

Multipurpose Drone

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Abstract - Drone being a future technology marks its importance in industries, defense and various other fields. Due to its remarkable wide application the usage of drones is exponentially increasing. The goal of this project is to build a quad copter and develop a customized remote using which drone and its features are controlled. Drone is also equipped with fire extinguisher unit, pick and place unit which can be controlled by customized remote via wireless technology. The present invention relates to a fire-extinguishing firefighting drone which, in case of a fire at a house, a building and the like, can be rapidly deployed at the start of a fire to extinguish the fire early, and which connects to a central control center to be operated remotely as an unmanned drone. Pick and place robots are commonly used in modern manufacturing environments. Pick and place automation speeds up the process of picking up parts or items and placing them in other locations.

Keywords: Technology, quadcopter, drone.

I. INTRODUCTION

Drone stands for Dynamic Remotely Operated Navigation Equipment. A Drone, also called a quadcopter, is a multicolor helicopter that is lifted and propelled by four rotors. Most of helicopters, quad copter uses two sets of identical fixed pitched propellers; two clockwise (CW) and two counter-clockwise (CCW). Because of its unique design comparing to traditional helicopters, it allows a more stable platform, making quad copter ideal for tasks fire extinguisher and pick and place. And it is also getting very popular in UAV research in recent years.

This project serves as a solution to handling the quad copter with angular precision by illustrating how the spin of the four rotors should be varied simultaneously to achieve correct angular orientation along with standard flight operations such as taking-off, landing and hovering at an altitude. Fire is crucial for the development of human society, and it has become an important part of human civilization. Among different types of disasters, fire constitutes a significant threat to life and property in urban and rural areas. Fires that occur in homes and non-residential buildings as well as fires in wild lands cause plenty of health issues; including

death to humans and animals, in addition to great economic losses in structures, equipment and vegetation. Furthermore, the first response teams, such as fire-fighters, are exposing their lives to great risks in order to extinguish a fire.

One of the most popular ways to extinguish fires is to spray water in the area affected by the flames. The water can be delivered via hose using a pressurized fire hydrant, fire sprinkler system, pumped from water sources, such as lakes, rivers or tanker trucks, or dropped from aircrafts in the case of wild land fires. In order to help those that risk their life when a fire takes place, the living beings that can be potentially harmed and their surroundings, such as edifications and forests, to preserve the goods inside a building once a fire occurs, and to help avoid fires in open spaces. From the Literature survey, the beginning of the development of remote-controlled devices started with the invention of the radio, back in the 1880's, the development of small autonomous flying, i.e., aerial vehicles for indoor or urban applications, able to perform agile flight inside buildings, stadiums, stairwells, airports, train stations, ventilation systems, shafts, tunnels etc. is of significant importance. The development of such systems, including software, hardware, and applications, is still at a minimum.

Quad copter is a four-armed, four rotor propelled helicopter with inherently unstable and nonlinear dynamics. Though it is difficult to develop control system achieve stability, the final system develop can be very agile and with the capability of unidirectional movement much more than other UAVs such as planes and helicopter (with single rotor).

An unmanned aerial vehicle (UAV), commonly known as a drone is an aircraft without a human pilot aboard. UAVs are a component of an unmanned aircraft system (UAS) which include a UAV, a ground-based controller, and a system of communications between the two.

Drones are now-a-days are widely used around the world for a variety of purpose including aerial videography, photography, surveillance etc. In this study we propose a system of customized remote to control the drones. We investigate the use of computer vision method to develop an institute way of agent less communication between a drone and its operator. Computer vision-based methods relay on the

ability of drone’s camera to capture live video footage as well as live video.

The goal of this project is to build a quad copter and develop a customized remote using which drone and its features are controlled.

II. METHODOLOGY

Quad copter is built by assembling necessary components such as drone frame/chassis, motors, motor drivers, propellers, battery etc. and the main control of the drone is performed via drone control board where the motors are connected to it via motor driver boards.

A wireless module is connected to the drone control board which is used to receive the data which is being transmitted from the remote-control unit. Drone is also equipped with Pick and Place unit which can be used to pick necessary objects and objects can be placed in the destination location.

The controlling of pick and place unit is done via customized remote unit using wireless technology. It also can be used as a delivery drone.

It is an object of the present invention to provide a fire drone for fire suppression capable of immediately responding to fire conditions, conditions, and progress and having various functions to rescue various types of fire suppression and lifesaving.

The present invention relates to a fire drone for extinguishing fire, and more particularly, when a fire occurs in a house, a building, a building, etc., it is made so that the fire can be quickly suppressed by an initial input, and ground movement and flight movement can be freely performed. The present invention relates to a fire drone for fire suppression, which is connected to a central control system and operated unattended from a long distance.

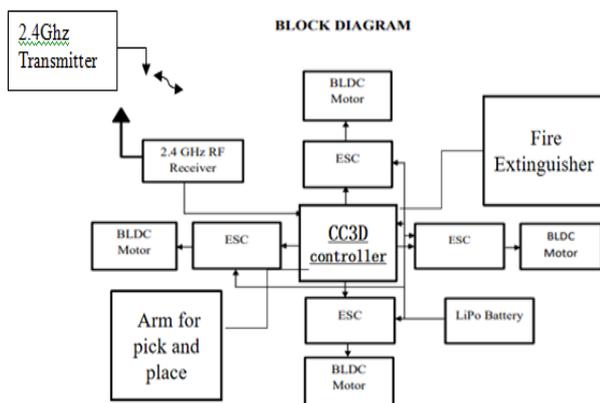


Figure 1: Block Diagram

CC3D controller

The CC3D board is an all-in-one stabilization hardware which runs the Open Pilot firmware. It can fly any airframe from fixed wing to a quad copter and is configured and monitored using the Open Pilot Ground Control Station (GCS) software. The CC3D boards have gained great popularity among UAV fans for its small volume, tidy circuit and affordable price.

DC motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current in part of the motor.

ESC (Electronic Speed Controller)

An ESC or an Electronic Speed Controller controls the brushless motor movement or speed by activating the appropriate MOSFETs to create the rotating magnetic field so that the motor rotates. The higher the frequency or the quicker the ESC goes through the 6 intervals, the higher the speed of the motor will be however, here comes an important question, and that’s how do we know when to activate which phase. The answer is that we need to know the position of the rotor and there are two common methods used for determining the rotor position.

LiPo battery

A LiPo cell has a nominal voltage of 3.7V. For the 7.4V battery above, that means that there are two cells in series (which means the voltage gets added together). LiPo batteries are fully charged when they reach 4.2v/cell, and their minimum safe charge, as we will discuss in detail later, is 3.0v/cell.

Flame sensor

Flame sensors work to minimize the risks associated with fire. There are several different types of flame sensor - some will raise an alarm while others may activate a fire suppression system or deactivate a combustible fuel line. Among the many different types of flame sensor, ultraviolet flame sensors, near IR array flame sensors, infrared flame sensors and IR3 flame detection sensors are the most prominent.

III. EXPECTED RESULT

Address the societal needs by establishing an interdisciplinary platform for the development and application of UAV drone systems for a variety of societal sectors. Within the platform, the aim is to connect and tie together established technology development (e.g. robotics, AI, image processing), research application and applications in different societal sectors to make them inform of each other. We also aim to incorporate and integrate user views and perspectives to enable the development of knowledge and innovation directed towards private companies as well as the public sector. The project is expected to result in an increased network of collaborating partners, interdisciplinary grants for research and demonstrable applications for autonomous drone operations in the selected areas.

IV. CONCLUSION

In this project, the materials and parts selection have been considered based on detailed evaluation of drones available in the market along with the considerable mass of payload to be carried. Multipurpose drone works there, where human beings are not able to reach. It is used to solve the problem of the fire extinguisher. The overall conclusion is to provide security of home, laboratory, office, factory and building which is important to human life using it.

REFERENCES

- [1] Mendoza-Mendoza, Julio, et al. "air-arm: A new kind of flying manipulator. "Research, Education and Development of Unmanned Aerial Systems (RED-UAS), 2015 Workshop on. IEEE 2015.
- [2] Maier, Moritz, and Konstantin Kondak. "Landing of VTOL UAVs using a stationary robot manipulator: An innovative approach for coordinated control."

Decision and control (CDC), 2015 IEEE 54th Annual Conference on. IEEE, 2015.

- [3] Barringer, F.A.A's concerns hold up use of wildfire drones, New York Times,2015.
- [4] Celebi, A.,Gullu, M., Ertuk,S.: Sistema movil para la detección y localización de mi-random fields with brightness compensation. In: 2011 IEEE 19TH Conference on Single Processing and communication Applications (SIU), pp. 916-919 (2012).
- [5] T. Ueno, N. Sunaga, K. Brown and H. Asada., "Mechanism and Control of a Dynamic Lifting Robot", International Association for Automation and Robotics in Construction ISARC 1996), 1996 ISARC International Conference.

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Citation of this Article:

Aparna More, Pushkar Kulkarni, Anjali Vadavnikar, Saurabh Patange, "Multipurpose Drone" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 5, Issue 6, pp 42-44, June 2021. Article DOI <https://doi.org/10.47001/IRJIET/2021.506009>
