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DESIGN AND FABRICATION OF FIRE EXTINGUISHING DRONE

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ABSTRACT—The drone commonly known as Quadcopters are operated through remote control system to fly independently. Currently, most of the drones marketed to civilians are rather simple in that they can only perform one task – typically surveillance or video recording of some sort. The goal of this project to build a quadcopter that can accomplish a variety of practical tasks like fire extinguishing, bridge inspection and police surveillance. The market for multipurpose drones has the potential to be expansive once proper FFA regulation is passed. Aerial drones, like quadcopters, have a largely protective effect on the users. This project work focuses on the extinguishing of small fires remotely with the use of a quadcopter to help prevent injuries to firefighters and potentially even more people, to help prevent very serious or even fatal accidents incurred by inspectors when proper safety precautions are not taken while inspecting bridges, and to help the police and other law enforcement officers maintain a level of safety when certain circumstances warrant a possible need for an aerial drone to provide surveillance of these situations. In this drone we attach auto fire off (AFO) ball with the help of clamping device which throw the ball in a fire. Advantage of AFO ball we can easily carry out ball compared to water.encouraging results.

Keywords-*; FFA, AFO*

I. INTRODUCTION

An unmanned aerial vehicle (UAV), commonly known as a drone, is an aircraft without any human pilot, crew, or passengers on board. UAVs are a component of an unmanned aircraft system (UAS), which includes adding a ground-based controller and a system of communications with the UAV The flight of UAVs may operate under remote control by a human operator, as remotely-piloted aircraft (RPA), or with various degrees of autonomy, such as autopilot assistance, up to fully autonomous aircraft that have no provision for human intervention. Hexa-copters generally use two pairs of identical fixed pitched propellers; two clockwise (CW) and two counter clockwise (CCW). These use independent variations of the speed of every rotor to realize control. By changing the speed of every rotor it's possible to specifically generate a desired total thrust; Hexa-copters differ from conventional helicopters, which use rotors that are ready to vary the pitch of their blades dynamically as they move around the rotor hub. In the early days of flight, Hexa-copters (then referred to either as 'Hexa rotors' or simply as 'helicopters') were seen as possible solutions to some of the persistent problems in vertical flight. Torque-induced control issues (as well as efficiency issues originating from the anti-torque rotor, which generates no useful lift) are often eliminated by counter-rotation, and therefore the relatively short blades are much easier to construct. Several manned designs appeared within the 1920s and 1930s. These vehicles were among the primary successful heavier-than-air vertical take-off and landing (VTOL) vehicles. However, early prototypes suffered from poor performance, and later prototypes required an excessive amount of pilot workload, thanks to poor stability augmentation and limited control authority. In the late 2000s, advances in electronics allowed the assembly of cheap lightweight flight controllers, accelerometers (IMU), global positioning systems, and cameras. This resulted in the Hexa-copter configuration becoming popular for small unmanned aerial vehicles. With their small size and manoeuvrability, these Hexa-copters can be flown indoors as well as outdoors..

II. LITERATURE SURVEY

Drones are becoming a major part of society. From hobby drones to military devices to delivery services, more and more drones are getting used today. In fact, between 2014 and 2015, drone sales increased 63% and have only continued to rise. But like all sorts of technology, drones aren't flawless. And if you are a drone owner, it is vital to remember possible issues you'll encounter. So let's explore a couple of common drone problems and the way to repair them. In this paper the author says "force and torque were used as control variables in a mathematical model". Finally, a nonlinear optimal control problem was used to assess the hexacopter's mobility, showing the difficulties in moving the x and y coordinate directions due to the lack of actuators on those axes. Position control for a hexacopter was designed in this paper. An extra controller was added to reject the modelling error. The most common approach is to use the Failure Detection and Isolation (FDI) filter and then reconfigure the controller, but the FDI is too complicated for the hexacopter, so the controller was modified to use the Modified Linear Extended State Observer (LESO), which does not use the failure detection or reconfiguration strategy. The controller managed a safe flight, but there are still improvements to be made in terms of performance during the flight. According to

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author "the compression of a low volume aerosol in an unmanned octocopter is possible. The octocopter's primary rotor measures 3 meters in diameter and can carry a payload of 22.7 kilograms. Every 45 minutes, at least a gallon of gasoline was consumed. This research cleared the door for the development of aeronautical application systems for drones, allowing for the production of products with greater target speeds and larger Volume Median Diameter (VMD) droplets. The authors utilize unmanned UAVs equipped with cameras for site-specific vineyard management. Normalized Differential Vegetation Index (NDVI) values acquired by the Tetracam ADClite camera mounted on VIPtero were compared to ground-based NDVI values measured with the FieldSpec Pro spectroradiometer to verify the precision of the ADC system. The vegetation indices obtained from UAV images are in excellent agreement with those acquired with a ground-based highresolution spectroradiometer. The work in this journal addressed the design of an autonomous unmanned helicopter system for remote sensing missions in unknown environments. Focuses on the dependable autonomous capabilities in operations related to Beyond Visual Range (BVR) without a backup pilot by providing flight services.

Utilizes a method called Laser Imaging Detection and Ranging (LIDAR) for object detection which is applicable in real-world development. Generally, all aircraft are equipped with an IMU (inertial measurement unit), which is nothing more than a device that incorporates information from accelerometers, gyros, and an implanted controller to present accurate data on aircraft manoeuvring details as well as accelerations in all directions. Outdoor applications benefit from GPS since it provides a positional fix. GPS drift is a problem that may be overcome by combining data from an IMU or by employing a differential GPS. Navigation systems based on vision regularly choose between a single or stereo camera. Stereo vision lends itself to estimating the distance of features from the cameras via observation, whereas singlecamera systems need other distance sensors such as ultrasound.If the drone's compass isn't calibrated properly, drone users may experience the flight direction being wrong or abnormal during flight. This can also occur if the drone is fitted with a mounted flight controller and therefore the specifications are simply misplaced. This is why it is vital to offer your drone a quick inspection before each flight. Calibrating the compass can usually help solve this issue but sometimes a restart of the remote control can help. If none of those solutions work, then drone repair services could also be needed to detect the basis of those drone problems.Having a functioning battery is one of the foremost important parts of flying a drone. This is why it is vital to properly charge the battery before trying to require flight. When the drone isn't in use, it is best to store the battery during a cool, dry place — the battery shouldn't be left within the drone when it's not in use. This can help maintain the charge and increase the lifespan of the battery. Additionally, it is vital to not overcharge the battery, which may drastically decrease its lifespan. All in all, taking excellent care of the battery will ensure it lasts as long as possible.

III. APPLIICATIONS

Industry diffusion, regulation, and economics will all contribute to the standardization of drone-driven IoT's controls and capabilities. Drone makers will have a huge opportunity as a result of the use of similar tools, apps, and user interfaces. Between 2015 and 2020, the market for commercial and civilian drones is anticipated to expand at a compound annual growth rate (CAGR) of 19%. The following sectors could gain a lot from the commercialization of drones:

Mining: Drone-driven Numerous areas of mining operations, such as berm erosion, road analysis, subsidence, controlling automated ground vehicles, and security, can be surveyed and audited using IoT.

Construction: Drone-driven IoT can be used to survey build sites, monitor operations and progress, provide 3D mapping, inspect construction materials and check security.

Utilities: Drones and IoT can be used to monitor power lines, turbines, towers, and dams. Drones can also be used for security, equipment monitoring, and property surveys when IoT is included.

Delivery Services: Once rules are established and services are made available to extend operations, drone deliveries might start.

Film and TV: Already, drones are being used to equip cameras and shoot aerial photos that were previously only possible with the help of helicopters. In this area, drones have offered a less jarring and vibration-free medium.

Emergency Services: Drones are frequently utilized for accident investigation and traffic surveillance. They may also be requested to transport supplies like equipment and water as well as humanitarian aid and other logistical support tasks.

Agriculture: It will be possible to conduct aerial or orthographic surveillance of the land to spot and eradicate potential pest or fungus infection crop risks. It may be simple to detect soil anomalies like water saturation and erosion. Aerial drones might also scan fruit for sugar content and temperature variations to look for possible issues and pinpoint locations for planting crops at the best periods.

HARDWARE REQUIREMENTS:

- Multi-rotor control board
- Electronic speed controller(esc)
- Brushless dc motor
- Lithium-polymer battery
- Rf transmitter and receiver
- Quadcopter frame
- Propellers
- Servo motors
- Servo controller board
- AA batterys

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IV. BLOCK DIAGRAM

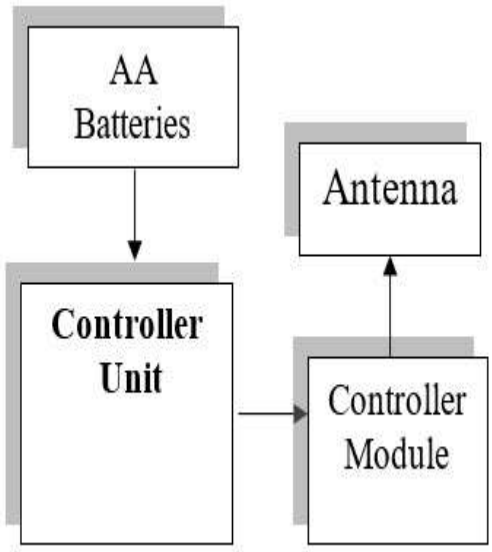


Figure 1:Block Diagram of Transmitter

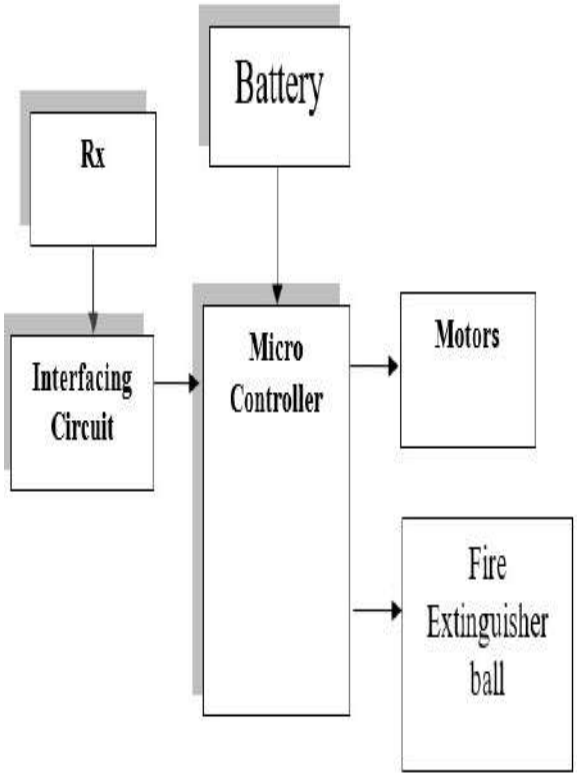
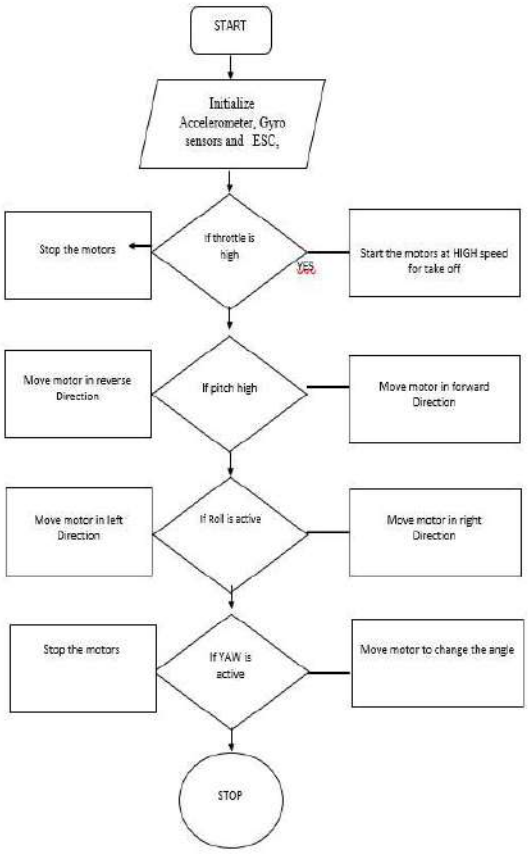


Figure 2: Block Diagram of Receiver

V. FLOW CHART



VI. SCHEMATIC DIAGRAM

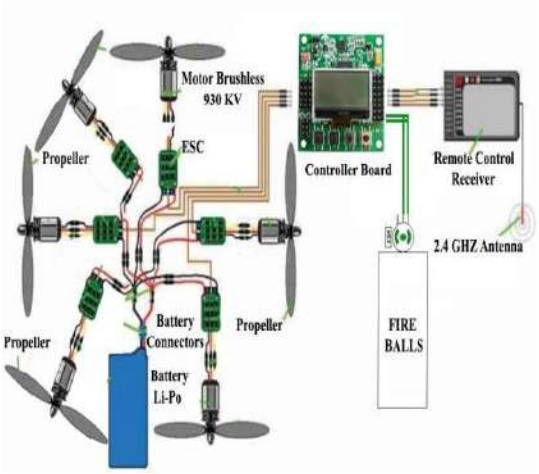


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Figure 3: Schematic Diagram Of Drone

VII. WORKING MODEL

Figure 4:Working Model

VIII. CONCLUSION

The idea of firefighter drone will help to improve the response and reduce the time required to monitor an area and help a distressed civilian. The use of thermal and normal cameras for creation of 3D area and heat model will provide valuable insights that would help the firemen to devise an appropriate plan of action that would otherwise be difficult. Human and explosives detection using cameras can help the firemen find distressed civilians. Speaker and microphone provide additional communication functionality. Using Fire Extinguisher Ball, fire in a particular area can be reduced and an entry or exit route can be created. The toxicity reports generated by the gas sensors can also help the firemen protect themselves. The cameras, sensors and other hardware used to make the drone are cost effective so that the drone would be affordable for the Fire-Fighter Department

IX. FUTURE SCOPE

Fire Extinguisher ball drop using Robotic Arm:

Fire Extinguisher Ball is used as fire extinguisher by firemen as it releases Carbon-dioxide when it burns.

Due to this feature it can then be loaded on to drone and released. This loading and releasing is achieved with the help of Robotic ARM.

This robotic arm is actually a robotic gripper which runs on a standard

servo motor which can be controlled on multiple boards like NodeMCU and arduino.The biggest challenge facing the agricultural sector right now is the ineffective crop monitoring caused by industrial farming's vast scale, which is made worse by the weather's rising instability, which raises risk and maintenance costs. In comparison to hitherto used satellite imagery, drones enable real-time surveillance at a far higher degree of accuracy and cost-effectiveness. In order to maintain crops healthy and determine yields, the drones are specifically made for this usage, providing customers with an aerial image package that is designed to track nutrients, moisture levels, and overall crop vigor. As a result, many other factors can be taken into account in the future. Drone Delivery of the Future: High-Speed, Contactless, and Accurate High-Speed, Contactless, and Accurate Drone delivery has many applications and will continue to expand in the years to come. To fully achieve this potential, businesses will need to continue to engage in drone delivery initiatives and technological advancements. Drones, also referred to as unmanned aircraft systems, are becoming more and more widespread in contemporary logistics operations. Drone delivery services move prescription drugs, packages, groceries, food, and other home healthcare supplies. Given their accuracy, environmentally friendly operations, quicker delivery times, and cheaper operational costs compared to traditional delivery channels, these drone delivery operations are becoming increasingly important in last-mile delivery. [Analysts estimate that compared to a vehicle delivery service model, operating expenses for a drone delivery service are 40% to 70% cheaper. Further accelerating the need for alternative, secure, and contactless delivery mechanisms is the COVID-19 pandemic. Due to this, demand for drone delivery services has increased globally.

Drones were first developed as military and law enforcement tools, primarily for surveillance and monitoring in the event of any targeted attacks. Since then, the use and application of this technology has expanded to a number of additional labor-intensive and difficult jobs in a variety of industries. These include inspecting the condition of crops, determining hotspots in the event of a fire, keeping an eye on mining and construction activity, filmmaking, and delivering parcels.

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