# Cost-Benefit Analysis

## Battery Form Factors

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Form Factor** | **Initial Cost** | **Safety** | **Durability** | **Longevity** | **Efficiency** | **Compactness** |
| Cylindrical | $0.50 - $100+ | High | 5 years | Moderate | Moderate | Low |
| Pouch | $1 - $500+ | Low | 4 years | Lower | Low | High |
| Prismatic | $50 - $1000+ | Moderate | 6 years | High | High | Moderate |

## Summary

Each type of battery form factor has distinct attributes that make them suitable for different applications:

* **Cylindrical Batteries:** Offer high safety and durability with moderate efficiency. They are ideal for applications where space is less critical.
* **Pouch Batteries:** Prioritize compactness and low initial cost but compromise on safety and durability. Suitable for space-efficient designs.
* **Prismatic Batteries:** Balance high durability and energy efficiency with moderate compactness. Ideal for applications requiring efficient use of space.

## LiDAR Sensors

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sensor Type** | **Initial Cost** | **Durability** | **Resolution** | **Scanning Speed** | **Power Consumption** |
| Mechanical Scanning | $1,000 - $10,000+ | Moderate | High angular  Resolution | Moderate | Moderate |
| Solid-State | $10,000 - $100,000+ | High | High-speed scanning | High | Low |
| Hybrid | $5,000 - $50,000 | Moderate | Balanced resolution and range | High | Moderate |

## Summary

Each type of LiDAR sensor exhibits distinct attributes that render them suitable for different applications:

* Mechanical scanning LiDAR sensors, with their lower initial cost, are ideal for applications that prioritize detailed environmental mapping and navigation over long distances but do not require high-speed scanning. However, their moderate durability and relatively high-power consumption might limit their suitability in dynamic and fast-paced environments.
* Solid-state LiDAR sensors, despite their higher cost, offer enhanced durability, high-speed scanning capabilities, and lower power consumption, making them a preferred choice for applications that demand reliable and precise data acquisition in dynamic and energy-conscious settings. However, they work best for short-range sensing.
* Hybrid LiDAR sensors strike a balance between the two, offering a blend of long-range sensing, high resolution, and fast data acquisition at a moderate cost. They are well-suited for applications that require comprehensive 3D perception while maintaining a reasonable budget.