# STEM & Robotics Produino Set

## E40.1 ROBOTICS Lessons

The **STEM & Robotics Produino education set** is specially designed for Secondary school children of ages 12+ but is ideal for older students of 12-16+ and even vocational schools and hobby engineers. With innovative experimental activities it covers the core subjects of STEM and moves into advanced programming with textual coding. Besides its main controller, it embeds an additional Arduino processor that enables open DIY projects. The set comes in a convenient plastic storage tub that contains a large number of ENGINO® structural and technical parts and high-level of robotic devices such as the unique Produino controller. It has 2 DC motors, a servo motor, a touch sensor, 2 IR sensors, a color sensor, an ultrasonic sensor and a gyroscope/accelerometer sensor. Besides the programmable screen, it conveniently has a built-in large breadboard for making your own circuitry. It allows the construction of more than 30 STEM and Robotic models.

ENGINO® EDUCATION

12-16

Edition: 10/22

# Lesson: Motorised house

## Outputs - DC Motor, Servo Motor & Buzzer

Motors and servomechanisms are the most common outputs on a robot. They can give motion to the robot itself or change the position of its movable parts. Another common type of output is the buzzer which emits auditory signals. Learn how to command outputs using the flow diagram and unlock programming skills!

**Discover:**

- How DC motor and a servo motor work.
- Output action blocks and their properties.
- How to program using the flow diagram.

**Materials Needed:**

- Engino® STEM & Robotics PRODUINO.
- PC or tablet with KEIRO™ software installed.

**Procedure:**

**1.** Find the building steps in the **instructions section** to build the **High-tech House** model.

**2.** Switch on the Produino controller and connect it to a PC through the USB cable. Open KEIRO™ software and connect the two devices by clicking on the appropriate button. Follow **exercise 1** to configure the simulator.

**3.** The garage door is open and waits for a car to be parked inside! Read **exercise 2** to learn how to operate the garage door. Then send the program to the controller and test how accurate it is. Play the program using the LCD screen menu.

**4.** Click on the appropriate icon at menu bar to **save** the program on the PC.

**5..** The servo motor works differently compared to the DC motor. It rotates in degrees, completing a semi-circle of 180°. Do the program of **exercise 3** and find how to open and close the house door with a servo.

**6.** By now you have used most of the output blocks. Read **exercise 4** to have an overview of the available properties that can affect the operation of an output.

*Engino® High-tech house*

**Exercise 1:** Expand the simulator panel and assign the ports to the connected peripherals as appear on your model. Drag and drop the proper icon blocks to the ports.

**Exercise 2:** Drag and drop the appropriate action blocks beneath the "Start" block on the flow diagram to make the following program:

- *garage door closes;*
- *then, the buzzer emits a C5 sound signal for 1 second;*
- *the door opens again;*
- *and finally, the buzzer emits a .*

Tip: Examine the properties of action blocks and adjust them to achieve this. Also, experiment with the duration time and/or speed of the motor to achieve a fine tuning of the door.

**Exercise 3:** Drag and drop the necessary action blocks into the flow diagram to create the following sequence of commands:

- *The door closes and a buzzer tone follows for 0.5 seconds;*
- *then, the door widely opens;*
- *the door remains open for 3 seconds;*
- *and finally the door closes back.*

Tip: Servo motor has a finite upper limit on rotation speed to secure precise rotation. Hence, by giving a short duration interval may not lead to the desired outcome.

**Exercise 4.** Place a tick (✓) into the cells of the table to indicate which variables are available for each of the following outputs.

| Properties / Outputs | port | state | direction | speed | angle | music note | frequency | delay | duration | sequence |
|---|---|---|---|---|---|---|---|---|---|---|
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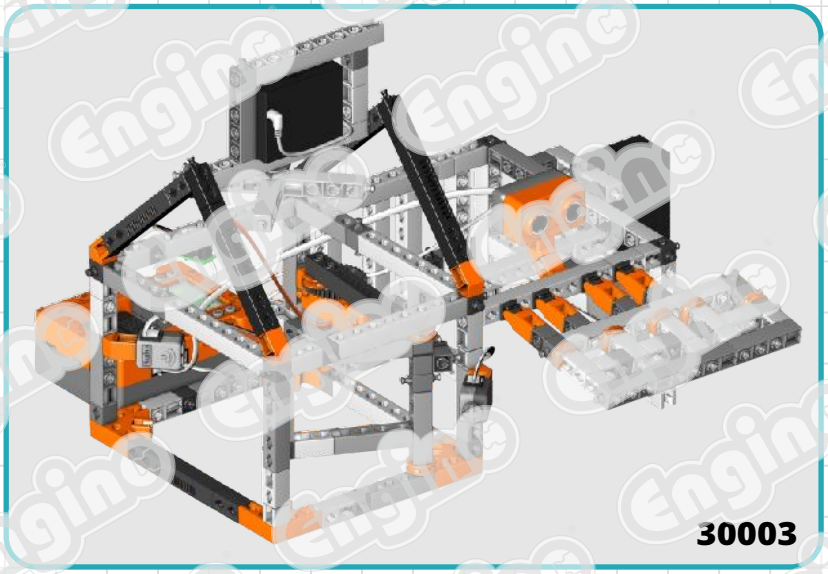
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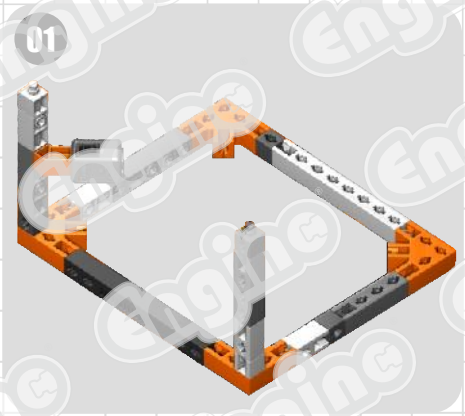
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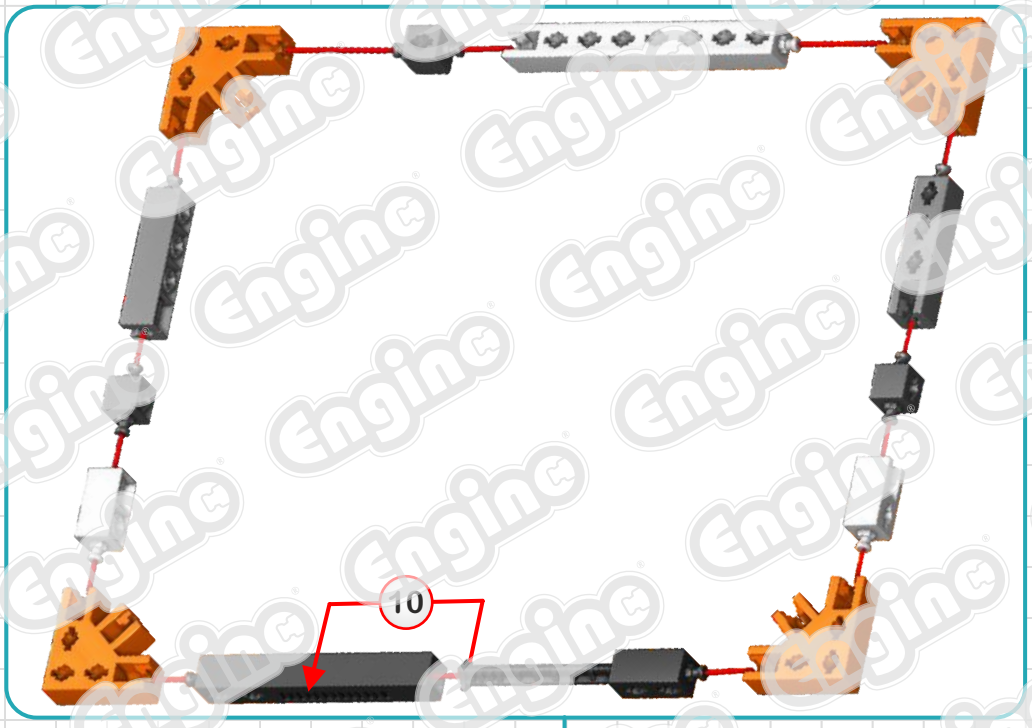
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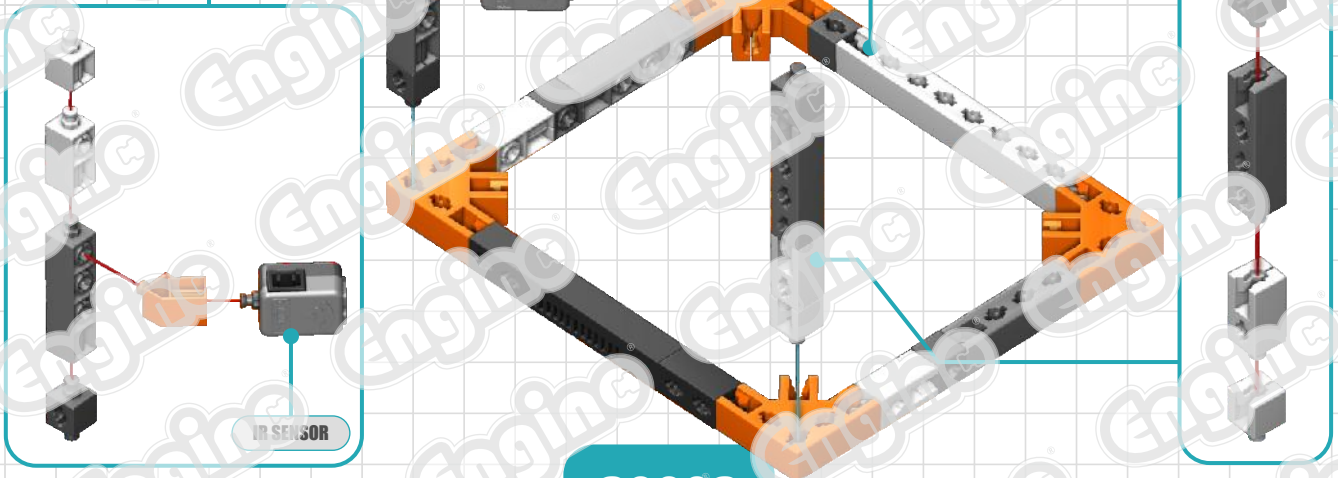
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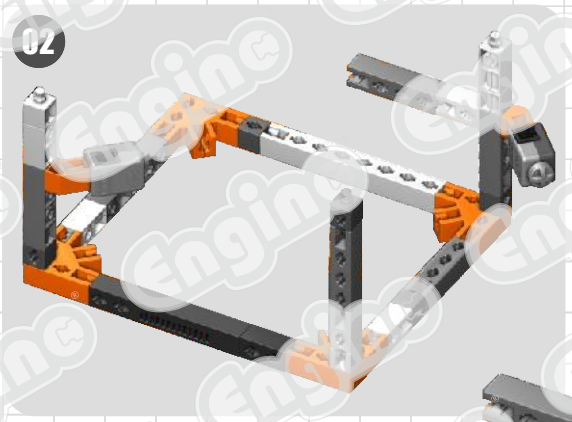
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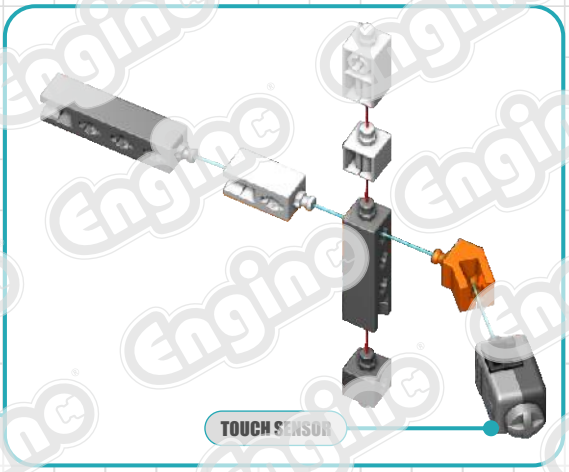
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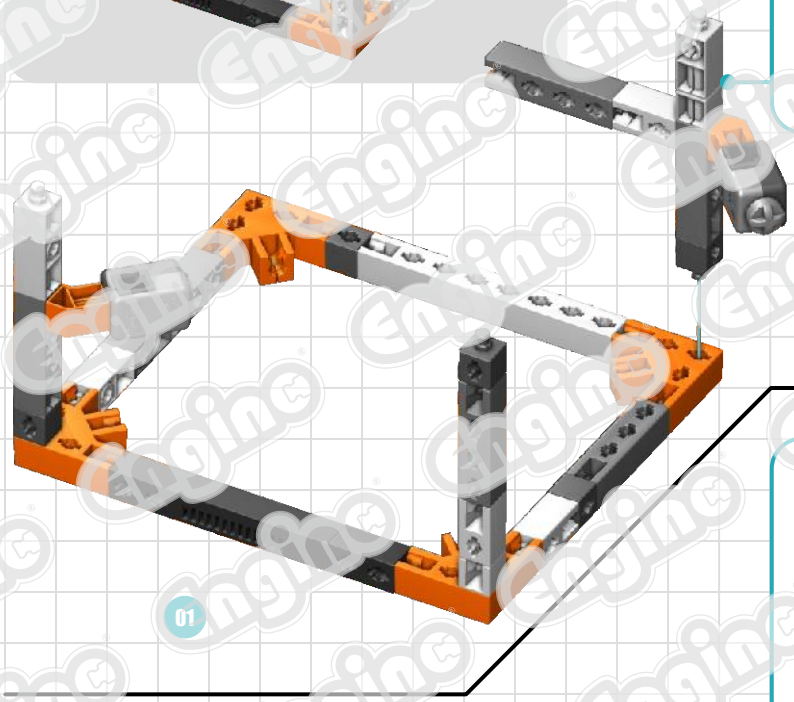
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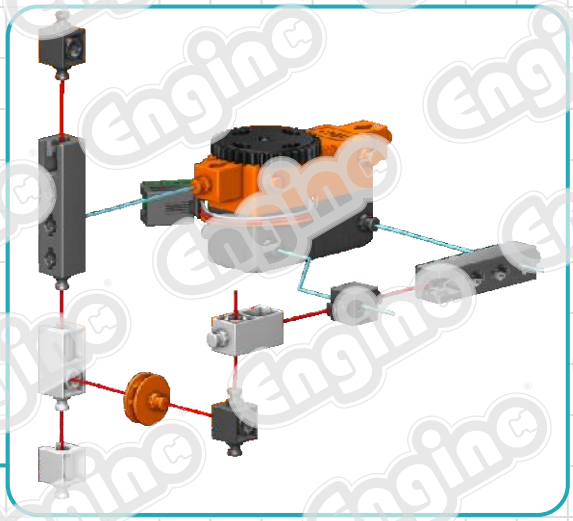

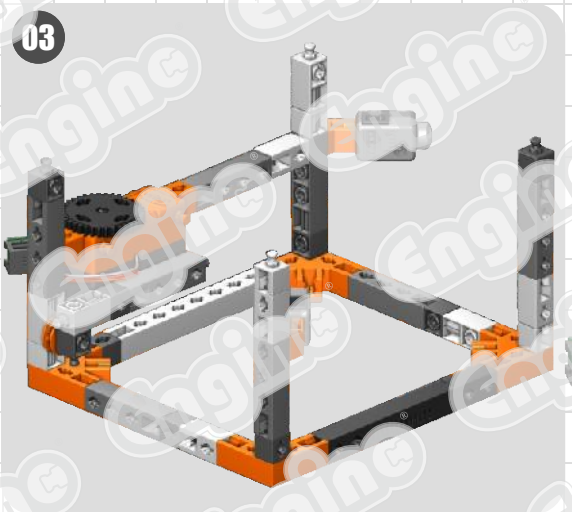
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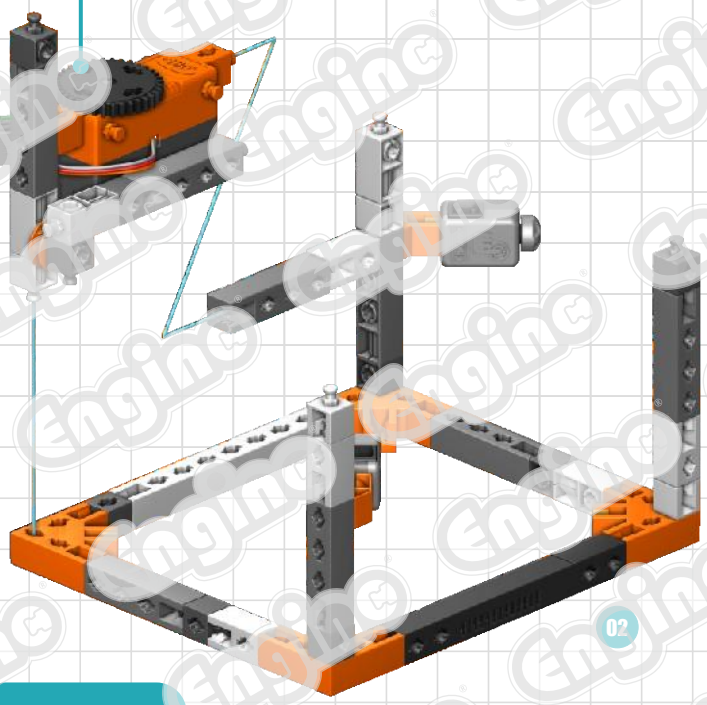
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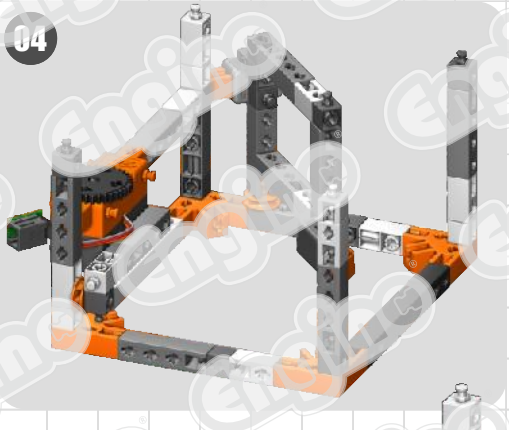
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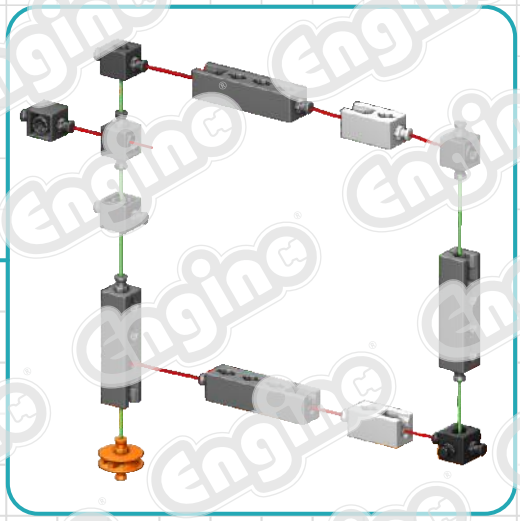

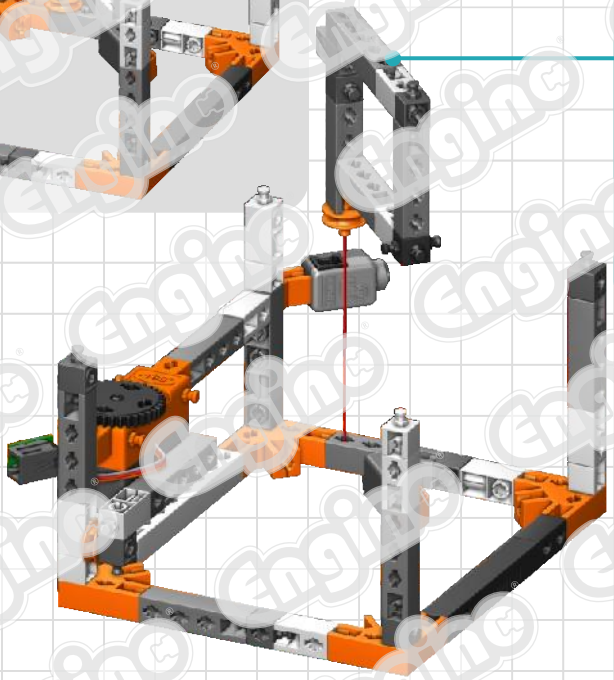
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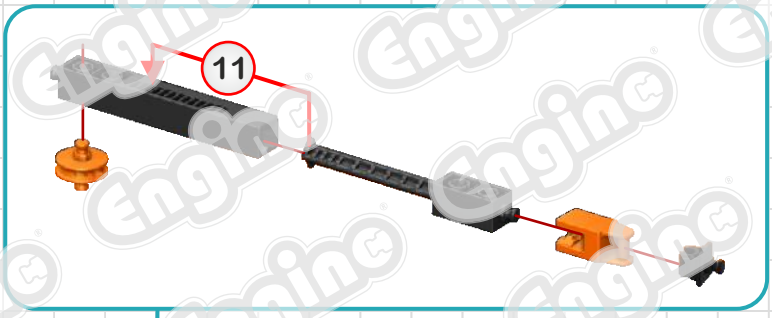
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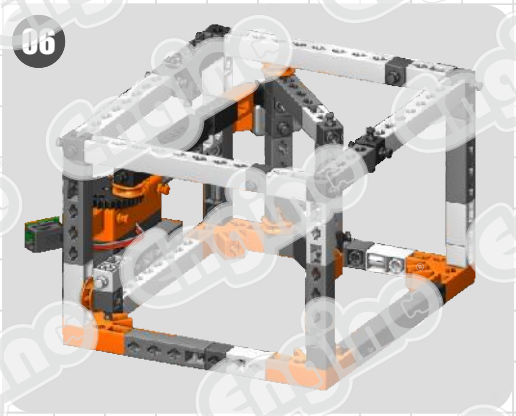
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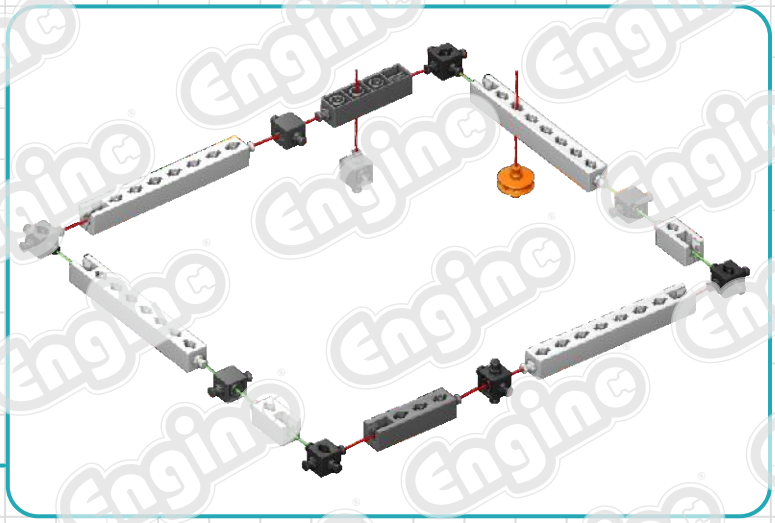

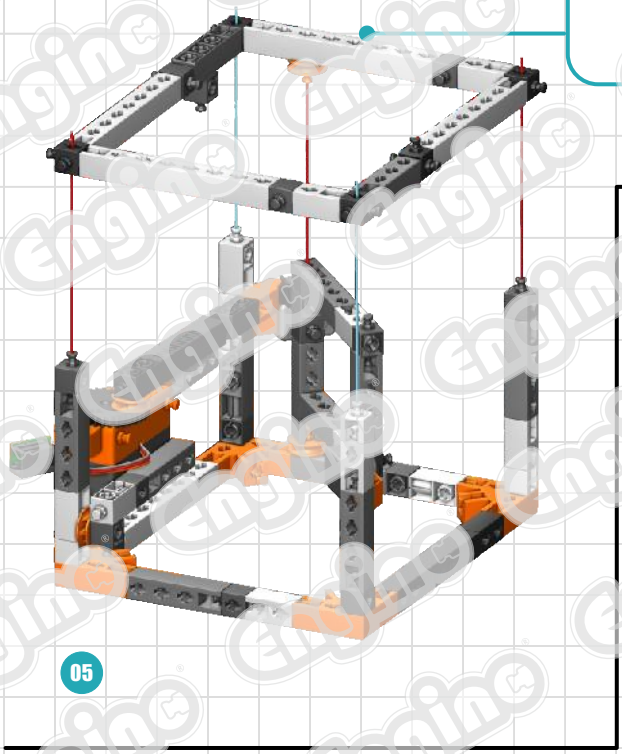
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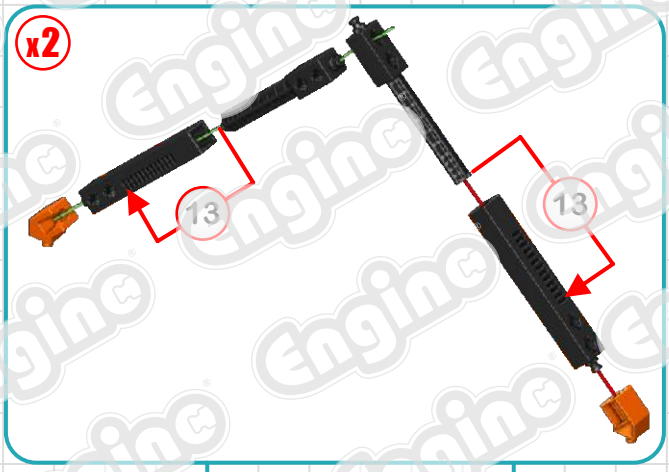
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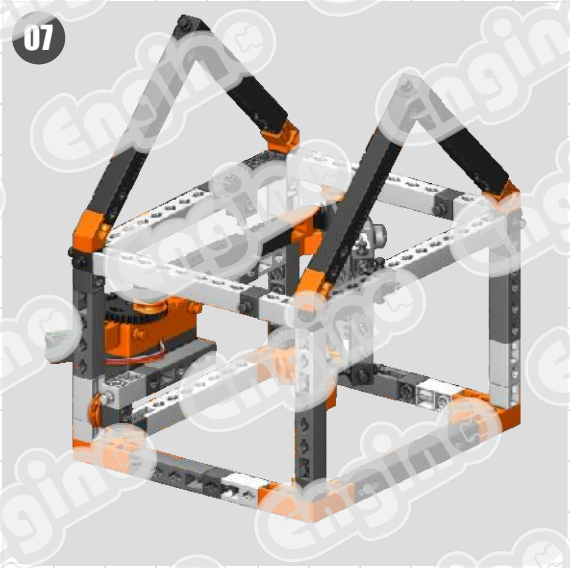
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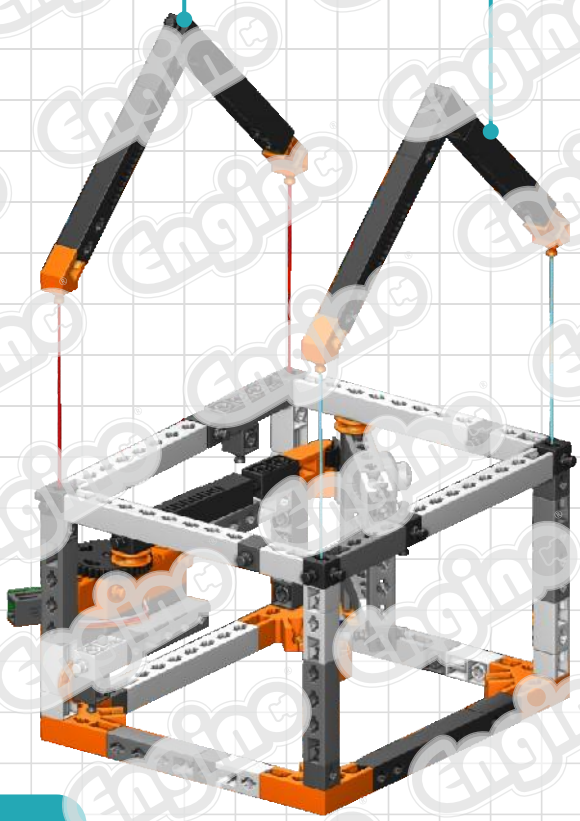
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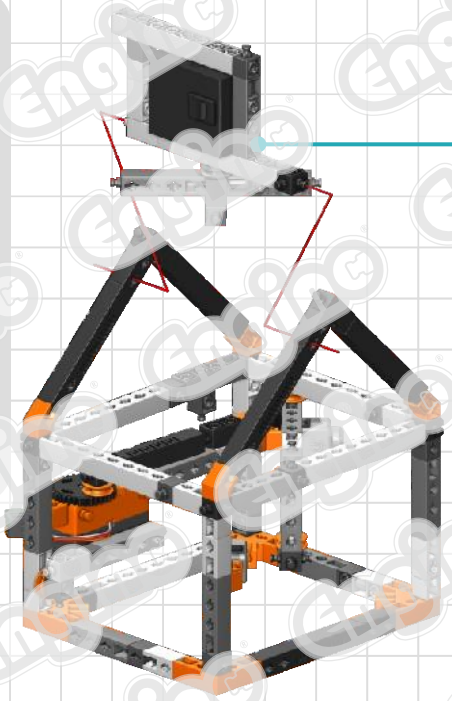
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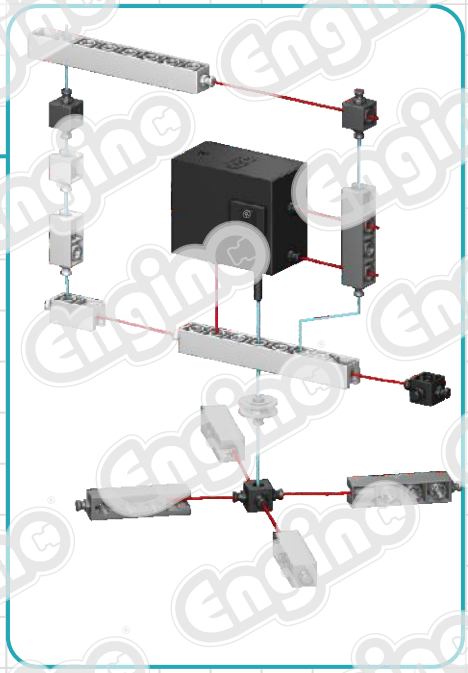

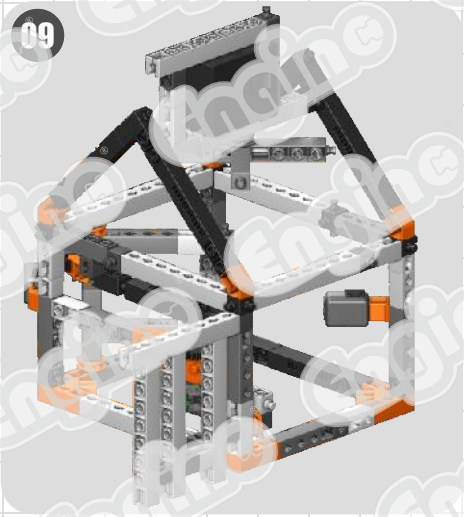
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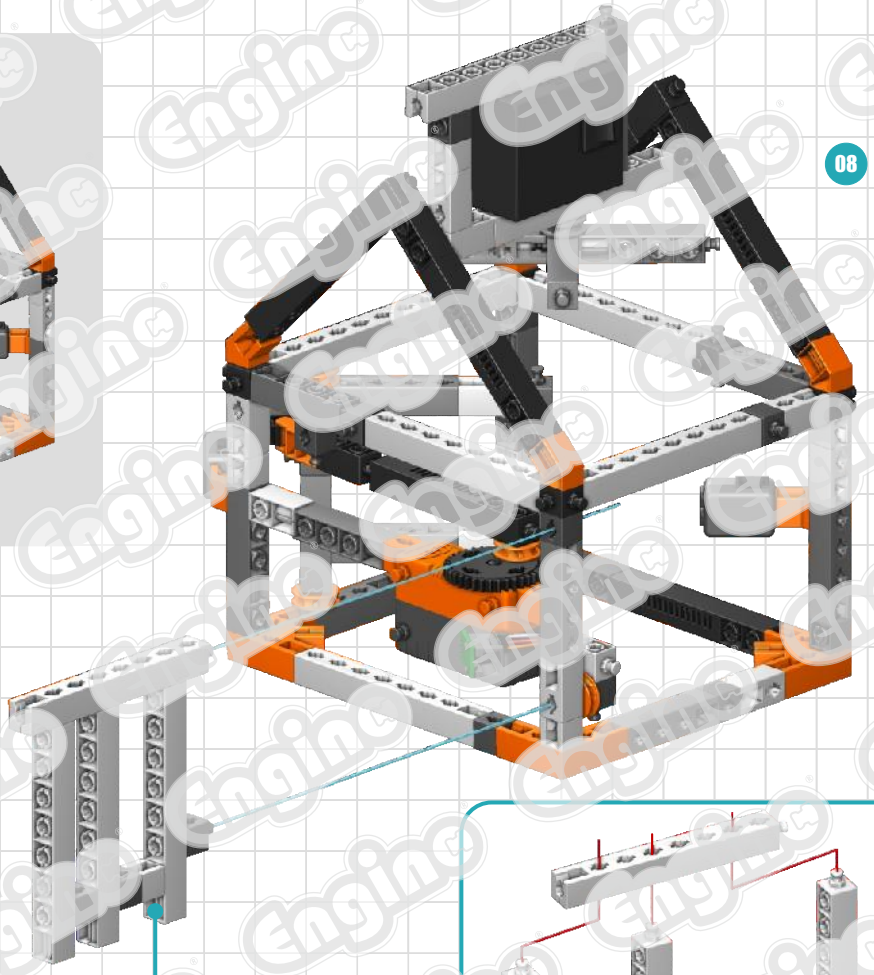
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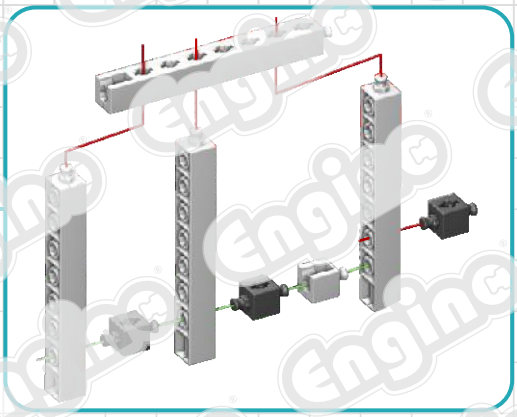

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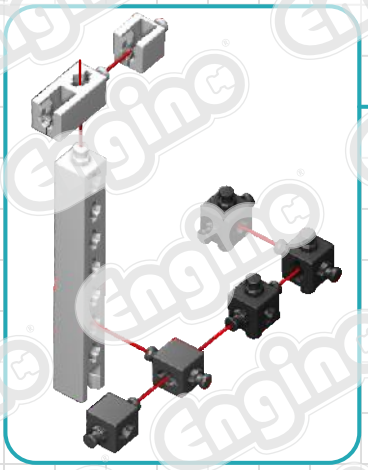

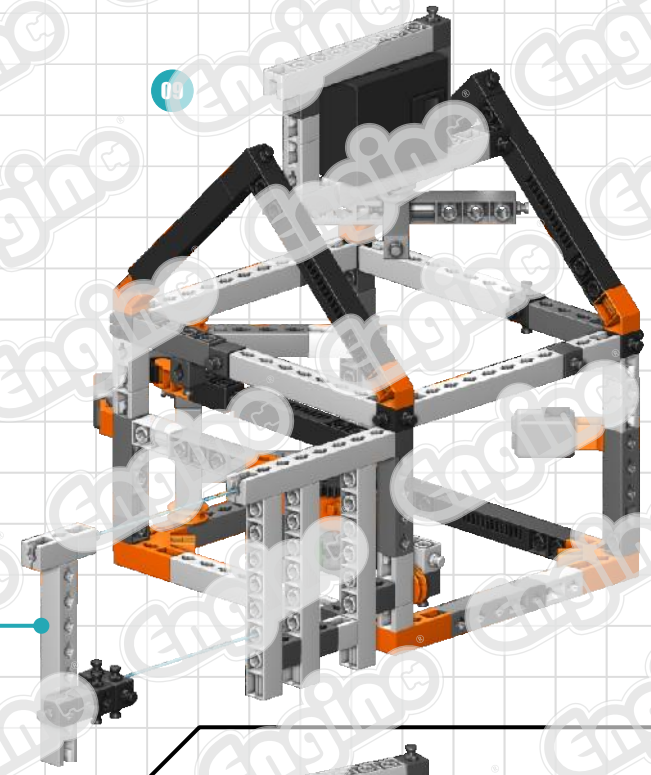
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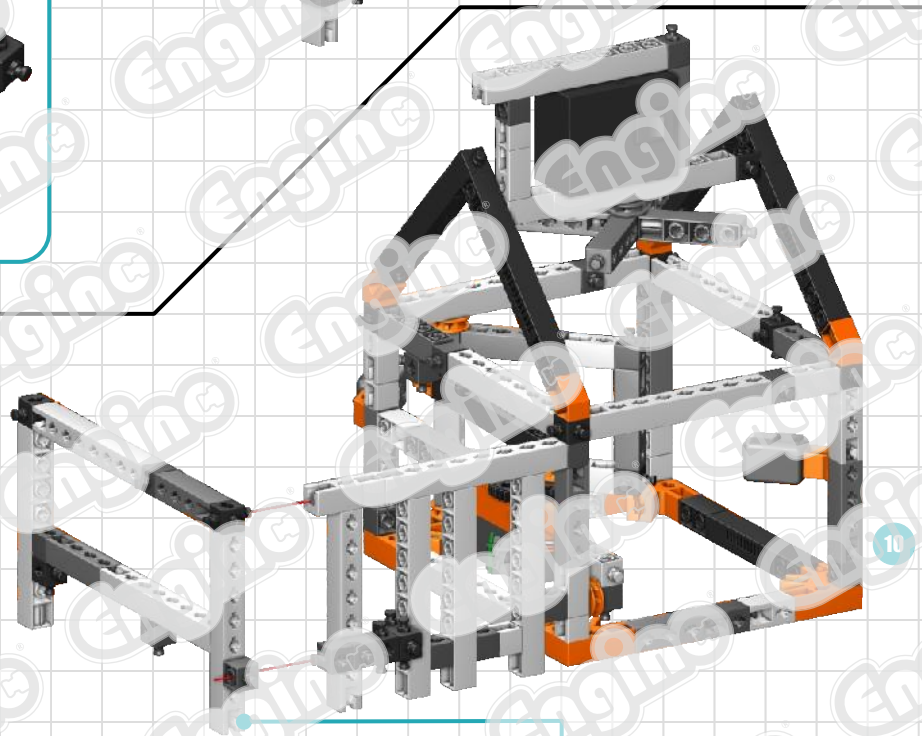
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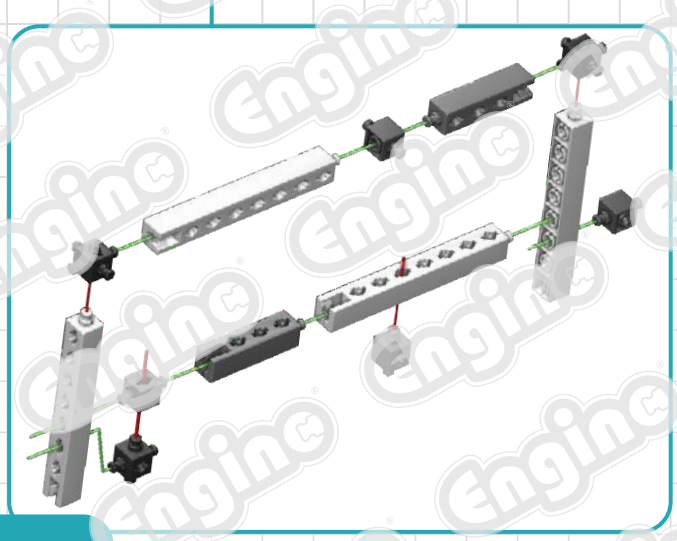

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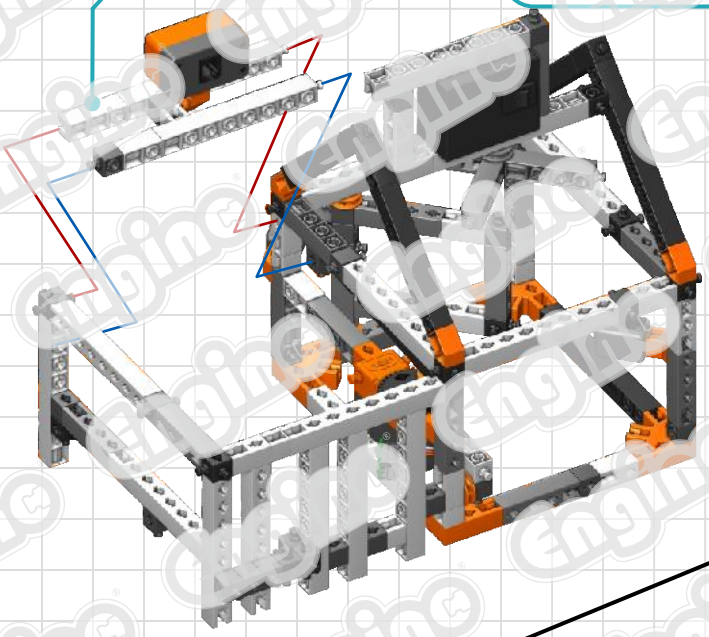
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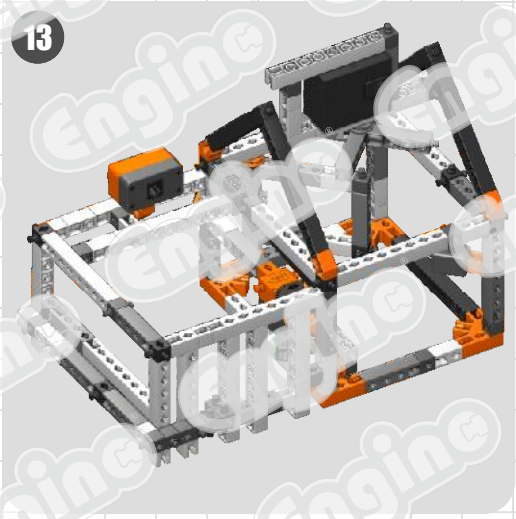
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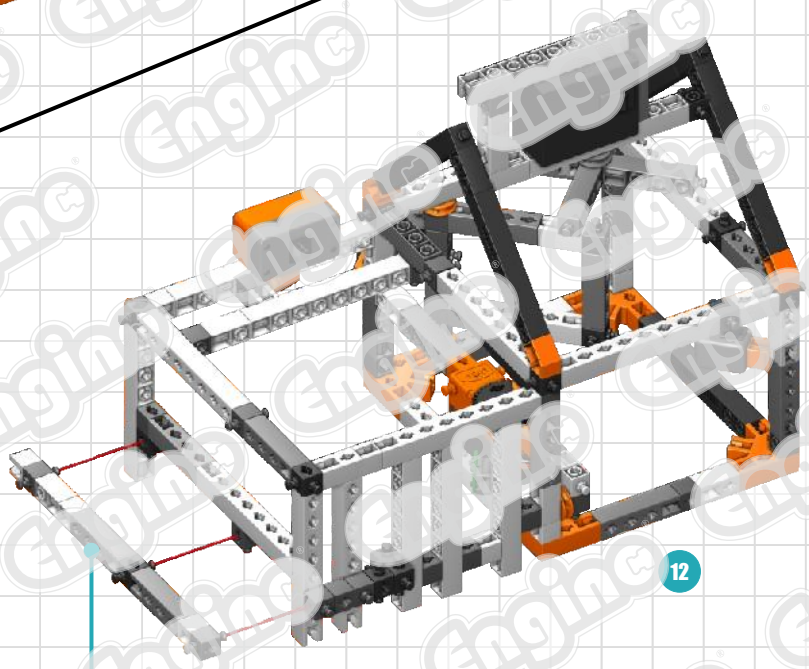
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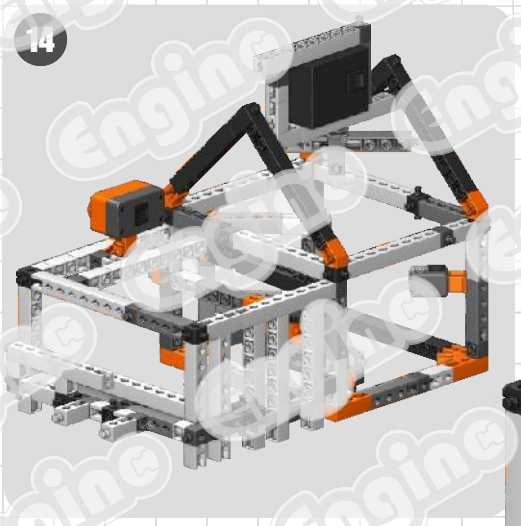
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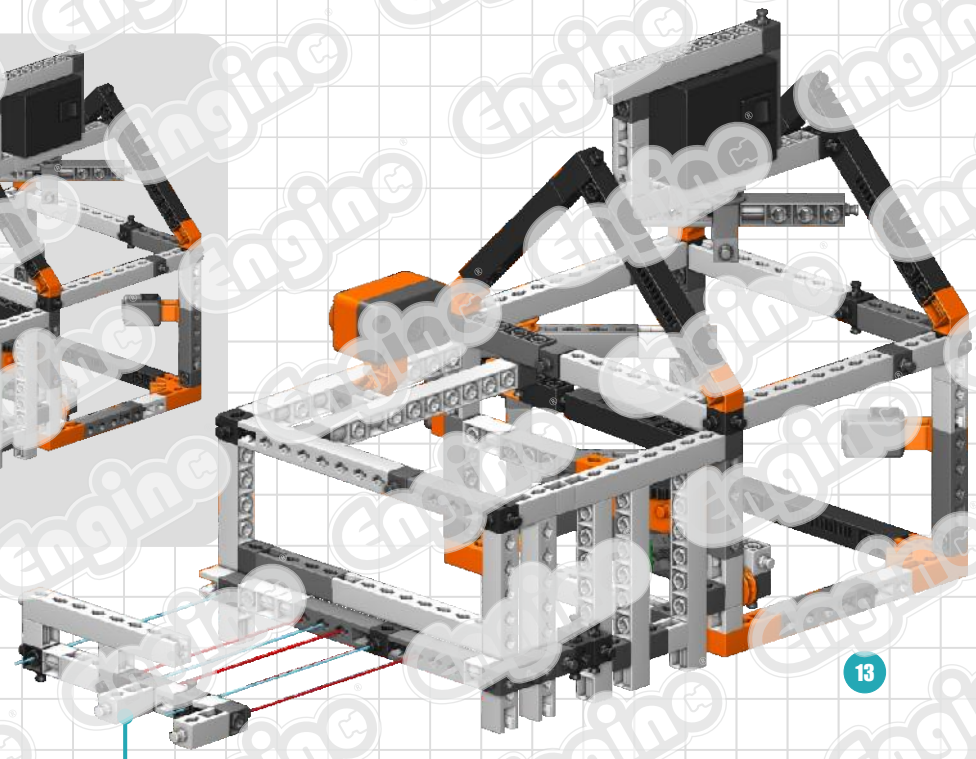
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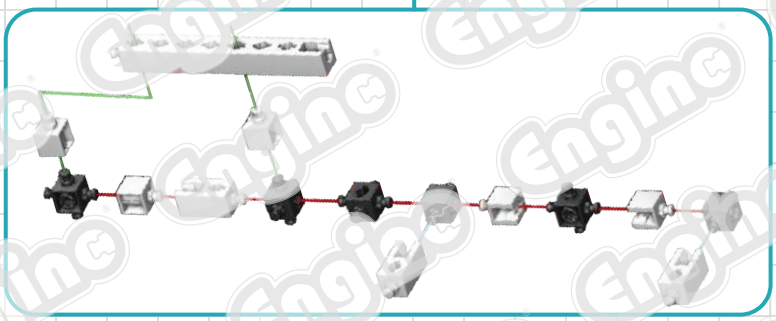

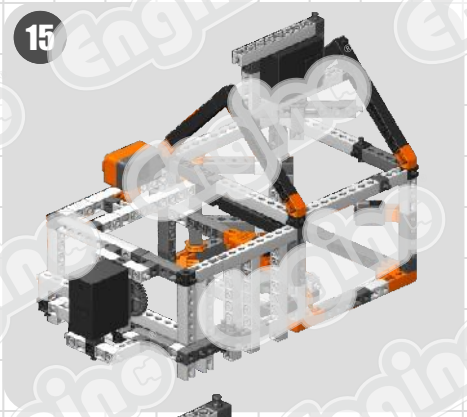
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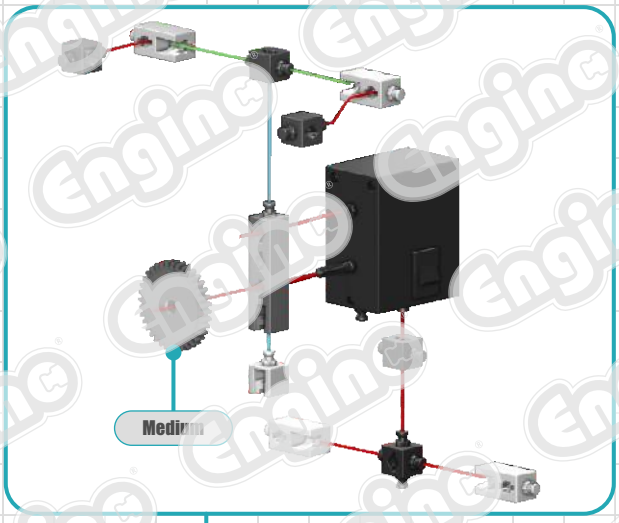
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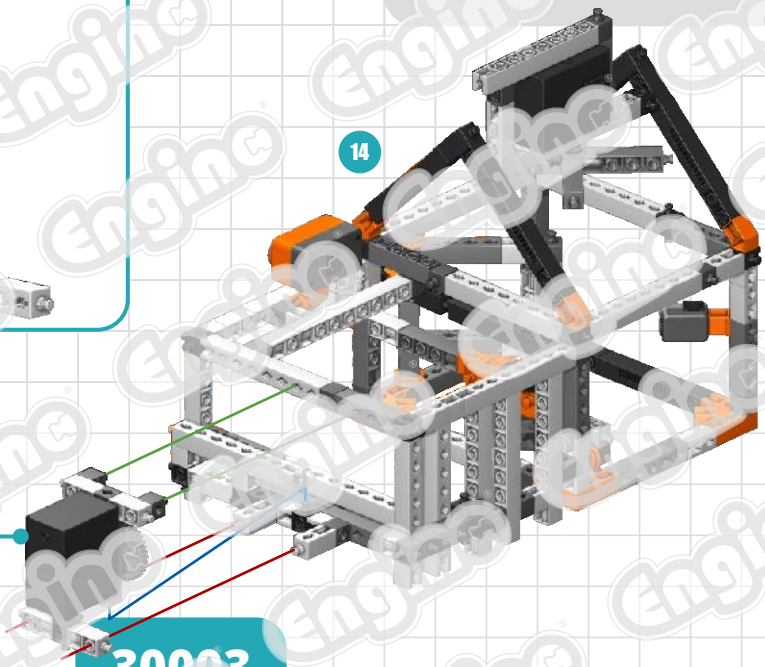
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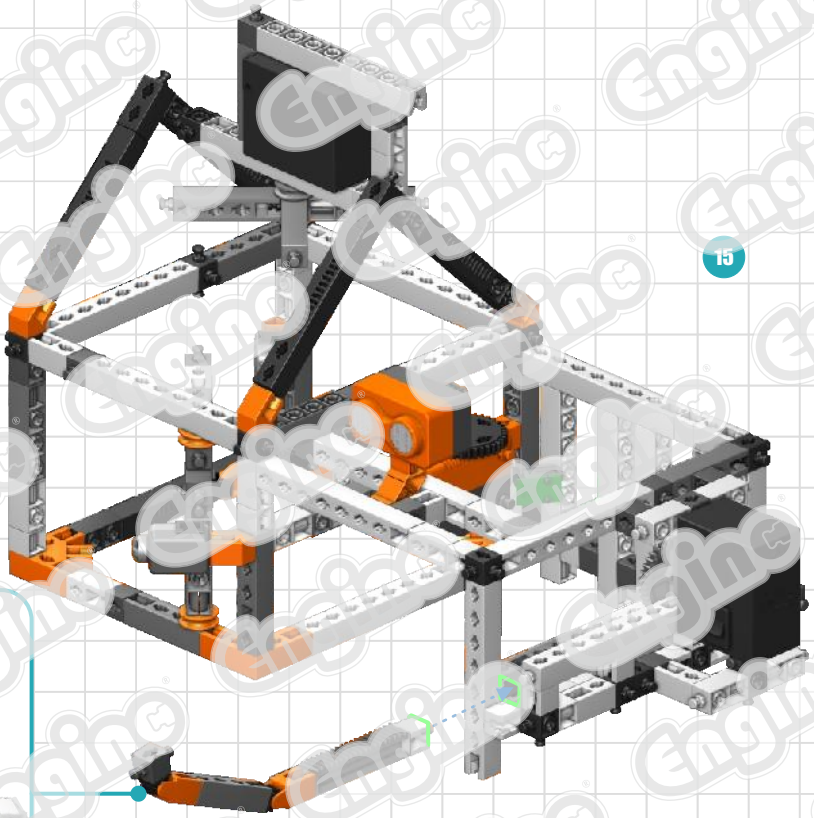
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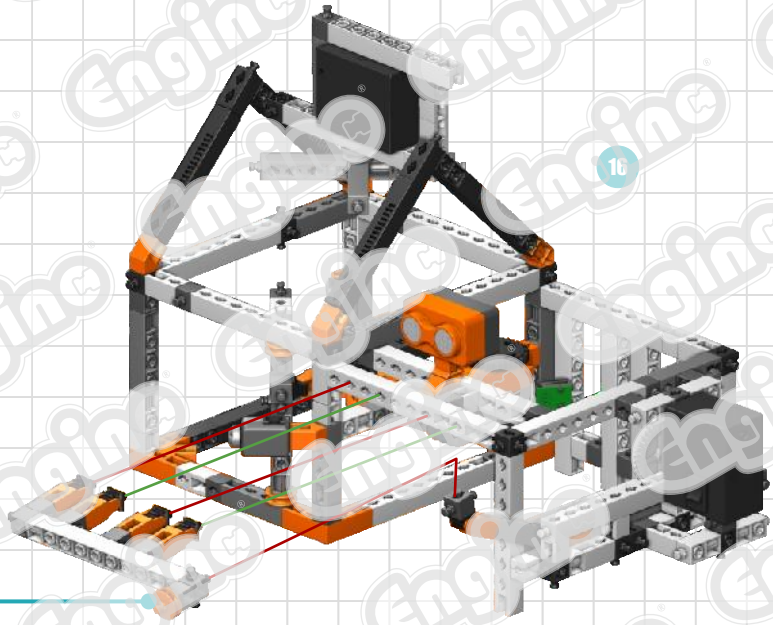
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