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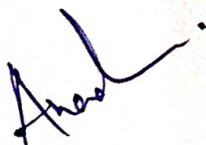
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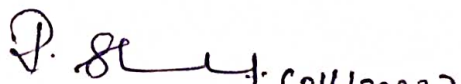
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March 31, 2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. M Bharath**, II Year, M.Sc Degree in Physics department, Bharath Institute of Higher Education and Research, Chennai had successfully completed his Internship Training in Ocean Acoustics Department at National Institute of Ocean Technology, Chennai during the period 01st February 2023 to 31st March 2023.

(एम. पलनियप्पन / M. PALANIAPPAN)

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Internship Training Report on Drone Fabrication and Assembly at Aero Knotz Drones India PVT.LTD

Submitted by

Name: Kathiravan S

Internship Period: 1 SEP 2022 to 15 SEP 2022

Company Name: Aero Knotz Drones India Pvt.Ltd

College Name: Bharath Institute of Higher

Education and Research, Chennai

Abstract

This internship report offers an overview of my internship at Aero Knotz Drones India Pvt. Ltd., where I focused on the fabrication and assembly of F450 drones. During this internship, I actively participated in various stages of drone assembly, from sourcing components to quality control and testing. This report highlights my roles and responsibilities, the challenges I encountered, and the strategies I employed to overcome them. It also presents the completed F450 drone and emphasizes the practical application of engineering principles in a real world context. Overall, this internship equipped me with valuable skills and knowledge essential for a career in drone technology.

In conclusion, my internship at Aero Knotz Drones India Pvt. Ltd. was a transformative experience that not only deepened my understanding of drone technology but also contributed significantly to my personal and professional development. This report serves as a reflection of my journey and provides insights into the intricacies of drone fabrication and assembly.

1.1 Introduction:

The evolution of drone technology has catalysed a profound transformation across industries, providing innovative solutions to a myriad of challenges. It is within this dynamic landscape that I embarked on an enriching journey during my internship at Aero Knotz Drones India Pvt. Ltd. This internship report chronicles my immersive experience in the meticulous process of fabricating and assembling an F450 drone, a venture that allowed me to bridge the gap between theoretical knowledge and practical application.

Drones, once considered novelties, have now become indispensable tools in sectors ranging from agriculture to surveillance. Understanding the intricacies of drone assembly has become paramount to unlock their full potential. My internship sought to immerse me in this realm, where the principles of precision engineering intersect with cutting edge technology.

The cornerstone of our project was the F450 frame, accompanied by an array of essential components. This included the deployment of high performance 1000KV BLDC motors, Simuok 30A ESCs (Electronic Speed Controllers), a KK2.5 flight controller, and an FSct6b transmitter for precise control. Powering our drone was a 2200mAh LiPo battery, a crucial element to ensure sustained and reliable flight. Aero knotz Drones India Pvt. Ltd., a pioneering entity in the drone industry, played a pivotal role in facilitating this internship, offering not just a platform for hands on learning but also a glimpse into the company's vision of reshaping the future of aerial robotics. This report aims to document the journey, challenges, and successes encountered as we meticulously fabricated and assembled the versatile F450 drone, bridging the gap between classroom theories and real world application.

2.0 Drone Technology Overview:

Drones, also known as Unmanned Aerial Vehicles (UAVs) or Unmanned Aircraft Systems (UAS), represent a disruptive and transformative technology that has found applications across numerous industries. In this section, we will provide an overview of drone technology, its various types, and its growing significance in today's world.

2.1 Definition and Purpose of Drones:

Drones are aerial vehicles that operate without a human pilot on board. They are controlled remotely or autonomously through preprogrammed flight paths. Originally developed for military and defence purposes, drones have now evolved into versatile tools with applications spanning several domains:

Agriculture: Drones are used for crop monitoring, precision agriculture, and pesticide spraying, enabling farmers to optimize yields and reduce resource use.

Surveillance and Security: Law enforcement and security agencies employ drones for surveillance, border patrol, and disaster response, enhancing situational awareness.

Photography and Videography: Drones equipped with high resolution cameras have revolutionized aerial photography and filmmaking, providing unique perspectives for various creative industries.

Delivery and Logistics: Companies like Amazon and UPS are exploring drone delivery services to expedite last mile delivery and reduce transportation costs.

Environmental Monitoring: Drones are used for wildlife conservation, environmental research, and disaster assessment, facilitating data collection in remote or hazardous areas.

Infrastructure Inspection: Drones enable cost-effective inspection of infrastructure such as power lines, bridges, and pipelines, reducing the need for risky human inspections.

Mapping and Surveying: Surveyors and cartographers employ drones to create detailed maps, 3D models, and terrain analyses with speed and precision.

2.2 Types of Drones

Drones come in various types and sizes, each designed for specific tasks and environments. The key categories include:

Multicopters: These drones have multiple rotors, typically quadcopters (four rotors) or hexacopters (six rotors). They offer stability, versatility, and ease of control, making them suitable for applications like photography, surveillance, and hobby flying.

Fixed-Wing Drones: Resembling traditional airplanes, fixed-wing drones are efficient for covering large distances but require runways for take-off and landing. They are commonly used for mapping, agriculture, and long-range surveillance.

VTOL (Vertical Takeoff and Landing) Drones: Combining features of both multicopters and fixed-wing drones, VTOL drones can take off vertically and transition to fixed-wing flight, offering the benefits of vertical launch and efficient forward flight.

Hybrid Drones: These drones incorporate various propulsion systems, combining the advantages of multiple drone types. They are often used for specialized applications.

2.3 Significance of Drone Technology

The significance of drone technology lies in its ability to collect data, perform tasks, and access areas that were previously challenging or dangerous for humans. Drones have revolutionized industries by enhancing efficiency, reducing costs, and improving safety. They enable rapid response during emergencies, provide invaluable insights through data collection, and open up new possibilities for innovation.

As drone technology continues to evolve, it holds the potential to transform the way we approach various aspects of life, from logistics and transportation to environmental conservation and entertainment. In the following sections of this report, we will delve deeper into the specific project involving the fabrication and assembly of the F450 drone, offering practical insights into the world of drone technology.

3. Project Description

In this section, we will provide a comprehensive overview of the F450 drone fabrication and assembly project undertaken during the internship at Aero Knotz Drones India Pvt. Ltd. This project aimed to construct a fully functional F450 drone by assembling various components and ensuring its proper functioning.

3.1 Project Goals

The primary objective of the project was to fabricate and assemble an F450 drone from scratch. The specific goals included:

1. **Component Selection:** Identifying and selecting the appropriate components required for the construction of the F450 drone, such as the frame, motors, ESCs, flight controller, transmitter, and battery.
2. **Assembly Process:** Executing the stepbystep assembly of the drone, including mounting the motors, attaching electronic speed controllers, installing the flight controller, and connecting all components.
3. **Wiring and Integration:** Ensuring proper wiring and integration of all components to establish functional connections and facilitate communication between the drone's parts.
4. **Calibration and Testing:** Calibrating and testing the drone to achieve stable flight, including motor calibration, gyroscopic sensor calibration, and ensuring proper communication between the transmitter and the flight controller.
5. **Safety Measures:** Implementing safety protocols to minimize risks during the assembly and testing phases, including safety checks, emergency shutdown procedures, and flight precautions.

6. Documentation: Maintaining comprehensive documentation of the entire assembly process, including wiring diagrams, component specifications, and test results, to facilitate future reference and quality control.

3.2 Equipment and Materials

The successful execution of the project depended on the utilization of specific equipment and materials, including:

F450 Frame: The central structural component of the drone that provided the foundation for attaching other parts.

1000KV BLDC Motors: Highperformance brushless motors designed for efficient and reliable drone propulsion.

Simuok 30A Electronic Speed Controllers (ESCs): ESCs that regulated the speed of the motors and converted electrical signals from the flight controller into motor rotations.

KK2.5 Flight Controller: The flight controller that managed the drone's flight stability and responsiveness.

FSct6b Transmitter: The remote transmitter used to control the drone's movements and functions.

2200mAh LiPo Battery: The power source that provided energy for the drone's operations.

3.3 Project Execution

The project followed a structured approach, encompassing the following steps:

1. **Component Procurement:** Procuring the necessary components, ensuring compatibility, and verifying the quality of each component.
2. **Assembly:** Carefully assembling the drone by mounting the motors on the F450 frame, attaching the ESCs, installing the flight controller, and connecting all components following a prescribed sequence.
3. **Wiring and Integration:** Establishing connections between the various components, including the motors, ESCs, flight controller, transmitter, and battery, ensuring proper wiring and integration.
4. **Calibration:** Calibrating the drone's components and systems to optimize its flight characteristics, stability, and responsiveness.
5. **Testing:** Conducting comprehensive tests to verify the drone's functionality, including hover tests, stability checks, and flight tests to ensure safe and stable flight.

3.4 Project Outcomes

The successful completion of the project resulted in the fabrication and assembly of a fully operational F450 drone. The assembled drone was capable of stable flight, and its performance was evaluated in various conditions and flight scenarios.

In the subsequent sections of this report, we will delve into the specific tasks and responsibilities undertaken during the internship, challenges encountered, and the outcomes and achievements of the project, providing a detailed account of the hands-on experience gained in the realm of drone fabrication and assembly.

4. Methodology

In this section, we will provide a detailed methodology outlining the stepbystep process employed in the fabrication and assembly of the F450 drone during the internship at Aero Knotz Drones India Pvt. Ltd. This methodology serves as a blueprint for understanding how the project was executed.

4.1 Component Selection and Procurement

1. Needs Assessment: The first step was to determine the specific requirements of the F450 drone project, considering factors such as payload capacity, flight time, and intended use.
2. Component Research: Extensive research was conducted to identify and select the most suitable components for the project, including the F450 frame, 1000KV BLDC motors, Simuok 30A ESCs, KK2.5 flight controller, FSct6b transmitter, and 2200mAh LiPo battery.
3. Component Procurement: After selecting the components, the next phase involved procuring them, ensuring compatibility and verifying their quality and authenticity.

4.2 Drone Assembly

1. Frame Assembly: The assembly process commenced with the mounting of the 1000KV BLDC motors onto the F450 frame. Careful attention was given to ensure the correct orientation and alignment of the motors.
2. ESC Installation: Simuok 30A Electronic Speed Controllers (ESCs) were attached to each motor, connecting them to the power distribution board (PDB) and the flight controller.

3. Flight Controller Setup: The KK2.5 flight controller was configured with the appropriate settings, including motor layout and initial stabilization parameters.

4. Wiring and Integration: Wiring connections were established between the various components, including the ESCs, flight controller, receiver, and battery.

4.3 Calibration and Testing:

1. Motor Calibration: Individual motor calibration was performed to ensure uniform and synchronized motor performance.

2. Gyroscopic Sensor Calibration: The gyroscopic sensors of the flight controller were calibrated to optimize stability and responsiveness during flight.

3. Transmitter Binding: The FSct6b transmitter was bound to the drone's receiver to establish a reliable communication link.

4. Preflight Checks: Comprehensive preflight checks were conducted, including propeller attachment verification, battery voltage checks, and safety measures.

5. Test Flights: A series of test flights were carried out to evaluate the drone's stability, responsiveness, and overall performance. Flight testing included hovering, manoeuvrability assessments, and altitude control checks.

4.4 Documentation

1. Assembly Documentation: Detailed documentation was maintained throughout the project, including wiring diagrams, component specifications, and assembly photographs.

2. Testing Records: Records of calibration results and flight testing outcomes were documented for reference and quality control.

5. Internship Activities and Responsibilities

In this section, I will outline the specific tasks, activities, and responsibilities that I undertook during my internship at Aeroknotz Drones India Pvt. Ltd. These experiences provided me with valuable hands-on learning and contributed to the successful fabrication and assembly of the F450 drone.

5.1 Component Inspection and Verification:

One of my initial responsibilities was to inspect and verify the components that were essential for the drone assembly. This included:

Component Quality Check: Ensuring that all components, including the F450 frame, 1000KV BLDC motors, Simuok 30A ESCs, KK2.5 flight controller, FSct6b transmitter, and 2200mAh LiPo battery, met the required specifications and quality standards.

Compatibility Assessment: Verifying that the selected components were compatible with each other and suitable for the intended purpose of the drone.

5.2 Frame Assembly and Motor Mounting

I actively participated in the assembly of the drone frame and the mounting of motors. This involved:

Frame Setup: Assembling the F450 frame by following the manufacturer's instructions, ensuring proper alignment and structural integrity.

Motor Installation: Attaching the 1000KV BLDC motors securely to the designated motor mounts on the frame, using appropriate fasteners and ensuring correct orientation.

5.3 Electronic Speed Controller (ESC) Configuration

I was responsible for configuring the Simuok 30A ESCs, which are crucial for motor control and stability. My tasks included:

ESC Connection: Properly connecting the ESCs to the motors and the power distribution board (PDB), ensuring correct wiring and secure connections.

Programming: Configuring the ESCs to match the motor specifications and calibrating them to operate smoothly and synchronously.

5.4 Flight Controller Setup

I actively contributed to setting up and configuring the KK2.5 flight controller, which plays a pivotal role in drone stability and control:

Initial Configuration: Configuring the flight controller with the correct settings, such as motor layout, flight modes, and stabilization parameters.

Sensor Calibration: Calibrating the gyroscopic sensors on the flight controller to optimize stability during flight.

5.5 Wiring and Integration

I was responsible for the intricate process of wiring and integration, ensuring that all components worked together seamlessly:

Electrical Connections: Establishing proper wiring connections between the ESCs, flight controller, receiver, transmitter, and battery, following a precise wiring diagram.

Cable Management: Maintaining organized and secure cable management to prevent interference and maintain the reliability of electrical connections.

5.6 Preflight Checks and Safety Protocols

I actively participated in preflight checks and safety procedures to ensure the safety of the drone and personnel:

Safety Checks: Conducting comprehensive preflight checks, including propeller attachment verification, battery voltage checks, and verifying the integrity of all components.

Emergency Shutdown Procedures: Understanding and practicing emergency shutdown procedures in case of unexpected events or malfunctions during testing.

5.7 Test Flights and Data Collection

I had the opportunity to be part of the test flight phase, which included:

Hover Tests: Conducting initial hover tests to assess the drone's stability and responsiveness.

Maneuverability Assessment: Evaluating the drone's maneuverability and control by performing controlled flight maneuvers.

Altitude Control Checks: Verifying the drone's ability to maintain stable altitude during flight.

5.8 Documentation and Reporting

Throughout the internship, I diligently maintained documentation of the project:

Assembly Records: Recording assembly details, wiring diagrams, and specifications for future reference.

Testing Records: Documenting the outcomes of calibration, preflight checks, and test flights to ensure data integrity and quality control.

My internship activities and responsibilities encompassed various aspects of drone fabrication and assembly, providing me with practical skills and firsthand experience in the field. These experiences will undoubtedly contribute to my professional growth and proficiency in the realm of drone technology. In the subsequent sections of this report, I will elaborate on the outcomes, challenges, and lessons learned during the internship

Conclusion:

The internship at Aeroknotz Drones India Pvt. Ltd. provided an immersive and enriching experience in the field of drone technology, with a specific focus on the fabrication and assembly of the F450 drone. This journey, which began with careful component selection and procurement, evolved into a hands-on exploration of precision engineering and practical application in the realm of unmanned aerial vehicles. As this report concludes, it is essential to reflect on the overarching significance of this internship and its enduring impact.

The completion of the F450 drone stands as a tangible testament to the knowledge, skills, and dedication invested in the project. It underscores the successful integration of various components, from the robust F450 frame to the high-performance 1000KV BLDC motors, Simuok 30A ESCs, KK2.5 flight controller, FSct6b transmitter, and the reliable 2200mAh LiPo battery. This achievement signifies not only the fulfillment of project objectives but also the practical realization of the transformative potential of drone technology in various industries.

Throughout the internship, numerous challenges were encountered and overcome, from component compatibility issues to intricate calibration procedures. These challenges, while demanding, were instrumental in honing problem-solving skills, fostering adaptability, and emphasizing the importance of meticulous attention to detail. The experience highlighted the paramount importance of safety protocols and the significance of documentation and reporting in ensuring the quality and reliability of drone operations.

The outcomes and achievements of this internship extend beyond the completion of a drone project. They encompass a holistic learning experience that transcends the boundaries of the classroom. From hands-on learning to collaborative teamwork, from safety awareness to effective communication, the internship provided a comprehensive platform for personal and professional growth. It ignited a passion for drone technology and a commitment to harnessing its potential to address real-world challenges

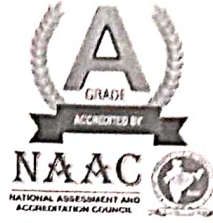
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BONAFIDE CERTIFICATE

*This is to certify that the dissertation entitled “Bio-synthesis of ZnO Nanoparticles through extract from Aegle marmelos: antibacterial and anti fungal activities ” submitted by Ms. P.MONISHA (P21PI009) to the, in partial fulfillment of the requirements for the award of the degree of Master of Science in Materials Science, for the year 2021-2023 is the bonafide work of the candidate, carried out under **Dr. S. RAJESH** (External Guide), Guest Faculty, Department of Materials Science, University of Madras and **Dr.S.ANANTHI** (Internal Guide), Associate Professor and Head, Department of Physics, Bharath institute of science and technology.*


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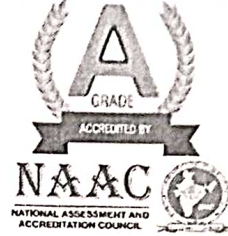
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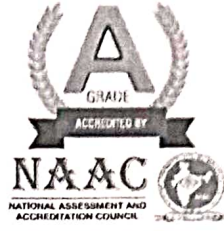
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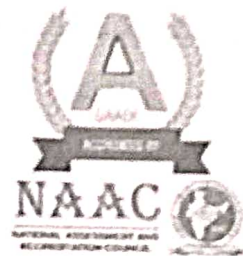
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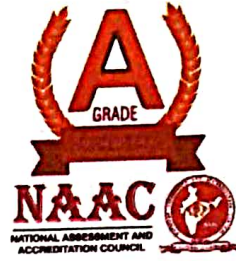


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This is to certify that the dissertation entitled "**Synthesis, Characterization, and Biological activity of ZnO Nps using terminalia chebula extract**" submitted by Mr. S. DEEPAK (P21PI002) to the, in partial fulfillment of the requirements for the award of the degree of Master of Science in Physics of Faculty of Arts & Science, Bharath Institute of Higher Education and Research is a bonafide record of the work carried out by him under my guidance and supervision during February 2023 - March 2023.

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This is to certify that the dissertation entitled “MAGNETIZATION REVERSAL MECHANISM IN COBALT NANOSTRUCTURES” submitted by Mr. ELAVARASAN S in partial fulfillment of the requirements, for the award of degree of MASTER OF SCIENCE in PHYSICS of Faculty of Arts & Science, Bharath Institute of Higher Education and Research is a bonafide record of the work carried out by him under my guidance and supervision during February 2023 - March 2023.

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June 1st 2023

To whomsoever it may concern

This is to certify that Mr. S. Elavarasan, second year M.Sc. Degree in the Physics Department, Bharath Institute of Higher Education and Research, Chennai has successfully completed his internship training in Spintronics and Nanomagnetism Laboratory at SRM Institute of Science and Technology during the period of 2nd January 2023 to 31st May 2023.

Jaivardhan Sinha

Jaivardhan Sinha

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This is to certify that the dissertation entitle “ **DYE SENSITIZED SOLAR CELLS USING CYZYGUM CUMINI AS NATURAL DYE**” submitted by **MS. SWETHA.S** in partial fulfilment of the requirements, for the award of degree of **MASTER OF SCIENCE** in **PHYSICS** of Faculty of Arts & Science, Bharath Institute of Higher Education and Research is a bonafide record of the work carried out by him under my guidance and supervision during February 2023 - March 2023.

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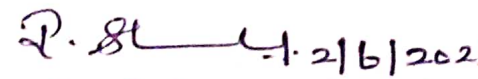
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