### c) If you are allowed to make changes in the design of regular drone what will you change and justify your answer. Also attach the referecnes for the suggested changes in the design.

### Solution:

### Enhancements to the Design of a Regular Drone

To make a regular drone more efficient, functional, and versatile, I would implement the following design changes:

**1. Modular Design**

**Change**: Implement a modular design allowing for easy swapping of components such as cameras, sensors, and batteries.

**Justification**:

* **Versatility**: Users can customize the drone for various missions by easily changing payloads.
* **Maintenance**: Simplifies repairs and upgrades, reducing downtime and extending the drone's lifecycle.
* **Scalability**: Enables users to start with a basic configuration and upgrade components as needed.

**Reference**: A similar approach is used by the DJI Matrice series, which offers a modular platform for various industrial applications .

**2. Enhanced Battery System**

**Change**: Integrate a hybrid battery system combining lithium-ion with hydrogen fuel cells.

**Justification**:

* **Extended Flight Time**: Hydrogen fuel cells can significantly increase the drone’s flight time, addressing one of the major limitations of battery-powered drones.
* **Efficiency**: Provides a more efficient power-to-weight ratio compared to traditional batteries.

**Reference**: Research on hybrid power systems for drones has shown potential for significant improvements in flight duration and operational efficiency .

**3. Advanced Collision Avoidance System**

**Change**: Incorporate 360-degree Lidar and advanced AI-based obstacle detection algorithms.

**Justification**:

* **Safety**: Enhances the drone’s ability to detect and avoid obstacles in all directions, crucial for operating in complex environments.
* **Autonomy**: Improves the drone’s autonomous navigation capabilities, making it safer and more reliable for tasks like delivery and surveillance.

**Reference**: Autonomous vehicles and advanced drones, such as those from Skydio, use comprehensive collision avoidance systems integrating Lidar and AI .

**4. Improved Aerodynamics**

**Change**: Redesign the drone’s body and propellers to enhance aerodynamics and reduce drag.

**Justification**:

* **Efficiency**: Reducing drag increases flight efficiency and stability, allowing for longer flight times and better performance in windy conditions.
* **Noise Reduction**: Better aerodynamics can reduce noise, making the drone less intrusive, which is particularly important in urban and residential areas.

**Reference**: Studies on aerodynamic optimization in UAVs show that tailored design improvements can significantly enhance performance and efficiency .

**5. Enhanced Payload Capacity**

**Change**: Reinforce the frame with lightweight, high-strength materials like carbon fiber or graphene composites.

**Justification**:

* **Durability**: Stronger materials increase the drone’s payload capacity and durability without significantly increasing weight.
* **Versatility**: Allows the drone to carry heavier and more varied payloads, expanding its range of applications.

**Reference**: The use of advanced materials like carbon fiber is common in high-performance drones and has been proven to improve payload capacity and structural integrity .

By implementing these changes, a regular drone can be transformed into a more versatile, efficient, and reliable tool suitable for a wide range of applications. Each enhancement addresses specific limitations of current drone designs, ensuring improved performance and user experience.