

White Paper

Custom Drones & UAV

Technologies

By **NewAgeRobots**



ABSTRACT

NewAgeRobots provides a one-stop shop for crafting your ideal drone. We design multirotor configurations for optimal performance, integrate camera systems for specific data needs, and meticulously calculate battery life for extended missions. Furthermore, NewAgeRobots offers advanced features like autonomous navigation, visual odometry for obstacle avoidance, and depth estimation for enhanced situational awareness. By analyzing thrust-to-weight ratios, we ensure your drone

achieves the perfect balance of power and maneuverability. These services aren't just technical details; they empower you to leverage the transformative potential of drones in today's world, from search and rescue to environmental monitoring.

INTRODUCTION

The modern world craves innovation, and drone technology has emerged as a powerful tool across a vast spectrum of industries. From the heart-stopping urgency of search and rescue missions to the meticulous detail required for infrastructure inspections, drones offer unparalleled capabilities for tasks once deemed difficult, dangerous, or even impossible. However, harnessing the full potential of this technology requires more than simply acquiring a drone off the shelf. Building a drone that effectively addresses your specific needs involves a complex interplay of design considerations, component selection, meticulous assembly, rigorous testing, and finally, safe and efficient deployment.

This is where NewAgeRobots steps in. We understand the challenges associated with crafting the perfect drone for your unique application. NewAgeRobots goes beyond simply selling drones; we offer a comprehensive suite of services encompassing every stage of the drone-making journey. Our team of experts collaborates with you to translate your vision into reality, ensuring your drone is not just functional, but meticulously optimized to deliver superior performance and push the boundaries of what's possible.

PROBLEM STATEMENTS AND OFFERED SOLUTIONS

Unmatched Configurability

Off-the-shelf drones may not cater to your specific needs. NewAgeRobots tackles this by offering customized multirotor configurations, considering factors like payload capacity, flight time, and maneuverability.

Data Acquisition Hurdles

Choosing the right camera system can be overwhelming. NewAgeRobots assists in selecting and integrating camera configurations tailored to your data needs, be it high-resolution photography, thermal imaging, or low-light videography.



Limited Flight Time

Battery life is crucial for successful drone operations. NewAgeRobots performs meticulous battery calculations to ensure sufficient power for your mission and explores methods for extending flight time, maximizing efficiency.

Lack of Autonomy

Basic drone control can be limiting. NewAgeRobots offers advanced services like autonomous navigation, allowing pre-programmed flight routes without human intervention.

Safety & Situational Awareness

Obstacle avoidance is paramount. NewAgeRobots integrates visual odometry (VO), visual-inertial odometry (VIO), and depth estimation for enhanced situational awareness and safe operation

Performance Optimization

Understanding a drone's thrust-to-weight ratio is vital. NewAgeRobots performs these calculations to guarantee sufficient lift for your desired payload while maintaining maneuverability.

Project Complexity

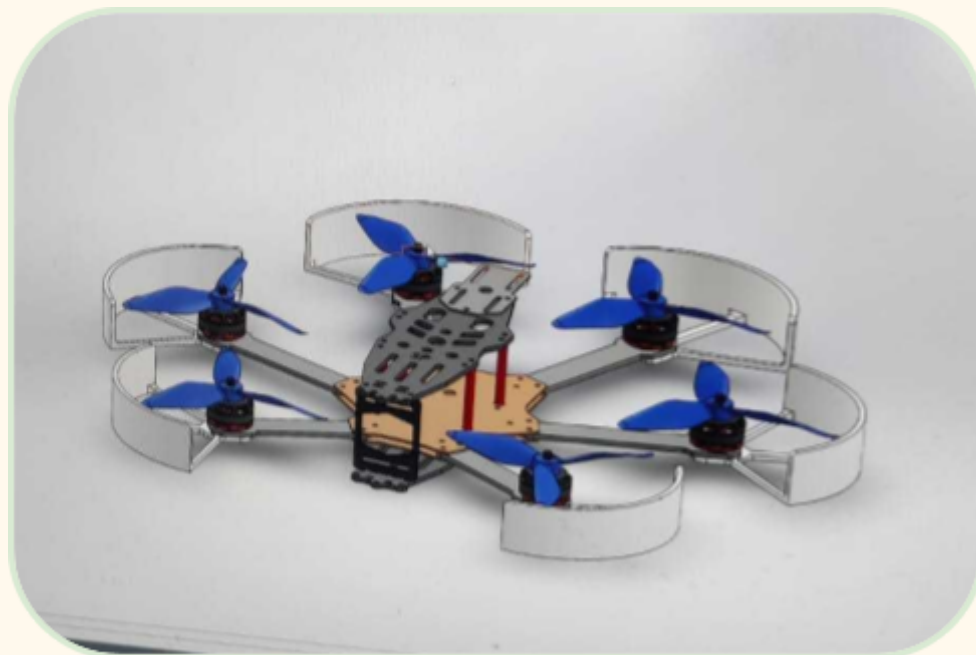
Drone building can be intricate. NewAgeRobots bridges the gap by offering a one-stop shop, handling design, assembly, testing, and deployment, ensuring a smooth and successful project.

Methodology

Building the Foundation with a compatibility table of components

The first step involves creating a comprehensive compatibility table. We meticulously analyze your project's requirements (refer to problem statements outlined earlier) and identify compatible components across various categories like motors, propellers, batteries, and flight controllers. This ensures seamless integration and optimal performance of the chosen components.

Design Precision: CAD/URDF models for the proposed Hardware

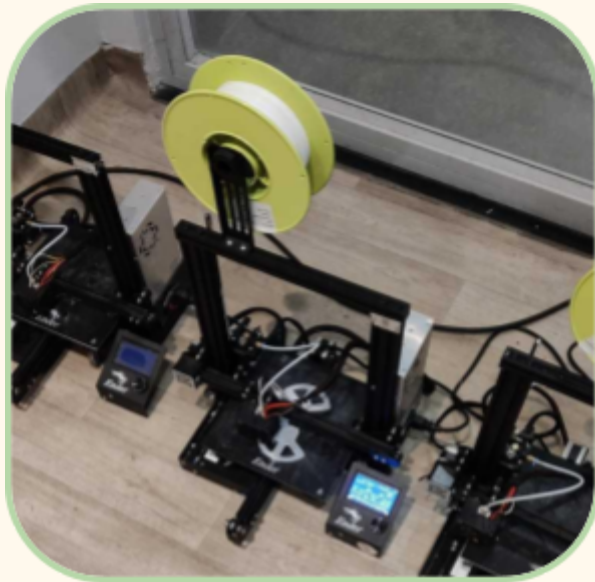


With the compatibility table established, our team utilizes Computer-Aided Design (CAD) software to create detailed 3D models of your drone. These models, alongside Unified Robot Description Format (URDF) files, provide a virtual representation of the drone's physical structure and allow for precise component placement and weight distribution analysis.

Rigorous Simulation & Calculation: Before We Fly

Prior to physical testing, we leverage rigorous simulations and calculations. Software tools enable us to predict the drone's performance characteristics, including flight time, stability, and power consumption. This virtual testing environment allows us to refine the design and identify potential issues before the drone takes flight.

Building & Beyond: Assembly and Manufacturing



Once the design is finalized, our team meticulously assembles the drone using the chosen high-quality components. In cases where specific components are not readily available, NewAge Robots' in-house manufacturing capabilities allow us to create custom parts that perfectly integrate with your drone's design.

Controlled Takeoff: Testing in a Safe Environment

The final stage involves testing the drone in a controlled environment. This allows for a safe and efficient evaluation of the drone's flight characteristics, performance metrics, and overall functionality. Through this controlled testing phase, we ensure your drone performs flawlessly before deployment in real-world scenarios.

Examples

Jetson Nano-based QuadRotor (Intel T265 based)



RaspberryPi based QuadRotor (Intel T265 based)



HmmngbRD-290 (OAK-D based HexaRotor)



Implementation Guide

NewAgeRobots's comprehensive services extend beyond design and testing. This guide provides a roadmap for implementing your custom drone, empowering you to navigate the key steps involved.

Determination of use case

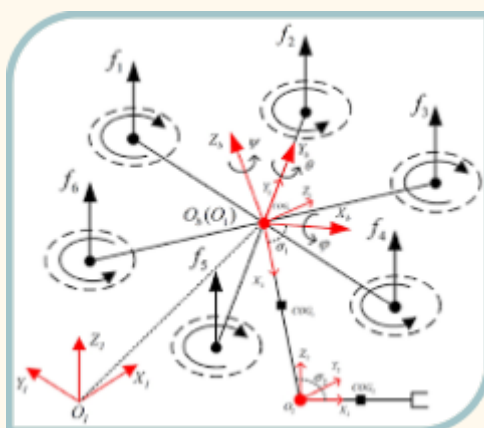
The very first step involves a clear understanding of your drone's purpose. What specific task will it be entrusted with? Is it envisioned for high-resolution aerial photography, capturing stunning landscapes or intricate architectural details? Perhaps your project demands a drone adept at search and rescue operations, navigating challenging terrains to locate missing individuals.



Maybe your focus lies in infrastructure inspection, requiring a drone capable of meticulously examining bridges, pipelines, or wind turbines for potential damage. Identifying the primary use case is crucial, as it will dictate the ideal configuration and capabilities your drone needs to possess. NewAgeRobots's team of experts will work closely with you to understand your specific needs and translate them into a customized drone solution.

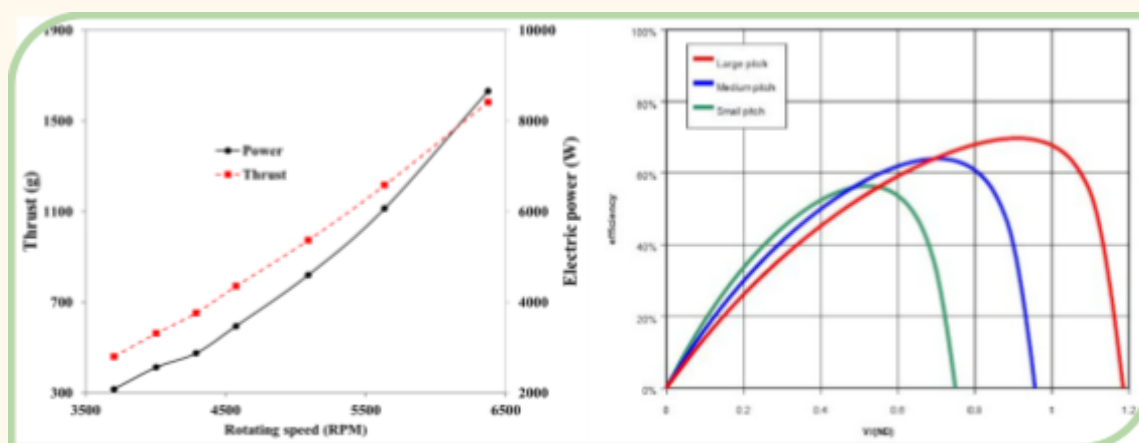
Determination of Size

The size of your drone will be directly influenced by the use case and the payload requirements. Imagine the scenario: a nimble, lightweight drone might be perfectly suited for navigating tight indoor spaces, conducting inspections within buildings or confined environments.



Conversely, a larger drone with a higher payload capacity would be necessary for search and rescue operations, potentially carrying medical supplies or even thermal imaging cameras to locate survivors in vast areas. NewAgeRobots boasts extensive experience in selecting the optimal size for diverse applications. We will guide you through this critical decision, ensuring your drone is neither too small to fulfill its purpose nor excessively large and cumbersome for the intended environment.

Thrust Calculation:



Thrust is the unsung hero, the invisible force that allows your drone to defy gravity and take flight. It's the critical factor determining a drone's ability to lift off and maneuver effectively. NewAgeRobots's meticulous calculations ensure your chosen motors and propellers generate sufficient thrust for your desired payload weight. We delve into the intricate details of motor specifications, propeller pitch, and overall airframe design to achieve the perfect balance. Imagine an underpowered drone struggling to maintain altitude with a heavy payload; through our precise calculations, we prevent such scenarios and ensure your drone has the muscle it needs to soar through the skies.

Flight Controller Selection

The flight controller acts as the brain of your drone, playing a central role in its operation. It's responsible for stabilizing flight, processing data from various sensors like accelerometers and gyroscopes, and controlling the output of the motors. The complexity of your drone and the desired feature set will determine the ideal flight controller. NewAgeRobots offers a comprehensive range of flight controller options, from basic models suitable for simple drones to advanced options capable of handling complex functionalities like autonomous navigation.

and waypoint missions. Our team will provide expert guidance in selecting the perfect flight controller to ensure your drone operates with precision and control.

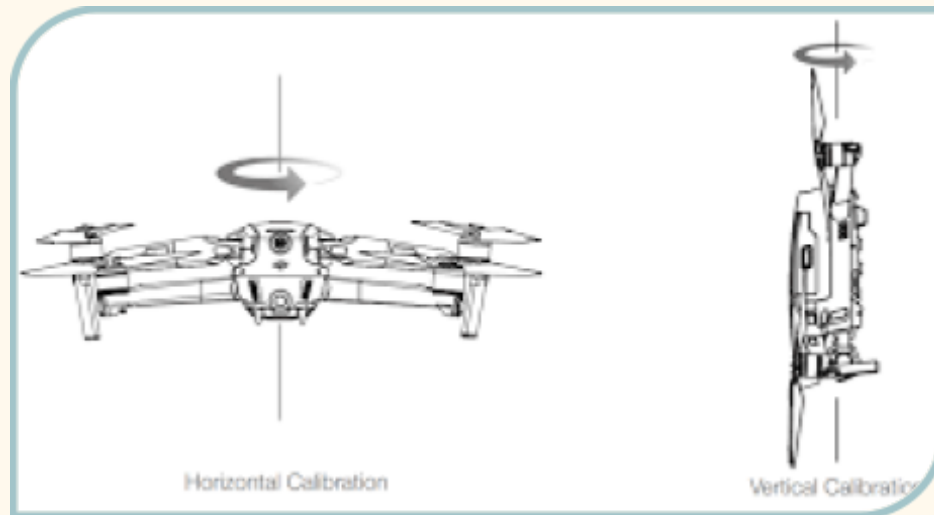
Feature	Pixhawk	Cube	Matek	Holybro (Flywoo)
Price	Moderate	High	Moderate	Low-Moderate
Size & Weight	Larger & Heavier	Larger & Heavier	Moderate	Smaller & Lighter
Processing Power	High	Very High	High	Moderate
Feature Set	Extensive	Most extensive	Extensive	Moderate
Community & Support	Large & Active	Active	Active	Large & Active
Software Compatibility	Widely Compatible	Widely Compatible	Widely Compatible	ArduPilot Preferred
Typical Use Cases	Professional, Research, Long-Range	High-Performance, VTOL	Professional, Research, Agriculture	Hobbyist, Freestyle

Assembly

With all the components meticulously chosen, it's time to witness the magic unfold: the assembly of your custom drone! NewAgeRobots can handle the entire assembly process, ensuring proper component integration and adherence to the highest safety protocols. Our team of skilled technicians possesses the expertise to meticulously assemble your drone, following best practices and utilizing specialized tools. This meticulous approach guarantees a robust and reliable drone, ready to tackle the demands of your project. However, if you possess the technical know-how and a thirst for hands-on experience, NewAgeRobots can provide detailed assembly instructions and guidance throughout the process.

Calibration

Calibration is an essential step, akin to fine-tuning a musical instrument. It ensures all the sensors and flight control systems work in perfect harmony. Imagine a drone experiencing erratic flight patterns due to improperly calibrated sensors. NewAgeRobots performs meticulous calibrations for optimal performance and flight stability.



Our team utilizes specialized equipment and software to calibrate the accelerometers, gyroscopes, magnetometers, and other sensors, ensuring they provide accurate data to the flight controller. Through this crucial step, we guarantee your drone flies smoothly and predictably, responding precisely to your control inputs.

Companion Computer and OS selection

For advanced functionalities like autonomous navigation or complex data logging, a companion computer might be required. This additional hardware acts as the brawn behind the flight controller's brain. Imagine a scenario where your drone needs to autonomously navigate a pre-programmed route to capture aerial imagery of a vast agricultural field. NewAgeRobots will assist you in selecting the appropriate companion computer hardware based on processing power and memory requirements. We will also guide you in choosing the most suitable operating system for your specific needs, considering factors like user-friendliness, compatibility with flight controller software, and real-time data processing capabilities.

Parameter Configuration

The flight controller software requires configuration with various parameters that act as the drone's flight DNA. These parameters include motor outputs, control settings, safety features, and autonomous navigation parameters (if applicable). Imagine a drone exhibiting sluggish flight behavior due to improperly configured motor outputs. NewAgeRobots's expertise ensures these parameters are optimized for your drone's unique configuration. We will meticulously configure the software, tailoring it to your specific use case and ensuring the drone operates with optimal efficiency and safety.

Test Flight

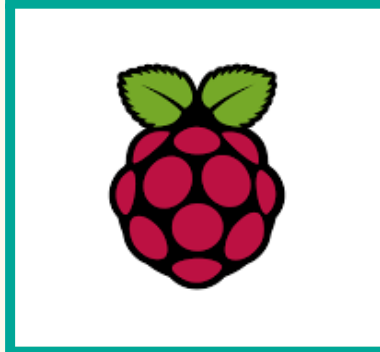
The moment of truth has arrived! After meticulous assembly, calibration, and configuration, it's time to witness your creation take flight. NewAgeRobots conducts a series of controlled test flights in a designated safe environment. These test flights serve a critical purpose: to evaluate the drone's performance, stability, and overall functionality. Our team will meticulously analyze flight data, assessing factors like motor performance, battery consumption, flight time, and control responsiveness. Imagine a scenario where a test flight reveals an imbalance causing the drone to drift erratically. Through these controlled test flights, we identify and address any potential issues before the drone ventures into real-world scenarios. NewAgeRobots prioritizes safety and ensures your drone is thoroughly tested and performing flawlessly before deployment.

Technologies Used

Software



Companion



Sensors and Actuators



Conclusion

The modern world craves innovation, and drone technology has emerged as a powerful tool across a vast spectrum of industries. However, harnessing the full potential of drones requires a more nuanced approach than simply acquiring a pre-built model. NewAgeRobots bridges this gap by offering a comprehensive suite of services, transforming your vision into a reality.

Our team of experts collaborates with you at every stage of the drone-making journey, from design and assembly to testing and deployment. We don't just sell drones; we craft customized solutions meticulously tailored to your specific needs and challenges. NewAgeRobots empowers you to leverage the transformative potential of drones, unlocking possibilities in search and rescue, infrastructure inspection, environmental monitoring, and countless other fields.

Partner with NewAgeRobots today and let's take flight together!