Problem 3

==**1. Determine Power Requirements**==

Total Current Draw:

Motors:

Each motor: 4A

Four motors: 4 A×4=16 A

Camera: 0.5A

Total Current Draw: 16 A+0.5 A=16.5 A

Total Power Consumption:

Voltage: 12V

Power Required: 12 V×16.5 A=198 W

Battery Capacity:

Operation Time: 30 minutes (0.5 hours)

Capacity Required: 198 W×0.5 hours=99 Wh

Adjust for Safety Factor:

Adjusted Capacity: 99 Wh×1.2=118.8 Wh

==**2. Select Suitable Batteries**==

Battery Type Options:

1. **Lithium-Ion Batteries:**

   High energy density, Light weight, Higher cost

2. **Lead-Acid Batteries:**

   Lower cost, Heavier, Larger size

Battery Specification:

- **Voltage: 12V**
- **Capacity: Minimum 120 Wh**

Example Battery Models:

Lithium-Ion Option:

- **Model:** 12V 15Ah Lithium-Ion Battery
  - o **Capacity:** 180 Wh
  - o **Weight:** Approximately 2.5 kg
  - o **Cost:** Higher, around $150-$200
  - o **Benefits:** Compact, high-energy density, longer life cycle

- **Advantages:**
  - o Meets capacity requirements with room for safety factor
  - o Lighter and more compact
  - o Longer lifespan and better performance in high-current applications
- **Disadvantages:**
  - o Higher cost

Recommendation:

For the optimal balance of weight, size, and performance, **a 12V 15Ah Lithium-Ion Battery** is recommended. It provides sufficient capacity with a safety margin, is lighter, and more compact compared to lead-acid alternatives. Despite the higher cost, the benefits of lighter weight and longer lifespan justify the investment in high-performance applications like Cyborg's.