



The Future of Aerial Surveillance: Drone

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Abstract. In a world like today with technology soaring high and amidst the rush to create and evolve, there is the utmost importance to incorporate aerial surveillance in defense in a way that contributes to the manpower of our Indian Army without incurring any losses in our troops. Through the means of this paper, I, as an adept citizen of the nation brings forward the ways and means through which a Drone can serve as a one-man army on the battlefield and will make our counterparts taste the bitter essence of defeat. This is our bit of contribution towards the avid and dedicated Army of the nation which stands strong and firm on their ground to ensure our safety. As the various layers of this paper will unfold, our readers will come in terms with the technologies that we have incorporated along with a precise and crisp comparison of our idea with the one available in the market. Our main purpose and idea surge around to create a feasible, affordable and efficient system of Aerial Drone Surveillance which will replace every other of its sort. We also provide our fragmented idea and extravagant system to serve in both private as well as government institutions.

INTRODUCTION.

In a world like ours, technology has reached heights which are still unfathomable to many. At an impalpable pace, Humans have managed to combine their psychic strengths into machines and perfectly coordinated systems to thereafter form a formulation which could benefit the human race as a whole. What's more than human than finding ways to live a better life, with utmost security and stability? And for that, innovation has to meet technology.

And this is exactly what we have intended to do and create. Drones are now a part of military and defense surveillance. We can also witness its contribution towards civil Purposes. Let it be for navigation, military attacks, civil surveillance, and undercover missions or just to keep a track of visual advances around us, Drones have always proved to be efficient in its working and purpose. And now we are all ready to take it up to the next level. But not many of know that the use of Drones in the battle field, of any kind, is formulated only in the USA and Israel. India still lacks behind in reforming this technology into its slot. Our country is a firm believer of peace and sovereignty as a whole but rigorous situations in life don't come knocking at the door, its barge in and knock everyone down. So it's best to stay prepared beforehand and this paper with a detailed description and formulation involved in Aerial Drone Surveillance Is an urge to encourage the officials of our country to incorporate this technology in the best way possible. The paper includes the various materials which are of utmost importance, along with a comparison and calculations involved. Dive in to venture in closely knitted paper of practicality and feasibility.

Analysis and Prerequisites

Anything in the whole of universe which is visionary and is created to bring about a change also has its own sets of consequences. As we all must have heard – Everything comes with a cost. And this systematic culmination of ideas to introduce Drones in military and civil surveillance also comes with risks and threats, some are concerning while others are not as much. Let's start by the analysis of what could be pros of this project, gradually we shall stumble down to the cons as well.

Flag bearer of various Opportunities – Pros.

- Is created in a way that is fit to replace the manpower on the field, and act as a perfect alternative. It can be used in times of civil wars and attacks. Military empowerment by a dystopian party of the country's counterparts.
- The drone can serve as the ideal choice for spying and keeping a track of the enemy's visual activities, its compact size and ability to record from a certain distance makes it oblivious to the eye of the enemy.
- Rare to this kind and form, this drone incorporated a special feature which is deliberated and thought over, HHS.
- The overall structure and detailing of the drone is such that the drone excels in recording videos and clicking photos to a much detailed resolution as well as from a certain distance.
- This unmanned and fierce option of potential surveillance will take up its deserving space and time in the slot of the Indian Army, for whom it is basically brought to life. The drone will manage to impart complete functionality in difficult terrains and weather. Unlike other of its kind which fail in its purpose when there is adversities in weather, this one would surely not disappoint you.

Weaknesses and flaws – Cons.

- Like a warrior requires to be warmed up and on the track before he gets down on the battle field to make the opposing party taste defeat, similarly this drone would also require a minimum time 3 hours to get fully charged and spiked up to unveil its strengths on the field. It goes without saying but the drone will not function properly if handled by an unskilled person. Only a person who understands the mechanisms and fraternity well can deal with this system to a wider extent.
- The drone might and has a high probability to lose the functionality if it reaches out of the range. The item would resolve all the purposes when it is made to function within the specified rates and in any other circumstances the drone will pop up with certain lapses in the performance for obvious reasons.

Design and Structure

1000 kW Motors

The role of motors in a drone is to provide an upward thrust which is required for the drone to take flight. Usually, the power and number of motors which are applied in the drone depending on the mass of the total weight of the drone, including the internal system as well. In this drone, the formulation of the perfect thrust and pressure, we have used 4 motors if the same specified power.

30A – ESC.

An important device to produce the linear power output. It transfers the electricity from the source to the motor to kick start the functioning. The device also looks upon the battery voltage and draw a parallel to the power of the motor. In our quad copter (drone) we have made use of a 30 A- ESC which works without fail and risks.

Fly sky - CT6B

This entry level 6 – channel transmission is worth the prize that comes along. An entry level radio transmission device which is primarily used in quad copters or multi copters which need a 6-way transmission medium. The radio has a light weight which suits the overall flight of the drone. The device also has a way to easily switch between 5 – 6 channels.

Electric detonator

Now, we can't imagine our drone to work without an electric detonator, can we? The electric detonator is required as the driving force of the drone. Responsible for igniting the base charge of the system and lay the first stone to the functioning. We have kept in mind the measure and power of the electric detonator as sometimes that may lead to a series of combusive processes in the done and may cause function failure.

Camera

We have fitted a high resolution and focused camera which is capable of recording extravagant videos and photos, this property and inheritance makes the drone an ideal choice for spying and to come in assistance to keep a visual record of incidents. This also makes it a perfect alternative for civil purposes. And even when a certain region of the country is knocked down by a natural disaster and when it is almost impossible to send people to keep track and record, in such a case these drones will prove to be highly beneficial.

We have also made use of 1.5 Fly controller, propellers, a 12V battery and an aluminum pipe to make the overall structure whole and firm. The propellers are made to spin by the power of the motor, the rate at which the motor spins them determines the rate at which the propellers spin the drone. The battery is customized to a range which can withstand the functioning of the entire drone. *Basis of Functionality and Modifications.*

There is no exaggeration and naivety about the current situation of the World. The whole of human race is stuck in a crisis which is still unfathomable to cope. Though measure are been made and precautions are undertaken but COVID 19 is still feeding over people and has taken almost all forms of life into its clutches. Now, through below- mentioned paragraphs, we would like to highlight how our drone will prove beneficial in times like these –

Our drone incurs a property of Auto ignition, which will help it to combat and spread the disinfectants and anti-viral doses in the air through this mode. Not just this, the drone also consists of a compartment in its compact structure which can contain rocket sized containers, these are customized to contain disinfectants and antiviral drugs.

In rigorous situations like such, we can make use of technology in the correct way. It's nowhere close to being safe to send people close or in the containment area. It will be almost like adding more to the trouble and sufferings to humans. But this precisely culminated drone can be sent to launch these rockets into the air which will kill the virus which sits on surfaces and make it less dangerous for people who aren't carriers of this deadly virus. It's an idea which could prove to be revolutionary without any casualty or harm on anyone.

Furthermore, we have included a WIFI camera in our drone which has the features of ZOOM IN and ZOOM OUT, these features prove really beneficial to click photos in difficult terrain and also, all the photos which are clicked get automatically saved in the mobile phones through an app. Our drone shall never suffer a setback due to darkness in any level, and to make sure of it we have added a night vision mode which will enable our drone to function perfectly well even in the absence of an external source of light.

Our drone functions on the integrated collaboration of the propeller direction and drone's motor rotation and speed. Through the Electronic speed control circuits, the flight controller sends data regarding the thrust to the motors. The data is also signaled to RPM and direction control. Before thrust and rotor speed, there is another major phenomenon that takes place that is combination of IMU, GYRO AND GPS.

By the notion of gravity, flight and action-reaction, our drone sets to motion and action. The 4 motors put focus on all weight, lift, thrust and drag. All of them are the key functions of a drone, whose proper culmination is required for any drone to work. And in ours, we have made sure of it. Aerodynamics and mathematics are important subjects, on which stress was given while design of propellers and the mobility of the drone.

Comparison of Functionality.

Now we would like to draw a parallel of our drone with the ones that are already available in online markets and tech stores. This would provide a better understanding to potential buyers and officials, it could also help them to get a better insight as to how our drone is much better and efficient in functionality than the ones which are already available. Coming to cost, the market drones cost round 5,000 rupees and includes only the basic functions like camera for recording and clicking photos. Whereas our drone is built to Perfection and consists of all feature and devices like controllers, receivers, firing options, rocket space and cameras, it cost around just 25000 with all functions intact.

The market drone is manufactured with poor quality fiber where as our drone is built with aluminum, which increases the durability and efficiency of our system. For any machine to take flight, it must be assured that it incurs an appropriate keeping this in mind, we have built the drone in a manner that it weighs only 500 grams whereas the market drones 600 to 700 grams. Our drone also consists of Autopilot mode if it exceeds its range, along with an indicator that will let the handler know of the matter. Our drone, unlike the rest, is fit to work and out to action in DRDO and surveillance both. Our drone leaves and behind the one available in the market in every justified point. Let it be the cost structure, range, and compactness of size and system, autopilot and auto-ignition modes, high

EQUATIONS AND FORMULAS.

We will now describe the formulas and equations which are brought to use in the formulation and accumulation of the drone. The first being the thrust required in the drone, further equations describe the vertical and forward acceleration.

Drone thrust is the amount of upward force your drone can produce when at full throttle. You are probably not the only one with a juvenile snicker when reading “thrust” so many times, so let’s just get it out of the way. The amount of thrust a drone generates tells you how much the drone can lift. If a drone’s thrust is less than the weight of the drone then you don’t have a flying machine, you have a paperweight.

$$T = (2\pi R^2 \times \text{air density} \times (\text{propeller constant} \times (\text{rpm})^{\text{power factor}})^2)^{\frac{1}{3}} \quad (1)$$

$$y = y_0 + v_0 t + \frac{1}{2} a t^2$$

The position of an accelerating object depends on both time and the square of the time

$$F_{\text{net-y}} = m a_y$$

Substituting the mass (**m**) of the drone and its vertical acceleration (**a_y**), we can find the effective *net* force in the vertical direction with this force-motion relationship.

$$F_T = m a_y + m g$$

The upward thrust force, **F_T**, and the downward gravitational force, **mg**, which is mass times the local gravitational field **g** (9.8 N/kg). So **F_{net-y} = F_T - mg**.

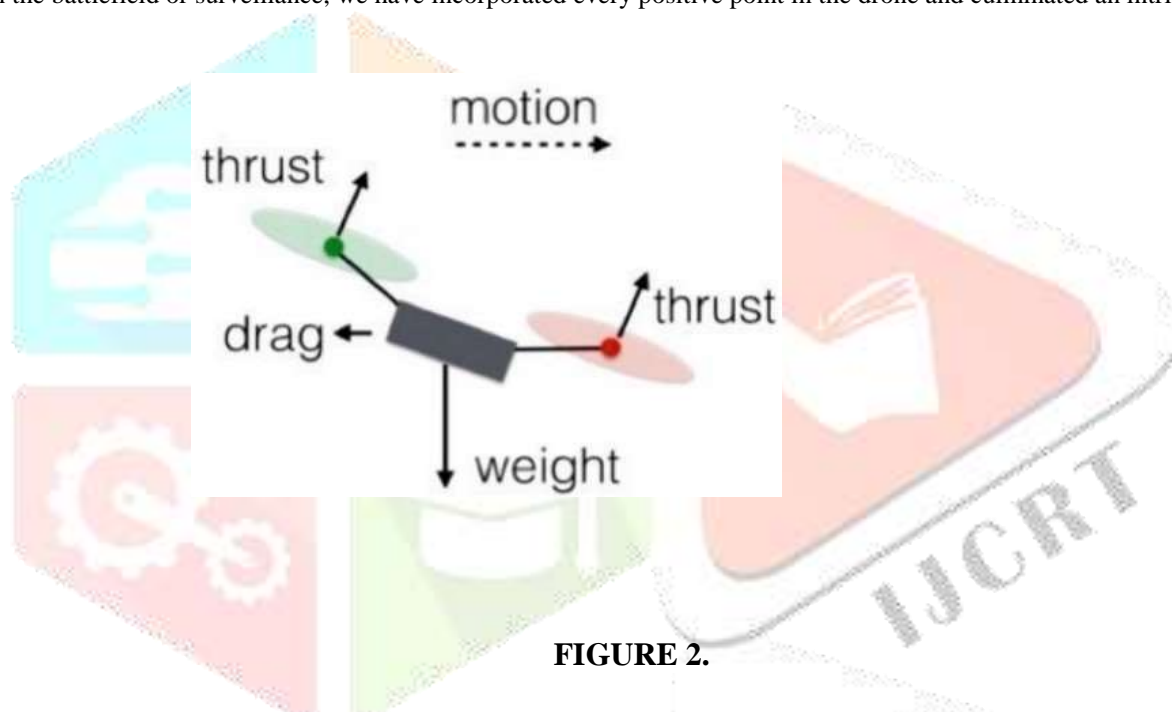
OTHER SPECIFICATIONS

Coming to the comparison between our systematic drone and the one already available in the market, we will now draw a parallel and distinguish the points that make our drone more feasible and efficient in various levels. The calculations so made are intricate and foolproof, we have considered various factors which are entitled to be considered.

Insights and Images

**FIGURE 1.**

As the comparison figure indicates, our drone leaves and behind the one available in the market in every justified point. Let it be the cost structure, range, compactness of size and system, autopilot and auto-ignition modes, high-resolution camera, ability to prove as an alternate of manpower in the battlefield or surveillance, we have incorporated every positive point in the drone and culminated an intricate piece of use

**FIGURE 2.**

The figure demonstrates that the drone uses rotors for controlling the device. There are majorly 4 functions that the drone can perform - descend, hover, climb. The functionality of the drone depends on how fast the rotors spin, the faster it does, the higher is the drone lifted from the ground level.

ACKNOWLEDGEMENT

I thank my colleagues from ITM Vocational University who provided insight and expertise that greatly assisted the research, although they may not agree with all of the interpretations/conclusions of this paper. I thank Prof. Edward Bernard for assistance with his guidelines and support. Prof. Kalpesh Parekh for comments that greatly improved the manuscript. I would like to thank 3 “anonymous” reviewers for their insights. I am also immensely grateful to my friends for their comments on an earlier version of the manuscript, although any errors are our own and should not tarnish the reputations of these esteemed persons.

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