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Technological Improvements of Surveillance Drone

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Abstract- The focus of the project is to create new approaches and to the study of the new technology through the use of innovative aero- space technologies and to create a drone which can fulfil different requirements of the industry the presented article analyses, adopts and develops new solutions with regard to the aerial electric supply solutions for operational surveillance drones. This article proposes a number of innovative new usages and original solutions for continuously operating surveillance drones on a predefined path or around a predefined perimeter and, afterwards, steps are discussed which have to be followed to provide ingredients and end-to-end systems in order to transform this project into reality i.e., the aerial electric supply of surveillance drones. The presented article analyses, adopts and develops new solutions with regard to the aerial electric supply solutions for operational surveillance drones. This article proposes a number of innovative new usages and original solutions for continuously operating surveillance drones on a predefined path or around a predefined perimeter and, afterwards, steps are discussed which have to be followed to provide ingredients and end-to-end systems in order to transform this project into reality i.e., the aerial electric supply of surveillance drones. The presented article analyses, adopts and develops new solutions with regard to the serial electric supply solutions for operational surveillance drones. This article proposes a number of innovative new usages and original solutions for continuously operating surveillance drones on a predefined path or around a predefined perimeter and, afterwards, steps are discussed which have to be followed to provide ingredients and end-to-end systems in order to transform this project into reality. I.e., the aerial electric supply of surveillance drones. The presented report analyses, adopts and develops new solutions with regard to the aerial electric supply solutions for operational surveillance drones. This article proposes a number of innovative new usages and original solutions for continuously operating surveillance drones on a predefined path or around a predefined perimeter and, afterwards, steps are discussed which have to be followed to provide ingredients and end-to-end systems in order to transform this project into reality i.e., the aerial surveillance drones. Now days because of increase in modern technology there is equal growth in automobile this will creating huge amount of traffic jam, sound pollution and air pollution. In this situation lots of time gets wasted to reach one place to another place. Drone/quadcopter is a flying robot which is unmanned aerial vehicle (uav), controlling from ground with wireless remote. It has flexibility of tack-off and landing with wide range. To fly or operate drone rc controller is used and camera is used to send capture or record its audio-video visuals. We can use unmanned aerial vehicle in various sectors like disaster rescue, industry for delivery of material in lesser time, agriculture to check the condition of crops and the military use has gowned up as per the capability of drone to operate in critical region while keeping their operators at safe distance.

Keywords- serial electric, lesser time, agriculture etc.

I. INTRODUCTION

As in 2022, drones (radio-controlled unmanned aircrafts) are the hottest consumer product. In last few years, a true revolution occurred in terms of the hardware and software used in both the manufacturing process and in controlling drones. This has made these devices easier to manoeuvre, able to fly more, be safer and able to obtain video footage and high-resolution photos at a professional level. The commercial drones' space is projected to become a multi-billion- dollar industry over the next ten years. Business insider intelligence published a report in January 2014 that predicts "there will be $98.2 billion in total cumulative drone spending over the next 10 years, with $11.8 billion of that spending falling into in the commercial space". The surveillance of maximum security areas using professional drones is a very hot topic this year also. For example, railway and land transport security is using, among others, cutting-edge technical solutions such as the using of drones for aerial surveillance.

The aerial video surveillance enables authorities to have access to real-time monitoring of various sites and serves to detect and limit different types of incidents which would otherwise adversely impact the integrity and availability of their systems.

However, video surveillance by drones can be also used for industrial perimeter security, work site inspection, oil & gas pipeline inspection, power grid or nuclear plants inspection or border security patrol, in areas such as the border between the United States of America and Mexico. On this border, drug trafficking and illegal immigration still constitute huge challenges. This is also increasingly the case for Western Europe, where waves of immigrants from syria and afghanistan continue to arrive both by sea and land.

The use of drones for asset management and infrastructure inspection has recently increased at an exponential rate due to the cost- effectiveness of drone services, accurate image capturing through infrared cameras, and data analysis and prediction through machine learning (ml) technology. The market data collected through drones can be used to identify and predict defects such as corrosion in structures, coating failures, and any other structural damages. The oil and gas industry are largely focusing on the inspection and monitoring of rigs as they require regular checks for better performance and safety. According to our study, the global oil and gas industry invests around usd 50.76 billion yearly to monitor onshore and offshore pipelines.

II. METHODOLOGHY

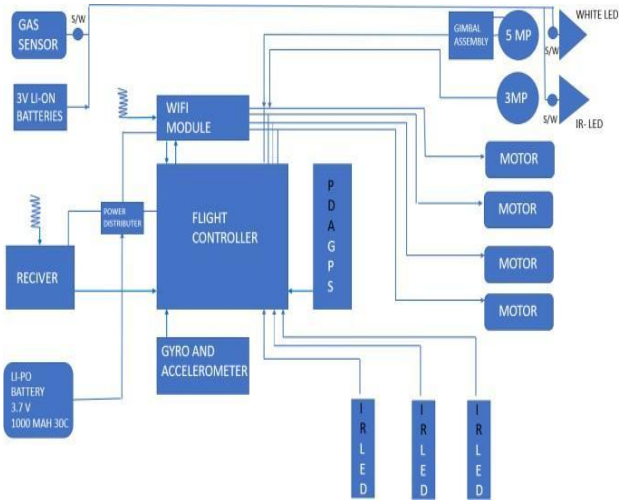

Fig 1. Block diagram of drone circurity.

Quadcopter use for motors with four propellers to make thrust to offer the craft carry. Two of the motors rotate counter clockwise and the other two rotate clockwise. This configuration causes the force from every motor to cancel by the corresponding motor rotating the other direction.

The different about quad copters from other vertical take off and landing aircraft (VTOL) is that in order to control pitch, yaw, and roll the pilot uses variable thrust between the four motors.

Each rotor produces a thrust and force concerning its centre of rotation, as well as a drag force opposite to the vehicle's direction of flight. If all rotors are spinning at an equivalent angular rate, with rotors 1 and 3 rotating clockwise and rotors 2 and 4 rotate counter clockwise and hence the angular acceleration concerning the yaw axis, is precisely zero, that mean there is no need for a tail rotor as on standard helicopters.

Yaw is elicited by mismatching the balance in mechanics torques. Schematic of reaction torques on each motor of a quadcopter aircraft, due to spinning rotors. Rotor 1 and 3 spin in one direction which is clockwise, where as rotor 2 and 4 spin within the wrong way, produce opposing torques to control aircraft. A uad rotor adjusts its altitude by applying equal thrust to all four rotors. A quad rotor adjusts its yaw by applying more thrust to rotors rotating in one direction. A quad rotor adjusts its pitch or roll by applying more thrust to one rotor and less thrust to its diametrically opposite rotor

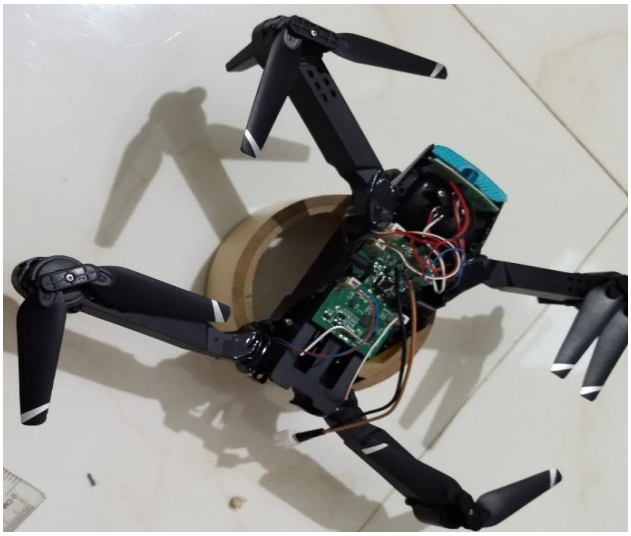

Fig 2. Drone project under work.

Aircrafts are able to rotate in three different dimensions: roll, pitch, and yaw. We'll cover each one, but to start, "yaw" refers to the direction the front of your drone (or even a plane or car) is facing when rotating either clockwise or counterclockwise (or left and right if you prefer) on its vertical axis.

The second dimension an aircraft can move in is called "pitch." The pitch means the drone tilts upwards or downwards based on its orientation and the location of its nose. A downwards tilt will move the aircraft (drone in this case) in a forwards motion, while an upwards tilt will move it backwards. This moves the drone to the sides,

causing it to "roll." However, it does not cause the drone to change its altitude position. These "rolls" cause the aircraft to move to the right and the left on its horizontal axis.

Table 1. Component specification.

Sr.No.	Parts	Specifications
1	Frame	190mm × 130mm
2	Propellers	5×4.5inch
3	Cordless motors	30,000rpm

This project is based on techniques and methods already being utilised, but we try to gather this technology's and mix them to form a uav which is able to fulfil different aspects of industries.

1. Gas sensors:
Gas sensor converts the components and concentrations of various gases into standard electrical signals by using specific physical and chemical effects. It has been widely used in the detection of noxious and harmful gases and natural gas leakage. A drone is able to watch or sometime even record visual images and sounds and is successfully meant to send this information to the operator but their still exists some substances which a drone cannot inspect with any high-quality camera and microphone and it's the gases. This project is equipped with a mq-2 sensor which is successfully able to detect smoke, cng and lpg gases if present any, in the inspection zone. The gas sensor on the project lights a blue blinking led and a high pitch clicking buzzer sound when actuated due to any gases.

2. Led:
Generally all drones in the market are equipped with different colour leds and they are mostly for showing the on/off status of differentcomponents on the drone. Some drones are equipped with white flash leds at the side of the camera to make the camera able to watch the surrounding's at the dark. This project has each led set equipped with a manual control switch so as the battery on the drone can be utilised as required. Also turning all led switch to off helps the drone, not to get detected by any blinking or steady flash light of leds.

3. Night vision:
Ir leds are not visible to normal eyes but can be seen in the camera; ir leds consume nearly same space and energy as that of any white leds. Camera which is able to appropriately see the ir flash, should not have an ir filter in the camera assembly module, removing ir filter from any camera module makes its picture quality low compare to any same other standard camera.

4. Obstacles avoidance:
The drone has a different set of ir led sensors on the motherboard itself which can also be turned on/off through a switch present on the remote controller. This set of leds when turned on helps detect any obstacle in air and move the drone against it so as to avoid collision.

5. Wifi module:
Drones are equipped with wi-fi module and this wi-fi system helps control different features and components on the drone.

6. Battery:
Generally all drones are powered by a lithium polymer battery which is high in power output; the project has two batteries equipped one for the drone operation which is a 1000mah 30c li-po battery and other 9v li-ion for the auxiliary systems. As said li- polymer batteries are best suited for drone operation it's not best suitable for other auxiliary system. So, a different yet light weight battery is used for other systems, i.e.- li ion battery.

7. Software:
Now days each digital system and devices can be upgraded on the software basis if it contains any. Software helps to continuously advancement of any device and helps improve its ability time to time. Software also helps to add some ai features on the devices which can easy the task of the operator. This drone is added with auto-follow feature, v- self and palm indication auto photo capture. This software can further be developed to detect faces of different peoples and also follow them particularly and also be developed to measure or inspect construction sites, farms, forests, if enable with some advance software upgrades, as that of tesla model cars which particularly only used cameras for self- driving capabilities.

III. PROBLEMS AND ITS SOLUTIONS

The most highlighted problem on the drone is its li-po battery, the battery is only able to provide a flight time of 6 to 10 minutes which varies according the handling of the drone. We use a 1000mah 30c orange li-po battery which also required a proper li-po battery charger to charge the battery in the safest manner.

To over this problem we have a simple option to change the battery with a more ratting capacity of battery, but as tried doing so in real practice we found that the extra power rating battery comers with extra weight which then disturbs the overall stability of the system. So if a new battery with a high ratting is used then we will also need to improve the motors and the propellers to carry the extra weight and improve the stability of flight of the drone.

Another problem faced while testing the drone was the interference of the commands, as the drone was able to operate and control both by remote controller and wifi devices, giving the drone commands from both the different modes at the same time would make the drone connection lost with both the remote and the wi-fi.

To avoid this interference of the the control systems, we should try – when operating the drone through remote controller the wifi device should be only use to view the camera footages. And when the wifi device is used to operate the drone the remote controller should be turned off or disconnected.

IV. LIMITATIONS

Our drone project comes under nano categories of uav and is directly allow flying at permitted places, but as discussed in the problems increasing the drone's battery and motors will change our drone from nano to micro categories. And micro drone needs unicque identification number and digital sky for flying permission

Li-po batteries are highly dangerous if not used properly, and we had a situation will charging the battery, where the battery started to smoke due to improper charge rate monitoring.

V. RESULTS

The drone had performed excellent when the entire project was completed, and all the problems has resolved. Both the cameras provided live time footage with no lag in time and were clear as expected. The drone was easily able to manover in all directions and accepting all the commands from the operator. The drone speed and stability in all x, y and z axis was well performed.

Operating the drone through wi-fi device was also as easy as operating through the remote control, but one needs to train well himself / herself before getting hands on exploring all the driving capabilities of the drone. Videos and photos taken through both 5mp and 3mp camera were clear and the drone was successful to monitor it from a height also.

At a particular time will flying the drone at 30% power, the winds got fast and started to move the drone in the direction of the wind. And it was quickly able to fly against the wind by only changing its capacity to 100%. The drone performed good even in the winds and was even stable with the same mode of power in the winds.

VI. FUTURE SCOPE

Drones or unmanned aerial vehicles (uav) are robots that can fly autonomously under their embedded systems which use remote sensing, software development, gps etc. Such amalgamation promises a great future for extensive use of drones in providing services especially in areas that are remote or cannot have humans serving physically. They had been in the nascent stage up until now; however, mass adoption of such services will see a huge uptick in the future. Increased work efficiency and productivity, decreased production costs, improved accuracy, refined service, better customer relations and security are a few major advantages that drones offer industries globally.

According to the drone industry insights report 2020, the worldwide drone industry is predicted to increase at a 13.8 percent cagr to $42.8 billion by 2025. With ministry of civil aviation updating the drone rules 2021, efforts are to make India a global drone hub by 2030. By 2025, india is anticipated to be the world's third-largest drone market, according to the results. The unmanned aerial vehicle market in India is expected to grow at a cagr of 20.9% between 2020 and 2026 which further gives us an estimate on the investments from industrial conglomerates, chip companies, it consulting firms, etc.

Uav have a huge scope of development in the below mention fields

- **Logistics:** heavy-duty drones can replace trucks for inventory management and moving goods between warehouses. This is likely to decrease the number of semis you see on the road.
- **Filmmaking and photography:** low- budget filmmakers are already using drones to capture the aerial shots and hollywood will soon be hiring full crews of drone unmanned aircraft are also gaining ground with photo journal is who want to capture breaking news from above.
- **Isps:** big tech companies like facebook and google are experimenting with solar powered drone technology to beam internet to remote locals. This could transform connectivity as we know it

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