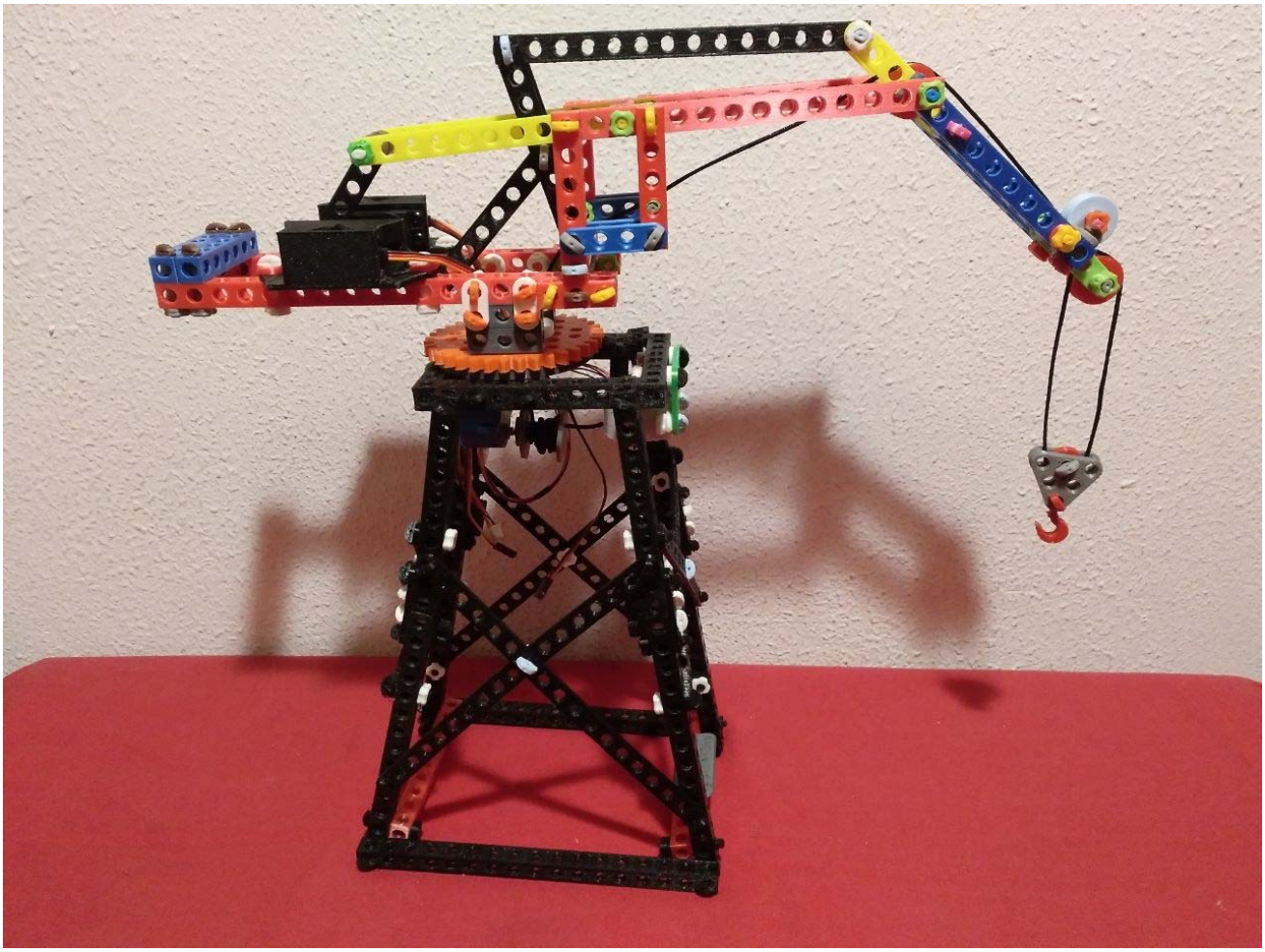
Port crane

This harbor crane is a reproduction with Stemfie parts(www.stemfie.org). It allows to be a tool for assembly skills and programming the control, the structure is formed by a tower base, the articulated boom and counterweight.

The screws are pieces that are not currently used in commercial toys, the pieces are joined based on easy assemblies, but the people lose the opportunity to gain hand skill and dexterity to place the screws and turn the nuts.



The control is composed by two power servomotors for to move the articulated boom, a stepper motor for the 360 degree rotation and another for the rope for rope winding drum.

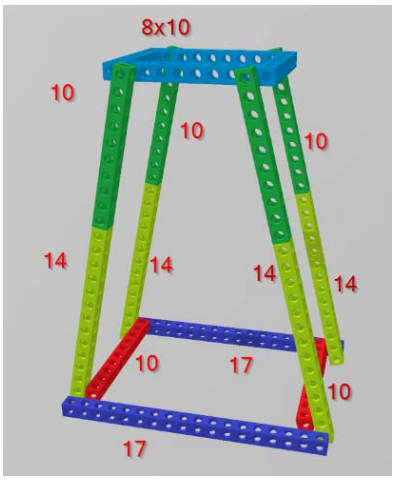
These motors are controlled by an Arduino Uno or ESP32 Steamakers board and two joysticks, LED light to indicate movements and a buzzer.

Alternatively, it can be controlled via a Bluetooth mobile phone app.

Mounting

Tower

The structure will also contain the power supply, the control unit and the stepper motors. In the upper part of this structure, the rotating platform will be housed, which allows turn 360-degree and supports the articulated boom.



2 Beam17 4 ScrewBU02.00 4 Nuts

4 Beam14 4 ScrewBU02.00 4 Nuts

6 Beam10 4 ScrewBU02.00 4 Nuts

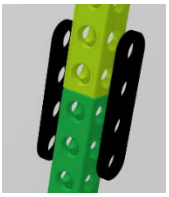
1 Base8x10

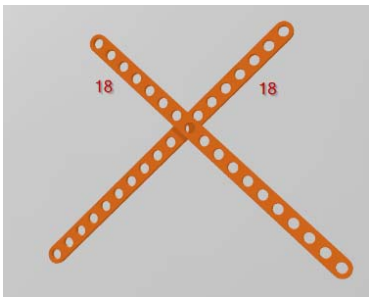
16 Brace4 16 ScrewBU01.50 16 Nuts

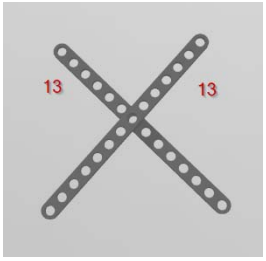
4 Brace18 2 ScrewBU00.50 8 ScrewBU01.25 10 Nuts

4 Brace13 2 ScrewBU00.50 8 ScrewBU01.25 10 Nuts

4 ScrewBU02.00 4 Nuts



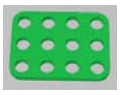


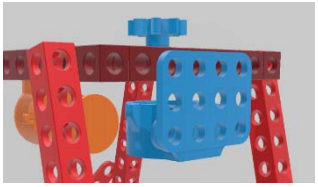


Stepper Motors

Platform Motor

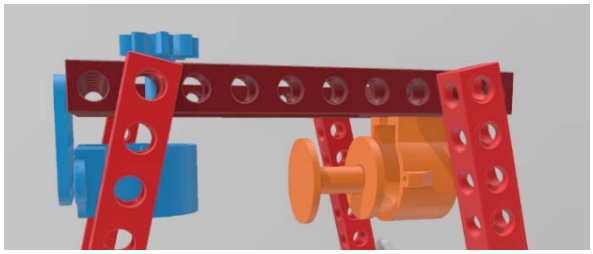
1 28BYJ-48_2H_Stemfie  Gear28BYJ-48_130mm 

1 STR_STD_BRM-4x3  2 ScrewBU01.50 2 Nuts 2 Washer2.5mm



Pulley Hook Motor

28BYJ-48_4H_Stemfie  1 Spool28BYJ-48  2 ScrewBU01.25 2 Nuts



Rotating Platform

This platform allows to rotate 360 degrees the articulated boom, it is fixed to the structure base. The yellow part should be glued to the light blue disc to ensure that the dark blue gear can rotate freely and will not come apart. The blocks are inserted in the disc and in the gear, they will serve to seat the base8x10 and the articulated boom.

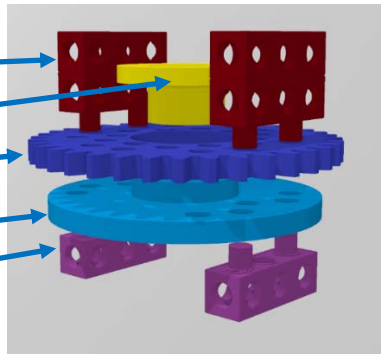
2 BlocGrua3x2

1 TapEngranatgeGrua

1 EngranatgeGrua

1 DiscEngranatge

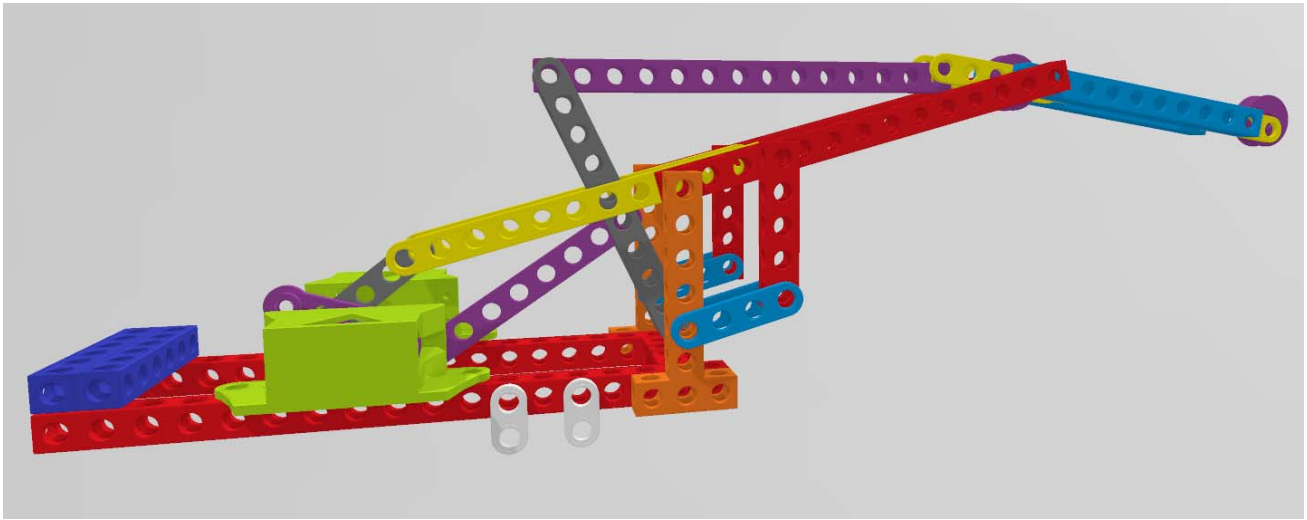
2 BlocGrua3x1

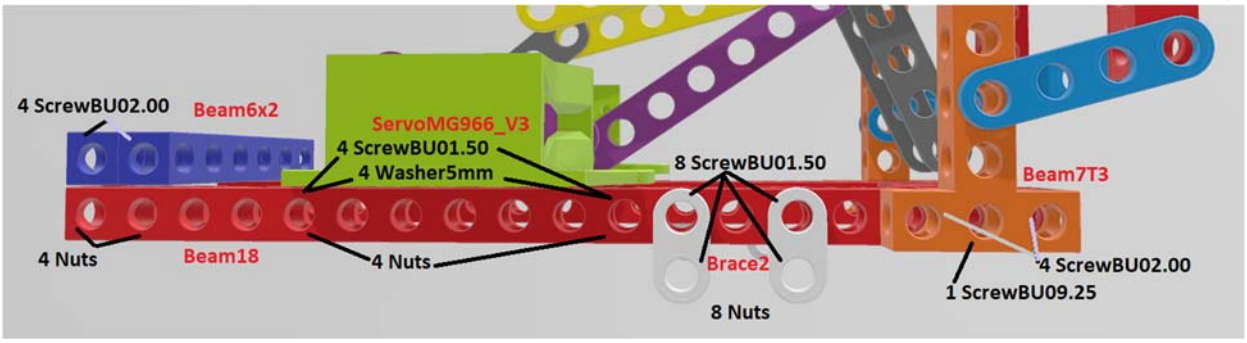


These parts have been specially designed for this mount, but comply with Stemfie compliances.

Articulating boom and counterweight

The crane boom is an articulated boom type and the counterweight area contains two servomotors for the movements of articulated boom.



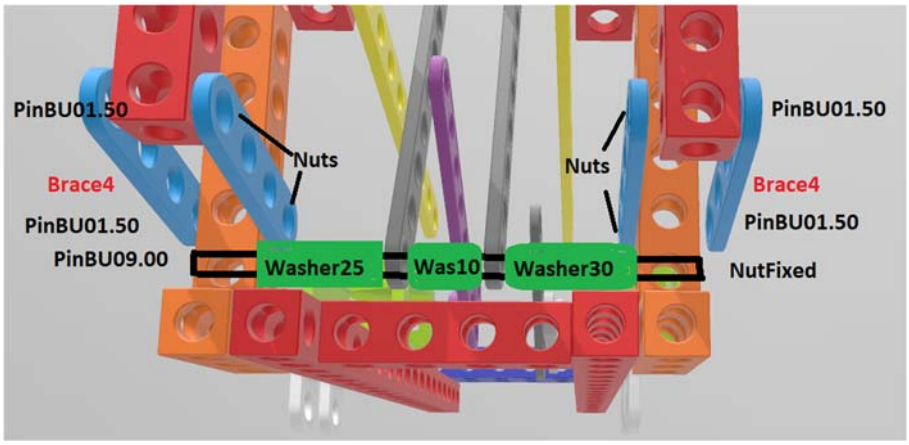


1 Beam6x2 4 ScrewBU02.00 4 Nuts 2 Beam18

2 ServoMG966_V3_x2 4 ScrewBU01.50 4 Washer5mm 4 Nuts

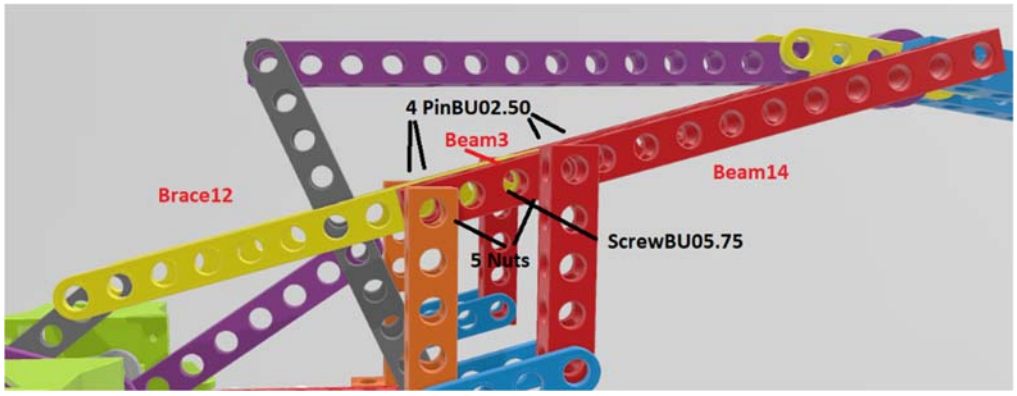
8 Brace2 8 ScrewBU01.50 8 Nuts

2 Beam7T3 4 ScrewBU02.00 1 ScrewBU09.25_x1 5 Nuts



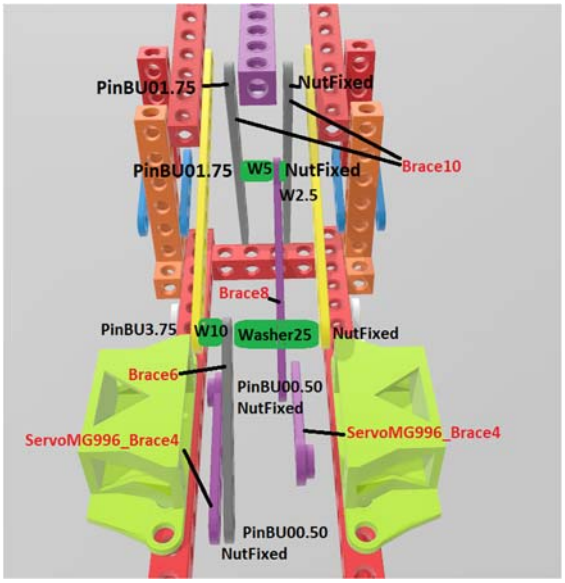
1 PinBU09.00 1 Washer25mm 1 Washer10mm 1 Washer30mm 1 NutFixed

4 Brace4 4 PinBU01.50 4 NutFixed



2 Beam14 4 PinBU02.50 4 NutFixed

2 Brace12 1 Beam3 1 ScrewBU05.75 5 Nuts



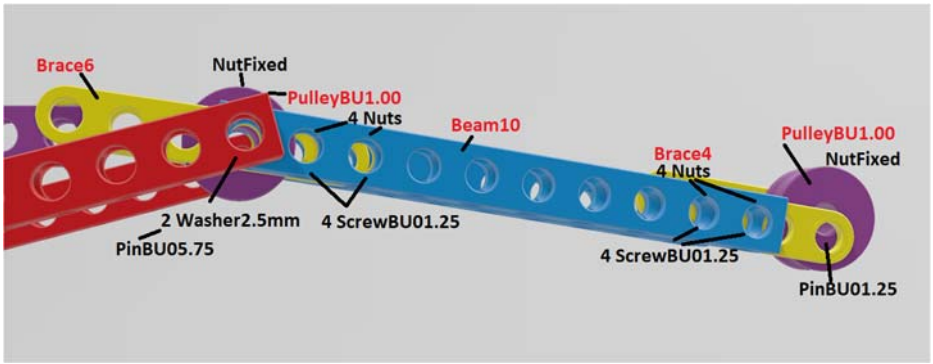
1 PinBU01.75 1 NutFixed 2 Brace10

1 PinBU01.75 1 Washer5mm 1 Brace8 1Washer2.5mm 1 NutFixed

1 PinBU03.75 1 Washer10mm 1 Brace6 1 Washer25mm 1 NutFixed

2 ServoMG996_Brace4 2 PinBU00.50 2 NutFixed

1 Beam14 2 PinBU01.75 2 NutFixed

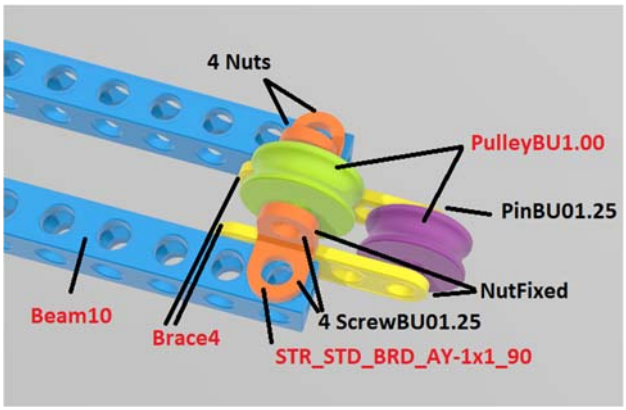


2 Beam10 1 PinBU05.75 1 Washer2-5mm 1 PulleyBU1.00 2 Washer2.5mm 1 NutFixed

2 Brace6 4 ScrewBU01.25 4 Nuts

2 Brace4 4 ScrewBU01.25 4 Nuts 1 PulleyBU1.00 PinBU01.25 1 NutFixed

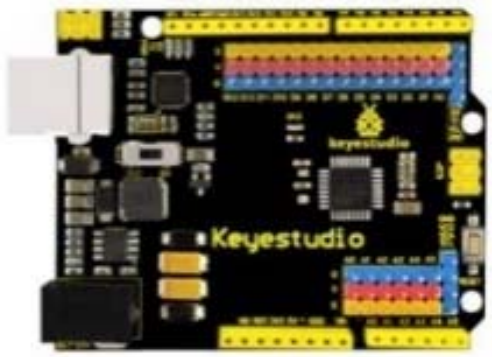
Improvement of hook rope



2 STR_STD_BRD_AY-1x1_90 4 ScrewBU01.25 4 Nuts 1 PulleyBU1.00 1 PinBU01.25 1 NutFixed

Unit Control

Arduino UNO



ESP32 Steamakers

Software used

http://www.arduinoblocks.com/

https://www.bigrentz.com/blog/what-is-a-crane-boom

https://www.bigrentz.com/blog/types-of-cranes

https://www.curioushistory.com/history-of-the-crane-from-inventions-to-improvements/

Port Cranes: Everything You Need to Know

Port cranes play a vital role in day-to-day port operations. Without the help of these cranes, containers can't be stacked in the yard or loaded on the vessel. There are two types of port cranes: quay cranes and yard cranes.

- **Quay Cranes**: These types of cranes are used to work on containers from ship to shore and shore to ship and are therefore also known as ship-to-shore cranes (STS). Quay cranes are located along the quayside where container ships are easily accessible.
- **Yard Cranes**: These types of cranes are primarily located in the port's container yard, and move laden containers from the yard to trailers. While there are several types of yard cranes, the most common ones are Rail-Mounted Gantry Cranes (RMG) and Rubber-Tired Gantry Cranes (RTG).

When it comes to ship-to-shore port cranes, there are two types: the high profile (with an A-frame) and the low profile. Though they function the same way, it is during the container port design process where the crane type is decided, based on suitability.

The low profile crane features a fixed boom to load containers off and onto the vessel. It's designed and used for scenarios where the seaport is near an airport so that aircrafts are not distracted or blocked by the cranes.

On the other hand, high profile port cranes have a hinged boom that allows for easier ship navigation when berthing or leaving the dock.