International Journal of Multidisciplinary Engineering in Current Research - IJMEC
Volume 7, Issue 9, September-2022, http://ijmec.com/

HEXA COPTER DELIVERY SYSTEM

Mohd Wasif Ali[1], Sohail[2], Syed Ali Lateef Ahmed[3], Mohammed Sohail[4], Mirza Nemath Ali Baig[5]
[1,2,3,4]*Department of ECE, Lords Institute of Engineering andTechnology* Hyderabad, India
[5]*Assistant Professor Department of ECE, Lords Institute of Engineering andTechnology* Hyderabad, India

ABSTRACT

The major goal of our research is to create a drone that is capable of performing tasks that are virtually difficult for a human to perform in areas like locomotion and aerodynamics. The demand for delivery personnel has multiplied due to the significant growth in the use of online ordering. In order to fulfil this demand, drone-based technology is being deployed. A hexacopter can fly vertically in a stable manner and be used to deliver goods or collect data in a certain area. We think delivery drones are poised to disrupt the last mile transportation industry given the development of drone technology and rising commercial usage. Drones can drastically shorten delivery times and lower both the human and financial costs of drone manufacturers. The value chain and opportunities in the market for delivery drones are examined in this paper. It also talks about adoption's difficulties. Our argument for using drones to deliver the majority of lightweight products for the final mile comes at the end. This study describes the Hexa copter (QC) as a lightweight, inexpensive, autonomous flying capable Unmanned Aerial Vehicle (UAV) for delivering packages ordered online. Its primary on-board computing unit is an android device. This QC can locate and reach its goal by using Google Maps. This experiment showcases QC's ability to deliver an online-ordered package and then return to the starting point. Future studies on the use of QC for parcel delivery are made possible by the method's encouraging results.

Keywords: *Hexa Coptor, Unmanned Aerial Vehicle (UAV).*

I. INTRODUCTION

A drone is a type of unmanned aerial vehicle (UAV), which is an aircraft without a human pilot, crew, or passengers. Unmanned aerial vehicles (UAVs) are a part of an unmanned aircraft system (UAS), which also includes a ground-based controller and a communications network for the UAV. UAVs' flight can be remotely piloted by a human operator, or it can have varying degrees of autonomy, such as autopilot help, up to fully autonomous aircraft that don't have any provision for human control. A drone, in its most basic definition, is a flying robot that can be remotely controlled or fly on its own using software-controlled flight plans in its embedded systems in coordination with onboard sensors and a global positioning system (GPS). A multicolored helicopter with four rotors that lifts and propels it is known as a hexacopter, also known as a hexarotor helicopter or hexarotor. Hexacopters are categorized as rotorcraft as opposed to fixed-wing aircraft since their lift is produced by a collection of rotors (propellers that are angled vertically). Typically, hexacopters have two sets of identical fixed-pitch

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/09.2022-99683463

propellers: two in the clockwise (CW) and two in the counter-clockwise (CCW) directions (CCW). These achieve control by independently varying the speed of each rotor.

One can particularly produce a desired overall thrust by altering the speed of each rotor. Hexacopters are different from traditional helicopters in that they don't have rotors that can dynamically change the pitch of their blades as they move around the rotor hub. Hexacopters, sometimes known as "Hexa rotors" or "helicopters," were considered potential solutions to some of the enduring issues with vertical flight in the early days of flying. Since counter-rotation frequently eliminates torque-induced control problems (as well as efficiency problems resulting from the anti-torque rotor, which produces no useful lift), the comparatively short blades are significantly simpler to build. In the 1920s and 1930s, a number of manned designs were developed. The majority of successful heavier-than-air vertical takeoff and landing (VTOL) vehicles were among these ones. However, due to weak stability augmentation and constrained control authority, early prototypes had poor performance, while subsequent versions demanded an excessive amount of pilot duty.

II. LITERATURE SURVEY

The use of drones is rapidly expanding throughout society. More and more drones are being employed today, including hobby drones, military equipment, and delivery services. In reality, sales of drones rose by 63 percent between 2014 and 2015 and have since kept rising. Drones aren't perfect, though—as with all technology. Additionally, it's important to keep in mind any problems you can run into if you possess a drone. So let's look at a few typical drone issues and how to fix them.

The author of this work states, "A mathematical model used force and torque as control variables." The mobility of the hexacopter was also evaluated using a nonlinear optimum control problem, which demonstrated the challenges associated with moving the x and y axes in the absence of actuators. In this paper, position control for a hexacopter was created. In order to reject the modelling error, a second controller was added. The failure detection and isolation (FDI) filter and subsequent controller reconfiguration are the most typical method, but the FDI is too complex for the hexacopter. As a result, the controller was modified to use the Modified Linear Extended State Observer (LESO), which does not use either of these methods. Although the flight was safe thanks to the controller, there is certainly room for improvement in terms of the flight's performance. With the help of their project, they were able to create a drone that can transport 5.5 liters of liquid with a 16-minute resistance.

The scientists noted that basic and inexpensive tools would be required to build an octocopter drone and its spray system. Both liquid and solid items can be sprayed using the universal spray system. They examined a number of agricultural controllers in their inquiry and came to the conclusion that the octocopter system with the Atmega644PA is the most suitable because of its effective implementation. UAV use is nothing new; the technology has been around since the turn of the 20th century. Military uses in World War I propelled the technology at first, and World War II led to its expansion. Applications for UAVs in the military are more sophisticated than those in civil aviation. Due to their quick adoption in numerous applications, including border security, traffic surveillance, precision agriculture, police observations of civil unrest and crime sites, and reconnaissance for natural disaster response, the civilian uses are also evolving in the same directions. The authors use unmanned UAVs with cameras

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/09.2022-99683463

for vineyard management tailored to each individual site. To ensure accuracy, the normalized differential vegetation index (NDVI) measurements obtained by the VetPro-mounted Tetra Cam ADC-lite camera were compared to ground-based NDVI values obtained by the Field Spec Pro spectroradiometer.

of the ADC system. The vegetation indices obtained from UAV images are in excellent agreement with those acquired with a ground-based high-resolution 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 The IMU (inertial measuring unit) is a device that uses data from accelerometers, gyros, and an implanted controller to present precise data on aircraft maneuvering details as well as accelerations in all directions. In general, all aircraft are equipped with one. GPS offers a positional fix, which is useful for outside applications. A differential GPS or the combination of data from an IMU can be used to combat GPS drift. Vision-based navigation systems frequently select a single or stereo camera. In contrast to single-camera systems, which require extra distance sensors like ultrasound, stereo vision is well suited to determining feature distance from the cameras by observation. The IMU (inertial measuring unit) is a device that uses data from accelerometers, gyros, and an implanted controller to present precise data on aircraft maneuvering details as well as accelerations in all directions. In general, all aircraft are equipped with one. GPS offers a positional fix, which is useful for outside applications. A differential GPS or the combination of data from an IMU can be used to combat GPS drift. Vision-based navigation systems frequently select a single or stereo camera. In contrast to single-camera systems, which require extra distance sensors like ultrasound, stereo vision is well suited to determining feature distance from the cameras by observation.

III. SPECIFICATIONS

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.

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/09.2022-99683463

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.

IV. BLOCK DIAGRAM

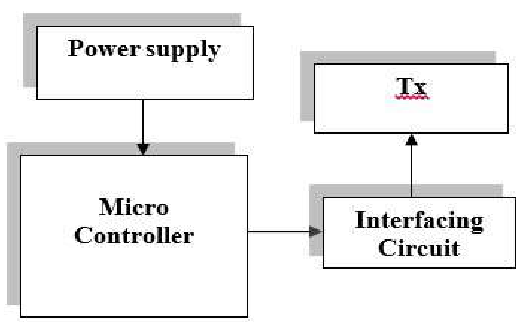


Figure 1: Block Diagram of Transmitter

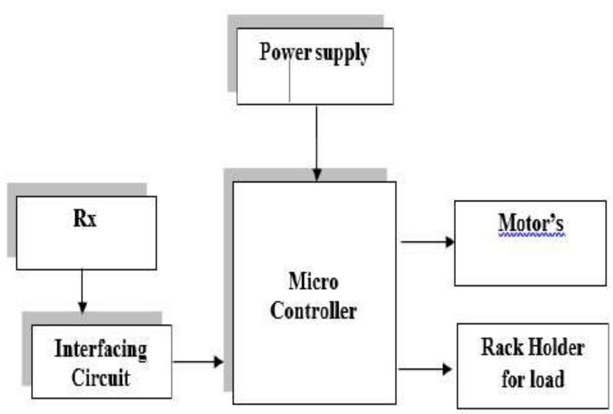
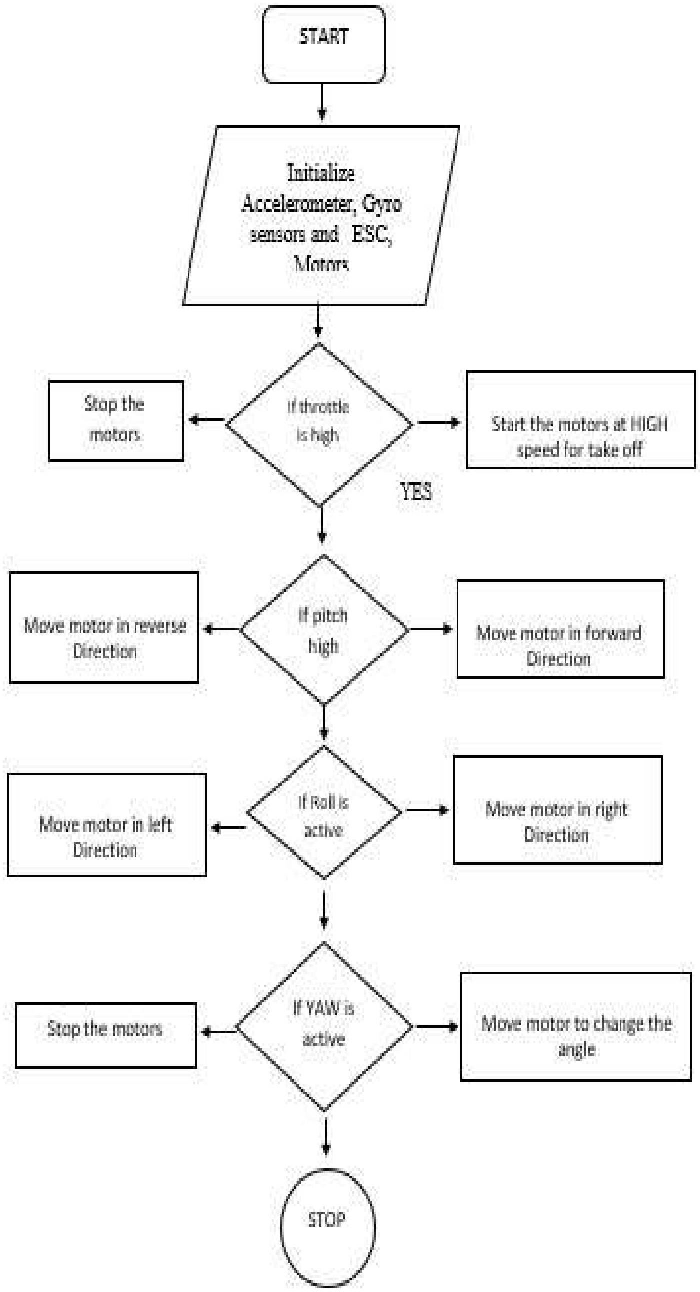


Figure 2: Block Diagram of Receiver

DOI: https://doi-ds.org/doilink/09.2022-99683463

V. FLOW CHART



DOI: https://doi-ds.org/doilink/09.2022-99683463

VI. Schematic Diagram

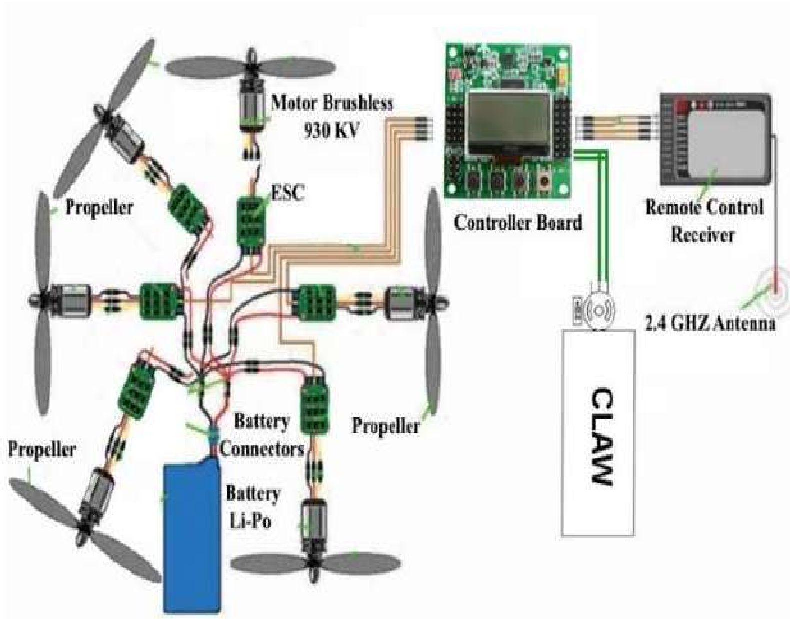


Figure 3: Schematic Diagram Of Drone

VII. WORKING MODEL

Figure 4:Working Model

VIII. CONCLUSION

Our drone's key benefit will be that farmers may spray crop protection agents, insecticides, and fertilizers while only needing one person to operate it from a secure position. The prototype that is being made is unique and has never been put to the test. This may be advantageous for the development of robotics and drones in the future, which may influence how humankind develops in various ways. This trial-and-error approach has been tried and tested numerous times to produce favourable outcomes for the demands of proper drone setting and operation. The drone has a lot of promise for improving various components, and with the right study, the field of robotics might undergo a stunning evolution.

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/09.2022-99683463

IX. FUTURE SCOPE

Along with better cooperation between governments, IT leaders, and industry, drones can play a significant role in the crucial answer to this exponential rise in demand. Drones can help farmers with a variety of tasks, including research and planning, planting crops, and following field monitoring to assess crop health and growth. Drones will be crucial in precisely monitoring a farm's crucial activities as farms grow larger and more productive to satisfy this increasing demand. Drones UAVs are uniquely sturdy in severe, unpredictably weather, and they give farmers the longest flying periods on the market because they were designed to carry out all of these farming applications. Farmers can survey their fields accurately and consistently thanks to the drones' simplified flight planning, monitoring, and analysis. Microdrones systems are adaptable and effective in a number of applications, such as crop monitoring, where multi-spectral photography and thermal mapping are required, or field analysis, thanks to modular payloads. LiDAR mapping solutions are a focus for Micro Drones, and this technology should be helpful in fields like precision agriculture.

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.

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/09.2022-99683463

X. REFERENCE

[1] America's Climate Choices: Panel on Advancing the Science of Climate Change; National Research Council (2010). Advancing the Science of Climate Change. Washington, D.C. The National Academies Press. ISBN 0-309-14588-0.

[2] Aviation Safety Unmanned Aircraft Programmed Office, in McBride Paul. Beyond Orwell: the application of unmanned aircraft systems in domestic surveillance operations (2009).Journal of Air Law and Commerce Summer Vol. 74, No. 3, pp.627-628.

[3]Bolkcom, C. (2004), Homeland security: unmanned aerial vehicles and border surveillance. Congressional research service reportfor Congress.

[4]USAir force (2010), "MQ-9 Reaper", available at: http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/1 04470/mq-9-reaper.aspx (accessed: 15 August 2014).

[5]http://www.agx.com.br/n2/pages/index.php, (accessed: 15 August 2014).

[6] Herakovic, N., Simic, M., Trdic, F. and Skvarc, J.(2011), "A machine-vision system for automated quality control of welded rings," Machine vision and applications, vol. 22, no. 6, str. 967- 981, doi: 10.1007/s00138-010-0293-9.

[7]http://www.amazon.com/b?node=8037720011, (accessed: 15 August 2014).

[8] Meng Leong, B.T., Low, S.M. and Po-LeenOoi, M. (2012), "Low- Cost Microcontroller-based Hover Control Design of a Hexacopter", Procedia Engineering, Vol. 41, pp. 458 – 464

[9] Bresciani, T. (2008), "Modeling, Identification and Control of a Hexarotor Helicopter", master's thesis, Department of Automatic Control, Lund University, Sweden.

[10] Erginer, B. and Altug, E. (2007), "Modeling and PD Control of a Hexarotor VTOL Vehicle," IEEE Intelligent Vehicles Symposium, pp.894-899.

[11] Tayebi, A. and McGilvray, S. (2006), "Attitude stabilization of a VTOL Hexarotor aircraft," IEEE Transactions on Control Systems Technology, vol.14, no.3, pp. 562- 571.

[12] Nonami, K., Kendoul, F., Suzuki, S., Wang, W. and Nakazawa, D. (2010), "Autonomous Flying Robots – Unmanned Aerial Vehicles and Micro Aerial Vehicles", Tokyo: Springer, pp.48-52. 48 Ostojić et al. IJIEM

[13] Heong Ang, K., Chong, G. and Yun Li (2005), "PID control system analysis, design, and technology," IEEE Transactions on Control Systems Technology, vol.13, no.4, pp. 559- 576.

[14] Prasad, L.B., Tyagi, B. and Gupta, H.O. (2011), "Optimal control of nonlinear inverted pendulum dynamical system with disturbance input using PID controller & LQR," 2011 IEEE
International Conference on Control System, Computing and Engineering (ICCSCE), pp.540-545.

[15] Pacher, M., D'Azzo., JJ. and Dargan JL, (2001),"Tight Formation Flight Control", Journal of Guidance, Control, and Dynamics, Vol. 24, No. 2, pp. 246-254.

[16] Hall, J., (2000), "Three Dimensional Formation Flight Control", (Master thesis), Air Force Inst of Tech Wright-Pattersonafb, OH.

[17] Boskovic, J. (2002), "Formation flight control design in the presence of unknown leader commands, in: American Control Conference, Woburn, MA, USA, pp. 2854–2859.

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/09.2022-99683463

[18] Ganji, F., Joshi, S.S. and Bayard, D.S. (2006) "Adaptive Formation Control for Rovers Traveling over Unknown Terrains", Journal of Guidance, Control, and Dynamics, Vol. 29, No. 3, pp. 714-724.

[19] Singh, S.N., Chandler, P., Schumacher, C., Banda, S. and Pachter, M. (2000), "Nonlinear Adaptive Close Formation Control of Unmanned Aerial Vehicles", Dynamics and Control, Vol. 10, No. 2, pp. 179-194.

[20] Arturo Cabral Mejía, R(2010),"Hexacopter Project" available at:
http://blog.ricardoarturocabral.com/2010/09/Hexacopter- project.html (accessed: 25 August 2014).

[21] Chee, K.Y. and Zhong, Z.W. (2013), "Control, navigation and collision avoidance for an unmanned aerial vehicle", Sensors and Actuators A, Vol. 190, pp. 66– 76

[22] Hex copter-The Unmanned Aerial Vehicle (2014) available at:
http://aermech.com/Hexacopter-unmanned-aerial-vehicle/ (accessed: 29 August 2014).

[23] Finn, R. L. and Wright, D. (2012), "Unmanned aircraft systems: Surveillance, ethics and privacy in civil applications", Compute Law & Security Review, Vol. 28, No. 2, pp. 184–194.

[24] Deccan Herald, (2010) IANS [Indo-Asian News Service]. Tirupati temple may get UAV surveillance. available at: http://www.deccanherald.com/content/105844/tirupati-temple- may-get-uav.html. (accessed: 29 August 2014).

[25] Homeland Security News Wire (2011), Canadian police push limits of civilian UAV laws. available at http://homelandsecuritynewswire.com/canadian-police-push- limits-civilian-uavs-laws. (accessed: 30 August 2014).

ISSN: 2456-4265

DOI: https://doi-ds.org/doilink/09.2022-99683463