Recent years have shown that Autonomous Aerial Vehicles (AAV), commonly termed "passenger drones", have the potential to become a game changing technology of the 21st century. Drones combine three key principles of technological modernity - data processing, autonomy and boundless mobility. Now-a-days, the usage drones is being vastly increased from surveillance/sensing missions to novel forms of logistics and passenger transportation. Unlike conventional transportation modes like Car or aeroplanes, UAM (urban air mobility) system requires a centralized remote command-and-controlled platform to perform multiple tasks autonomously. So, with the help of computer programs and cluster management techniques, the platform is able to control the flights of thousands of UAM vehicles simultaneously. Specific flights are coded, registered, executed and monitored to ensure safety, efficiency and quality.

In this context, Aerial Transportation means Transportation through the highly advanced Autonomous Aerial Vehicles (AAV's) also shortly known as Passenger Drones. Which are operated by command control (as of current technology) by the remote system and can accommodate 2 passengers. Due to safety issues, currently these AAV's and UAM's are operated from a central command control units in respective cities but we can expect manual functionality of these vehicles in the near future. Then with these manual functionality the cost can be much lower which will be economically benefitable for a common man.

1.2 Literature Review

Passenger drones, air taxis, flying cars and e VTOLs are just a number of the popular names currently being used to refer to unmanned vehicles which are being designed to carry humans in the future. With all these names being thrown around it's becoming difficult to distinguish between what an air taxi is versus a flying car, whether there can be one name for all of these devices and if so, why all these different names are being used interchangeably? The answer, as always, lies in the details. All of these platforms have one main thing in common: they are designed to carry humans. Therefore, the term that most accurately describes them under one umbrella and without any specification limitations (e.g. regarding energy sources, configuration etc.) is passenger drones. What makes an aerial vehicle passenger drone?

There are several levels at which it is possible to distinguish between different aerial platforms being designed to carry humans. The very first level is whether they are piloted/manned or unpiloted/unmanned. Looking at our framework *all* drones which are designed to carry humans but not be piloted are passenger drones. Important to note here is that even though many platforms aim to fly unpiloted in the future, today they are still manned. In order for this to change, full automation is key. Once truly autonomous solutions are made available and once these are certified according to aviation standards, passenger drones will be able to fly humans with no pilot involvement. As the industry grows and a private market develops, any passenger drone will

also have the option of becoming a private flying device, depending on what market the manufacturer seeks out for their platform. However, given how young the industry still is, this is not yet the case.

1.2 Motivation for Research

The term "Autonomous Aerial Vehicle" (AAV) was first created by EHang, a China-based UAM firm that launched the EHang 184, the world's first AAV at C E S in L as Vegas in 2016. Powered by eight 12kw electric motors and remotely controlled by a computer platform, the EHang 184 can carry one passenger for a 20-minute flight. Basically, the AAV was built upon the principles of "safe, smart, platform controlled, connected and eco-friendly". AAV Stands for Autonomous aerial vehicle which means it is a type of aerial vehicle which runs autonomously without the help of onboard pilot. Unlike conventional transportation modes like cars or airplanes, a UAM system requires a centralized remote command-and-control platform to perform multiple tasks autonomously. With the help of computer programs and cluster management techniques, the platform is able to control the flights of thousands of UAM vehicles simultaneously. Specific flight tasks are coded, registered, executed and monitored to ensure safety, efficiency and quality. Thus, complex traffic situations become manageable. Despite of all those wonderful features still autonomous aerial vehicles needed to be improved in particular aspects like emergency landing at any kind of place irrespective of its geography.

2. METHODOLOGY

2.1 Environmental Safety

Pollution cant be reduced by reducing usage of petroleum products like petrol, diesel, gasoline, kerosene for daily commutive vehicles like cars and bikes. Usage of these vehicles can be vastly reduced by opting electrical vehicles over fuel vehicles. We are now living in a generation where we can see fully developed electric cars. Not only manual but also we can see autonomous electric cars with are eco-friendly and much more cost efficient compared to fuel cars in long run.

2.2 Passenger Safety

These passenger drones are effectively used in transportation, but are facing some problem at the time of landings, especially in emergency time(medical issue, etc). So, if we are able to develop it by providing some geographical mapping sensors which can detect the plain or empty space on land or on a building, it would be useful for landing not only at specified parking places, but also at the traveller's wishpoint.

2.2.1 Geometric Mapping Sensors

Remote sensing is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance (typically from satellite or aircraft). Special cameras collect remotely sensed images, which help researchers "sense" things about the Earth. Some examples are 1.Cameras on satellites and airplanes take images of large areas on the Earth's surface, allowing us to see much more than we can see when standing on the ground. 2. Sonar systems on ships can be used to create images of the ocean floor without needing to travel to the bottom of the ocean. 3.Cameras on satellites can be used to make images of temperature changes in the oceans.

Some specific uses of remotely sensed images of the Earth include 1.Large forest fires can be mapped from space, allowing rangers to see a much larger area than from the ground. 2.Discovery and mapping of the rugged topography of the ocean floor (e.g., huge mountain ranges, deep canyons, and the "magnetic striping" on the ocean floor).

2.2.2 LIDAR Sensor

In this world full of advanced technologies, there are many sensors which are readily available for conducting remote sensing. LIDAR(Light Detection and Ranging) sensors which are used to detect surface of earth and its geography. Velodyne's latest sensor was engineered to be an optimal automotive-grade lidar solution for Advanced Driver Assistance Systems (ADAS) and autonomous vehicles, and is priced at only $100. Many carmakers and tech companies believe that lidar is a key component of future autonomous vehicles, which explains why suppliers have been putting in serious efforts to develop more cost- and size-efficient lidar sensors. A recent addition to the list of small and cheap lidar sensors for autonomous systems is Velodyne's Velabit, that is their smallest lidar sensor to date in their portfolio.

3. CONCLUSION

Technology wise autonomous aerial vehicles can be considered as revolutionary ideas and one of its kind innovations in 20th century. This has raised the standards of the aviation industry all around the world. With minor changes and advancements in its design and equipment this can be a game changing innovation which can fulfil dream of many common people to board a flight at low cost and at very affordable prices at that same time which is much more safer when compared to other aerial vehicles. Even though it's a little costlier but with this acceleration in evaluation of technology and with the above mentioned solutions we can expect much more efficient, cheaper and safer aerial vehicles in the near future

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