**Robot Project**

This Word Document is regarding the pick and place robot project, The project aims to create a small compact 4 DOF robot which utilize 3D printed parts for the links, Servo motors and Arduino Uno for running the robot.

The initial robot will be controlled with a smaller robot arm which looks like another 3D Printed arm where the signals of the angle movement are converted to the motion for the larger robot arm.

The Project aims to improve on this concept and make a robot which runs on inverse kinematics and polynomial regression for the autonomous movement of the robot.

If we are successful with this system we can add machine learning for holding of complex materials.

**Task List**

|  |  |  |
| --- | --- | --- |
| **S.No** | **Task** | **Status** |
| 1 | Making the budget List | Yes |
| 2 | Check the working of the various parts |  |
| 3 | Check the working of the various parts |  |
| 4 | Check if the software works |  |
| 5 | Make a list of the working parts already available |  |
| 6 | Redesign the 3D parts |  |
| 7 | Get the 3D printing done |  |
| 8 | Assemble the parts |  |
| 9 | Get it working |  |
| 10 | Reprogram the system by Incorporating Inverse Kinematics into this build robot |  |

**Parts required**

The different parts required for this

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Category** | **Part/Tool** | **Quantity** | **Price** | **Notes** |
| **Electronics** | High Torque Servo Motor  (20KG RC Servo High Torque Servo Motors) | 1 unit | 1,340.33 |  |
|  | Standard Servo Motors  (MG996R 55g Metal Gear Torque Digital Servo Motor) | 3 units | 280\*3 = 840 |  |
|  | Micro Servo Motor  (SG90 9g Micro Servos) | 1 unit | 71 |  |
|  | Arduino Uno (or Leonardo) | 1 unit | 1,300 |  |
|  | Servo Driver Modul (PCA9685 - 16 Channel 12-Bit PWM Servo Motor Driver I2C Module For Arduino) | 1 unit | 240 |  |
|  | Potentiometers  (WH148 Type B10K Ohm Linear Taper Rotary Potentiometer Panel Pot 3 Pin) | 4 units | 299 |  |
|  | Push Button | 1 unit | 5 |  |
|  | LED | 1 unit | 5 |  |
|  | Switch | 1 unit | 7 |  |
|  | Wires |  | 50 | Hook up wires |
|  | Set of Wires | Various lengths | 78+68 |  |
|  | Shrink Wrap | As needed | 12 | For wire insulation |
|  | Adapter cable | Various types | 99+48 | Adapter + female attachment |
| **Total Cost** |  |  |  |  |
| **Mechanical Components** | 3D Printed Parts | Various pieces | 1200 | Specific STL files linked in the original tutorial |
|  | 40-Tooth Gears | 2 units | 140 for 22 gears |  |
|  | 34-Tooth Gear | 1 unit |  |
|  | Small Piece of Clear Acrylic | 1 unit | - | For specific assembly parts |
|  | Foam or Grippy Substance | As needed | - | For the gripper |
|  | Rubber Band | 1 unit | - |  |
|  | Screws | Various sizes |  | Includes M4 x 6 mm screws |
|  | Servo Horn | Included with servos | - | - |
|  | Screws | 10(2.5 x 1.6 x 4.5) |  |  |
|  |  | 4(M4 x 6mm) washer |  |  |
|  |  | 3(M3 x 8mm) washer |  |  |
|  |  | 6(washer)  + (M2 x 8mm) |  |  |
|  |  | 4(M2 x 4mm) |  |  |
|  |  | 7(M2 x 6mm) |  |  |
|  |  | 4(M3 x 30mm) |  |  |
| **Tools Required** | Screwdrivers | Various sizes |  |  |
|  | Glue | As needed |  | For assembling certain parts |
|  | Soldering Iron | 1 unit | - | For connecting wires |
|  | Crimpers | 1 unit |  | For securing connections |
|  | Cutters and Wire Strippers | 1 set | - | For preparing wires |
|  | Torch (optional) | 1 unit | - | For heating shrink wrap |

**High Torque Servo Motor**

<https://robu.in/product/orange-ot5320m-7-4v-20kg-cm-180-copper-metal-gear-digital-servo-motor/?gad_source=1&gclid=Cj0KCQjwt4a2BhD6ARIsALgH7DrsNG6qFXQJZbClNWkcbqHNA5mflULXgDe_I4HRhxDNJ8CVDqDXZSUaAiFWEALw_wcB>

**Standard Servo Motors**

<https://www.electronicscomp.com/mg996r-metal-gear-servo-motor?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2EwFeCC7L8BMJzULWzkFqXPN8tbbaoaZDl0io2sANz6OF6WRL8Pkk0aAq8qEALw_wcB>

**Micro Servo Motor**

**(SG90 9g Micro Servos)**

<https://www.electronicscomp.com/towerpro-sg90-9gm-micro-servo-motor?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2HqFXvDq32MQskA_sInunvWMe_I6O-BcVATn1FY6BE0L_S-Nb5MCB4aAhHMEALw_wcB>

**Potentiometers**

**(WH148 Type B10K Ohm Linear Taper Rotary Potentiometer Panel Pot 3 Pin)**

<https://www.amazon.in/ElectroBot-Linear-Taper-Rotary-Potentiometer/dp/B07QB32TD3>

**Arduino:**

<https://www.hnhcart.com/products/original-arduino-uno-rev3-a000066?gad_source=1&gclid=Cj0KCQjwt4a2BhD6ARIsALgH7Dq5YkaEUqWoB9shT_vXMyW7niNR9d4cBU59QORYZlj_6Z_eZyxGYG8aAvkXEALw_wcB>

**Gear**

<https://www.electronicscomp.com/plastic-shaft-crown-differential-gears-diy-assorted-kit-11-kinds-pack?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2FnzvYx01B0TatQh1rGoRijNg71hHu9GE1KFMSSq3aHfdDsgISclqIaAuiOEALw_wcB>

<https://www.electronicscomp.com/gears-assorted-kit-for-diy-robotics-and-household-repair-75-pieces-pack?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2H94yaG5MMsKDDtBzzkl16LjAe_ydXWKYk-ChDDMIKJyNG6hFN9oS0aAo8qEALw_wcB>

**SafeConnect Nylon T-connector Male Pigtail with 14AWG Silicon Wire 10cm**

<https://www.electronicscomp.com/safeconnect-nylon-t-connector-male-pigtail-with-14awg-silicon-wire-10cm?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2EPVjGi_6pC6AyA4Wk8_l4kkBdw32Y8TmlVnGZvEv1_r45pvoX-SqcaAiJVEALw_wcB>

**SafeConnect Nylon T-connector Female Pigtail with 14AWG Silicon Wire 10cm**

<https://www.electronicscomp.com/safeconnect-nylon-t-connector-female-pigtail-with-14awg-silicon-wire-10cm?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2HOWNAAGRvn3n-zHofxSqgDtdpYfbwNaQfpZR83MeLiizeUdJX1nnoaApRDEALw_wcB>

**Adapter [check]**

<https://www.electronicscomp.com/12v-1amp-dc-adaptor?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2EOYJwP2NDfq2ON2R-j0W2MUA-HOAV97m1NAvCRTLtyWnbilpfJK_gaAtzXEALw_wcB>

**MX DC Female Socket To Open End Cord 6" L (MX-3556) [check]**

<https://www.electronicscomp.com/mx-dc-female-socket-to-open-end-cord-6-l-mx-3556?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2H-21jC__013jWWj1P2U69998fpSHM3GvkrVes_lMwUjrXAWYCZxesaAmwDEALw_wcB>

**Push Button (Switch - 12mm - 4 pin - Tactile/Micro Switch)**

<https://www.electronicscomp.com/push-button-switch-12mm?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2HMUI1eKKiBGzUmBfBSxz9kLkRCoZzRHXsjHC0mNeErr7ZUkqTKrM0aAhMtEALw_wcB>

**Red LED - 3mm Diffused - 5 Pieces Pack**

<https://www.electronicscomp.com/red-led-3mm-diffused-india?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2GMGF4ZSxddsfJeu7cd6IGAHZ87pgqOdGCYAJ7tRPFowNScVr5gsOkaAtQiEALw_wcB>

**Hook up Wire Packet(1 meter each, 5 colors)**

<https://robocraze.com/products/single-stranded-hook-up-wires-1m-each-5-colors?variant=40193905590425&currency=INR&utm_medium=product_sync&utm_source=google&utm_content=sag_organic&utm_campaign=sag_organic&campaignid=20078204115&adgroupid=&keyword=&device=c&gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2Fs8AJJ_8nxsPx38eB5VFfPsQqUxMMb2-FKpfUVGlA8bImcgml50WwaAkM6EALw_wcB>

**3mm Heat Shrink Sleeve Tube - Red - 1 meter**

<https://www.electronicscomp.com/3mm-heat-shrink-sleeve-tube-red-1-meter?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2E4uziqzA5kj54OSDQ6fX37nSYpLl-5Wnhedl8hKVi-fH7f3bKX6jYaAsBWEALw_wcB>

**Power Switch**

<https://www.electronicscomp.com/spst-on-off-switch?gad_source=1&gclid=Cj0KCQjw2ou2BhCCARIsANAwM2E0-x-y09J0Yn0VIEPtCzzOtst_srsQRkwVsqUDakeTueL7x2OATisaAtC1EALw_wcB>

**Screws (2.5 x 1.6 x 4.5)**

<https://www.electronicscomp.com/600pcs-sunglasses-clock-rimless-mirror-leg-screw-tool-package-with-screwdriver-plastic->

|  |  |  |  |
| --- | --- | --- | --- |
| Screws | 10(2.5 x 1.6 x 4.5) |  | 300 |
|  | M4 x 6mm washer | 4 |  |
|  | M3 x 8mm washer | 3 |  |
|  | washer  M2 x 8mm | 6 |  |
|  | M2 x 4mm | 4 |  |
|  | M2 x 6mm | 7 |  |
|  | M3 x 30mm) | 4 |  |
| Washers | M4 x 6mm washer | 4 |  |
|  | M3 x 8mm washer | 3 |  |
|  | washer  M2 x 8mm | 6 | 83 |

Total calculated in approximately 6K

3D Prints Parts

|  |  |
| --- | --- |
| Part | Status |
| 1-3 | Yes |
| 2 | Yes |
| 4-6 |  |
| 5-7 |  |
|  |  |
|  |  |
|  |  |