DESIGN, DEVELOP, AND TESTING A HYBRID QUADCOPTER-ROVER (DROVER) FOR RESCUE OPERATIONS, DISASTER MANAGEMENT, AND INDUSTRIAL SURVEILLANCE

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Project Overview:

The project "Design and Development of Drover" aims to combine the strengths of drones and rovers to create a hybrid vehicle capable of enhanced exploration in challenging environments. This innovative approach seeks to overcome the limitations of individual platforms by integrating the aerial capabilities of drones with the ground mobility of rovers.

Key Objectives:

1. Design and Development: To design and develop a "drover" that integrates both drone and rover functionalities.
2. Testing and Optimization: To conduct extensive testing and minimize errors, ensuring the model's efficiency and performance in various applications.

Methodology:

- Literature Survey: Reviewing existing research and technologies related to drones and rovers.
- Purpose Definition: Clearly defining the objectives and applications of the drover.
- Design and Configuration: Selecting appropriate configurations and designing the drover.
- Fabrication: Building the prototype based on the detailed design.
- Testing: Conducting tests to validate the design and make necessary adjustments.

Design Calculations:

- Drone Components: Estimation of weight and power requirements for motors, propellers, ESC, battery, and flight controller.
- Rover Components: Weight estimation and power consumption calculations for motors, wheels, and other structural components.
- Combined System: Ensuring the integration of drone and rover systems for seamless operation and communication.

Prototype Development:

The prototype development involved creating a detailed design using CAD software, followed by the fabrication of both drone and rover components. The integration focused on achieving a robust docking mechanism and reliable communication system between the two platforms.

Key Features:

- Autonomous Operation: Both the drone and rover are capable of autonomous operation, reducing the need for constant human control.
- Communication and Coordination: Real-time data sharing and coordinated exploration between the drone and rover enhance efficiency and data acquisition.
- Environmental Adaptability: The design considers factors such as terrain, wind speed, and temperature variations to ensure reliable operation in various environments.

Applications:

The drover can be used in diverse applications such as:

- Disaster Response: Rapid assessment and detailed inspection of disaster zones.
- Environmental Monitoring: Collecting data in remote or hazardous locations.
- Search and Rescue: Enhancing search efficiency and victim identification rates.

Conclusion and Future Work

The project concludes that the drover represents a significant advancement in exploration technology, combining the strengths of drones and rovers for

comprehensive and efficient data collection. Future work will focus on refining the design, improving autonomous functionalities, and expanding the range of applications.