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## Humanoid Robotic Hand

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### Description

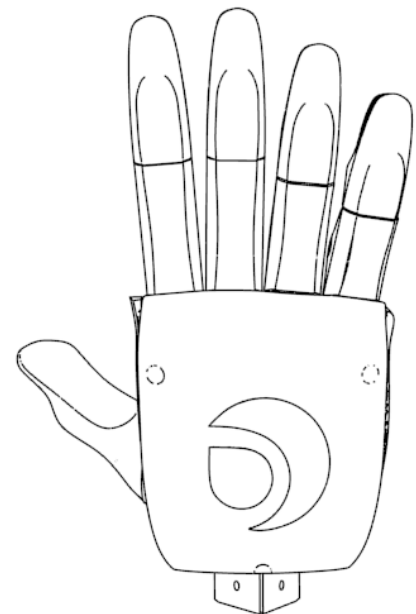
The Brunel Hand is the second robotic hand released by Open Bionics after the Ada Hand. Key improvements include integrated finger friction pads, a more stable pinch grip, and a revised custom control printed circuit board. The Chestnut V1.0 (PCB) is based around the SAMD21G18 microcontroller with I<sup>2</sup>C connectivity plus breakout pins. The hand is CE marked and comes pre-assembled, so there is no need to waste any time before getting started.

### Features

- Lightweight - ideal for low-payload robot arms
- Mechanically compliant features - robust and shock resistant
- High-grip pads on the palm and fingers
- 9 degrees of freedom (underactuated)
- 4 degrees of actuation
- Current feedback on motors to determine grip strength
- ROS compatible
- Arduino IDE compatible
- Fully open source hardware and software
- Fully controllable RGB status LED
- 9 axis IMU
- USB programmable
- Removable wrist connector

### Key specifications

- Mass: 371 g
- Major dimensions: 198 x 127 x 66 mm
- Operating voltage: 6-12V
- Materials: PLA plastic, TPU and urethane



**This is not a medical device.**

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## Applications

Perfect for the scientist, researcher, roboticist, educator or hobbyist. The Brunel Hand is ideal for dexterous manipulation tasks, as well as robot - human interaction studies.

## Components

The design files (.blend), print files (.stl), and other documentation for the components that make up the Brunel Hand can be found online at:

[www.openbionics.com/downloads](http://www.openbionics.com/downloads) or  
[www.github.com/Open-Bionics](http://www.github.com/Open-Bionics)

## EC Declaration of Conformity

The Brunel Hand is CE marked and conforms to the following CE Marking Directives:

**2006/42/EC** Conforms with the essential health and safety requirements (EHSR) of the Machinery Directive and its amending Directives.

**2014/30/EU** Conforms with the essential performance requirements of the Electromagnetic Compatibility (EMC) Directive and its amending Directives.

**2011/65/EU** Conforms with the Restriction of Hazardous Substances (RoHSII).

and to the following standards:

**EN ISO 12100:2010** Safety of machinery. General principles for design. Risk assessment and risk reduction.

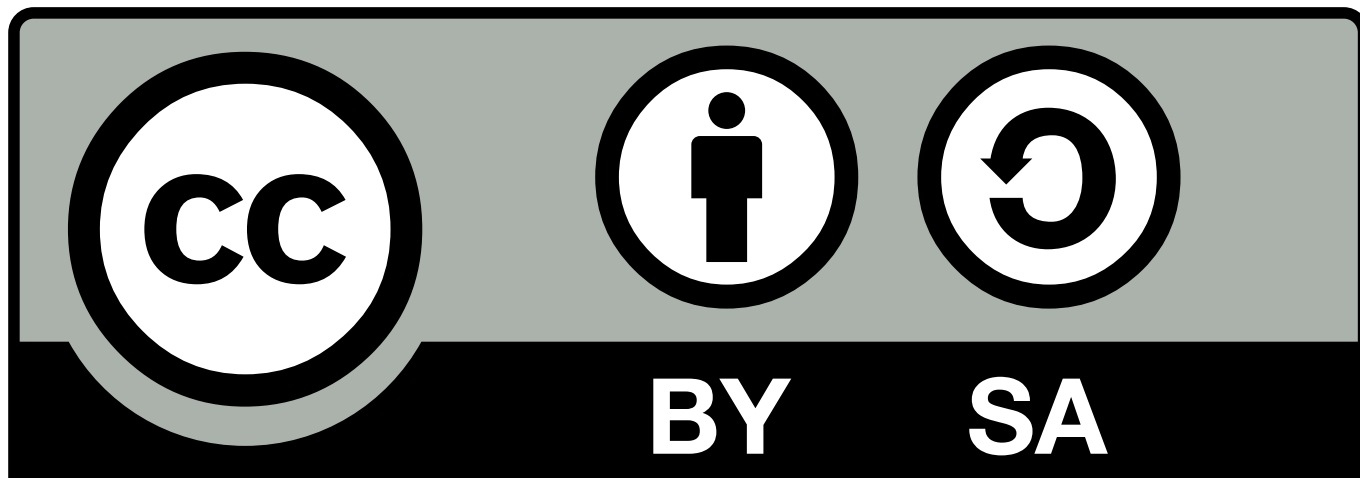
**EN 61010-1:2010** Safety requirements for electrical equipment for measurement, control and laboratory use.

**EN 55032:2012/AC:2013** EMC of Multimedia Equipment - Emissions Requirements.

**EN 55024:2010** Information Technology Equipment - Immunity Characteristics.

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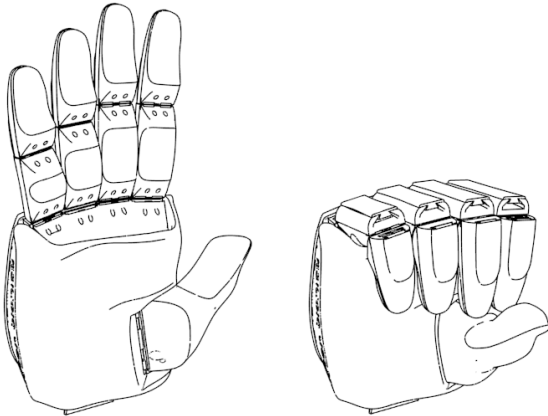
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### **Fist Grip**

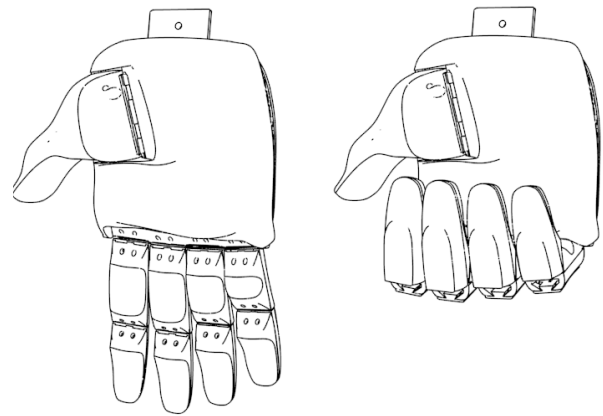
Handle: Tested up to 5.0 kg payload

Bulk object: 2.2 kg payload



### **Palm Grip**

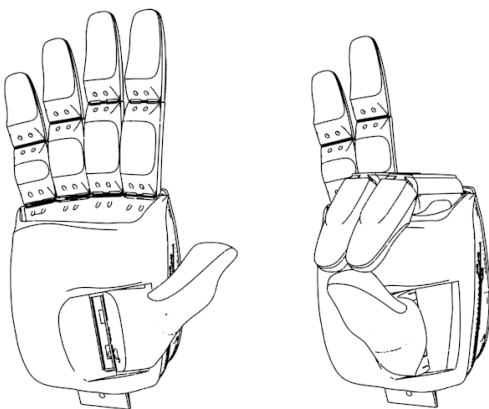
Tested up to 10.0 kg payload (holds comfortably)



### **Tripod Grip**

Bulk object: 2.0 kg payload

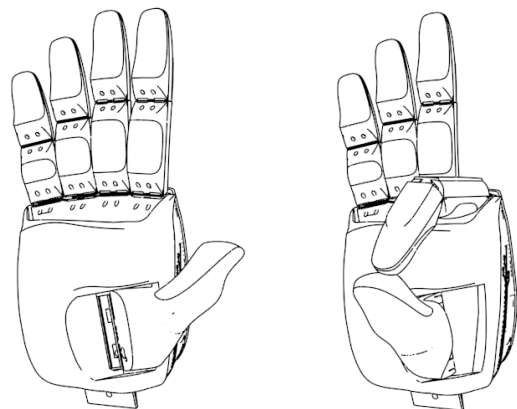
Small object: 0.4 kg payload



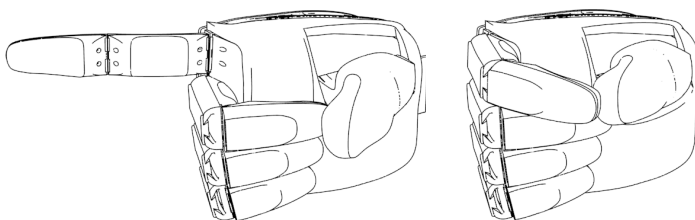
### **Pinch Grip**

Bulk object: 1.0 kg payload

Small object: 0.1 kg payload

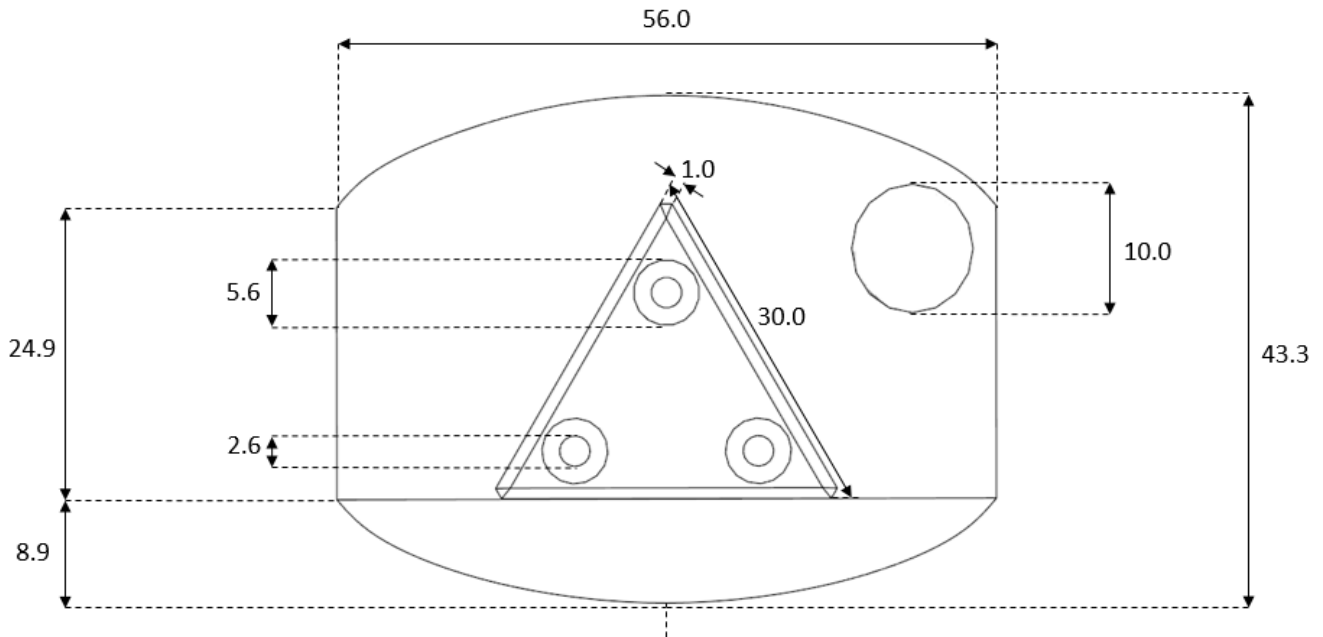


### **Point Gesture**

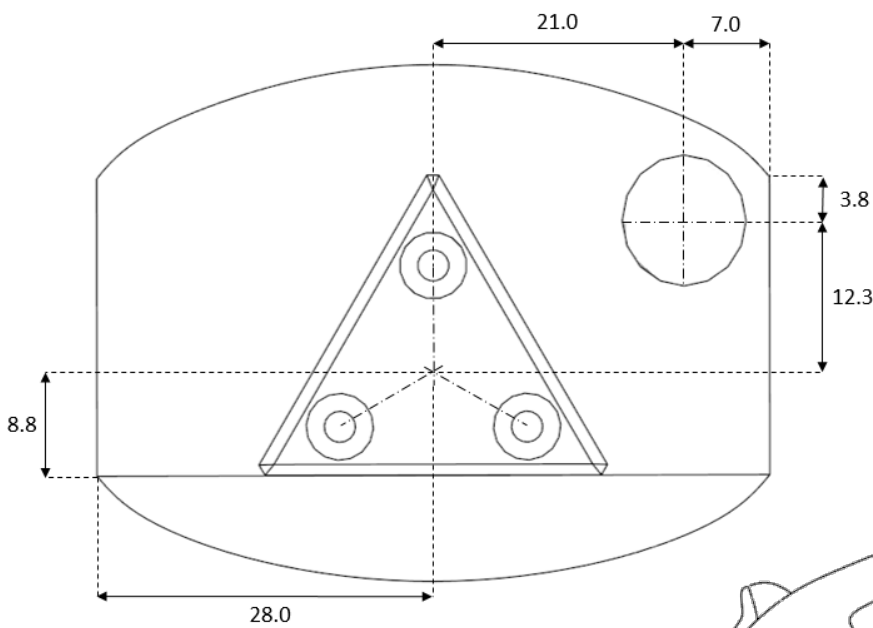


Payloads are approximate  
Bulk object taken as  $\varnothing 93$  mm

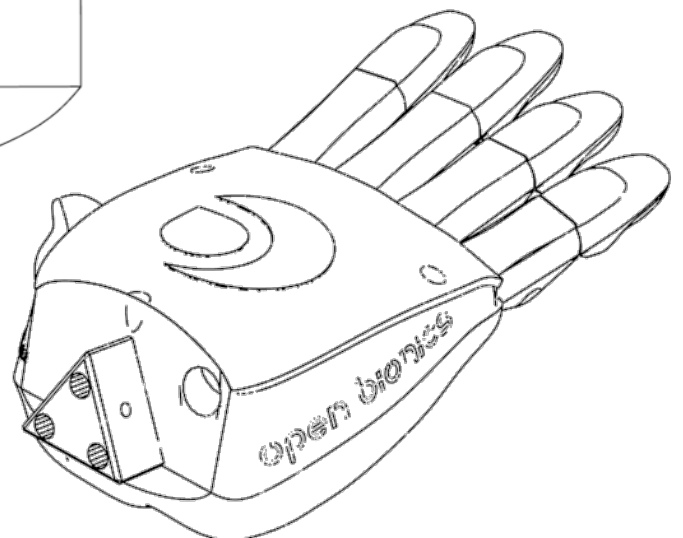
## Wrist Interface



All units in mm

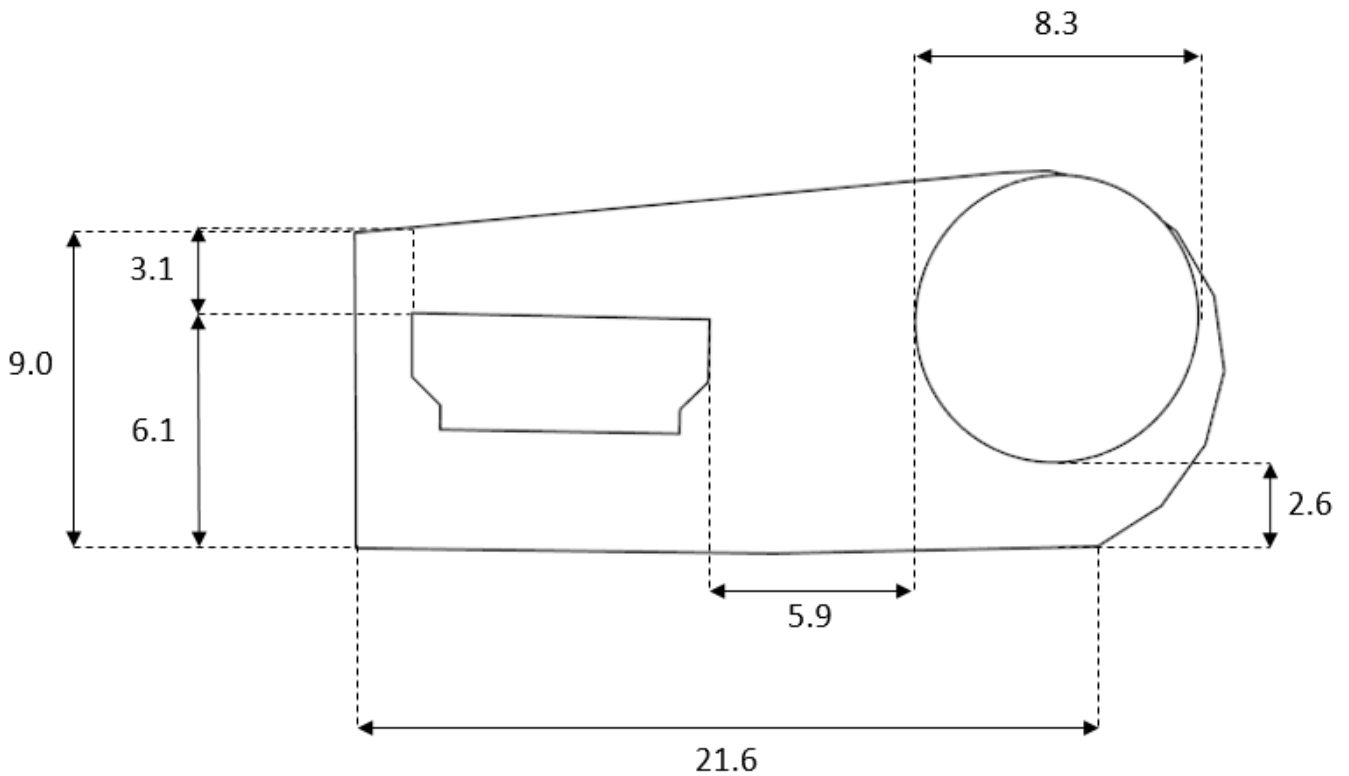


Drawing not to scale  
Printed parts subject to 0.5 mm tolerance



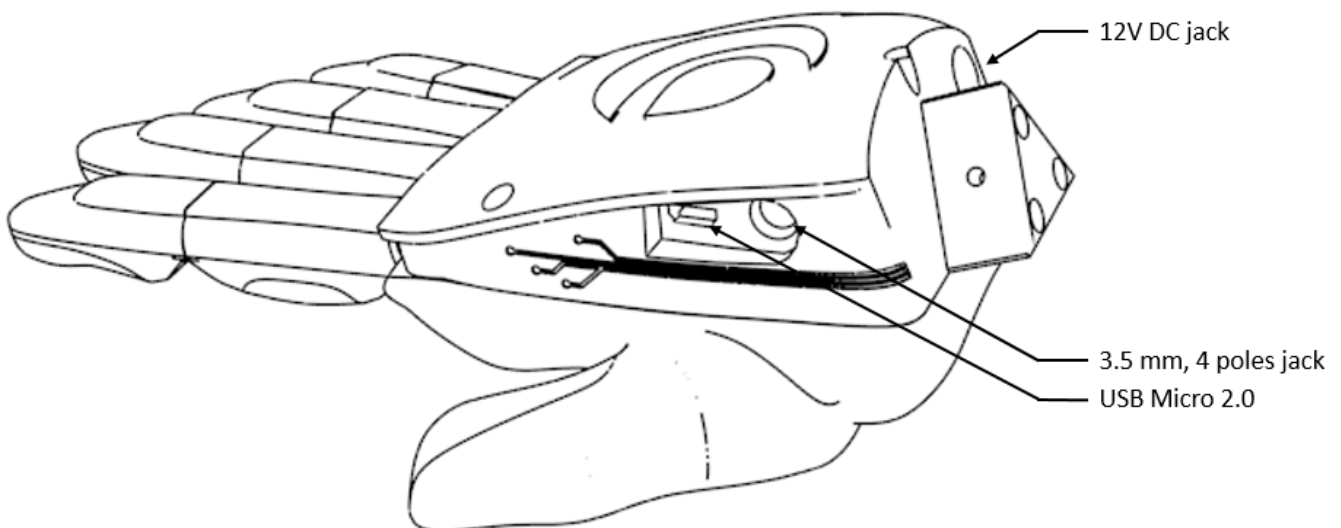
Wrist connector depth: 15 mm  
2 mm bolts present on each wrist connector face

## Wrist Cabling



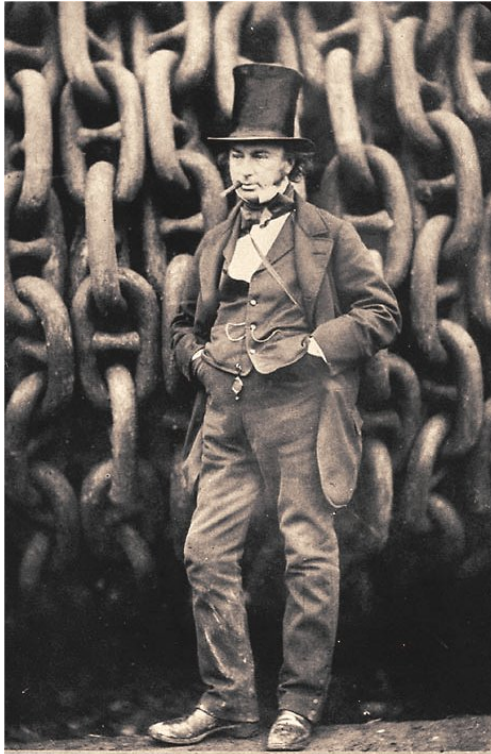
All units in mm

Drawing not to scale  
Printed parts subject to 0.5 mm tolerance



Cabling entry depth: 6.3 mm

## Dedication



Isambard Kingdom Brunel (1806-1859) revolutionised public transport and modern engineering. No dream was too big.

Dionysium Lardner, a celebrated academic, on Brunel's plan to cross the Atlantic Ocean with a coal powered ship:

"As the project of making the voyage directly from Liverpool to New York [...] they might as well talk of making the voyage from New York to the moon..."

In 1838 the *SS Great Western* steamed into New York harbour with 200 tonnes of coal to spare.

## Developers

Share your projects and join our developer community here:  
[www.openbionics.lefora.com](http://www.openbionics.lefora.com)