**ERC Hackathon Electronics**

**1) Tinkercad Link:** <https://www.tinkercad.com/things/8d2qznkHvkk-differential-drive-2-motors?sharecode=Ns-8g2LjNtwTED6gY1k7vyG_NdcpqaSt67hl80xUu4Y>  
  
**2) Power Calculations and Motor Specifications**

**2.1 Motor Specifications:**

1. **Transport Motors:**
   * **Voltage:** 12V to 24V
   * **Power:** 20W to 150W per motor
   * **Quantity:** 4 motors
2. **Arm Motors:**
   * **Voltage:** 6V to 24V
   * **Power:** 10W to 100W per motor
   * **Quantity:** 4 motors (including wrist control)
3. **Gripper Motors:**
   * **Voltage:** 6V to 12V
   * **Power:** 5W to 20W per motor
   * **Quantity:** 1-2 motors

**2.2 Power Calculations:**

* **Total Power for Transport Motors:**
  + **Minimum Power:** 4 motors × 20W = 80W
  + **Maximum Power:** 4 motors × 150W = 600W
* **Total Power for Arm Motors:**
  + **Minimum Power:** 4 motors × 10W = 40W
  + **Maximum Power:** 4 motors × 100W = 400W
* **Total Power for Gripper Motors:**
  + **Minimum Power:** 1 motor × 5W = 5W
  + **Maximum Power:** 2 motors × 20W = 40W

**Total Power Requirement:**

* **Minimum Total Power Required:** 80W (Transport) + 40W (Arm) + 5W (Gripper) = 125W
* **Maximum Total Power Required:** 600W (Transport) + 400W (Arm) + 40W (Gripper) = 1040W

**Battery Selection:**

* **Type:** Lithium-Polymer (LiPo) or Lithium-Iron-Phosphate (LiFePO4)
* **Capacity Calculation:**
  + For a 12V LiPo battery, a capacity of 10Ah would provide 120Wh of energy, which is suitable for the minimum power requirement scenario.

**Peak Current Calculation:**

* **Peak Current (Minimum):** Total Power / Voltage = 125W / 12V = 10.42A
* **Peak Current (Maximum):** Total Power / Voltage = 1040W / 12V = 86.67A

**Wire Gauge Recommendation:**

* Use wires rated for at least 1.5 times the peak current to ensure safety and reliability.

**3) Design Considerations**

**3.1 Motor Recommendations:**

1. **Transport Motors:**
   * **Recommendation:** RS-775 DC Motor
     + **Voltage:** 12V
     + **Power:** 100W
     + **Features:** High torque, suitable for transport applications.
     + **Link:** https://www.amazon.in/THEMISTO-passion-Themisto-RS-775-Replacement/dp/B07PT3LZR8/ref=sr\_1\_1?sr=8-1
2. **Arm Motors:**
   * **Recommendation:** Dynamixel MX-28
     + **Voltage:** 12V
     + **Power:** 30W
     + **Features:** High precision and torque control, ideal for robotic arms.
     + **Link:** https://www.robotis.us/dynamixel-mx-28t/
3. **Gripper Motors:**
   * **Recommendation:** HS-645MG Servo Motor
     + **Voltage:** 6V
     + **Power:** 15W
     + **Features:** High torque and reliability for gripper tasks.
     + **Link:** https://www.electronicscomp.com/hitec-hs-645mg-high-torque-metal-gear-premium-sport-servo?gad\_source=1