KSCST Project Synopsis

Project Reference Number: 46S_BE_2625

Title of the project: HYBRID E-VTOL AIRCRAFT

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Introduction / Background: The hybrid E-VTOL UAV (Unmanned Aerial Vehicle) is a new type of aircraft that combines both electric and gasoline-powered engines for optimal performance. This innovative design provides the benefits of electric propulsion, such as low noise, low emissions, and improved efficiency, while also incorporating the power and range of gasoline engines.

The UAV is capable of vertical take-off and landing (VTOL) using electric motors, which reduces the need for runway infrastructure and allows for operation in confined areas.
The hybrid propulsion system provides the necessary power for sustained flight and allows for transitions between vertical and fixed-wing flight modes. The design of the hybrid E-VTOL UAV also includes advanced sensing and communication systems that enable autonomous operation.

This feature makes the aircraft ideal for a range of applications, including surveillance, inspection, and monitoring of critical infrastructure, as well as search and rescue missions.
Additionally, the modular payload system of the UAV allows for easy customization to meet specific mission requirements. This feature provides a high degree of flexibility, making the aircraft adaptable to various applications.

Simulation and experimental testing of the hybrid E-VTOL UAV demonstrate its high performance and capabilities. The results show that the aircraft can cover significant distances and carry payloads while maintaining its VTOL capabilities.

Many successful models with vertical take-off and landing (VTOL) capability have been developed and implemented in the aeronautics industry, but few have been successful in the design of radio-controlled (RC) aircraft.

Objectives:

1. Develop affordable and efficient Hybrid E-VTOL Aircraft that meet safety and regulatory standards for various applications, such as urban air mobility, emergency medical services, cargo delivery, military operations, and personal transportation.

2. Improve the performance and reliability of Hybrid E-VTOL Aircraft, including their range, speed, payload capacity, noise level, and energy efficiency.

3. Develop innovative technologies and materials for Hybrid E-VTOL Aircraft, such as advanced propulsion systems, lightweight materials, and autonomous flight controls.

4. Collaborate with stakeholders, such as government agencies, industry partners, and academic institutions, to establish a regulatory framework and infrastructure for Hybrid E-VTOL Aircraft, including airspace management, pilot training, and maintenance standards.

5. Promote public awareness and acceptance of Hybrid E-VTOL Aircraft, by demonstrating their safety, environmental benefits, and economic potential to various stakeholders, including investors, customers, and the public.

Methodology:

A. Phase 1: Initial prototype building and testing.

1. A prototype consisting of a Combined wing body with a base, an upper plate, and four adjacently extending arms.

2. The prototype wherein four fixed brushless dc motors of 2200kv is located.

3. The prototype including four 30A electronic speed controllers to manage and regulate the brushless dc motors' speed.

4. The prototype including four individual 05x4.5-inch propellers.

5. The prototype including a 2200mah electric rechargeable battery to power all the electrical parts.
6. The prototype wherein consisting of a K.K 2.1.5 flight controller board for using user input to detect the drone's movements.
7. The prototype including a power distribution board that allows for the generation of multiple voltage levels of power supplies for the flight controller and other peripherals and the transfer of battery power to ESCs and motors.
8. The prototype wherein the entire model is controlled by an RC ground control station.

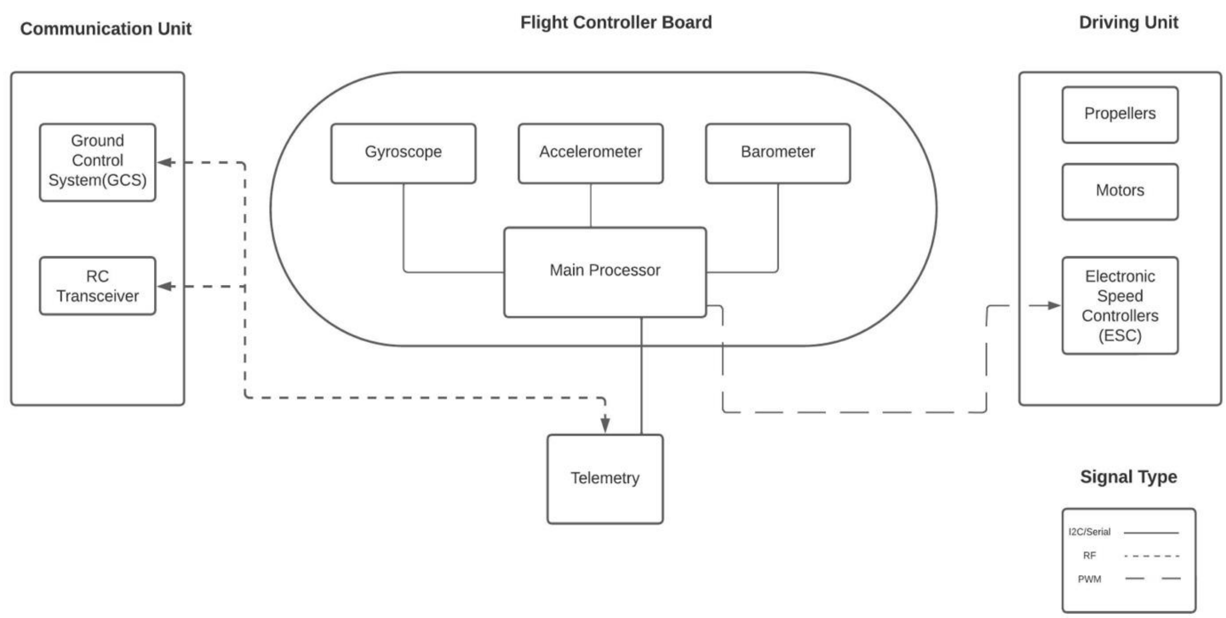
B. Phase 2: Conversion of prototype to a Hybrid Model.

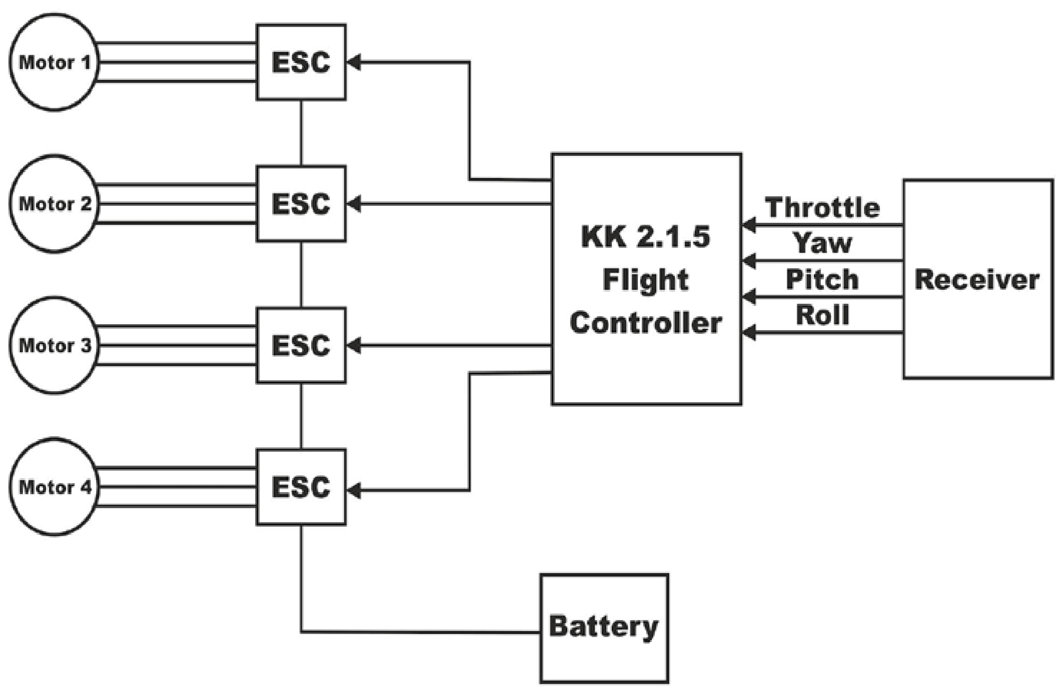
1. The preceding prototype wherein the hybrid model's body and wings are constructed as a 3D Model.

C. Work Carried Out:

1. Body Frame Assembly.
2. BLDC Motor Fixing.
3. Connecting Motors with Electronic Speed Controllers.
4. Attachment Of Flight Controller Board.
5. Adjustment Of Flight Controller Board.
6. Attachment Of TX And RX Of Remote Control to The Flight Controller Board.
7. Calibration Of Flight Controller Board.

8. Attaching Land Gear and Payload Lifter.





Results and Conclusion: In Conclusion the Hybrid Electric-Vertical Take Off Landing Aircraft represents a new era in aviation, bringing significant improvements in terms of efficiency, performance, and sustainability. The use of electric power in combination with advanced propulsion systems and flight control technologies provides a unique opportunity to address some of the most pressing challenges in aviation, such as noise pollution, carbon emissions, and limited take-off and landing locations.

The applications of Hybrid E-VTOL Aircraft are vast and varied, ranging from medical emergencies to cargo delivery and military operations. In the healthcare sector, Hybrid E-VTOL Aircraft can be used to transport patients and medical supplies to remote or hard-to-reach areas, thereby saving lives and improving access to healthcare services.

In the e-commerce and hyperlocal industry, these aircraft can provide fast and efficient delivery of goods and services, reducing traffic congestion and improving customer satisfaction.

In the defence sector, Hybrid E-VTOL Aircraft can offer several advantages over conventional aircraft, including increased agility, flexibility, and adaptability. These aircraft can be used for surveillance, reconnaissance, and precision strikes, providing enhanced capabilities for military operations.

As the technology continues to evolve, we can expect to see even more advanced and innovative designs that are faster, more efficient, and more reliable. The development of Hybrid E-VTOL Aircraft represents a significant step forward in aviation, opening up new possibilities for transportation, logistics, and defence. With the increasing demand for sustainable and eco-friendly aviation, these aircraft have a bright future ahead of them.

Innovation in the project: The development of Hybrid E-VTOL Aircraft is crucial to meeting the growing demand for more efficient and environmentally friendly transportation solutions.

These aircraft have the potential to revolutionize urban air mobility, emergency medical services, cargo delivery, military operations, and personal transportation, by providing faster, more reliable, and more accessible modes of transportation.

Furthermore, Hybrid E-VTOL Aircraft can significantly reduce carbon emissions, noise pollution, and traffic congestion, thereby improving the quality of life for people in cities and remote areas.

Therefore, the motivation for the development of Hybrid E-VTOL Aircraft is to create a more sustainable, efficient, and accessible mode of transportation that can address the challenges of urbanization, climate change, and global mobility.

Scope for future work:

1. Revolutionizing Urban Transportation: Hybrid E-VTOL Aircrafts Set to Transform City Travel
2. Lifesaving Air Ambulance: Hybrid E-VTOL Aircrafts to Enhance Emergency Medical Services
3. Faster, Greener Delivery: Hybrid E-VTOL Aircrafts to Revolutionize Cargo Transportation
4. Next-Gen Military Operations: Hybrid E-VTOL Aircrafts Bring Agility and Precision
5. Unveiling the Future of Environmental Monitoring: Hybrid E-VTOL Aircrafts for Data Collection
6. Swift Search and Rescue: Hybrid E-VTOL Aircrafts to the Rescue in Remote Areas
7. Disaster Relief Takes Flight: Hybrid E-VTOL Aircrafts Deliver Aid to Inaccessible Areas
8. Transforming Agriculture: Hybrid E-VTOL Aircrafts Revolutionize Farming Practices
9. High-Tech Policing: Hybrid E-VTOL Aircrafts Enhance Law Enforcement Operations
10. Unleashing Creativity: Hybrid E-VTOL Aircrafts Elevate Aerial Filming and Photography