| Motor Name | Price | Type | Torque (kg\*cm) | Torque (N\*m) | Rotation Range | Weight (g) | Required Arm Length (in) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Tower Pro MG995 | Not available in the US :( | Servo | 10 | 0.98 | 360° continuous | 55 | 4.33 |
| [Tower Pro MG996R](https://www.amazon.com/MG996R-Digital-Waterproof-Airplane-Helicopter/dp/B0DCK462XZ/ref=sr_1_3_sspa?crid=2BVYZY7ELDI1F&dib=eyJ2IjoiMSJ9.56K-hmwefmvdA0j2nTJs7eALbaDsPYbl--24Qz7n2d03NJxPLizw5b1-AjDARmUYnerbccU-RqX-cowDM_vcBlWkJC4kBFt1q6NT1cvH6bZlDklra0HhR3PDmLBql5P4njfPKj0ho3PCzmKmRAbBFqlAnGxgWQsmNX91Ys92v4Pdxxn_sxMAbW9izL4sinvDl8VR-TC4dJZEdP4YSvWjJ5fpRIrNtRLTyE2WTuyfyPqjBhfNxIi5ifnoK-BBXWUwlDytq91Cav4WD2sbLAZi3MIjOStxNJERu4FcTen9NjY.BH5K2IJvcocgplyuqUwN1KwbGhpgYvIybFi5jV2vAxs&dib_tag=se&keywords=mg996r&qid=1728250707&sprefix=mg996r%2Caps%2C160&sr=8-3-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1) | $13 for 2 | Servo | 11 | 1.07 | 180° | 55 | 4.33 |
| Futaba S3003 |  | Servo | 3.2 | 0.31 | 180° | 37 | 1.57 |
| Savox SC-0251MG |  | Servo | 15 | 1.47 | 180° | 58 | 6.49 |
| [Hitec hs-645MG](https://www.amazon.com/Hitec-32645S-HS-645MG-Torque-Metal/dp/B003T6RSVQ/ref=sr_1_1?crid=1MMDVJDWUMYJ6&dib=eyJ2IjoiMSJ9.tat9Yj1iSkYVCCP7fkJGHtwy6YDf6TwUDh0_x9B43am11sRDZcHNWielurGrGM5iY1vTpXmQHocxpwpCPHqOtJlKKr5dIeIca5fS7xr0kHW36nLTmyWrsAkbh48151-pZQdwxZVbt3Cp4BBxRqhCb_d9a5seWuWMcXrcJQ-C0ZaREa0f0lNmEfyWnQ5HuY77A-F1ZjJknvc-LJDX7Xut06vJaRjobcZ5z4aYHYq8YMT6BnHYuZABsauzgBMl2iqRxIWvYduFHwe2cArL2hOKX7Wk3B2dQ4IhxqN0z2IbOfg.OzL8SEAFwAjscmobiephuq-JRyZBkS9zJ2q2Yw4GAJA&dib_tag=se&keywords=Hitec%2Bhs-645MG&qid=1728252927&sprefix=hitec%2Bhs-645mg%2Caps%2C153&sr=8-1&th=1) | $35 | Servo | 9.6 | 0.94 | 180° | 55 | 4.33 |
| [Feetech FS90R](https://www.amazon.com/Feetech-Continuous-Rotation-Arduino-Microbit/dp/B086ZGTLZB/ref=sr_1_5?crid=1D9K7M2UBOUTL&dib=eyJ2IjoiMSJ9.z5OKbkfv2f0DFyWkkRI6pdwzA68MYq07TjRf4Jnb08CN1UfECOHmXy2QDQ3XgvLzAD9tP6Th1s9OeuuE_Vv5ju3TnhvDmdCGh5tQwlRts52EcNP_gw0vg6z2lhVRw0nQXHTJSJ_fd74t55gqKAK-7lyAlZY4nCIvimimyba9pdiYEqhtknYXElagG864w7dGJOhtL4IsTZI6urQagNqVOeZwsYV2KwuT4njJUukWhGmuQrAskq9O1Gb43UIeZiNSlxQ3Y6za7dTdrFaTS0tX3_txo_TYqf-waBtDipQf610.J3ue5QlCKgO2m_kbJji4qEZu9agS9VFw0CtE9VoLdX0&dib_tag=se&keywords=Feetech+FS90R&qid=1728252390&sprefix=feetech+fs90r%2Caps%2C120&sr=8-5#customerReviews) | $15 for 2 | Continuous Servo | 1.5 | 0.15 | 360° continuous | 13.5 | 0.79 |
| Dynamixel AX-12A |  | Servo | 15 | 1.47 | 300° | 53.5 | 6.49 |
| StepperOnline Nema 17 |  | Stepper | 38 | 3.72 | 200 steps (1.8°/step) | 400 | 16.14 |
| Pololu 35x36mm Stepper Motor |  | Stepper | 45 | 4.41 | 200 steps (1.8°/step) | 340 | 17.72 |
| Adafruit Stepper Motor 42STH38 |  | Stepper | 26 | 2.55 | 200 steps (1.8°/step) | 280 | 11.02 |
| DFRobot 5V Stepper |  | Stepper | 1.8 | 0.18 | 64 steps (5.625°/step) | 30 | 0.79 |

### **Key Considerations:**

* **Tower Pro MG996R** is a good servo choice with reasonable torque and weight, and you would need an arm length of about **4.33 inches (12 cm)** to lift a 2-pound opponent.
  + You can directly control the Tower Pro MG996R servo motor using a PWM signal from an ESP32 without the need for an additional motor driver. The MG996R is a standard hobby servo that operates on PWM signals to control its position.
  + PWM Control: The MG996R expects a PWM signal (typically 1 ms to 2 ms pulse width) to determine its position. The ESP32 has built-in PWM capabilities that can easily generate this signal.
  + Power Supply: While you can control the servo directly with the ESP32, ensure that the servo is powered separately with an appropriate power supply. The MG996R can require a significant amount of current (up to 1.5A under load), which the ESP32 cannot provide.
  + Common Ground: Make sure to connect the ground of the ESP32 and the power supply for the servo together to ensure proper operation.
* **Savox SC-0251MG** provides a bit more torque (15 kg·cm) with only a slightly heavier weight, allowing for a longer arm of **6.49 inches (16 cm)**.
* **Nema 17 Stepper** offers very high torque (38 kg·cm) but is much heavier at 400 grams. If you opt for this, you could use a longer arm of **16.14 inches (41 cm)**.