# Electronics Parts:

|  |  |  |  |
| --- | --- | --- | --- |
| Part name | Quantity | Recommended vendor | Price |
| MG955 servo motor | 2 | Robotshop.com | £12 |
| Raspberry Pi Zero W 2 | 1 | Raspberrypi.com | £17 |
| Raspberry Pi Camera module 3 | 1 | Raspberrypi.com | £26 |
| Pi zero camera adaptor | 1 | [link](https://thepihut.com/products/raspberry-pi-zero-camera-cable-300mm) | £4 |
| GPIO header pins | 40 pins | Any electronics vendor | ~£0.5 |
| Momentary switches (3-way, toggle, to adjust servos) | 2 | [link](https://www.switchelectronics.co.uk/on-off-on-momentary-miniature-toggle-switch-spdt) | £2 |
| Momentary switch (2-way, to capture image) | 1 | Any electronics vendor | £1 |
| Toggle switch (2-way) | 1 | Any electronics vendor | £1 |
| WS2812 (LEDs) | 10 | Any electronics vendor | ~£2 |
| 10000mah, 5V battery pack | 1 | Any electronics vendor, [example](https://www.amazon.co.uk/Anker-PowerCore-Ultra-Compact-Fast-Charging-Technology/dp/B019GJLER8/ref=sr_1_6?keywords=anker%2Bpower%2Bbank%2B10000mah&qid=1685973287&sprefix=anker%2Bpower%2Bbank%2Caps%2C128&sr=8-6&th=1) | ~£20 |
| Power distribution board | | | ~£2-5 |
| Total Price: | | | ~£90 |
| Jumper wires, solder, and other miscellaneous items may be required during assembly – but have been emitted as exact quantities will depend on the final design & assembly procedure. | | | |

Figure. 1

# Part selection justification:

The particular parts chosen here were chosen as they are available at low-cost, supported extensively by open-source software libraries, available globally, and easy to implement and repair.

Raspberry Pi:

# Wiring Diagram:

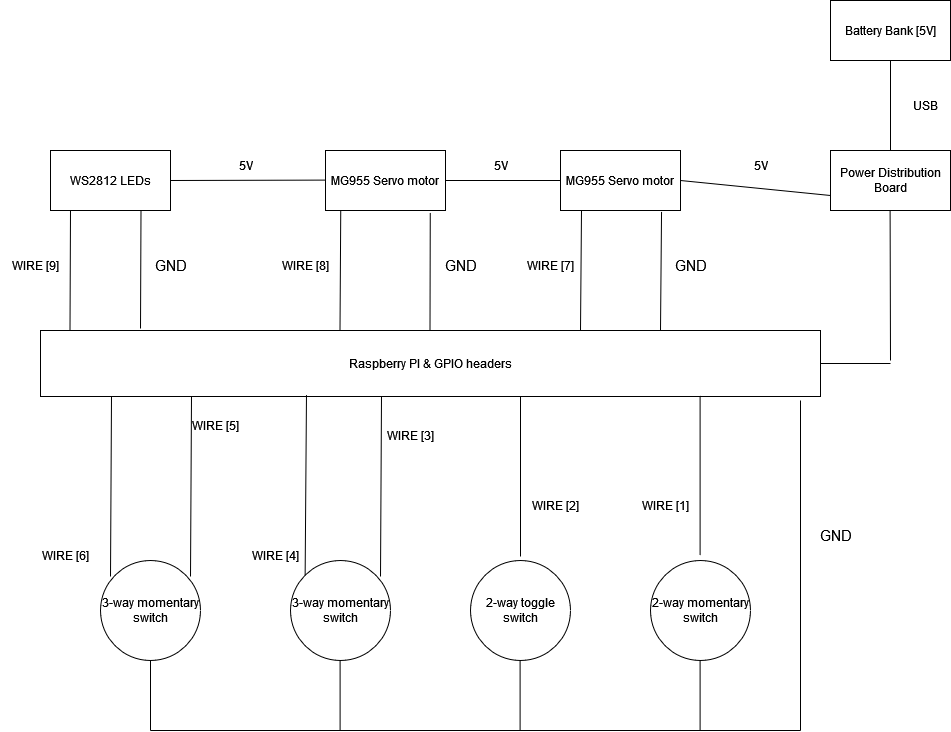


Figure. 2

A list of where each wire should be connected is included below. It is recommended that a jumper cable with a female header (see Fig 3) is used to connect the RasPi’s GPIO pins, as this allows for changes to be made easily. When the final assembly is complete, it is recommended to apply a small amount of hot glue (or other electrically insulating, easy-to-remove adhesive) to ensure that vibrations do not cause the jumper cables to fall out. All other connections should be soldered, as this provides a secure electrical and mechanical connection.



Figure. 3

|  |  |
| --- | --- |
| Wire number: | Raspberry Pi: GPIO pin number (BCM coding) |
| Wire [1] | 5 |
| Wire [2] | 6 |
| Wire [3] | 13 |
| Wire [4] | 19 |
| Wire [5] | 26 |
| Wire [6] | 12 |
| Wire [7] – servo signal wire | 16 |
| Wire [8] – servo signal wire | 20 |
| Wire [9] – WS2812 signal wire | 21 |

Figure. 4

**3-way momentary switches:** Used for adjusting each lens forward/backwards respectively.

**2-way toggle switch:** Used to control the LED lighting ring.

**2-way momentary switch:** Used to trigger a manual image capture.

# Protecting against vibrations and water/dust damage:

To protect the Raspberry Pi from water damage, it is recommended that is covered with a conformal coating, which can be bought at most electronics/hardware retailers. It is used to provide a small amount of water-resistant as it is a hydro-phobic coating.

Additionally, the mechanical design should be created such that water never flows over the switches in the event that the device gets wet. This can be done by including ridges that break the surface tension of water, which allows it flow along surfaces at acute angles. However, the switches chosen are water-resistant, ensuring the electronics are protected in either case.