OSOYOO Building Block DIY Programming Kit for Arduino

On-line Tutorial Link: https://osoyoo.com/?p=44354

Video Link: http://osoyoo.com/2021011600.html

https://osoyoo.com/?p=44354

Table of Contents

https://osoyoo.com/?p=44354

https://osoyoo.com/?p=44354

I : Preparation before Class

1: Graphical programming – mBlock

mBlock is designed for the Science, Technology, Engineering, Arts and Mathematics (STEAM) education. Inspired by Scratch 3.0, it supports both graphical and textual programming languages.

Software versions

Currently, the following versions are available:

For PCs (software required): https://www.mblock.cc/en-us/download

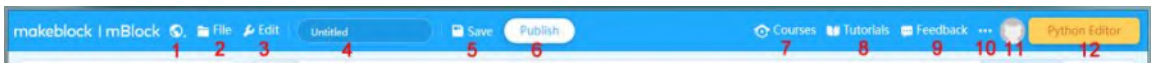
Web version (no software required): https://ide.mblock.cc/

For Android and iOS: Search for mBlock on any app store to download it

By signing in to mBlock 5, you can have your projects automatically stored in the cloud. Try synchronizing your projects across devices (such as PCs and mobile devices) now!

Get to Know the UIToolbar

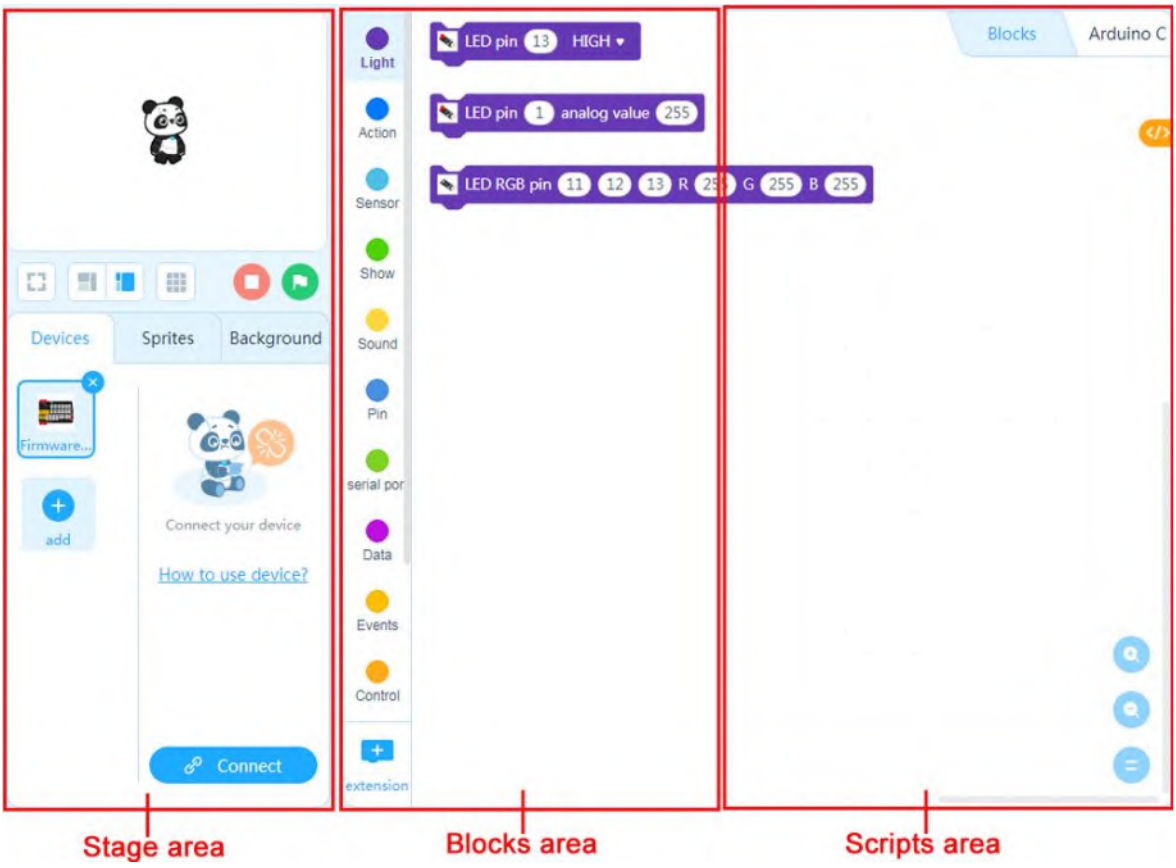
Toolbar



1. **Language**: Click it to change the UI language.
2. **File**: Click it to create, open, save a project, import a project from your PC, or export your project to PC.
3. **Edit:** Click it to turn on/off the stage turbo mode or hide/unhide the stage.
4. **Title**: Click it to set or change the title of the current project.
5. **Save**: Click it to save the current project to My Projects.
6. **Publish**: Cick it to publish the current project to the mBlock community.
7. **Courses**: Click it to visit the website: https://education.makeblock.com/resource/.

8. **Tutorials**: Click it to view online user guide and example programs.
9. **Feedback**: Click it to give your feedback for mblock.
10. **More**: Click it to see more functions about Check For Updates, About mBlock, About version 5.4.0, Serial driver quick install, Set as default editor, Cooperation
11. **Sign up/Sign in**: Click it to sign up an mBlock account or sign in. After signing in to mBlock 5, you can click it to view your projects, profile, account center, and cloud service authentication code, or click to sign out.
12. **Python Editor**: Click it to enter mBlock-Python Editor.

Editing area：

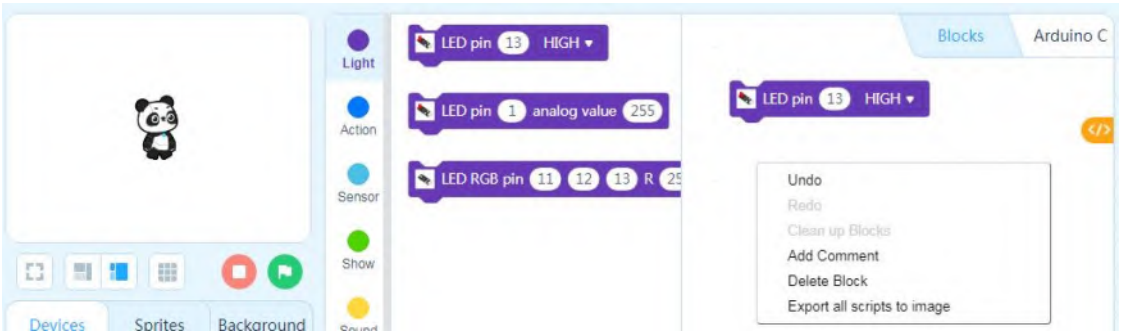


- **Stage area**: You can present your designs, connect devices, and set your sprites and backdrops here.
- **Blocks area**: You can find the blocks you need by category and color here.

https://osoyoo.com/?p=44354

- **Scripts area**: You can compile your program by dragging blocks to this area.

When you drag a block in Scripts area, and right click on the block, you will can do these operation for the block as the above picture.

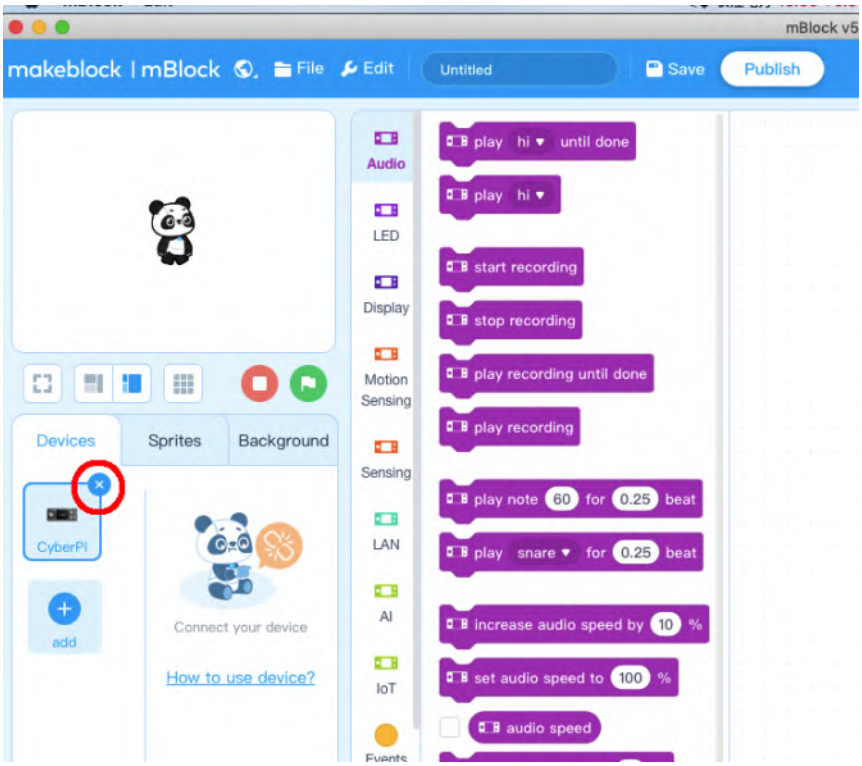


When you drag a block in Scripts area, and right click on blank, you will can do these operation for the block as the above picture.

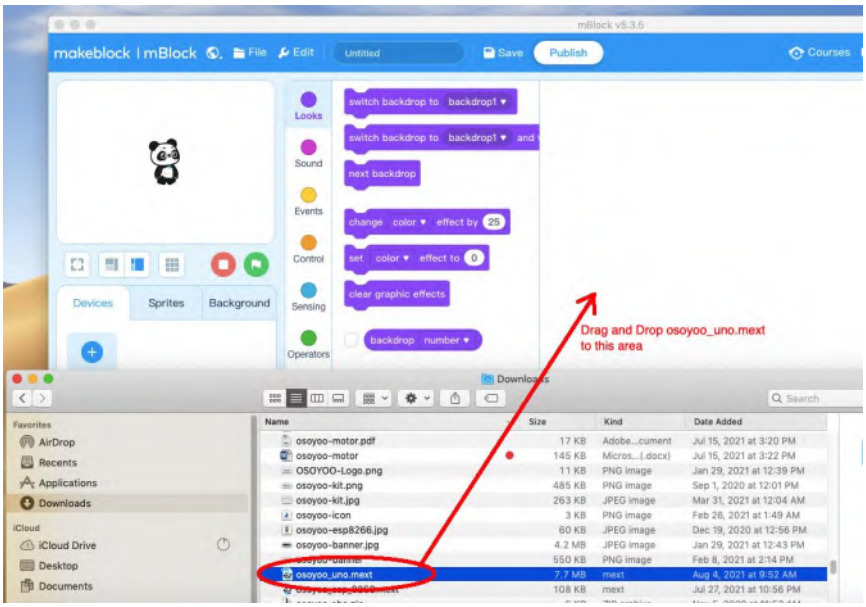
Connect OSOYOO basic board

Step 1) Download OSOYOO_UNO.mext device file from https://osoyoo.com/driver/mblock/osoyoo_uno.mext
Step 2) Run the mBlock PC software by double click the lovely Panda icon. You will see mBlock UI as following picture. Please delete the default device **CyberPi** by click the cross in the red circle.

https://osoyoo.com/?p=44354

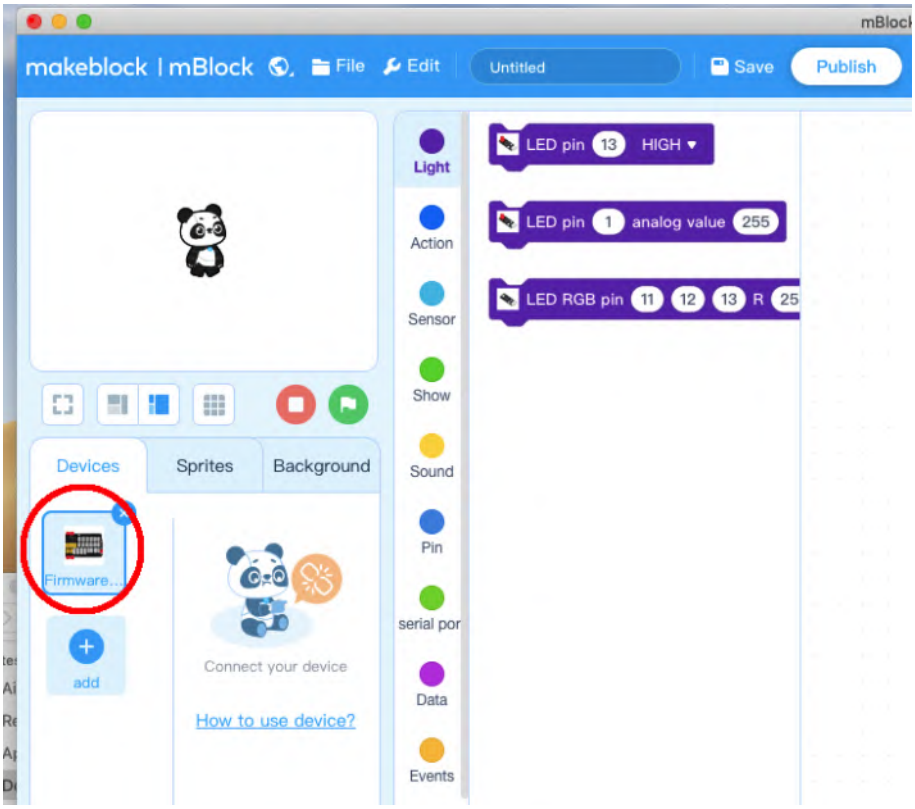


Step 3) Drag and Drop osoyoo_uno_mext file (downloaded in Step 1) to mBlock software as following:



https://osoyoo.com/?p=44354

Now you will see a new device firmware in mBlock, see following picture:

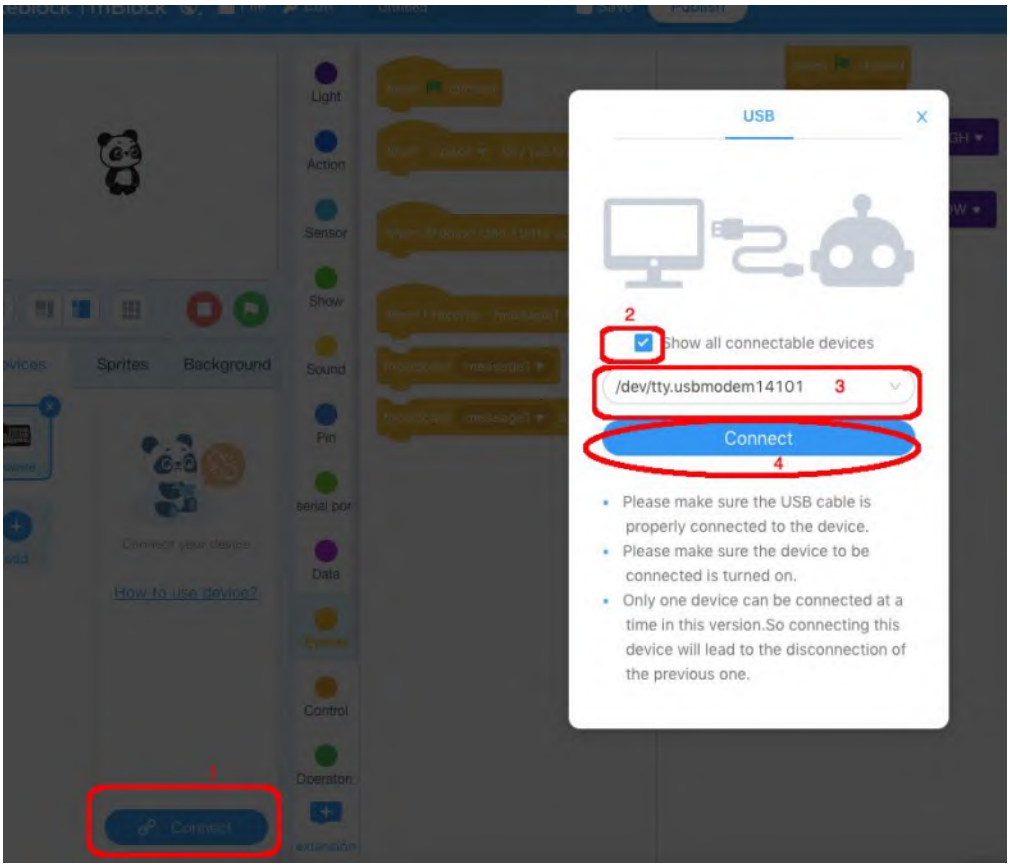


Now mBlock software and OSOYOO_UNO device firmware have been successfully installed in our PC!

Upload program to OSOYOO Basic board

1) You need connect your Arduino board to your PC with a USB cable first. Then click the Connect button in the bottom of the mBlock software, you will see a USB window pop up,
2) select Show all connectable device check box , then a device drop-down menu will show up,
3) select your Arduino port from device drop-down menu
4) click Connect button to connect your PC to Arduino

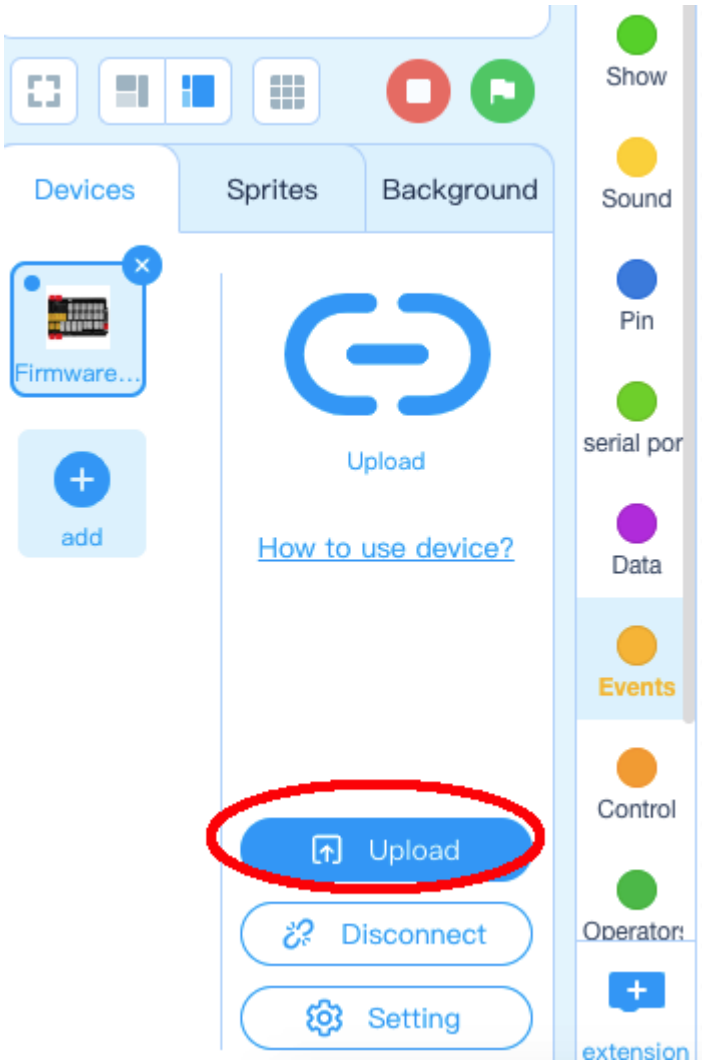
https://osoyoo.com/?p=44354



5)After you PC is connected to Arduino UNO board, please click Upload button in the bottom of your software, then the code will be uploaded to

https://osoyoo.com/?p=44354

Arduino UNO board:



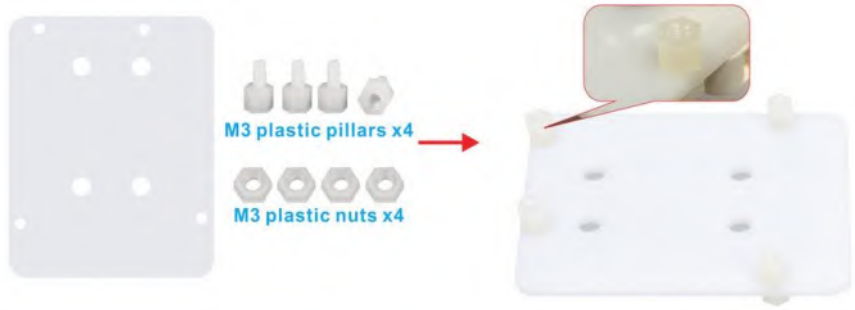
For more information, please click user guide to learn more or visit the link:
https://www.yuque.com/makeblock-help-center-en/mblock-5

https://osoyoo.com/?p=44354

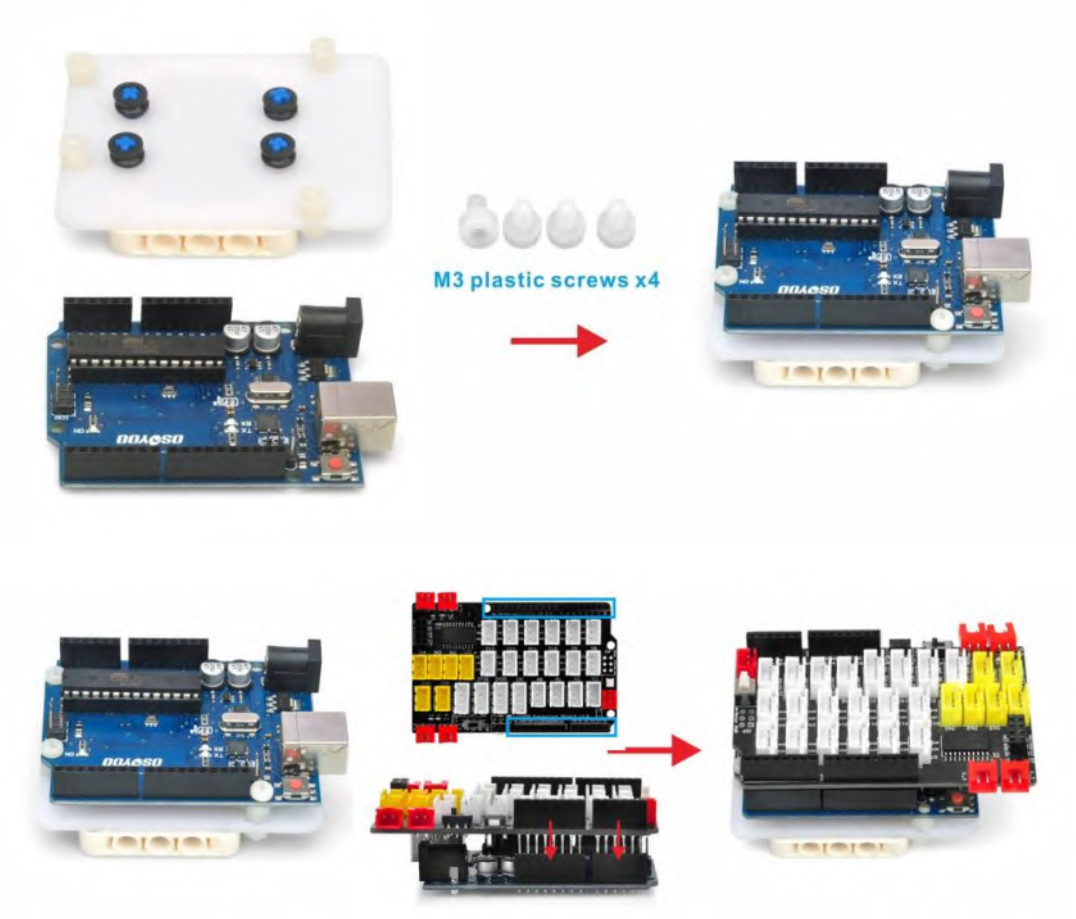
2: Install OSOYOO Basic board and 9V battery case Block

To make the OSOYOO basic board and 9V battery case build blocks easily, we design two Acrylic plate for these two parts. Before you build other projects, please follow this class to complete OSOYOO Basic board Block and 9V battery case Block.

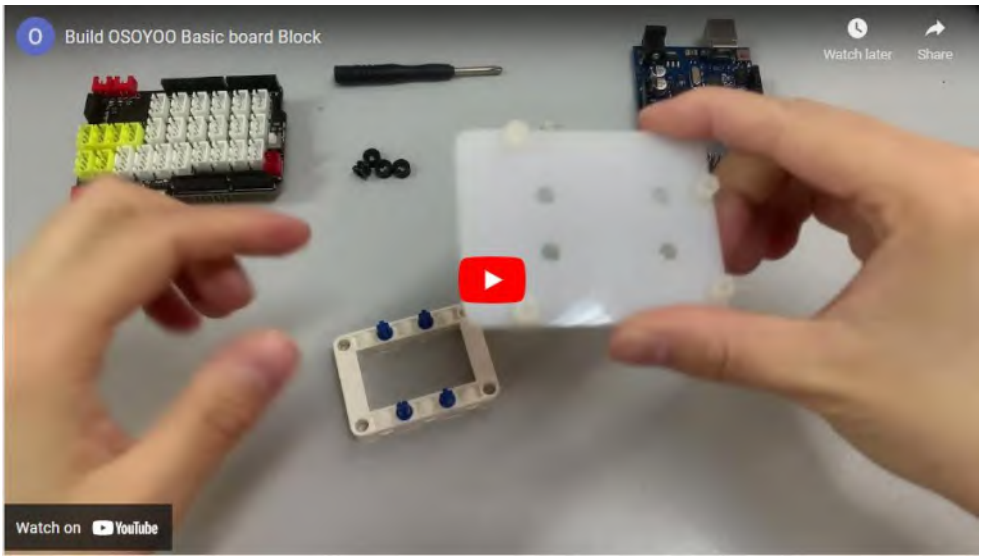
Please install OSOYOO basic board on blocks as the following steps:



https://osoyoo.com/?p=44354



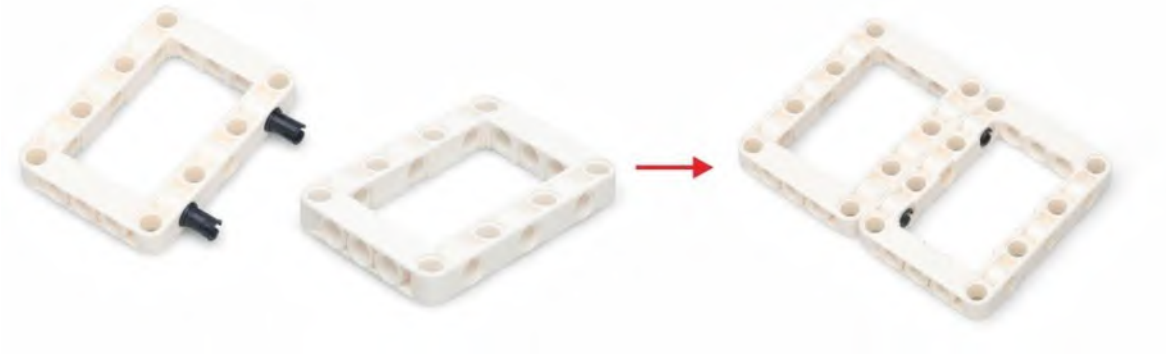
You can also follow this video to install board on block:
https://youtu.be/KaGaRDugRE4

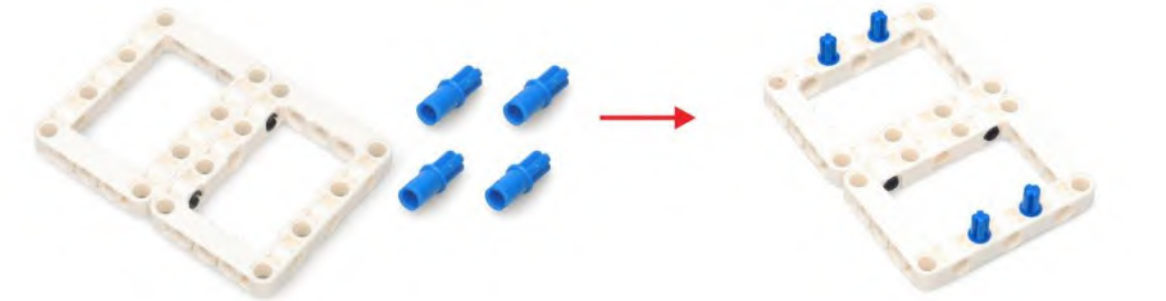


https://osoyoo.com/?p=44354

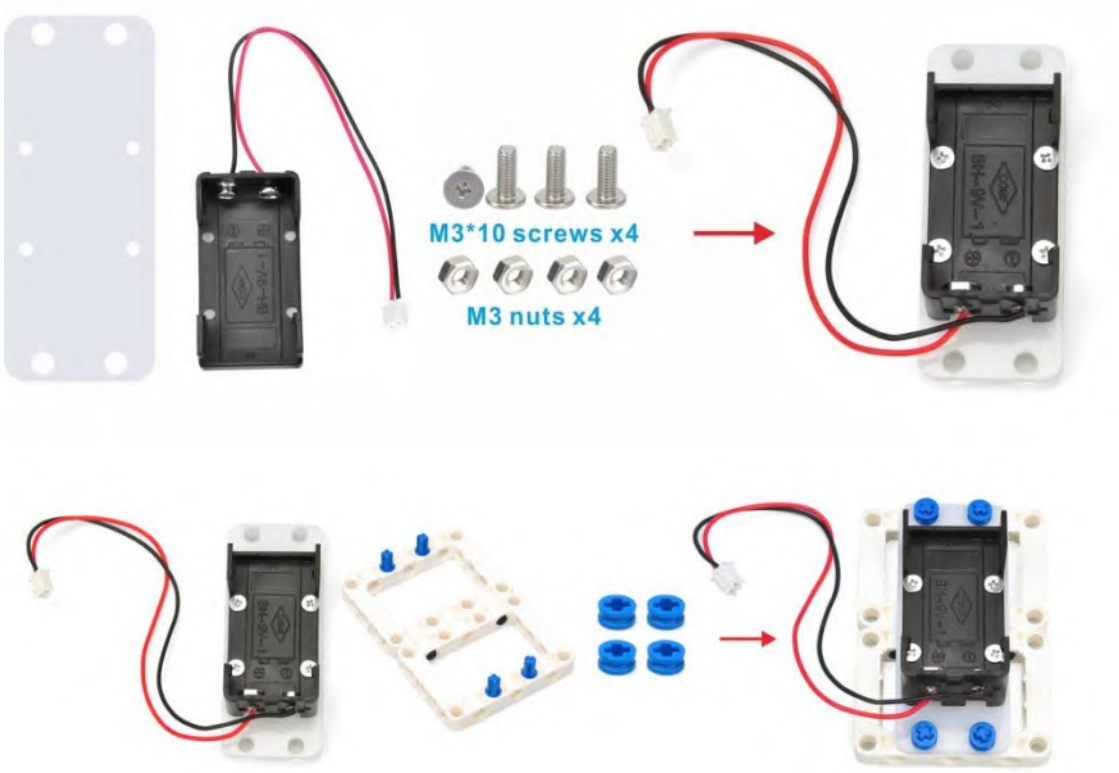
BUILD 9V BATTERY CASE BLOCK

Please install OSOYOO basic board on blocks as the following steps:

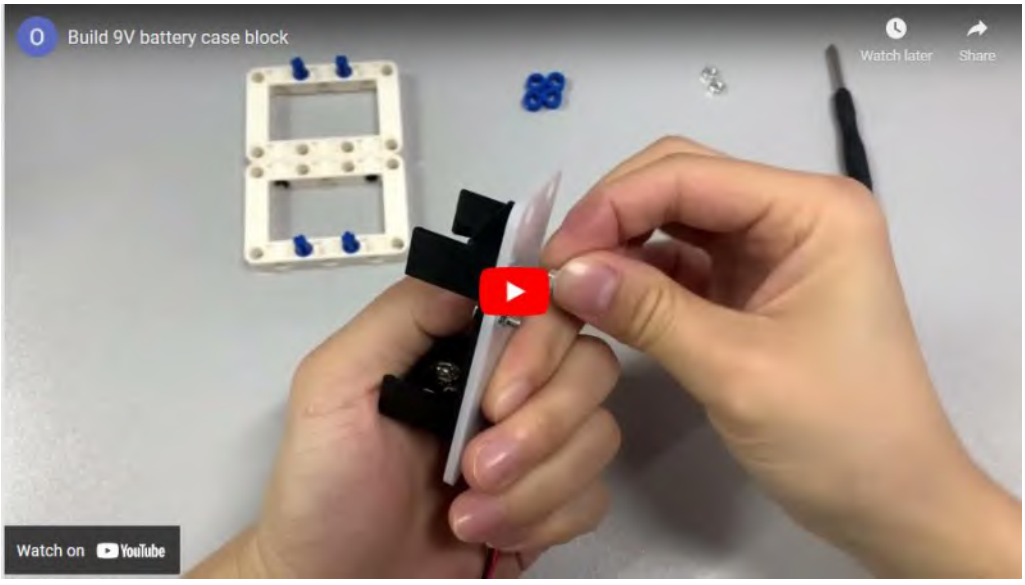




https://osoyoo.com/?p=44354



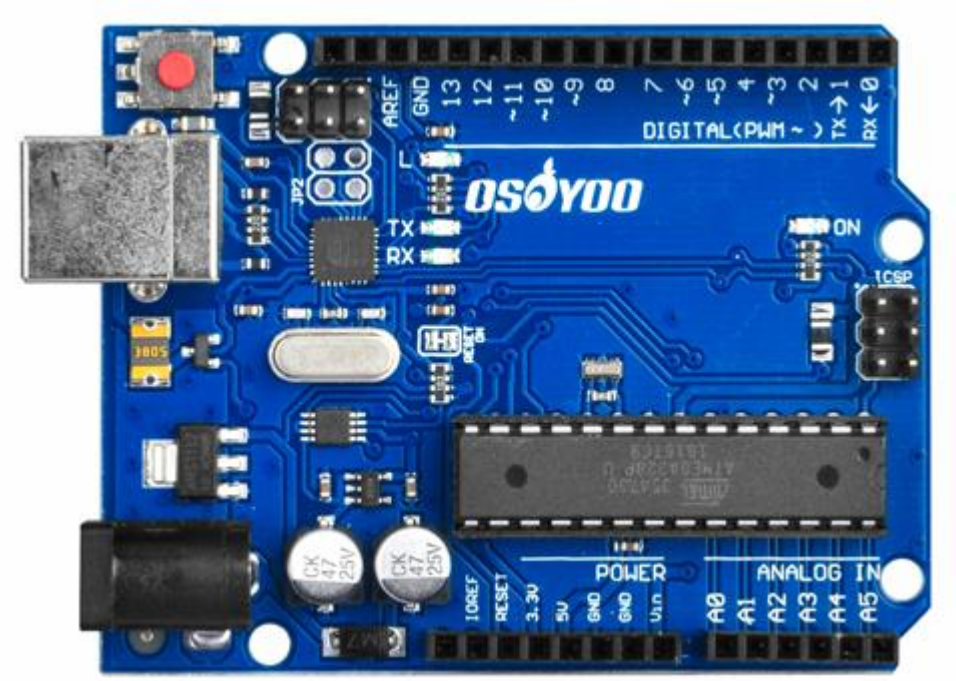
You can also follow this video to install board on block:
https://youtu.be/0BLrQoU1ckI



https://osoyoo.com/?p=44354

3: OSOYOO basic board for Arduino UNO

"The UNO is the best board to get started with electronics and coding. If this is your first experience tinkering with the platform, the UNO is the most robust board you can start playing with. The UNO is the most used and documented board of the whole Arduino family." ---------- www.Arduino.cc



Overview

The Osoyoo UNO Board is fully compatible with Arduino UNO rev.3, it is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worring too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

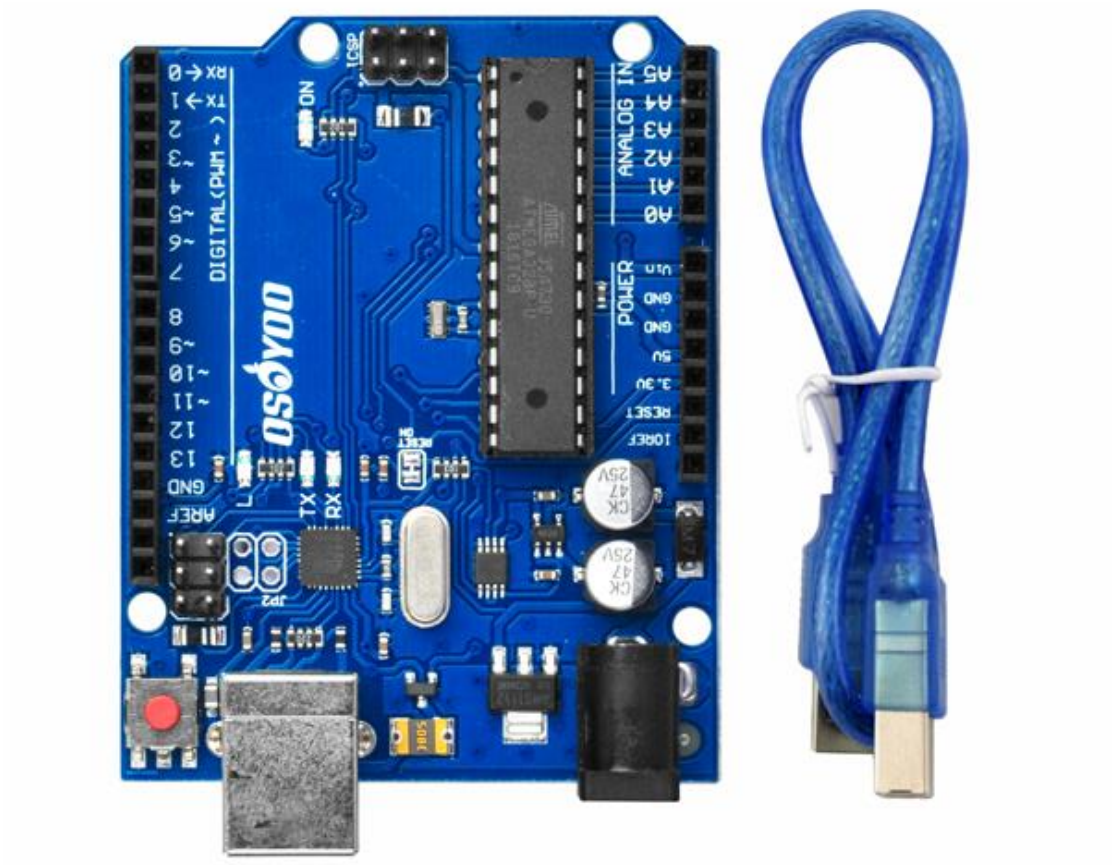
"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The

https://osoyoo.com/?p=44354

Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

Note:

This is an Arduino Compatible board. It is NOT an original Arduino board, but is similar. None of the Arduino Uno R3 boards sold on the internet at this price are original, they are all copies. This is perfectly legal, seeing that the whole Arduino ecosystem is open source! Please note this board is manufactured by Osoyoo! We do have control of the brand and quality of components used! We have also carefully selected suppliers that consistently supply quality products. We strictly control the quality of the products before leaving the factory. The excellent after-sales service and professional technical support will ensure you have a good time with Osoyoo UNO Board



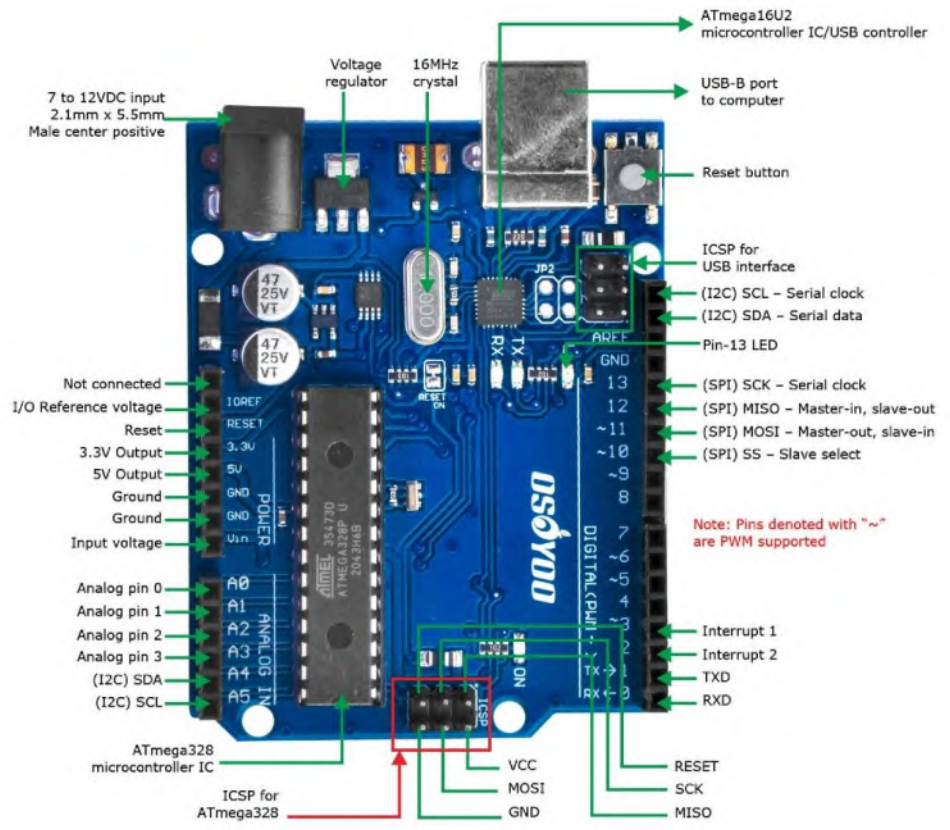
Specifications of Osoyoo UNO

- Microcontroller: ATmega328P-PU

https://osoyoo.com/?p=44354

- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB of which 0.5 KB used by bootloader
- SRAM: 2 KB (ATmega328)
- EEPROM: 1 KB (ATmega328)
- Clock Speed: 16 MHz

Pinout of Osoyoo UNO



Schematics

Arduino Uno is open-source hardware! You can build your own board using the following files from the Arduino official site:

- Arduino_Uno_Rev3 Eagle files
- Arduino_Uno_Rev3 schematic PDF file
- Arduino_Uno_Rev3 DXF file

Documentations

Programming

The Arduino Uno can be programmed with the (Arduino Software (IDE)). Select "Arduino/Genuino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials.

The ATmega328 on the Arduino Uno comes preprogrammed with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files).

You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar; see these instructions for details.

The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available in the Arduino repository. The ATmega16U2/8U2 is loaded with a DFU bootloader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then rese ing the 8U2.
- On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

You can then use Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU bootloader). See this user-contributed tutorial for more information.

Warnings

The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

Differences with other boards

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Power

The Arduino Uno board can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and Vin pin headers of the POWER connector.

The board can operate on an external supply from 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may become unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

- Vin. The input voltage to the Arduino/Genuino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V.This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.

- 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND. Ground pins.
- IOREF. This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.

Memory

The ATmega328 has 32 KB (with 0.5 KB occupied by the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

Input and Output

See the mapping between Arduino pins and ATmega328P ports. The mapping for the Atmega8, 168, and 328 is identical.

PIN MAPPING ATmega328P

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(),digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller.

In addition, some pins have specialized functions:

- Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.
- PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.

- SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- LED: 13. There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.
- TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.

The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. There are a couple of other pins on the board:

- AREF. Reference voltage for the analog inputs. Used with analogReference().
- Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

Communication

Arduino/Genuino Uno has a number of facilities for communicating with a computer, another Arduino/Genuino board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

A SoftwareSerial library allows serial communication on any of the Uno's digital pins.

The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino Software (IDE) includes a Wire library to simplify use of the I2C bus;

see the documentation for details. For SPI communication, use the SPI library.

Automatic (Software) Reset

Rather than requiring a physical press of the reset button before an upload, the Arduino/Genuino Uno board is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino Software (IDE) uses this capability to allow you to upload code by simply pressing the upload button in the interface toolbar. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload.

This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data.

The Uno board contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line; see this forum thread for details.

Revisions

Revision 3 of the board has the following new features:

- 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which

operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin that is reserved for future purposes.

- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

The Osoyoo UNO Board is 100% Software and Hardware compatible with Arduino UNO Board, you can get more info from www.arduino.cc. Thanks for their efforts, it's easier for us to learn Arduino !

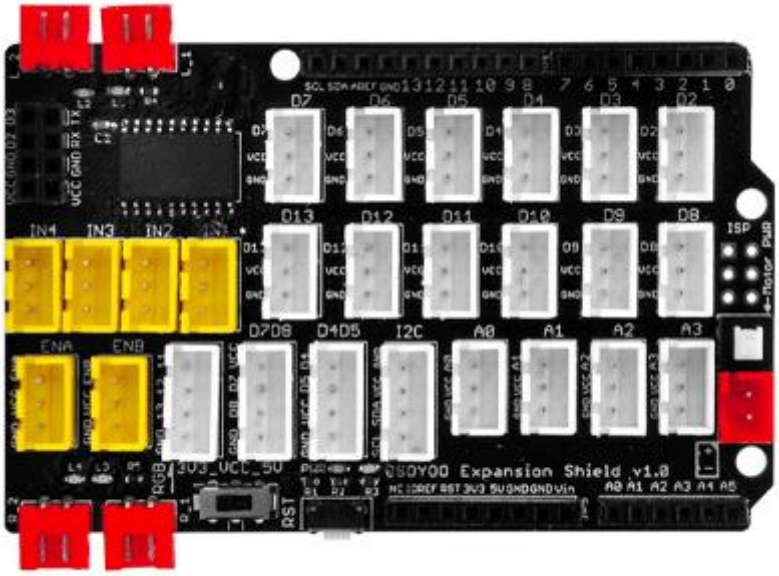
https://osoyoo.com/?p=44354

4: OSOYOO Magic I/O Shield for Arduino

Arduino Uno is the most popular Arduino board, however it is often frustrating when your UNO board needs connect many sensors and actuators with jumper wires. In worst cases, wrong connection of wires can burn Arduino board, cause circuit short-cut fire and make your project become a nightmare.

The purpose of creating the OSOYOO Magic I/O Shield for Arduino is to help people, especially beginners to make wire connection simple, convenient and safe.

With the rich Plug and Play (PnP) connectors on the base board, you can connect standardized OSOYOO sensor/actuator modules with the Arduino Uno through this shield conveniently!



This OSOYOO Magic I/O Shield fits standard Arduino UNO compatible board. It is a connection bridge between the electronic block module and UNO board. It is has a build-in motor driver similar to L293/L298, which can provide adjustable power to inductive loads such as relays, solenoids, DC and

stepping motors. It can drive two channels of DC motors with your Arduino board, controlling the speed and direction of each one independently.

It extends SPI port, UART, I2C, PWM and analog INPUT pins for Arduino board, so DIY enthusiasts, interactive designers can quickly attach the modules to the board for Arduino and accelerate project development progress. An intelligent power regulator allows you to connect a battery and USB cable simultaneously, and an on-board voltage switch makes it easy to change the output voltage, making 3.3V or 5V sensors compatible. With the plug-and-play interfaces, this board simplifies all your needs for an autonomous robot such as line tracer, obstacle avoidance, maze solver etc., The shield can be interfaced with 2 motors, 12 digital sensors, 6 analog sensors, a line array sensor and an ultrasonic sensor (4 pin and 3 pin).

FEATURES

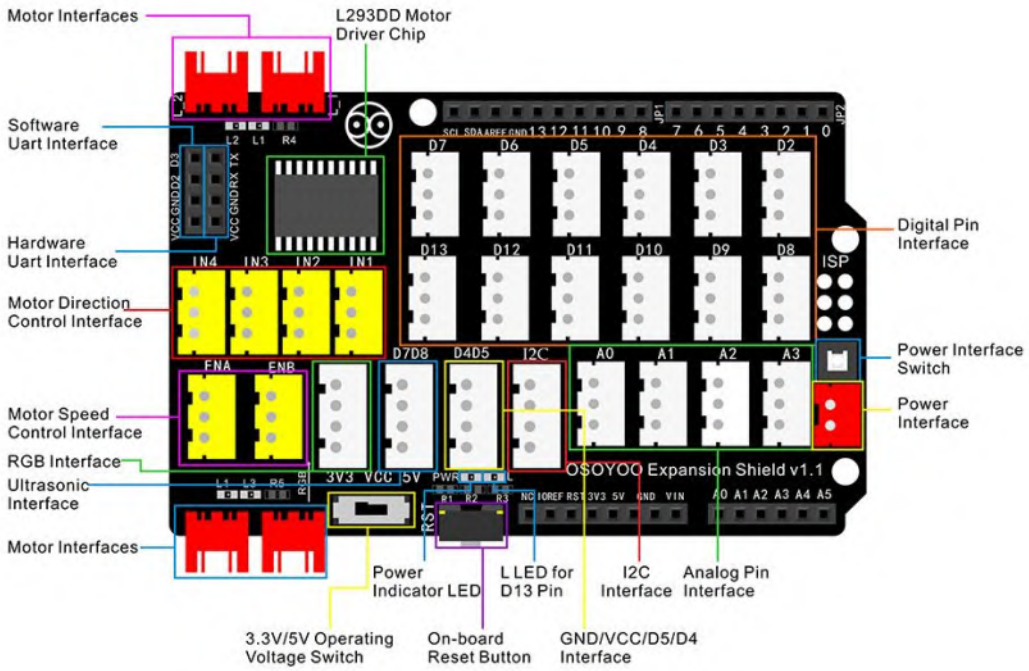
- Compatible for Arduino UNO R3, Leonardo R3, Mega2560 R3
- All sockets onboard are XH 2.54mm pitch.
- Motor socket number: 4
- I2C socket number: 1
- RGB socket number: 1
- 4PIN socket number: 4
- Power socket number: 1(DC 5V~12V)
- Software Uart interface number: 1
- Hardware Uart interface number: 1
- Analog input socket number: 4(A0, A1, A2, A3)
- Digital pin socket number：12（D2~D13）
- Motor Driver socket: for OPEN-SMART car chassis
- Colorful socket: 5 pins is red, 6 pins is blue, 20 pins is white.
- L LED for D13 pin

-3.3V/5V Operating Voltage Switch

- On-board reset button, power indicator led.

WHAT'S ON BOARD

https://osoyoo.com/?p=44354



Easy to plug OPEN-SMART products with XH socket to this shield and do not need to pay attention to the connection. So it is great for Training institutions and visual programming education.

TECHNICAL DETAILS

Dimensions	84mm x62mm x20mm
Weight	G.W 32g

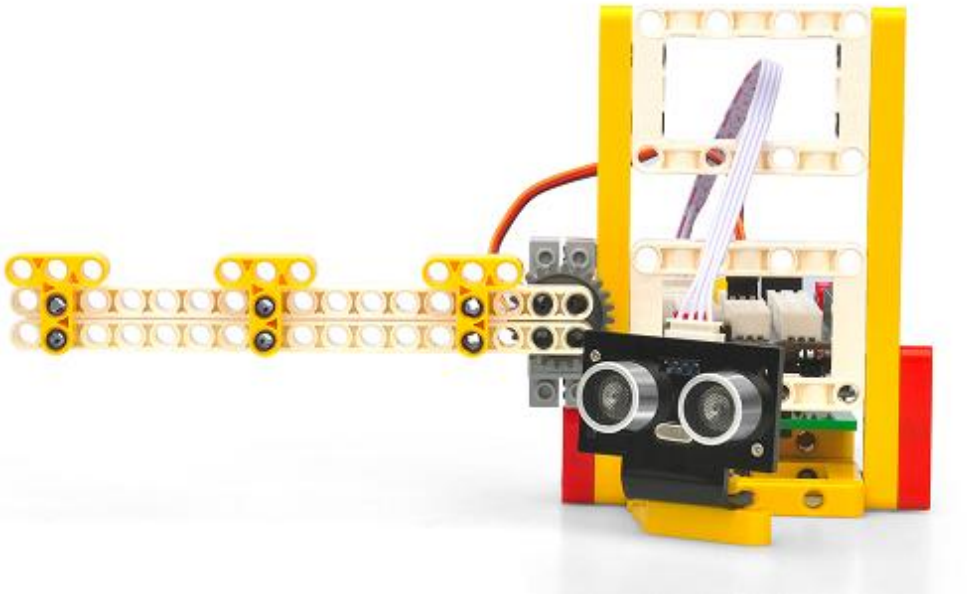
https://osoyoo.com/?p=44354

II: Tutorials

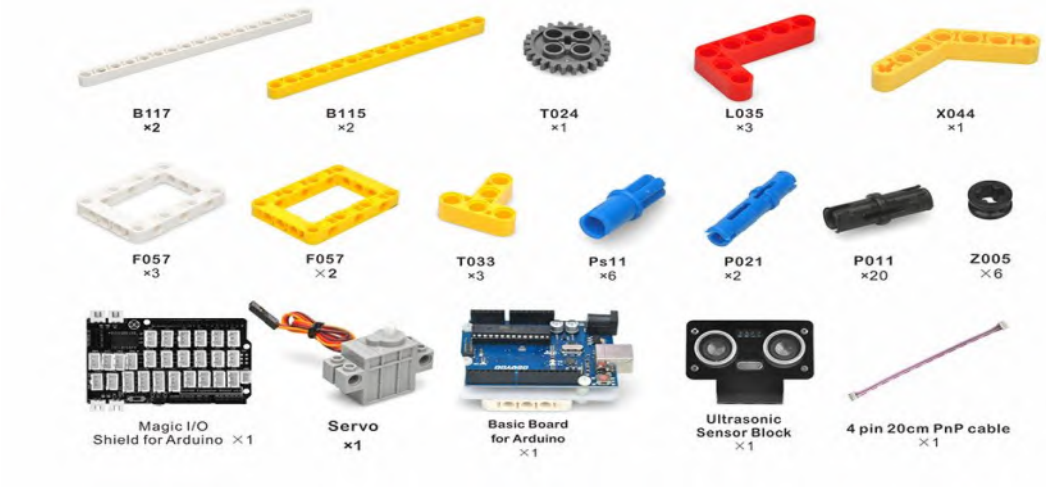
Lesson 1: Smart Gate

OBJECTIVE

In this lesson, we use OSOYOO mini bricks to make a smart garage gate. When Ultrasonic detect a car, the gate will open automatically.



PARTS & DEVICES



https://osoyoo.com/?p=44354

HOW TO BUILD

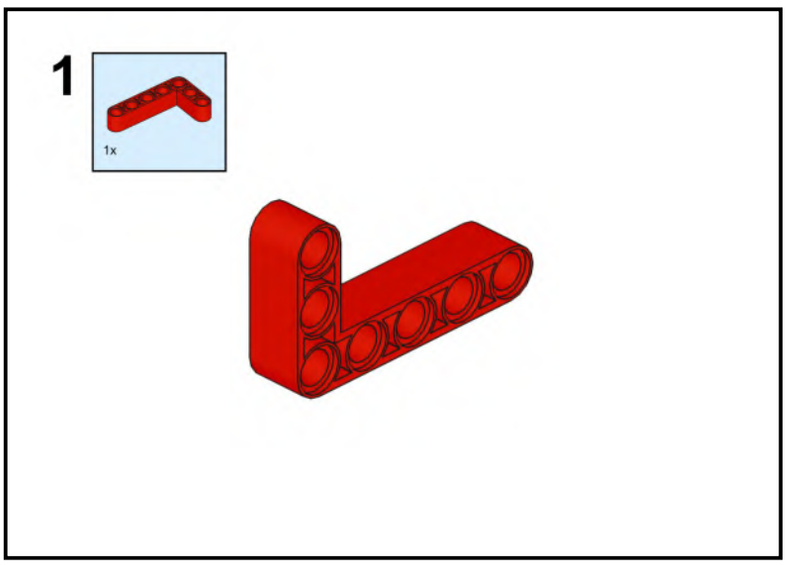
Before you build an elevator with blocks, please according to the Preparation before class 3: https://osoyoo.com/2021/12/01/preparation-before-class-3

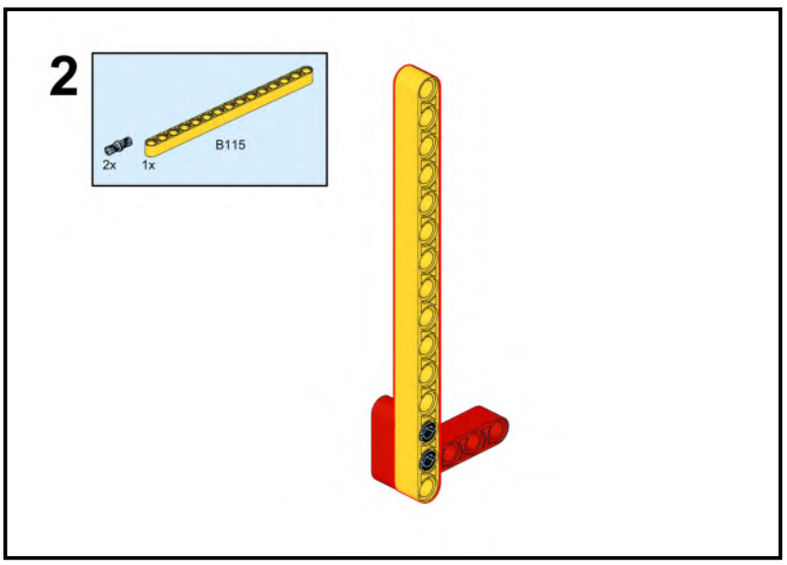
Please visit this link to watch video about Building Blocks: https://youtu.be/xOFasFBVLA0

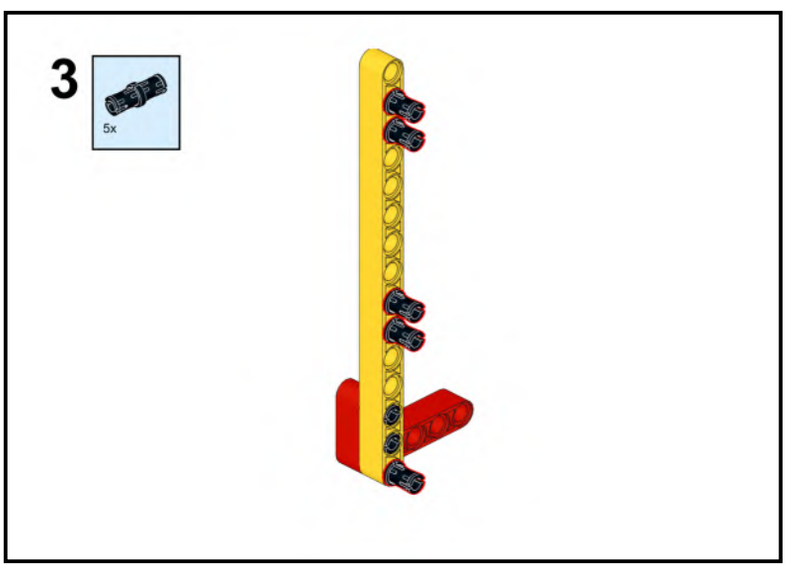
Please follow the instruction to build the blocks (Download link: https://osoyoo.com/picture/Block_kit/lesson1/lesson1.pdf)

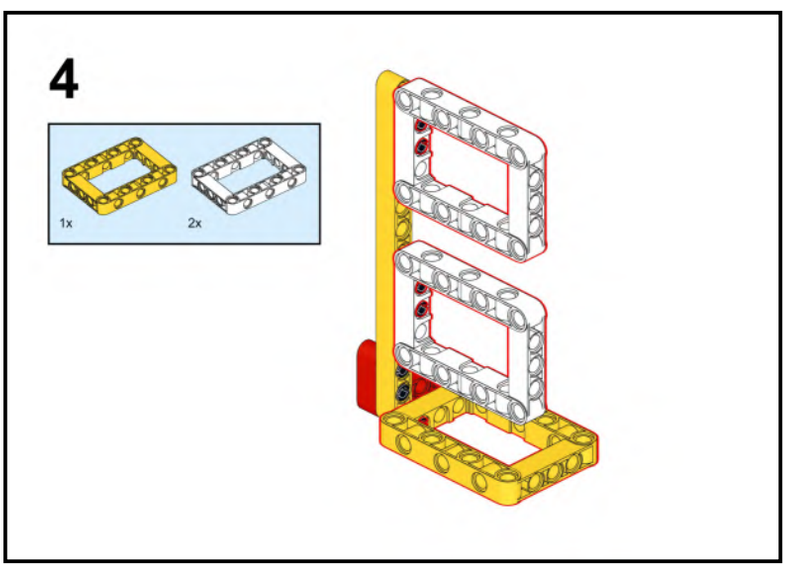
Note: The color of the building block is subject to the actual product, which does not affect the use.

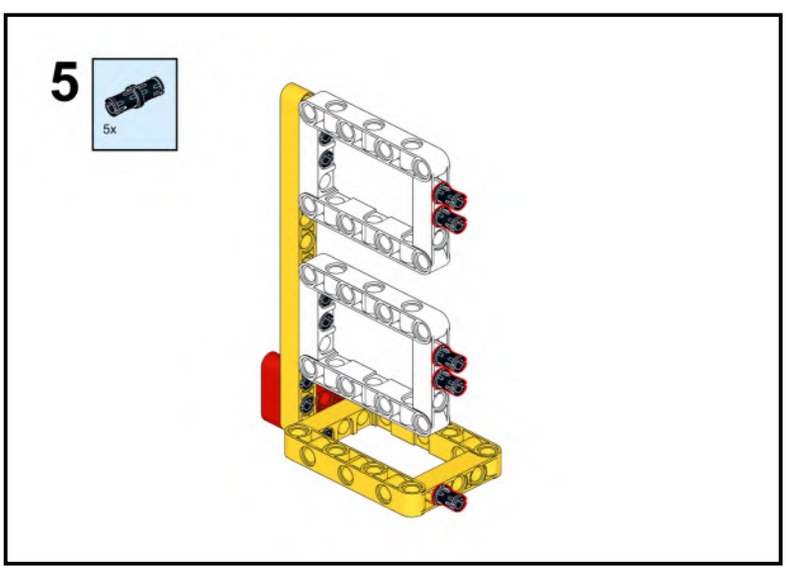
https://osoyoo.com/?p=44354

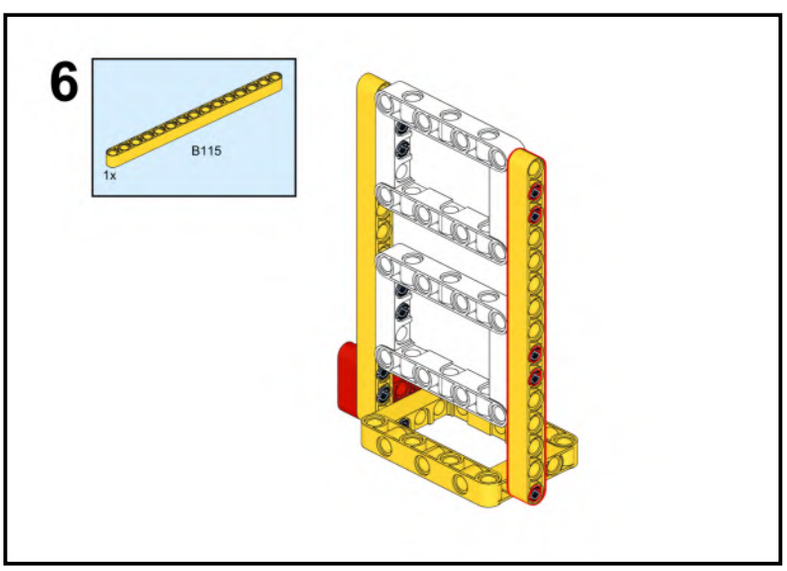




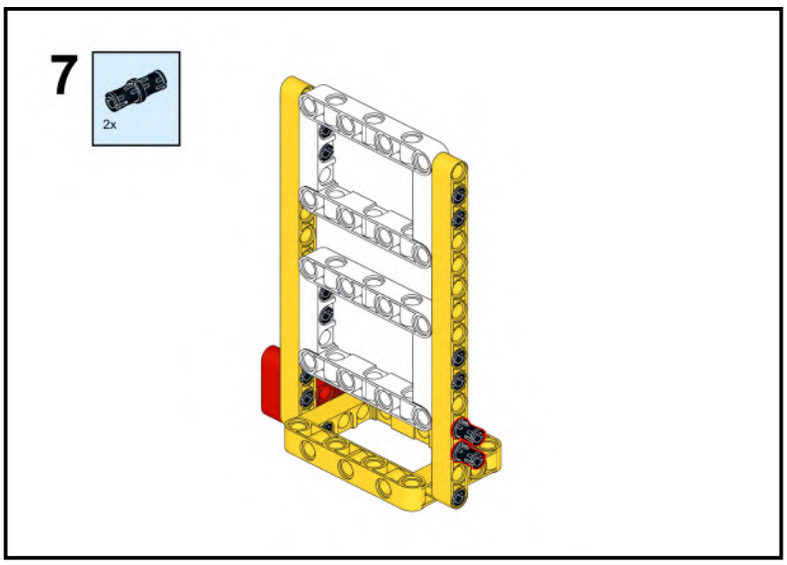


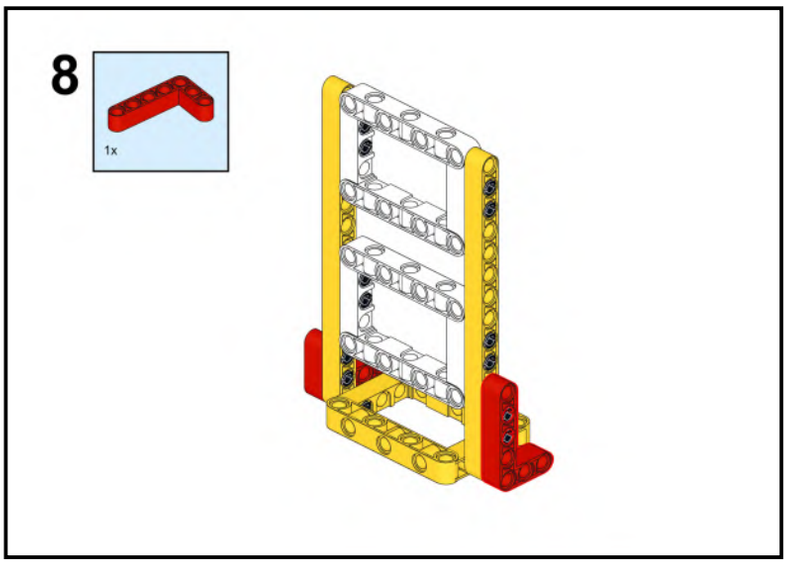


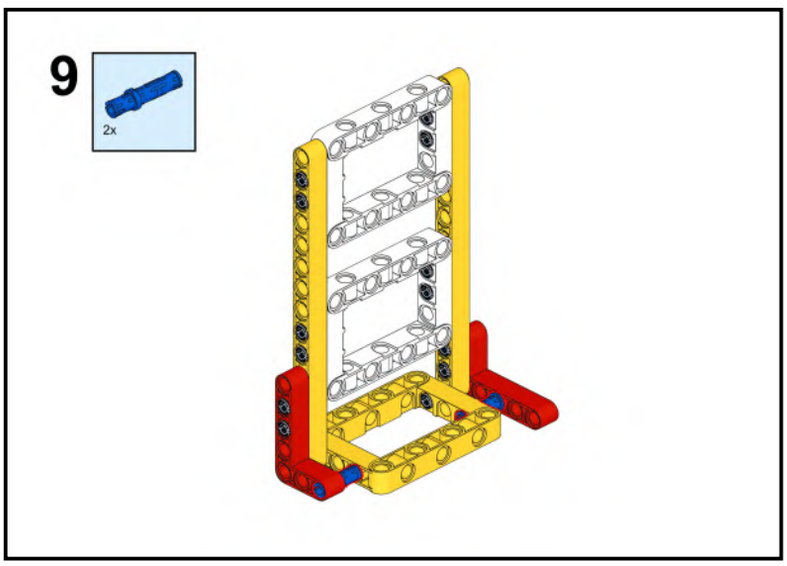


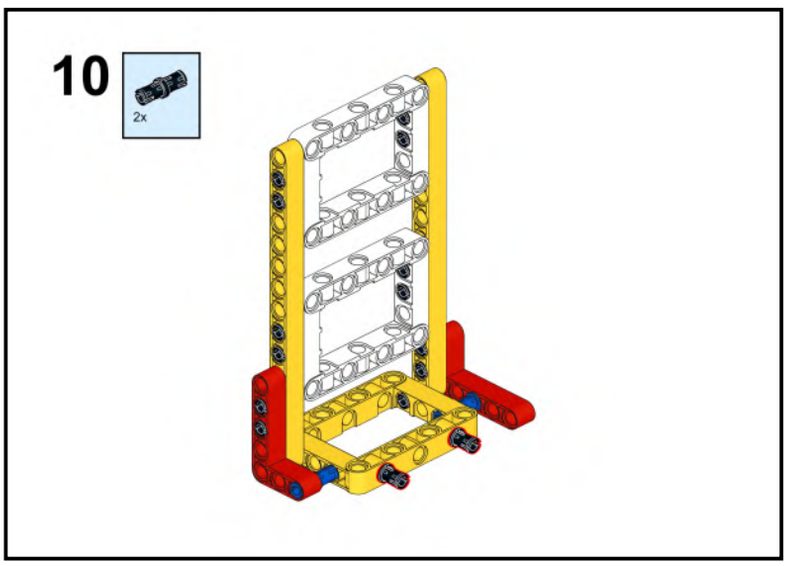


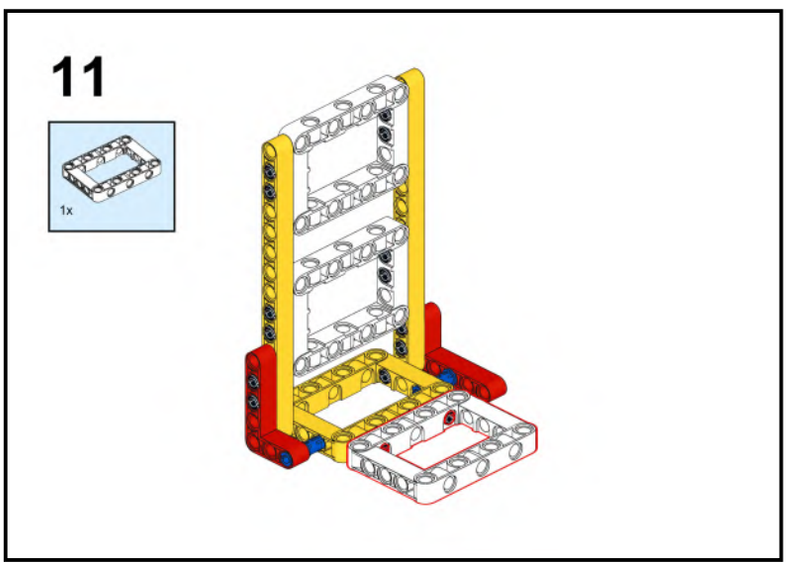
https://osoyoo.com/?p=44354

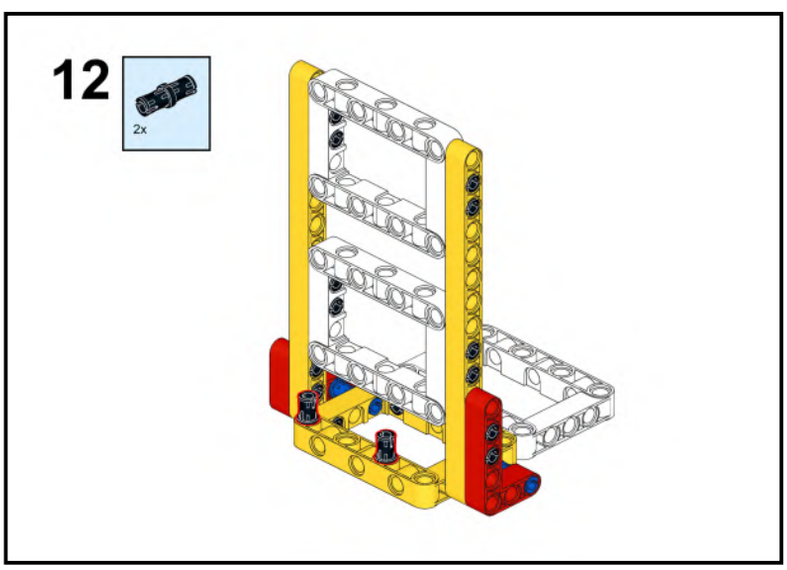




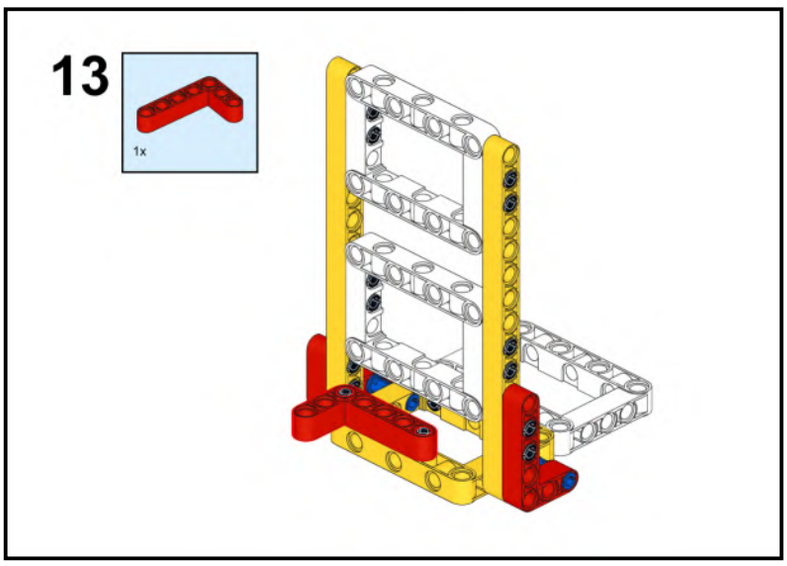


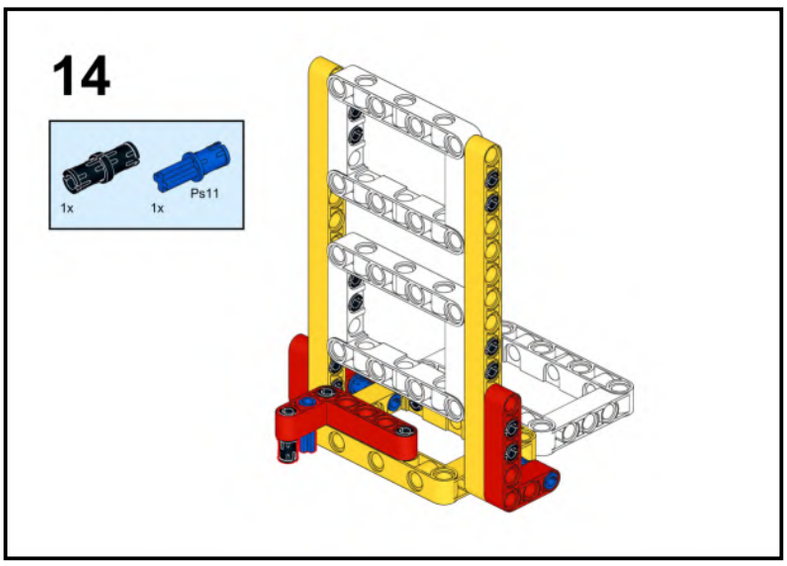


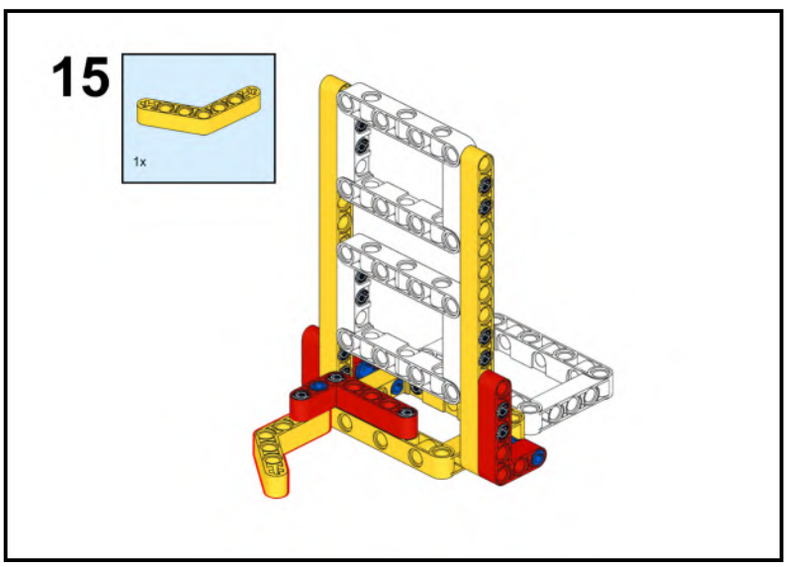


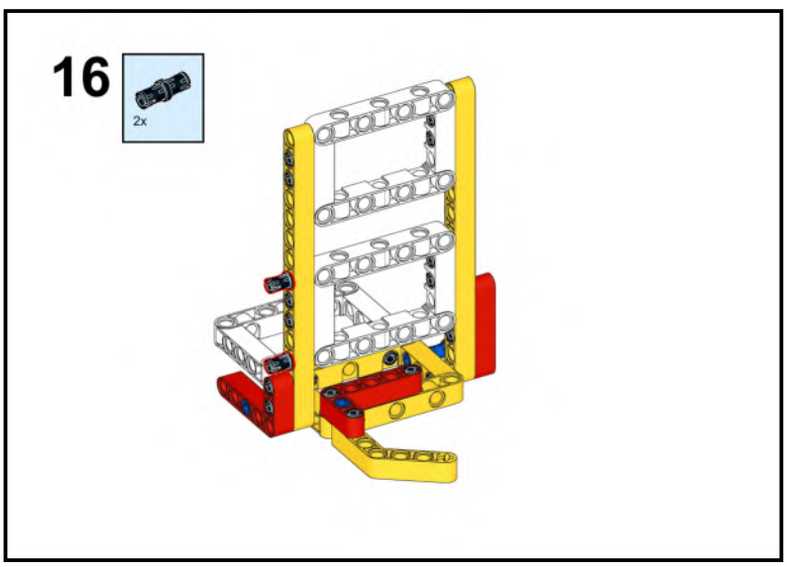


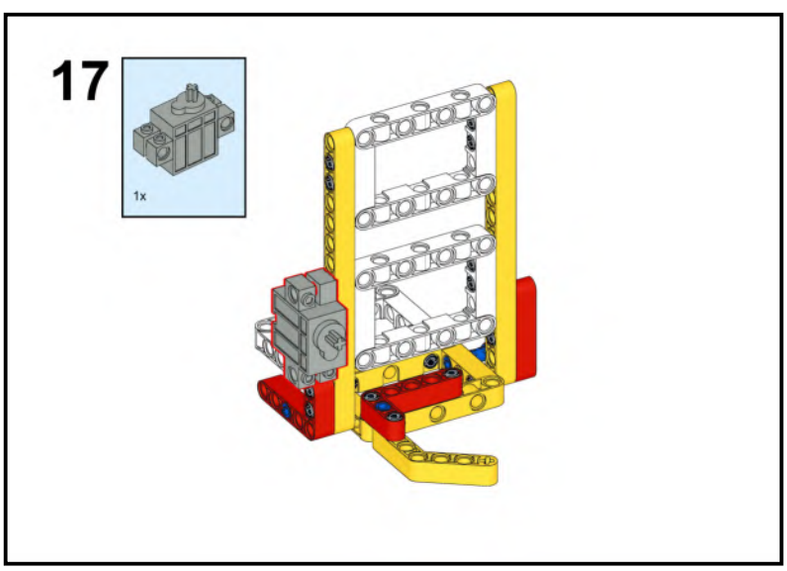
https://osoyoo.com/?p=44354

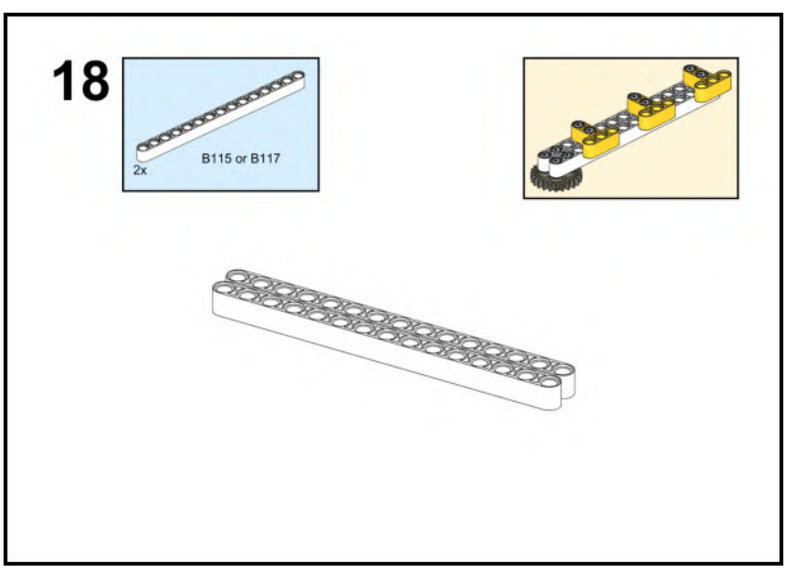




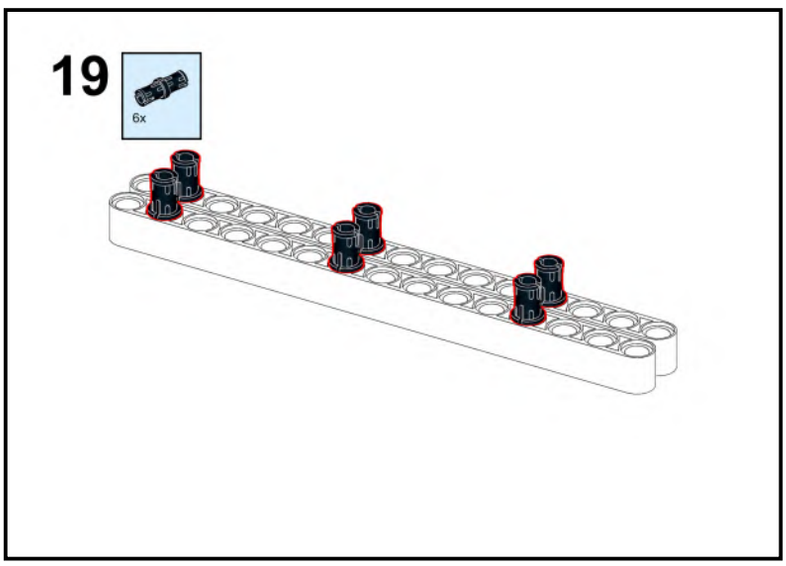


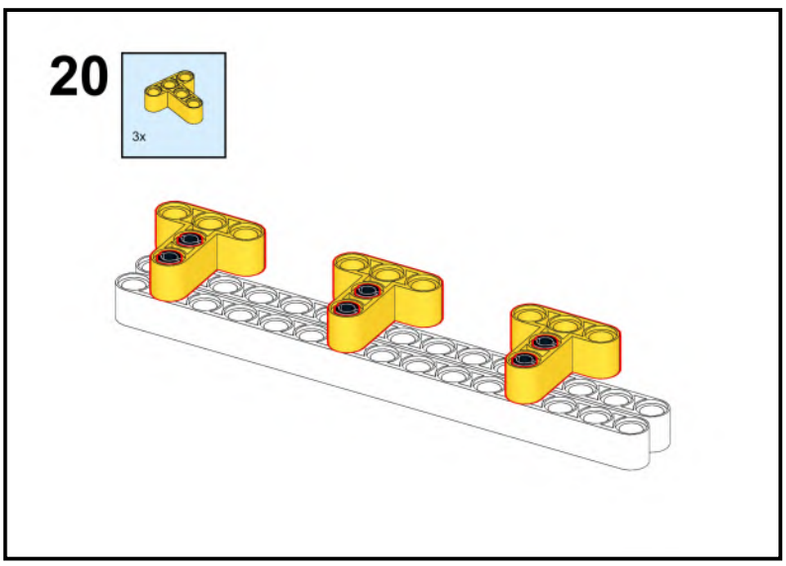


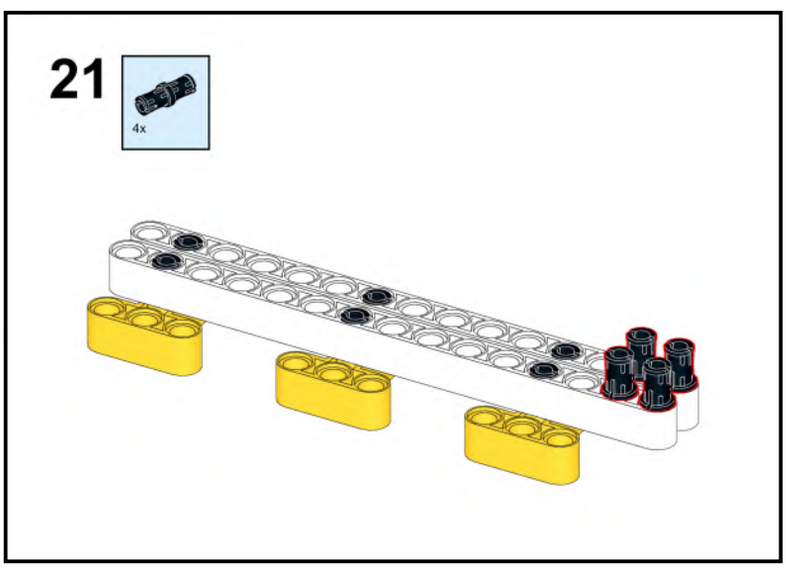


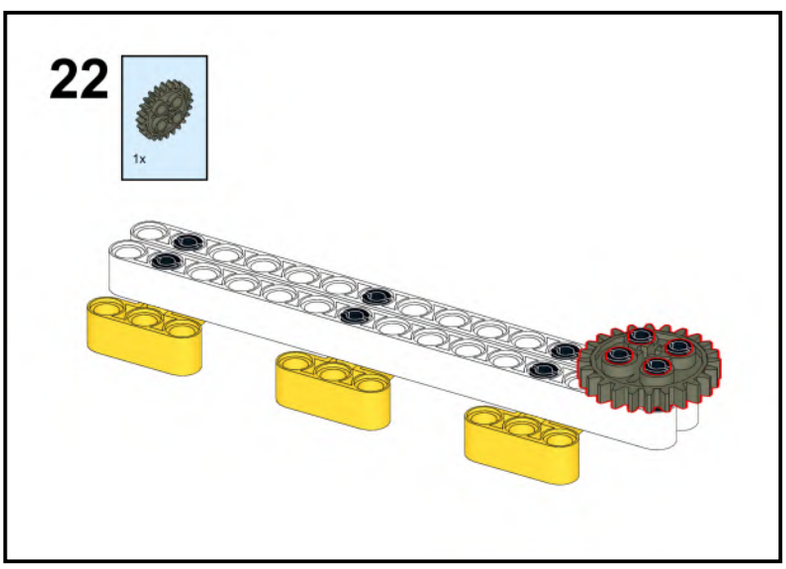


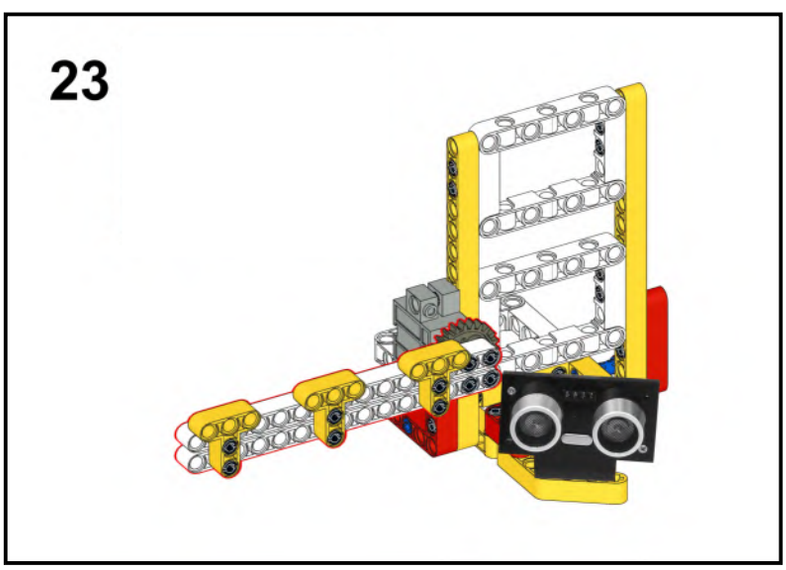
https://osoyoo.com/?p=44354

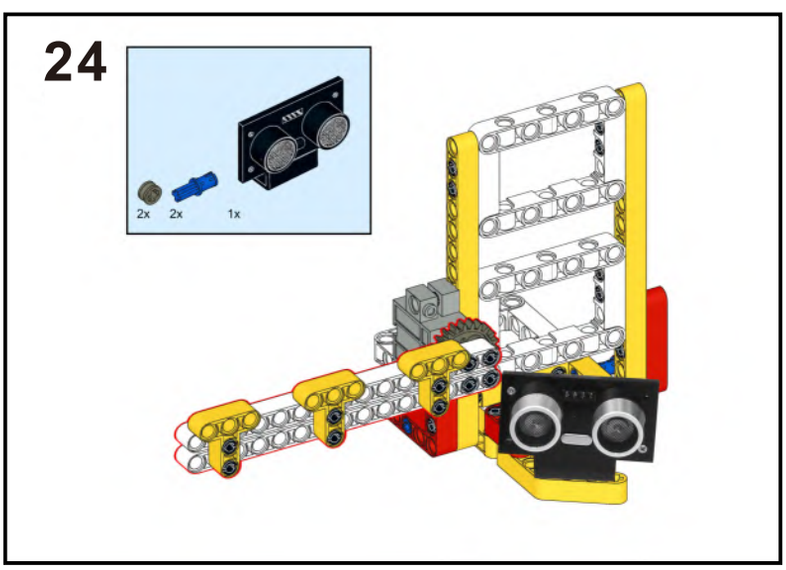




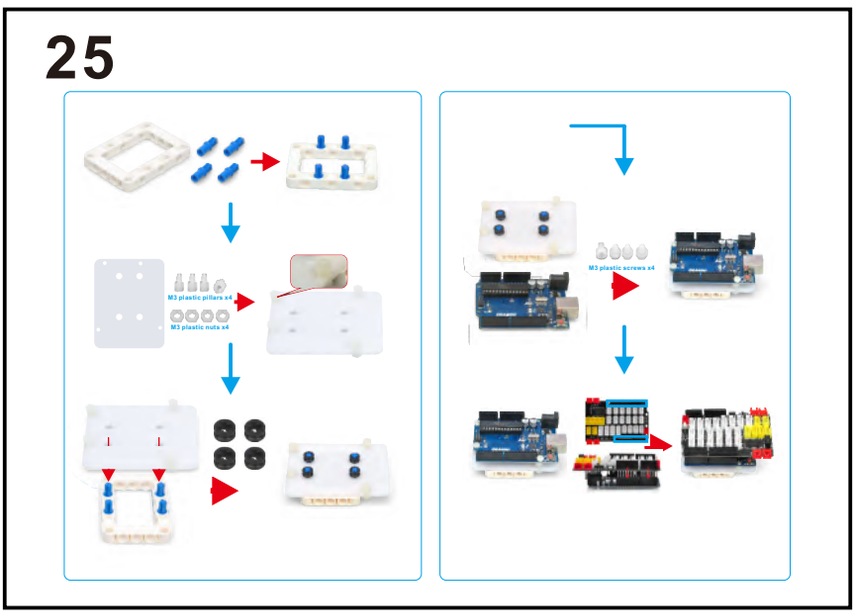


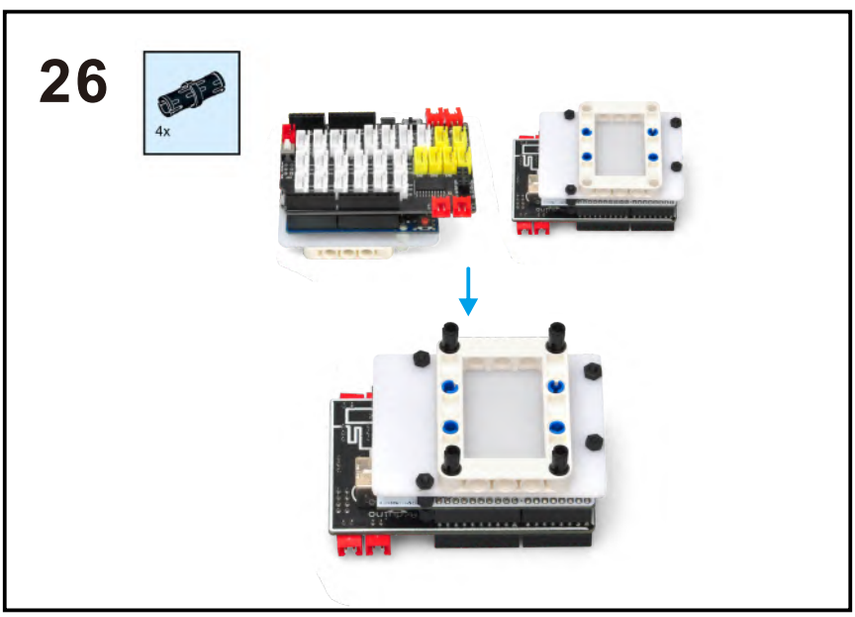


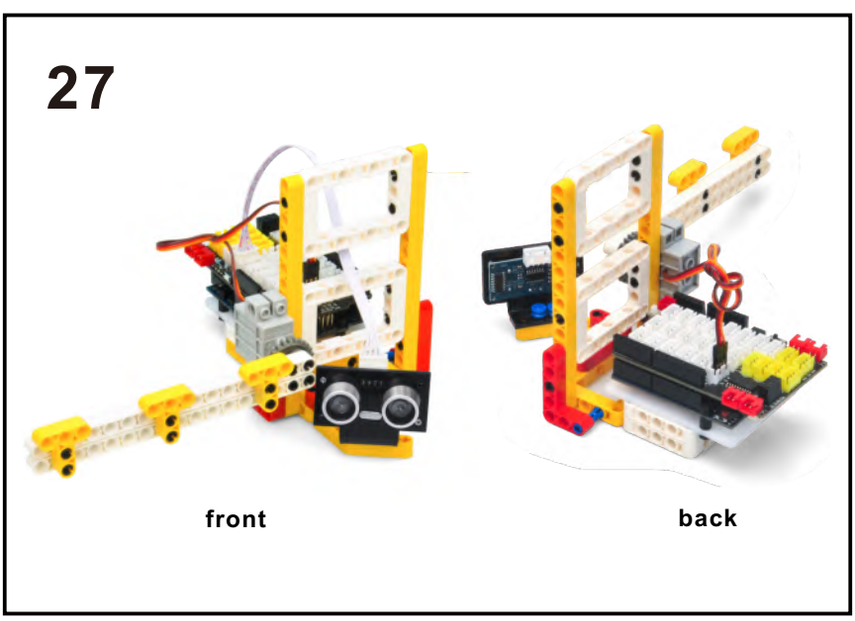




https://osoyoo.com/?p=44354



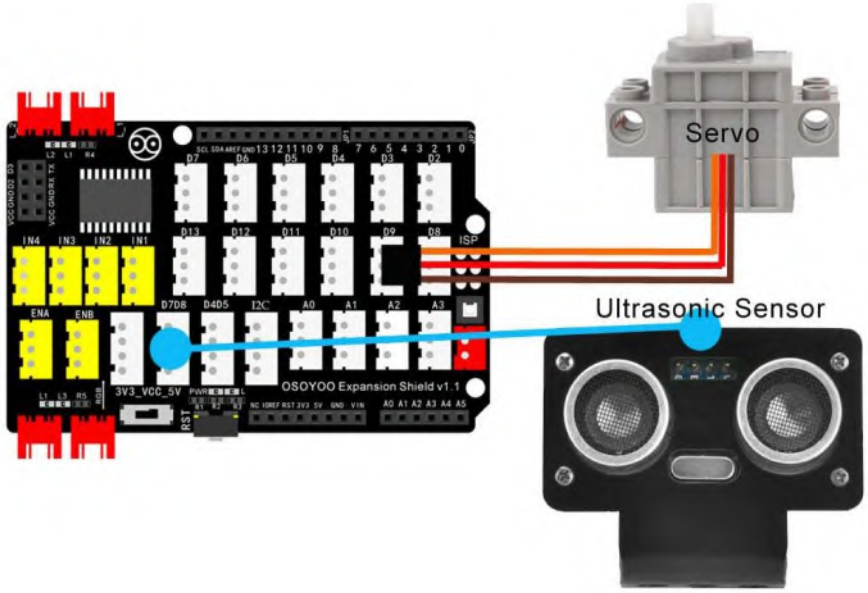




https://osoyoo.com/?p=44354

CIRCUIT CONNECTION

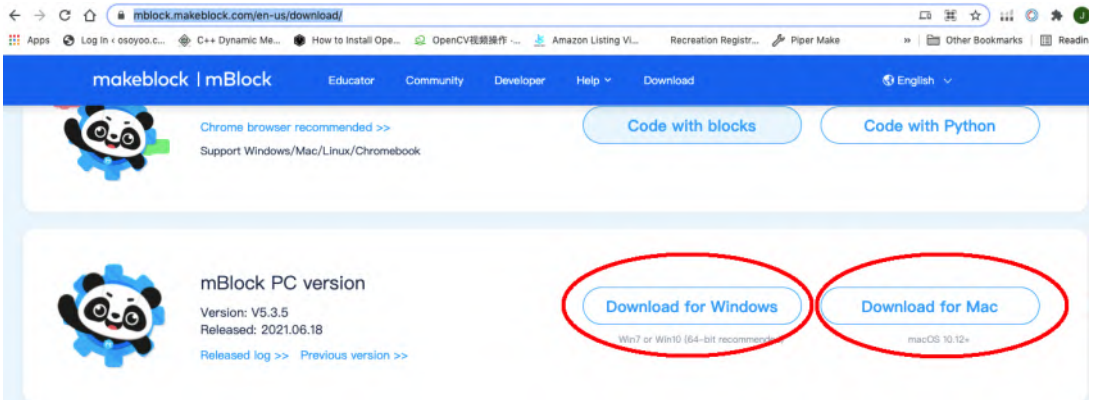
Connect ultrasonic sensor to D7D8 slot with 4pin PnP cable, Servo to D9 port as per following picture:



HOW TO CODE

Note: In this kit, we use mblock as programming tool, if you want to learn more about mblock, please visit preparation before class 1: https://osoyoo.com/2021/12/01/preparation-before-class-1

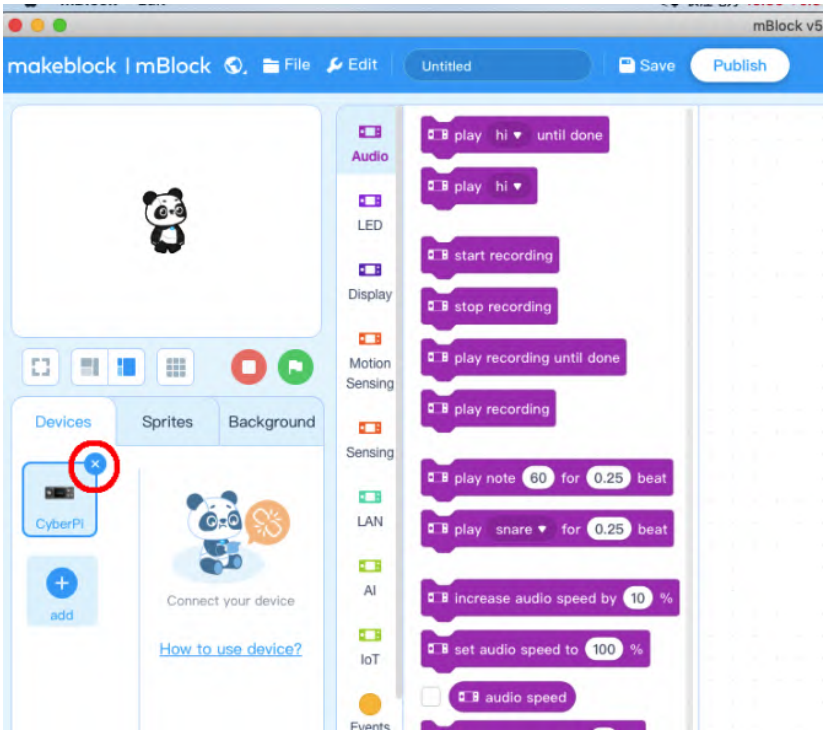
Step 1) Download mBlock PC from https://mblock.makeblock.com/en-us/download/, select the download file as per your computer OS type:



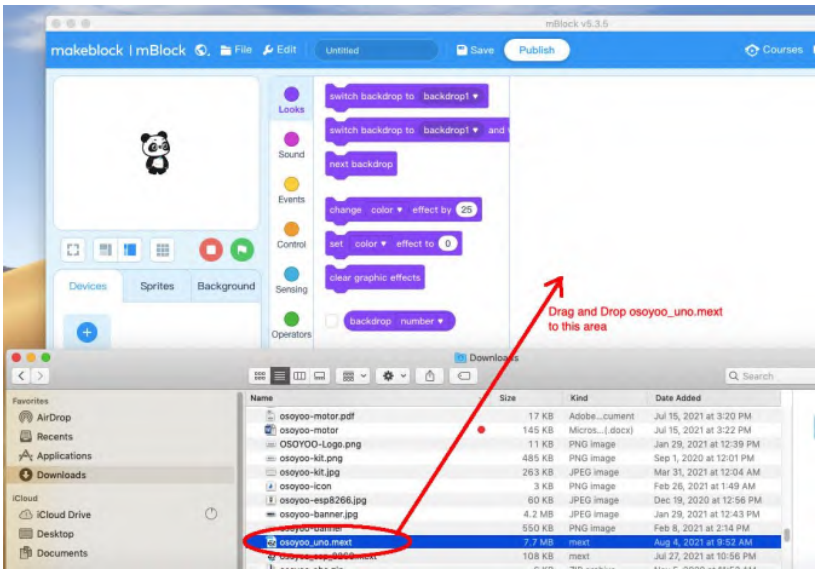
Step 2) Download OSOYOO_UNO.mext device file from https://osoyoo.com/driver/mblock/osoyoo_uno.mext

https://osoyoo.com/?p=44354

Step 3) Run the mBlock PC software by double click the lovely Panda icon. you will see mBlock UI as following picture. Please delete the default device **CyberPi** by click the cross in the red circle.

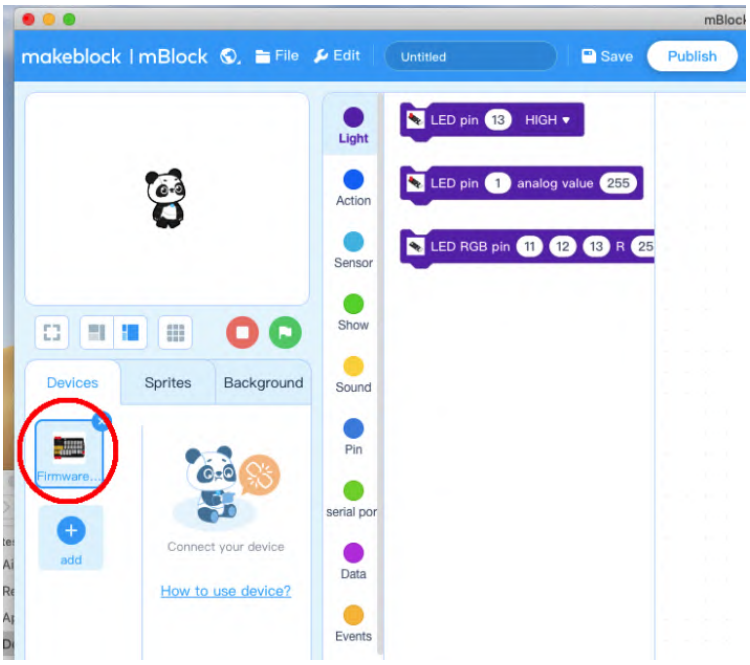


Step 4) Drag and Drop osoyoo_uno_mext file(downloaded in Step 2) to mBlock software as following:



Now you will see a new device firmware in mBlock, see following picture:

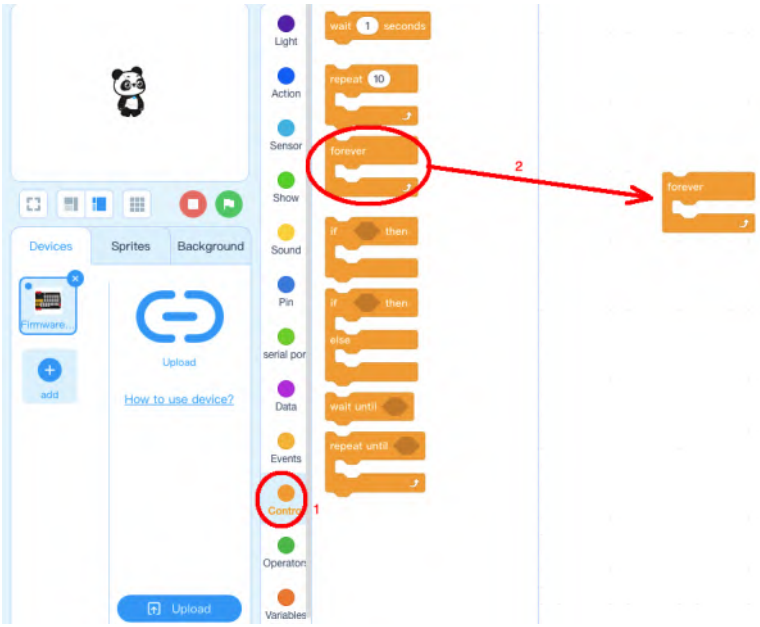
https://osoyoo.com/?p=44354



Now you will see a new device firmware in mBlock, see following picture:

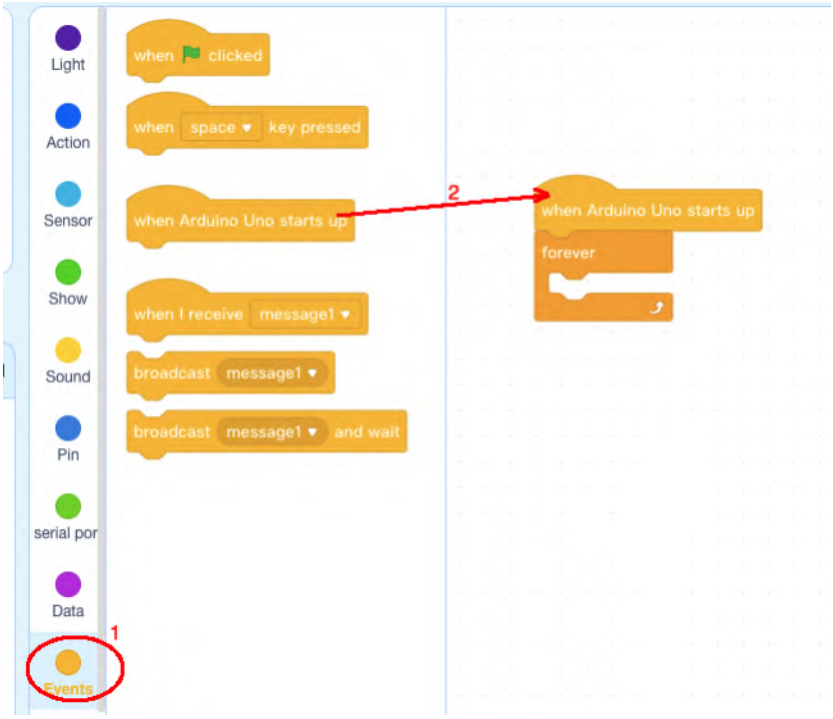
Now mBlock software and OSOYOO_UNO device firmware have been successfully installed in our PC!

Now we will show you how to use blocks to turn above idea into reality.
Step 1: Click **Control**, then Drag and drop **Forever** block to programming area as following:

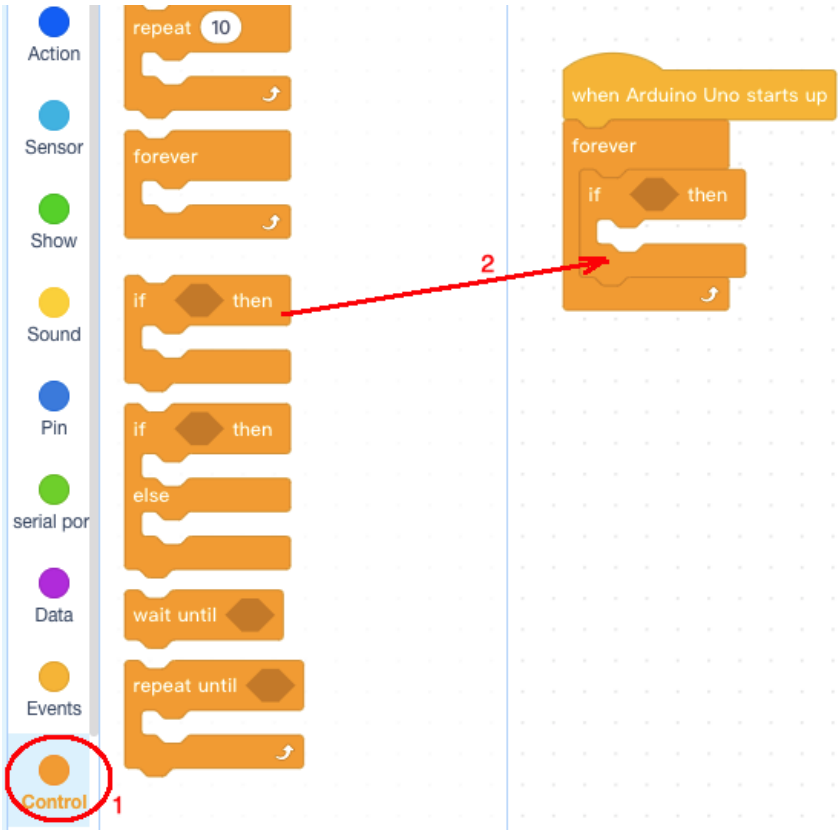


https://osoyoo.com/?p=44354

Step 2: Click **Events**, add **when Arduino Uno starts up** block to the top:

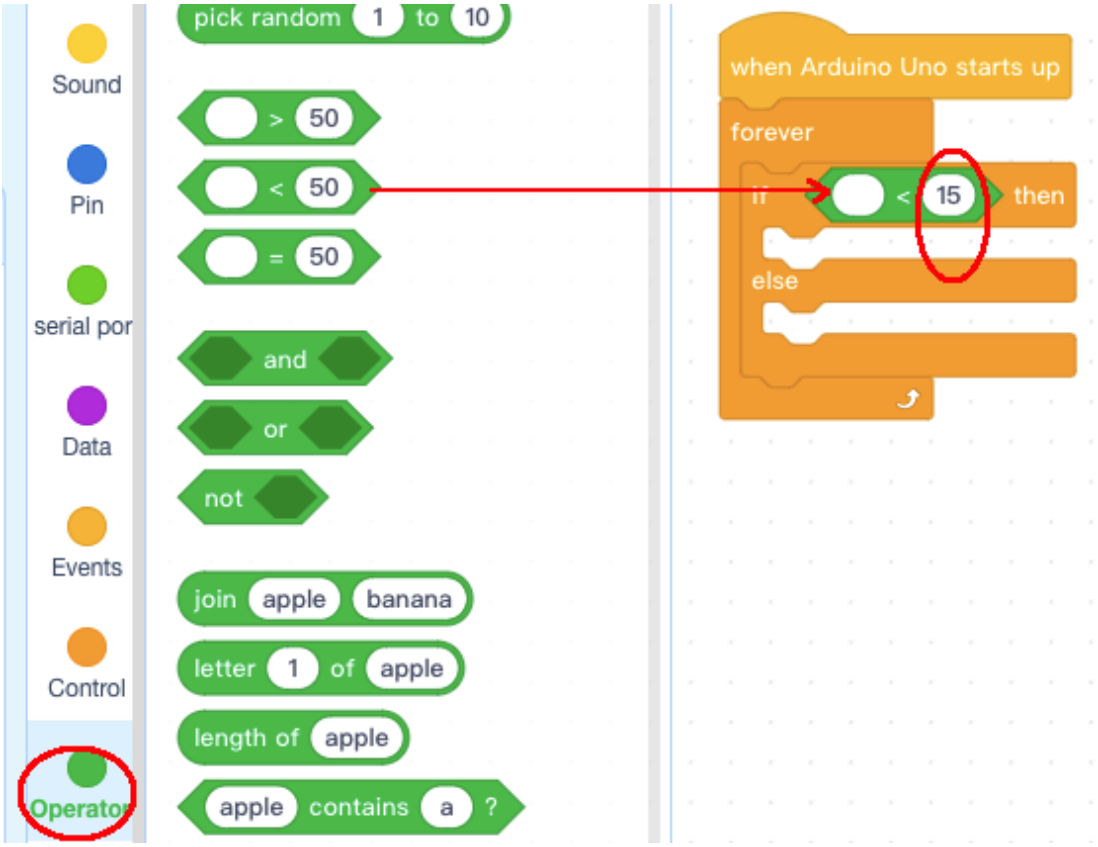


Step 3: Click **Control**, add *if then* block inside *forever* block:

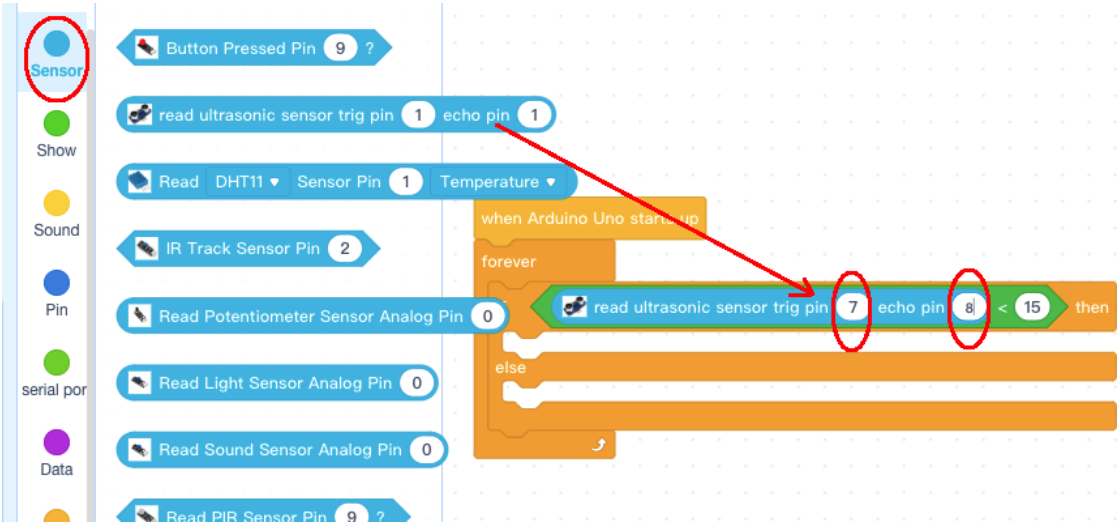


https://osoyoo.com/?p=44354

Step 4: Click **Operator** category, then add **< 50** block into **if else** block condition area, change the value from 50 to 15 as following:

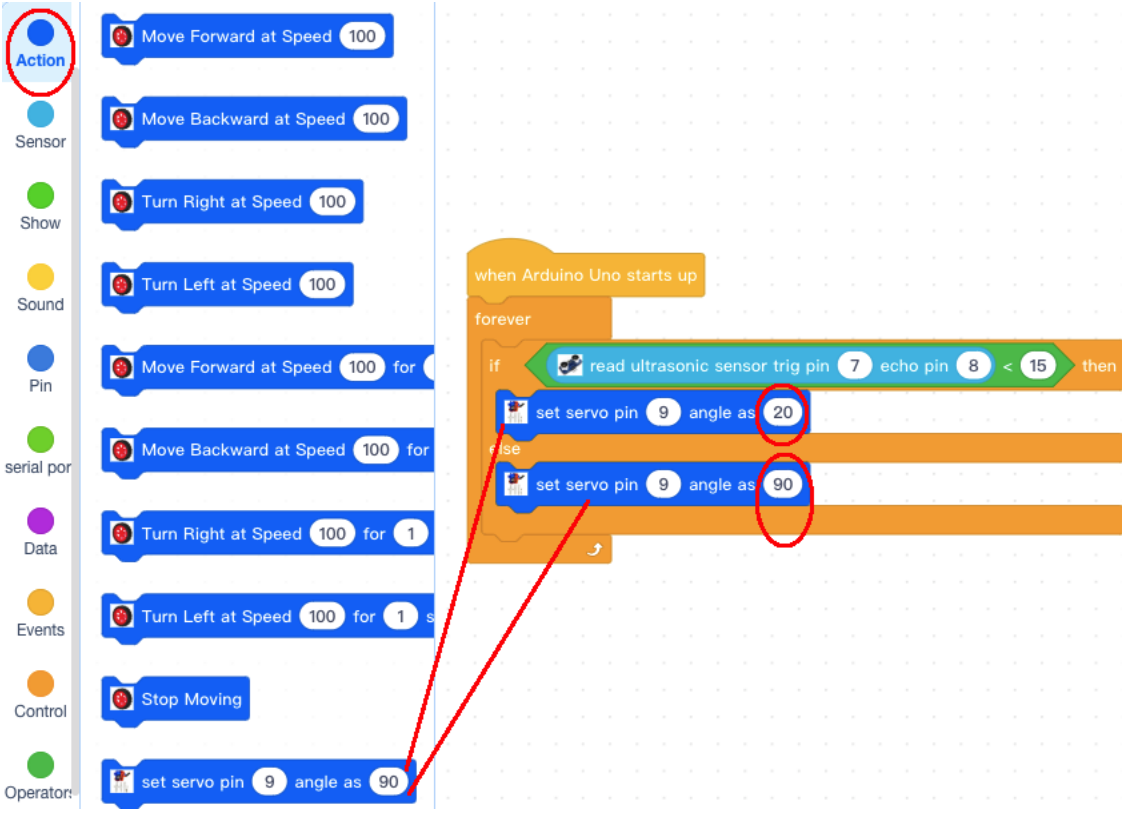


Step 5: Click **Sensor** category, add **read ultrasonic sensor** block into **<15** block, change trig pin to 7 , echo pin to 8 as following:

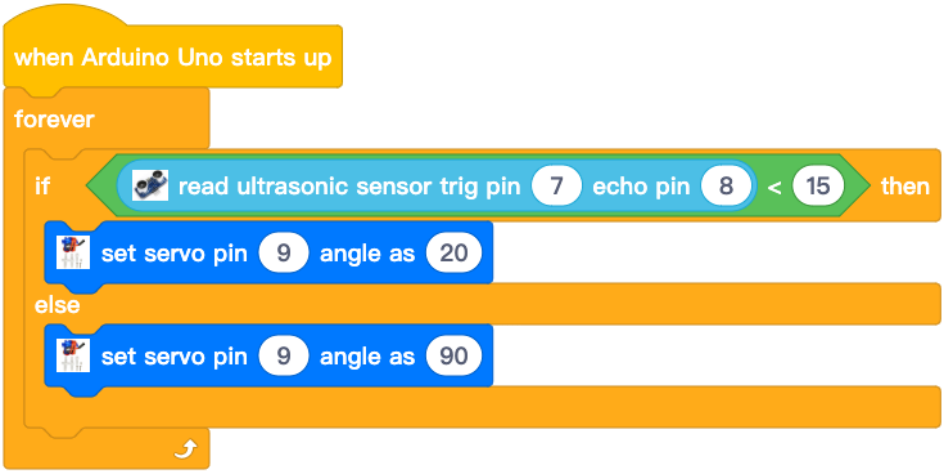


https://osoyoo.com/?p=44354

Step 5: Click **Action** category, add two pcs **set servo** pin blocks into **if else** block, change **angle as value** to 20 and 90 as following:



Now we have completed the block programming. The final blocks look like following:



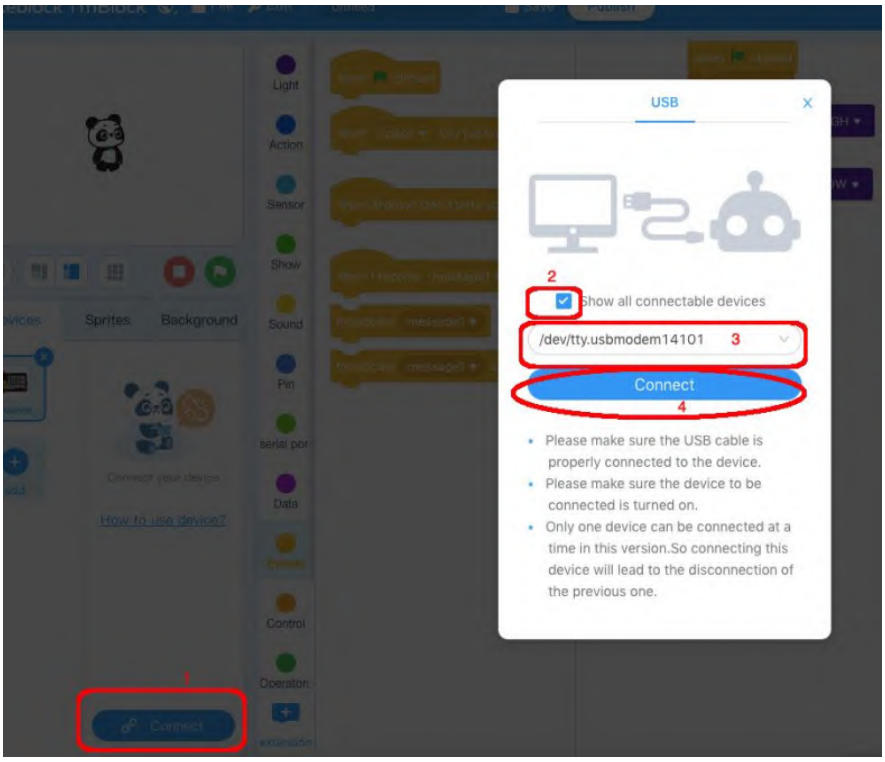
Upload the program to Arduino

1) you need click the Connect button in the bottom of the mBlock software, you will see a USB window pop up,
2) select **Show all connectable device** check box , then a device drop-

down menu will show up,

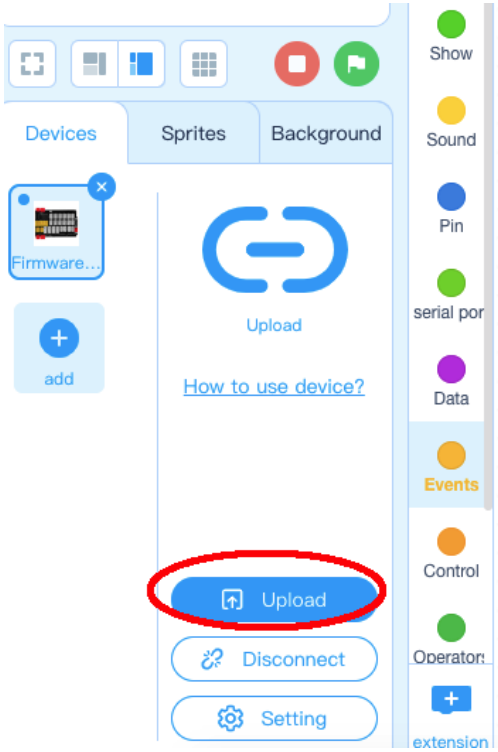
3) select your Arduino port from device drop-down menu

4) click **Connect** button to connect your PC to Arduino



5) After you PC is connected to Arduino UNO board, please click Upload button in the bottom of your software, then the code will be uploaded to Arduino UNO board:

https://osoyoo.com/?p=44354



HOW TO PLAY

When your car arrives the gate front and is detected by ultrasonic sensor, the gate will open. When the car passes the gate, the gate will close automatically.

https://osoyoo.com/picture/Block_kit/lesson1/1-5.mp4

https://osoyoo.com/?p=44354

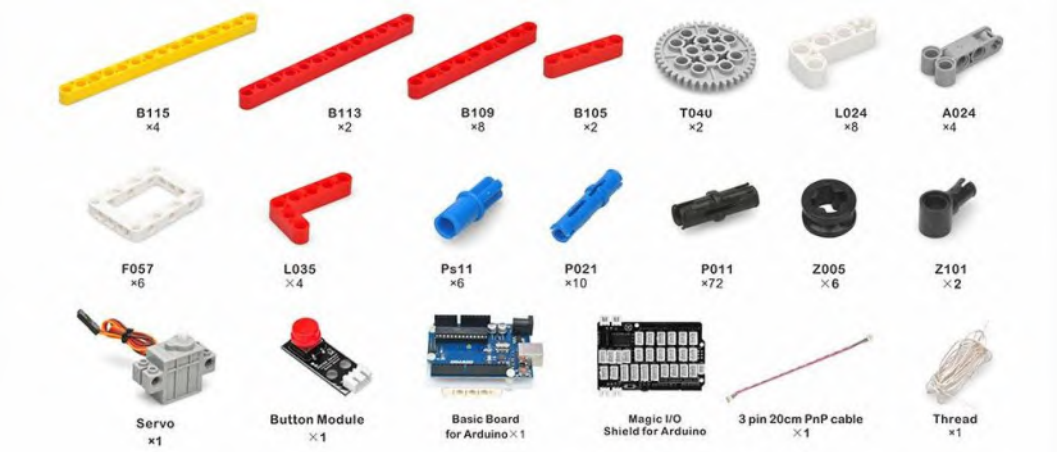
Lesson 2: Elevator

OBJECTIVE

The OSOYOO building bricks is mechanically compatible with leading building bricks. In this lesson, we will use OSOYOO Bricks to build an elevator and use OSOYOO electronic sensor module blocks to control it. When you press the push button, the elevator will be up; and when release, the elevator will be down.

PARTS & DEVICES

Please prepare the following parts to complete this project:

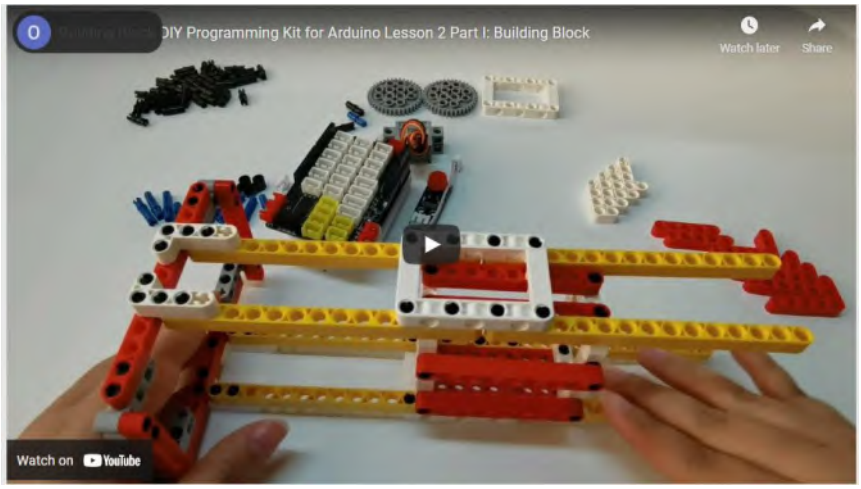


https://osoyoo.com/?p=44354

HOW TO BUILD

Before you build an elevator with blocks, please according to the Preparation before class 3: https://osoyoo.com/2021/12/01/preparation-before-class-3

Please visit this link to watch the video about Building Blocks:
https://youtu.be/J5FtYgJiEKs

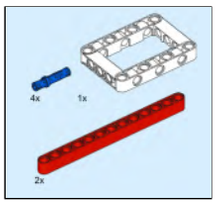


Please follow the instruction to build the blocks (Download link: https://osoyoo.com/picture/Block_kit/lesson2/lesson2.pdf)

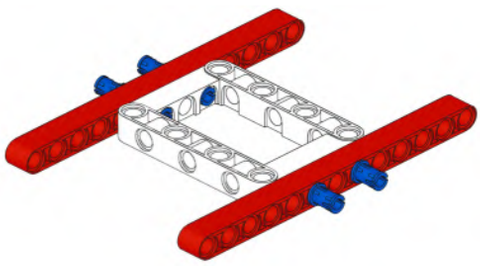
Note：the color of the building block is subject to the actual product, which does not affect the use.

https://osoyoo.com/?p=44354

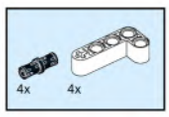
1

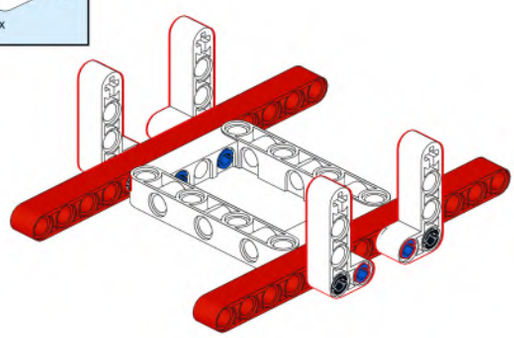


Here the frame block means frame block with control boards

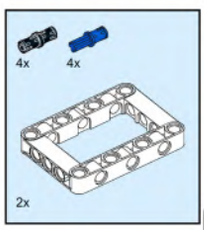


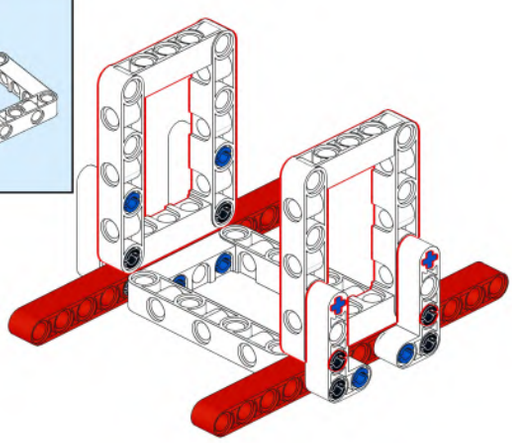
2



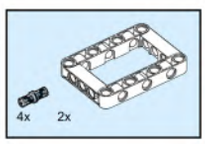


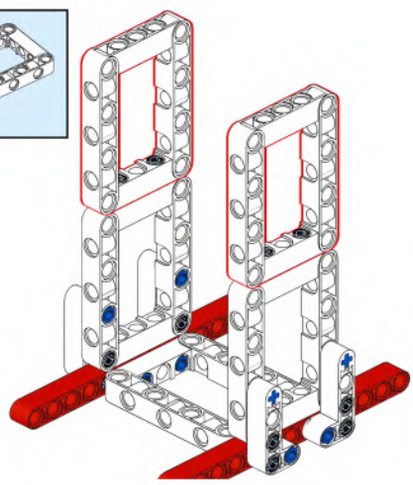
3



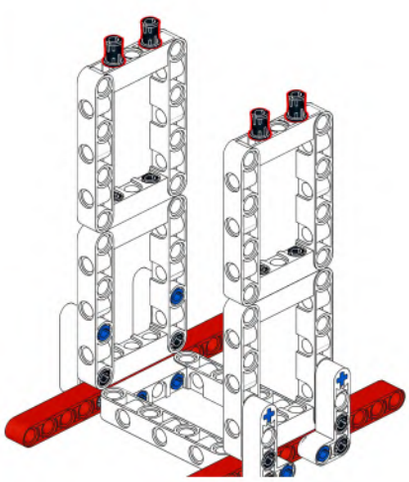


4

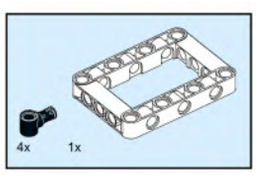


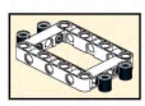


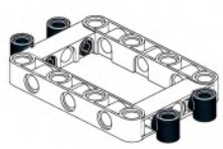
5



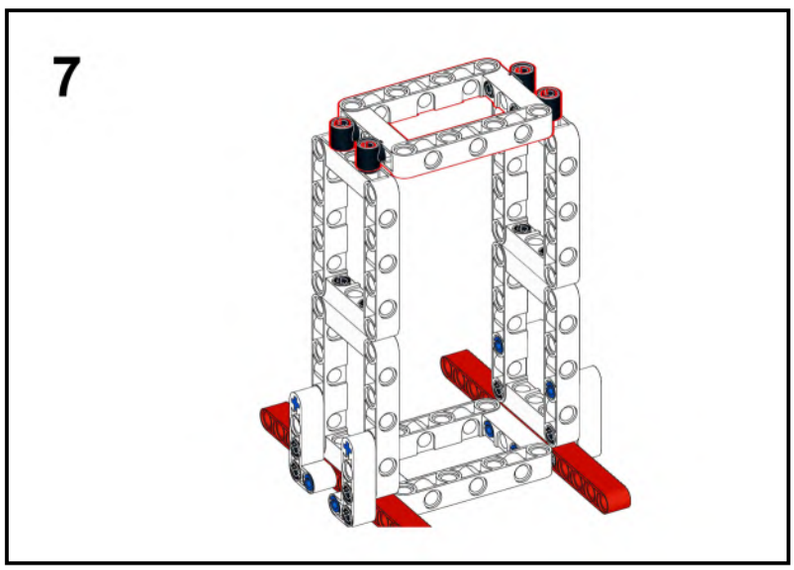
6

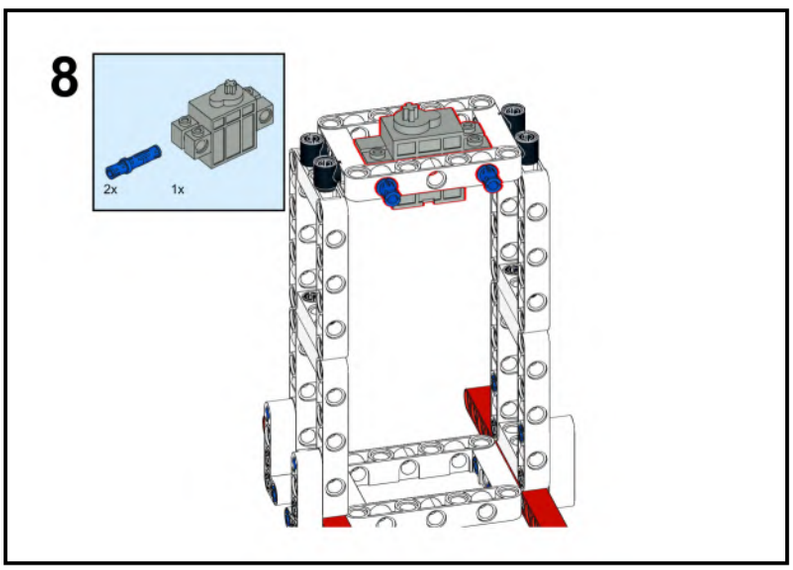


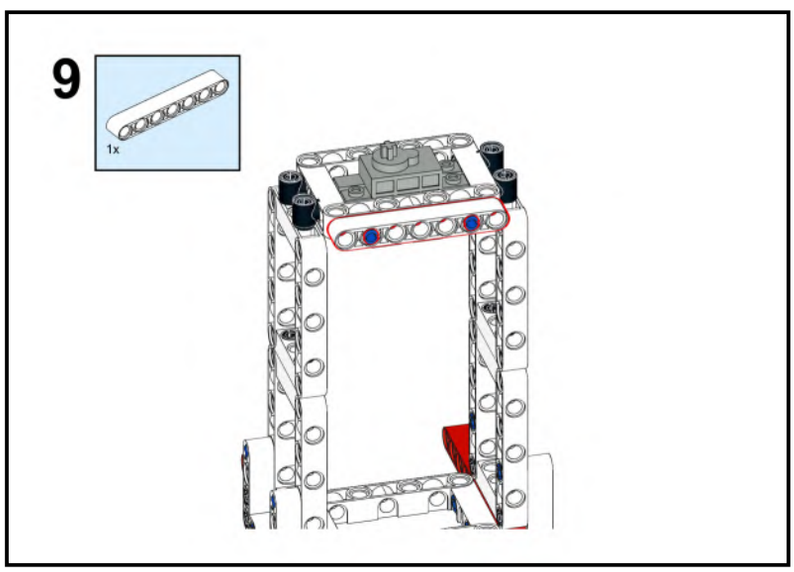


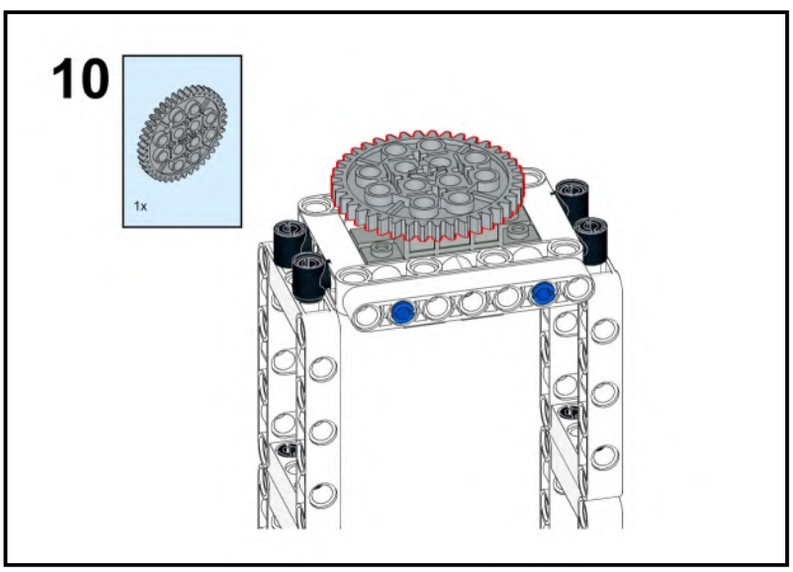


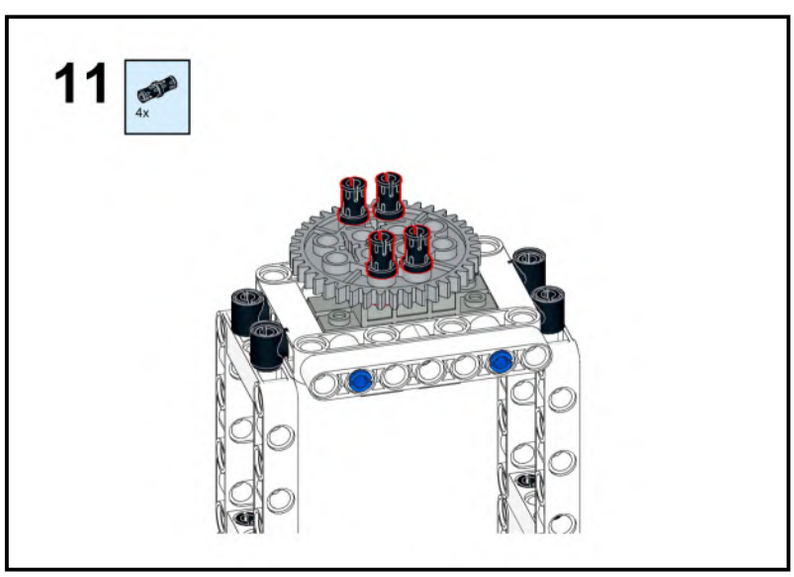
https://osoyoo.com/?p=44354

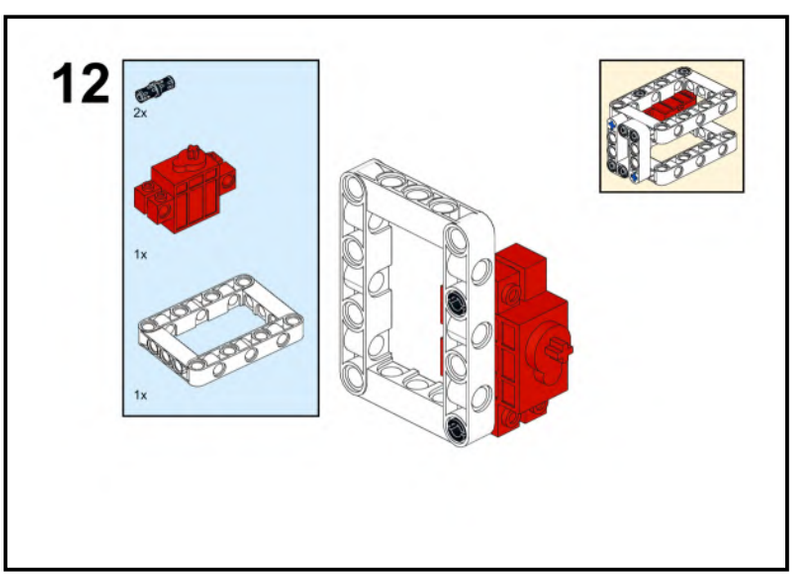






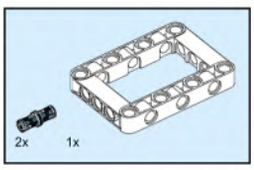


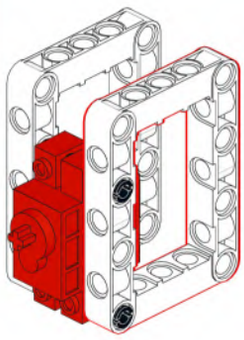




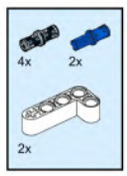
https://osoyoo.com/?p=44354

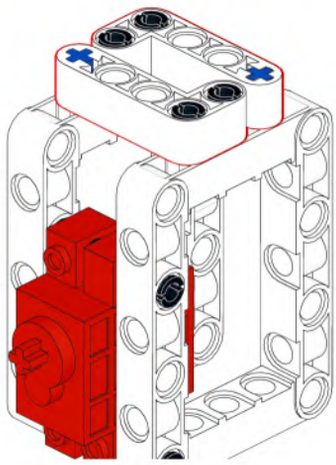
13



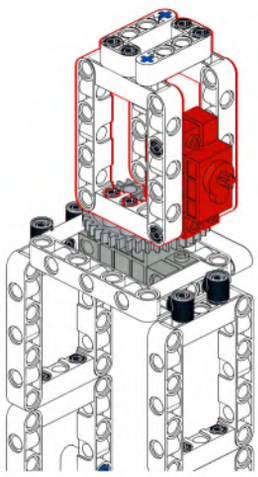


14

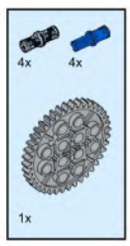


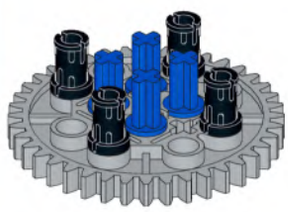


15

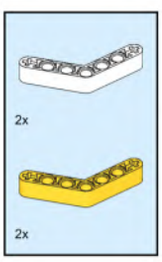


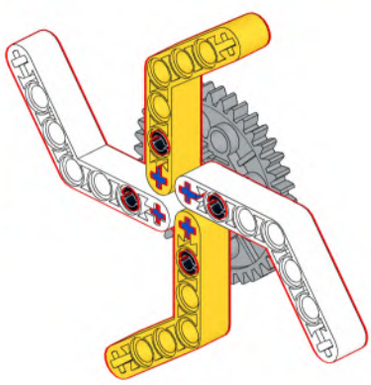
16



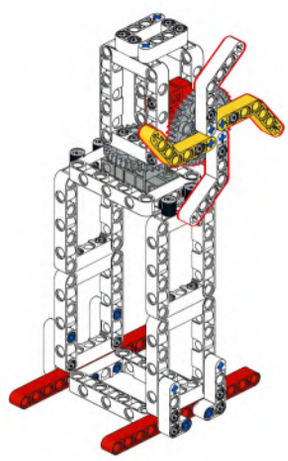


17

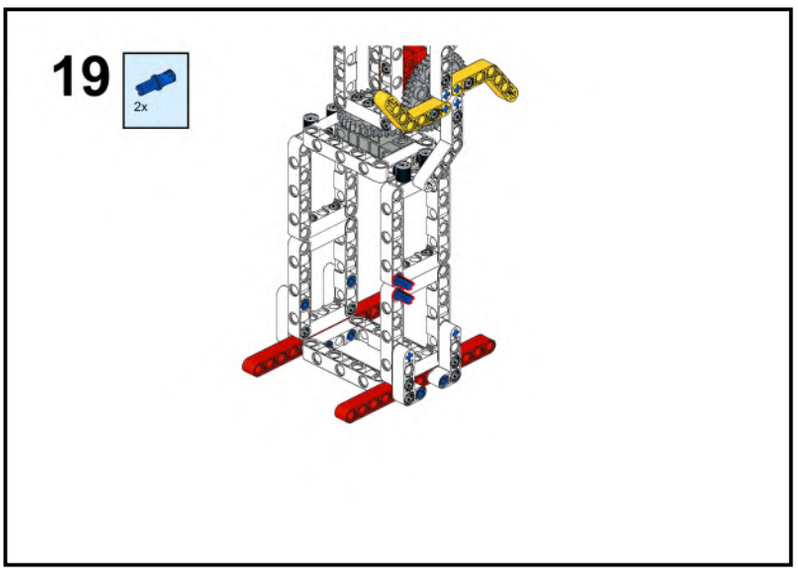


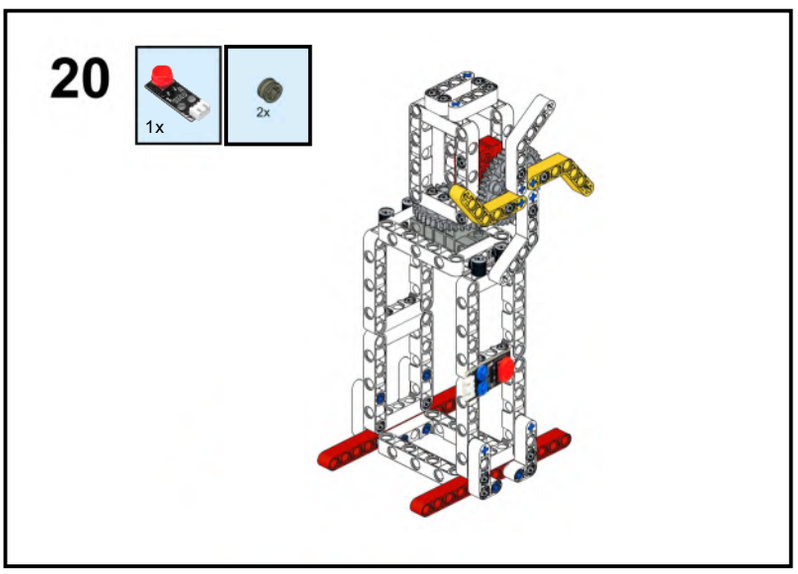


18



https://osoyoo.com/?p=44354

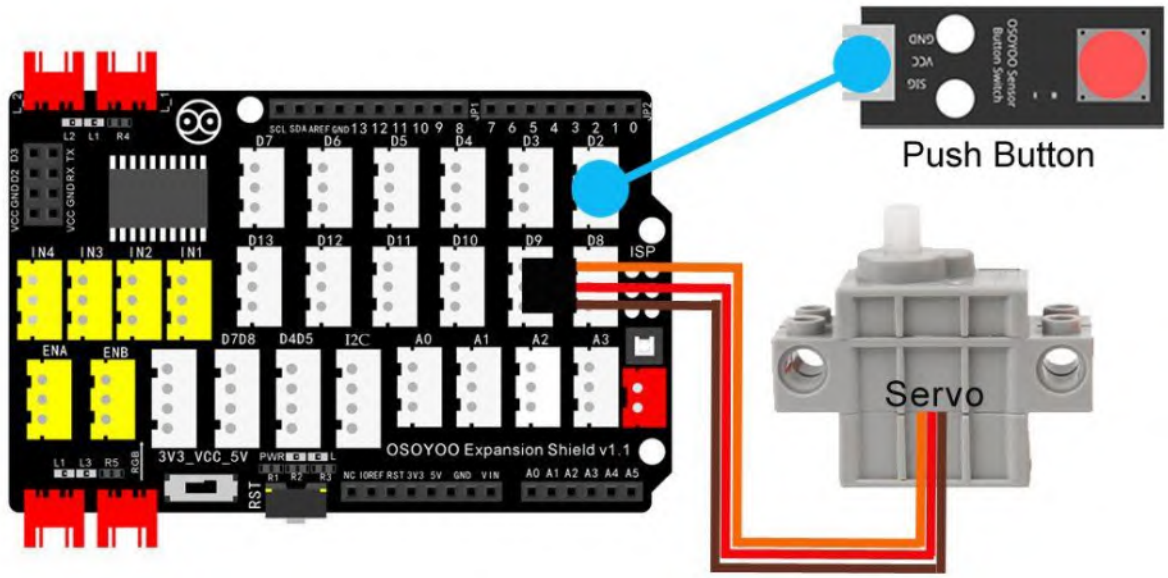




https://osoyoo.com/?p=44354

CIRCUIT CONNECTION

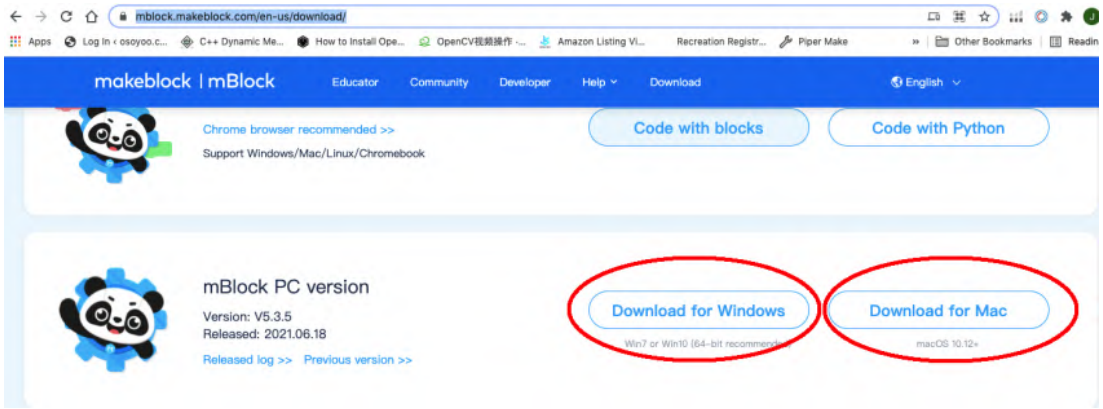
Connect push button to D2 port with 3pin PnP cable, Servo to D9 port as per following picture:



HOW TO CODE

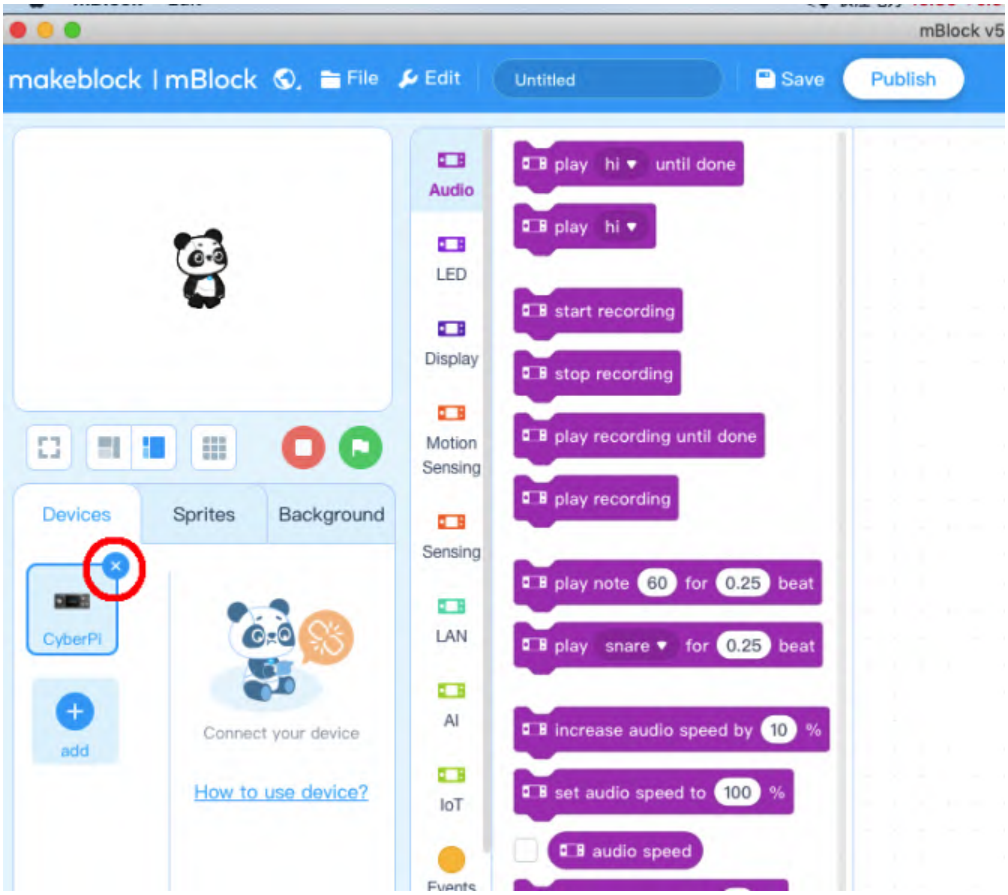
Note: In this kit, we use mblock as programming tool, if you want to learn more about mblock, please visit preparation before class 1: https://osoyoo.com/2021/12/01/preparation-before-class-1

Step 1) Download mBlock PC from https://mblock.makeblock.com/en-us/download/, select the download file as per your computer OS type:

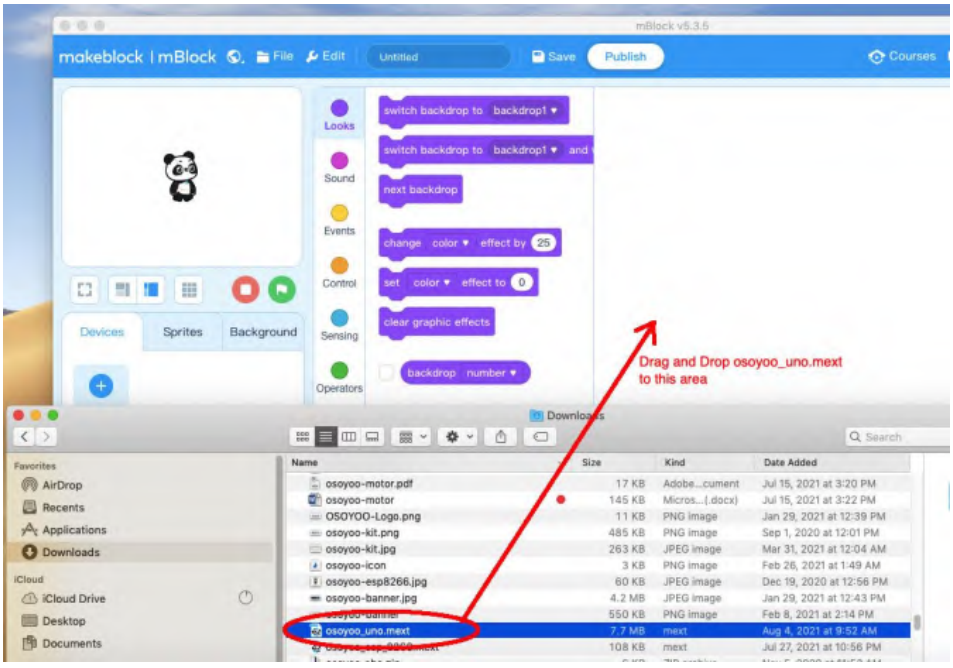


Step 3) Run the mBlock PC software by double click the lovely Panda icon. You will see mBlock UI as following picture. Please delete the default device **CyberPi** by click the cross in the red circle.

https://osoyoo.com/?p=44354

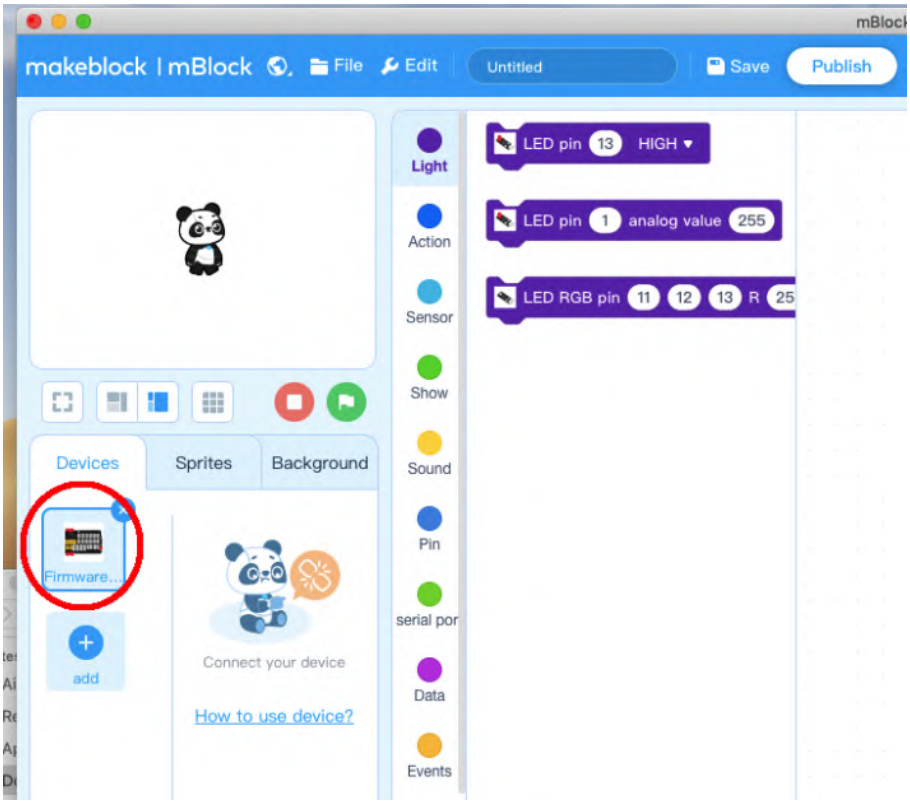


Step 4) Drag and Drop osoyoo_uno_mext file (downloaded in Step 2) to mBlock software as following:



https://osoyoo.com/?p=44354

Now you will see a new device firmware in mBlock, see following picture:



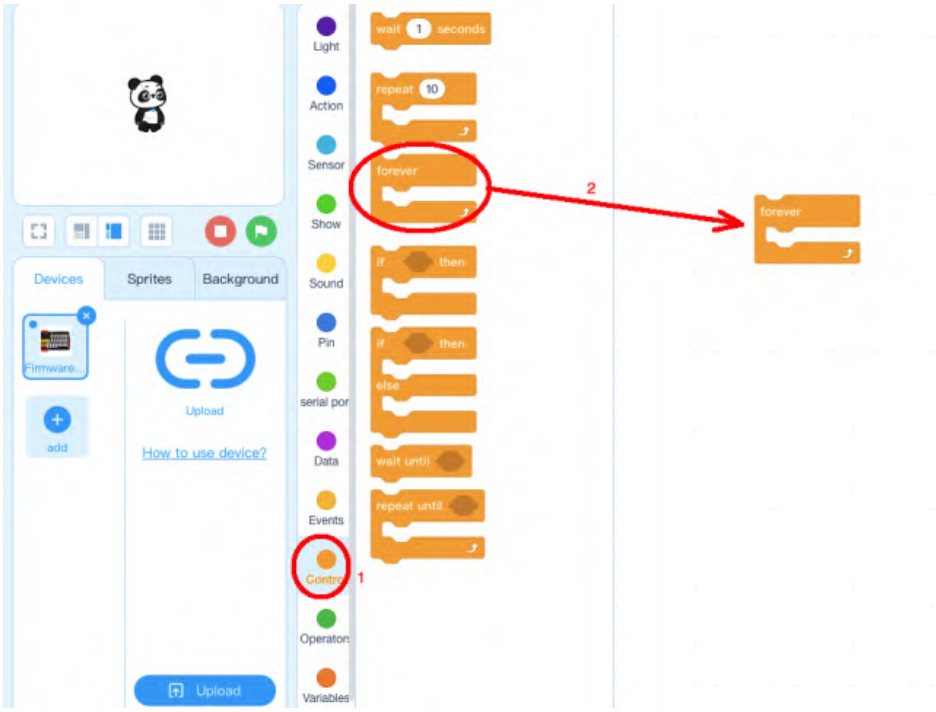
Now mBlock software and OSOYOO_UNO device firmware have been successfully installed in our PC!

Now we will show you how to use blocks to make our Oscillating Pedestal Fan into reality.

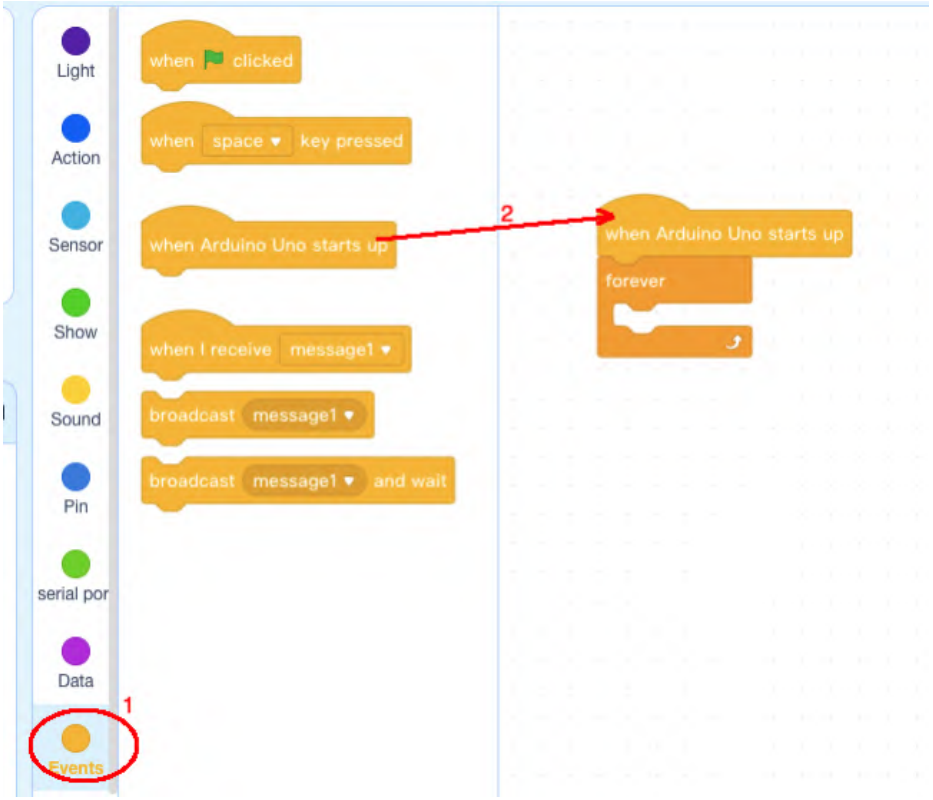
Step 1: Click **Control**, then Drag and drop **Forever** block to programming

https://osoyoo.com/?p=44354

area as following:

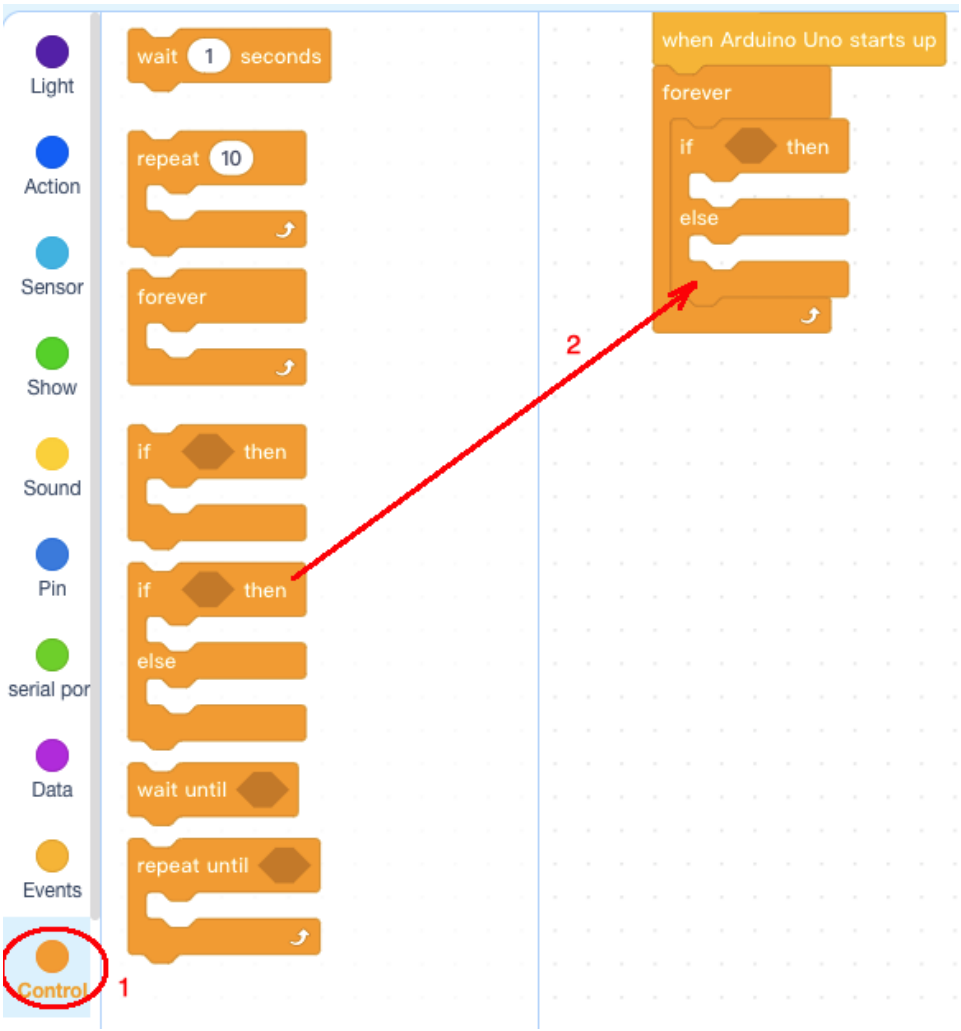


Step 2: Click **Events**, add **when Arduino Uno starts up** block to the top:

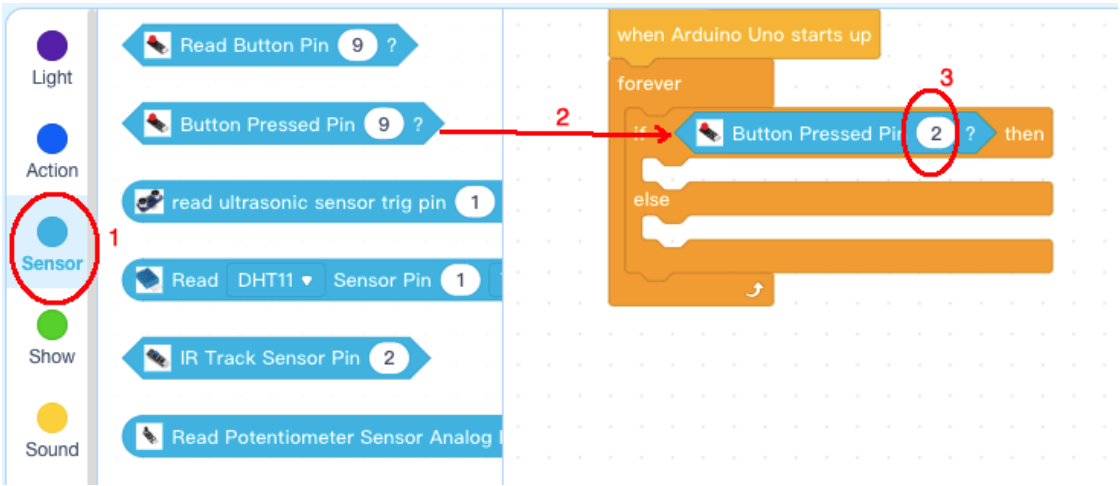


Step 3: Click **Control**, drag if else block to **forever** loop,

https://osoyoo.com/?p=44354

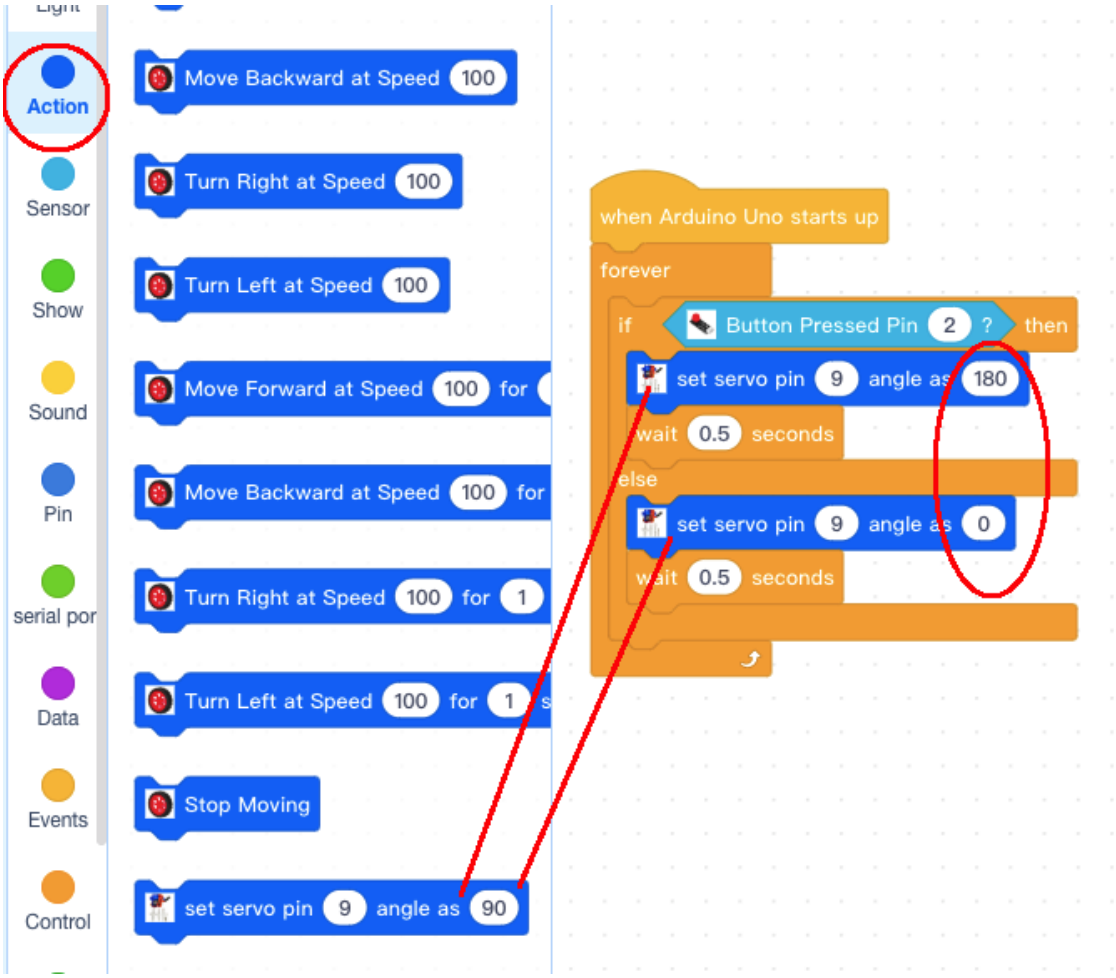


Step 4: Click **Sensor**, Add **Button Pressed** block to **if** condition area, change Pin number to 2:



Step 5) Click Action, then drag set Servo Pin block to if else block as following:

https://osoyoo.com/?p=44354



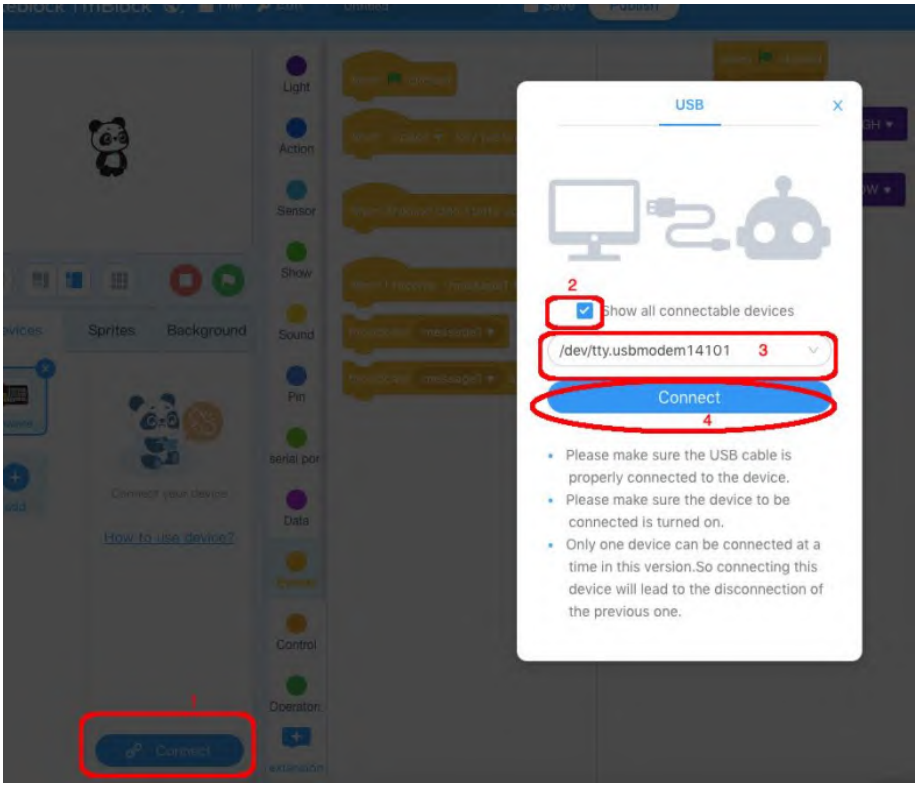
Now all the programming blocks have been completed! From above picture, the logic is pretty straight forward:

When Arduino is started, computer will enter a dead loop which will check the button status, when button is not pressed, the servo will stop at original position (in my servo 0 degree) and elevator is in the ground, when button is pressed, the servo arm will rotate from 0 degree position to 180 degree position and the elevator is lifted to the air.

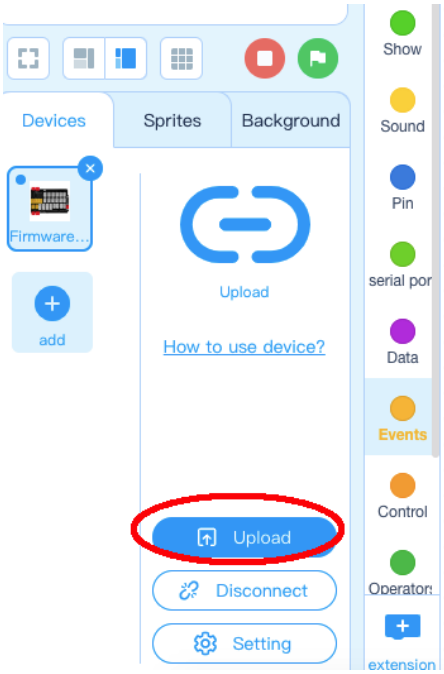
Step 6) Upload the program to Arduino

1) Please connect your Arduino board to your PC with USB cable firstly. Then click the Connect button in the bottom of the mBlock software, you will see a USB window pop up,
2) select Show all connectable device check box , then a device drop-down menu will show up,
3) select your Arduino port from device drop-down menu
4) click Connect button to connect your PC to Arduino

https://osoyoo.com/?p=44354



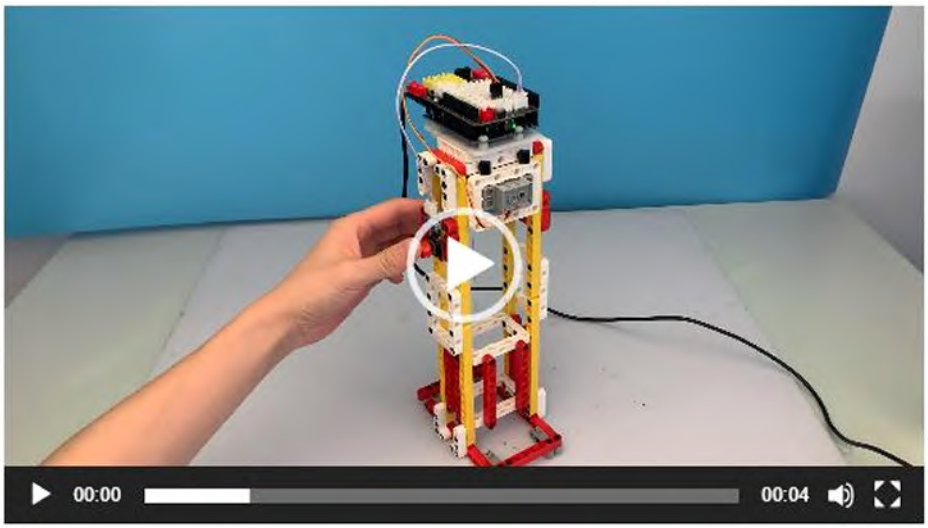
5) After you PC is connected to Arduino UNO board, please click Upload button in the bottom of your software, then the code will be uploaded to UNO board:



https://osoyoo.com/?p=44354

HOW TO PLAY

Now power UNO board via USB cable, the Arduino will start to work and elevator is in the ground. Press the button on D2, your elevator will be lifted, when you release the the button, the elevator will go back to the ground.



https://osoyoo.com/picture/Block_kit/lesson2/4.mp4

https://osoyoo.com/?p=44354

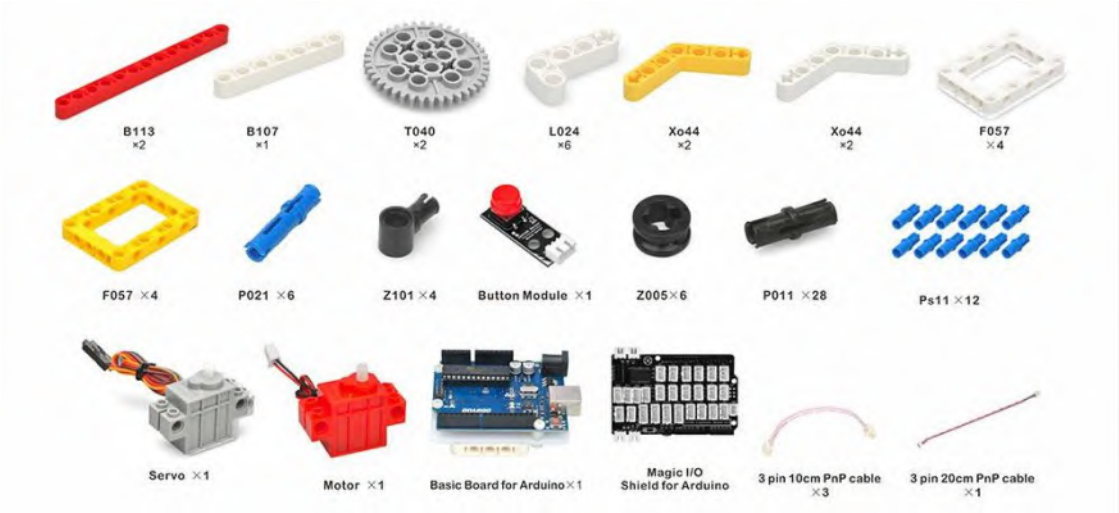
Lesson 3: Oscillating Pedestal Fan

OBJECTIVE

The OSOYOO building bricks is mechanically compatible with leading building bricks. In this lesson, we will use OSOYOO Bricks to build an Oscillating Pedestal Fan.

PARTS & DEVICES

Please prepare the following parts to complete this project.

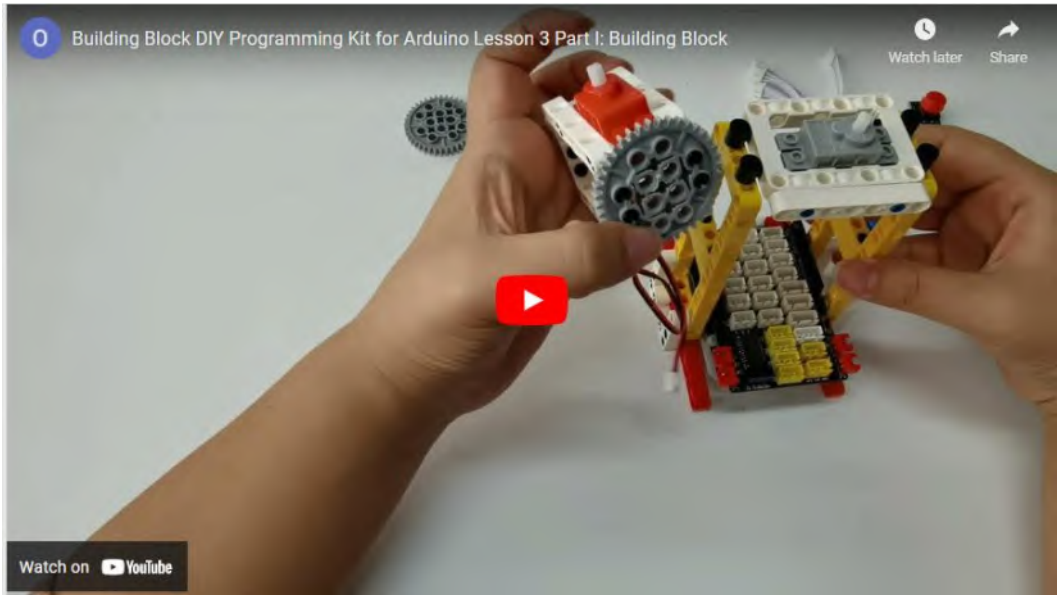


https://osoyoo.com/?p=44354

HOW TO BUILD

Before you build an elevator with blocks, please according to the Preparation before class 3: https://osoyoo.com/2021/12/01/preparation-before-class-3

Please visit this link to watch video about Building Blocks: https://youtu.be/kxr5pzBB_G8

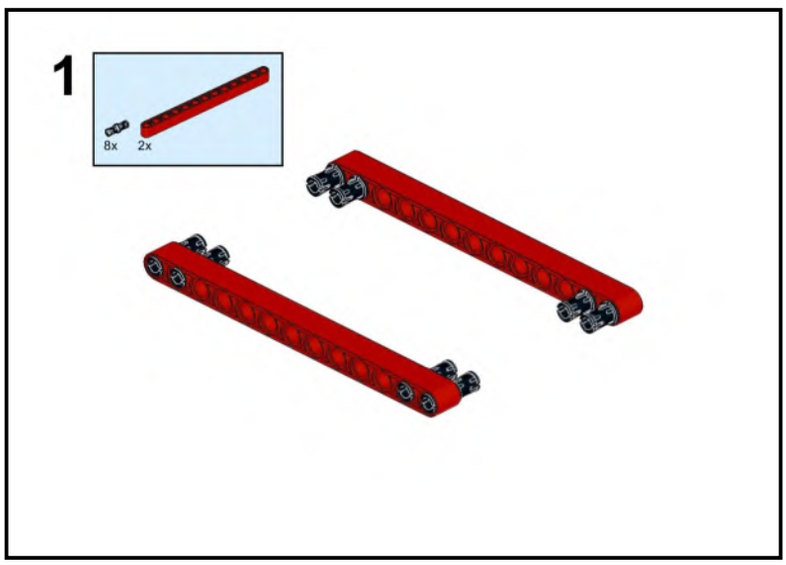


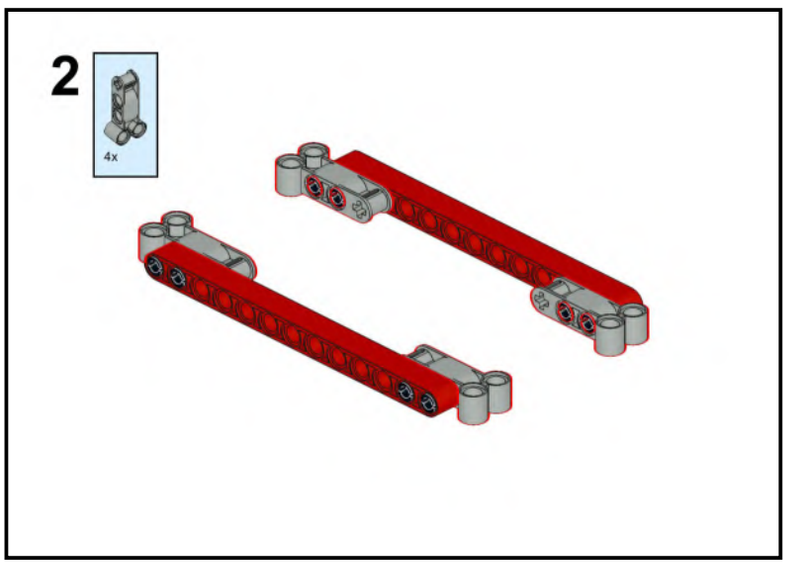
Please follow the instruction to build the blocks (Download link:

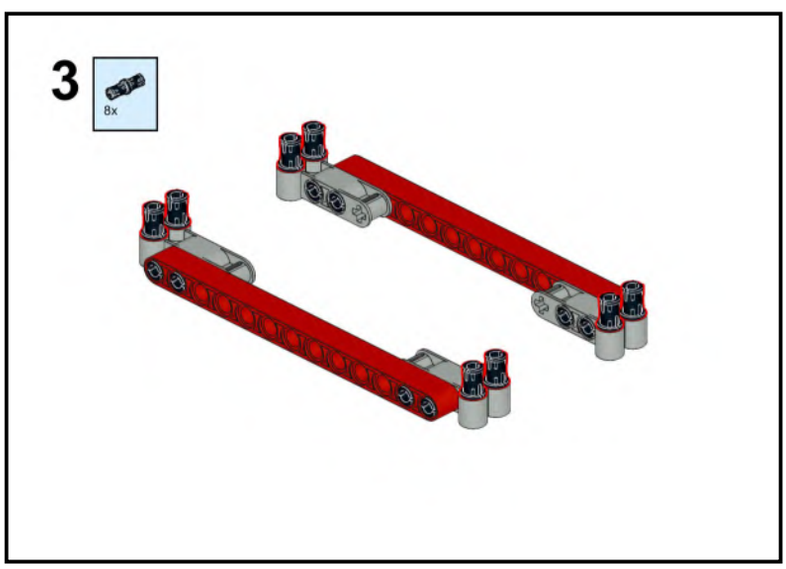
https://osoyoo.com/picture/Block_kit/lesson3/lesson3.pdf)

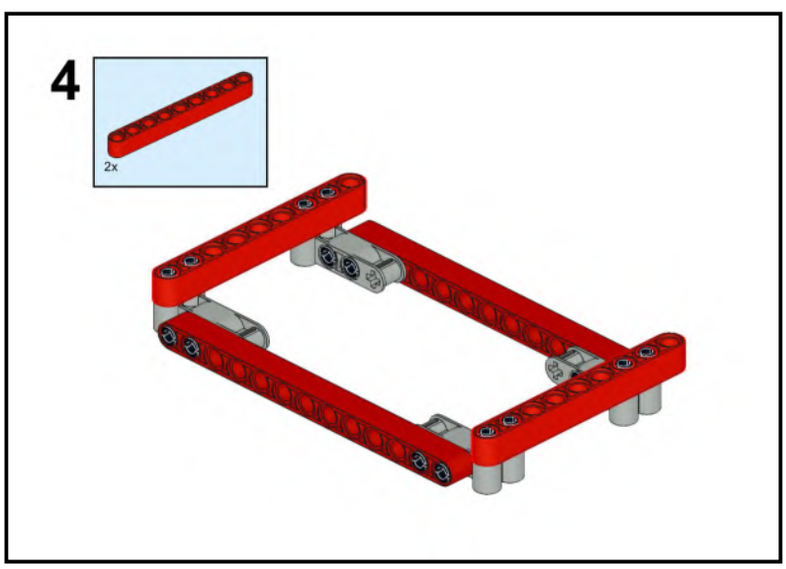
Note： the color of the building block is subject to the actual product, which does not affect the use.

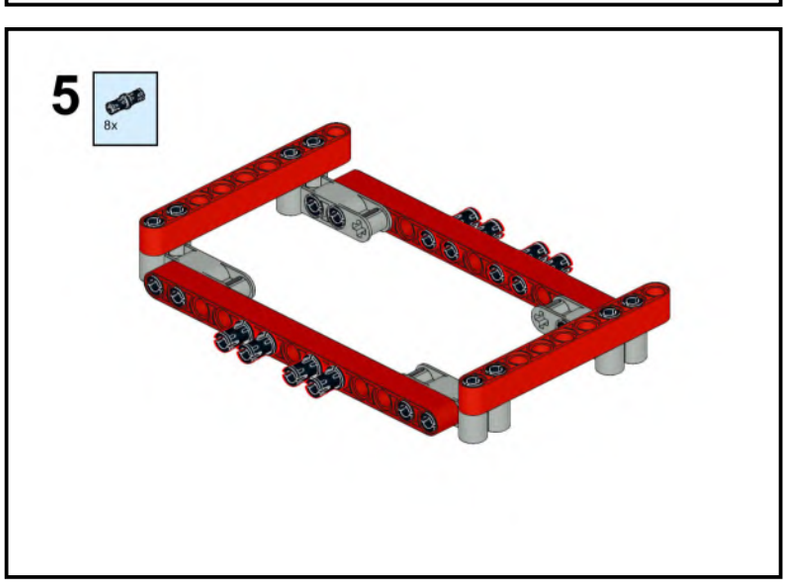
https://osoyoo.com/?p=44354

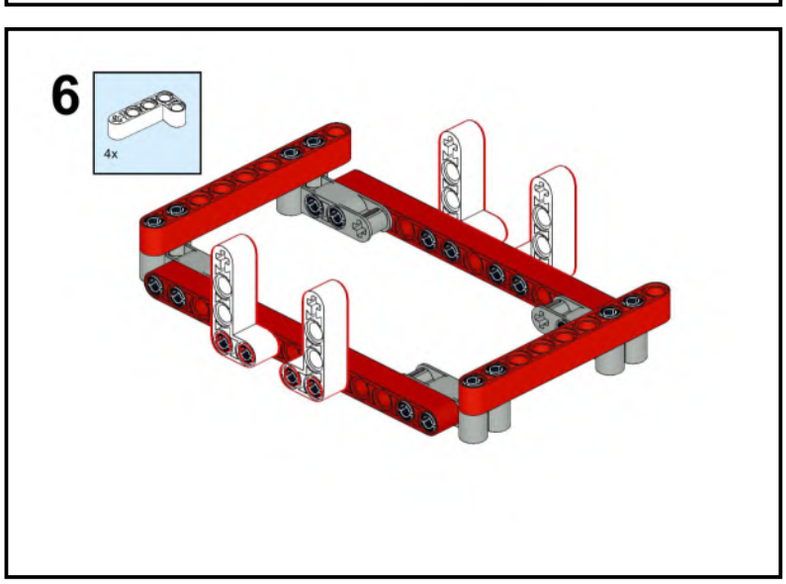




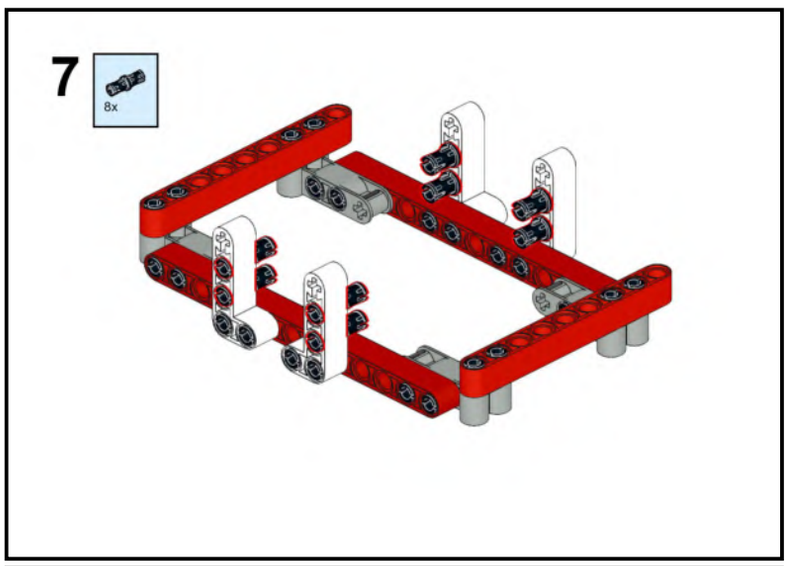


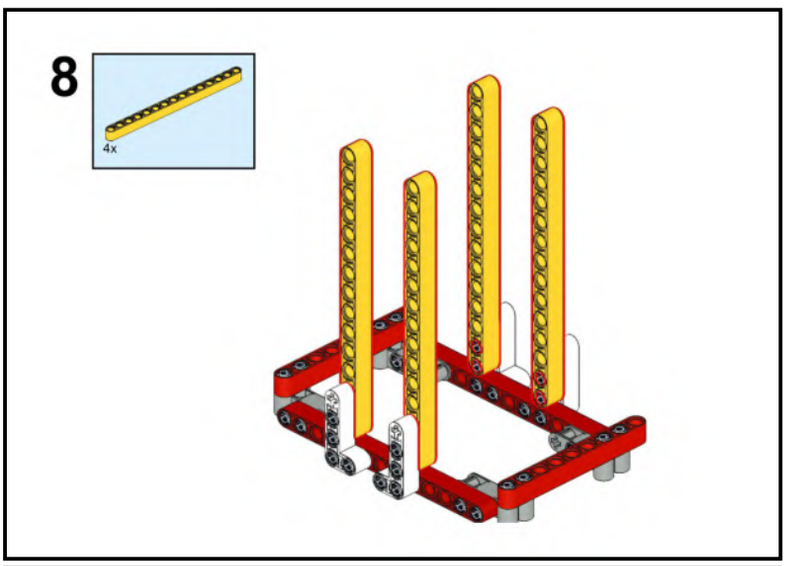


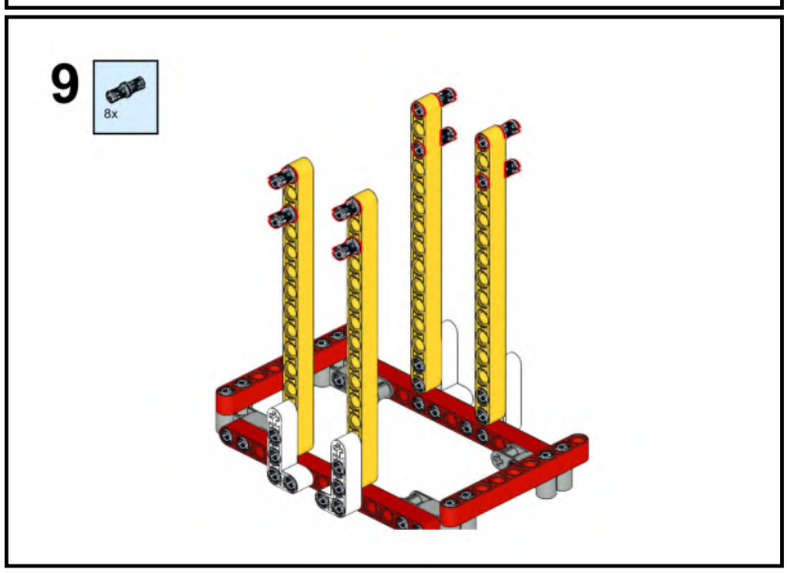


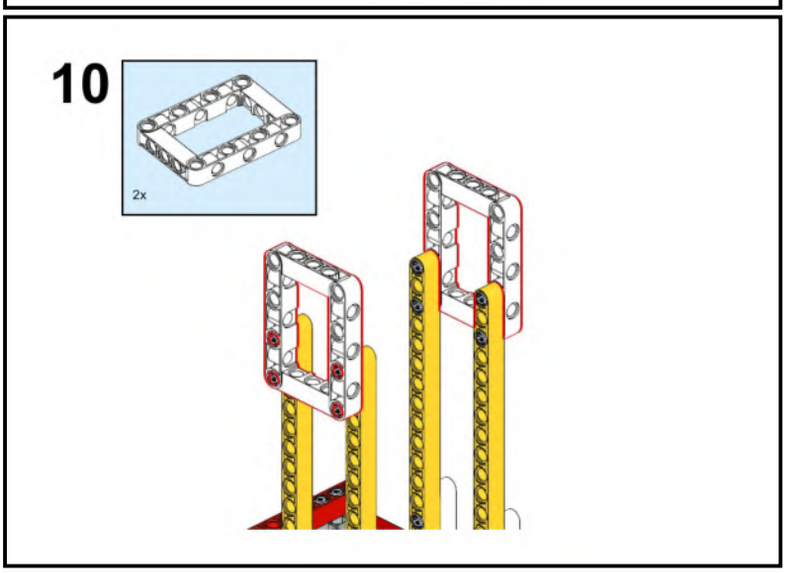


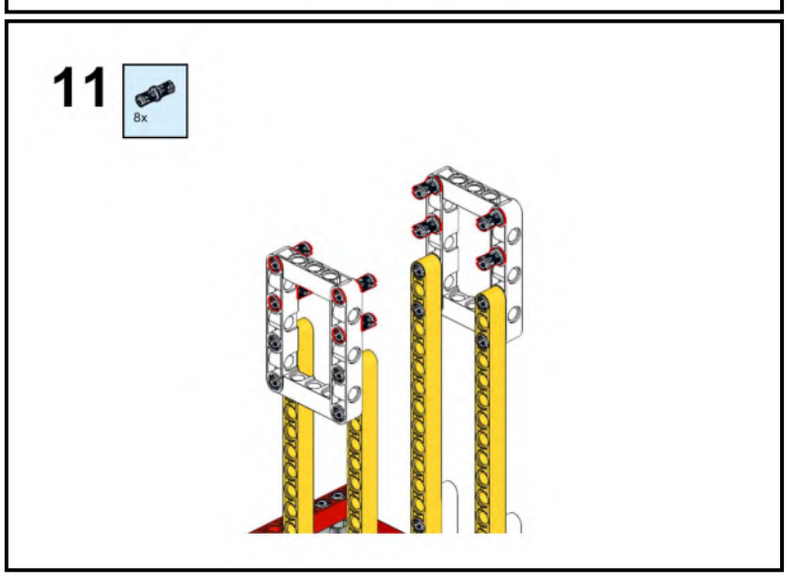
https://osoyoo.com/?p=44354

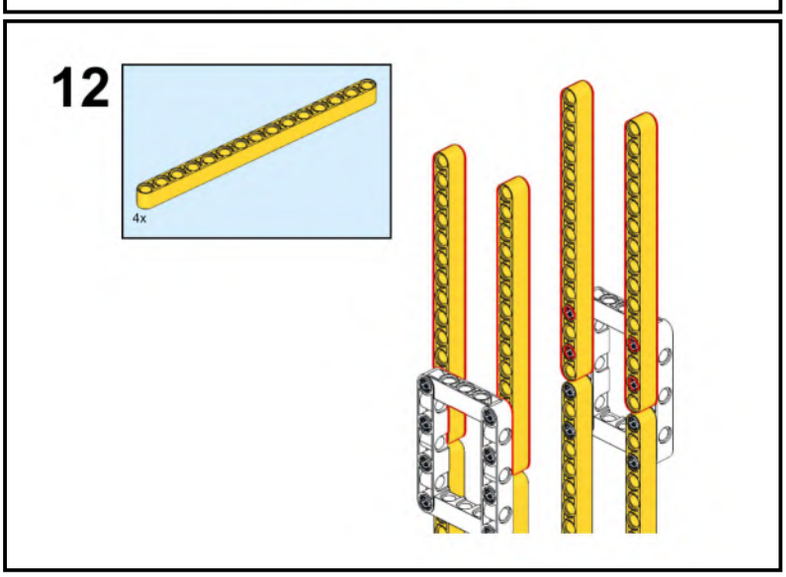




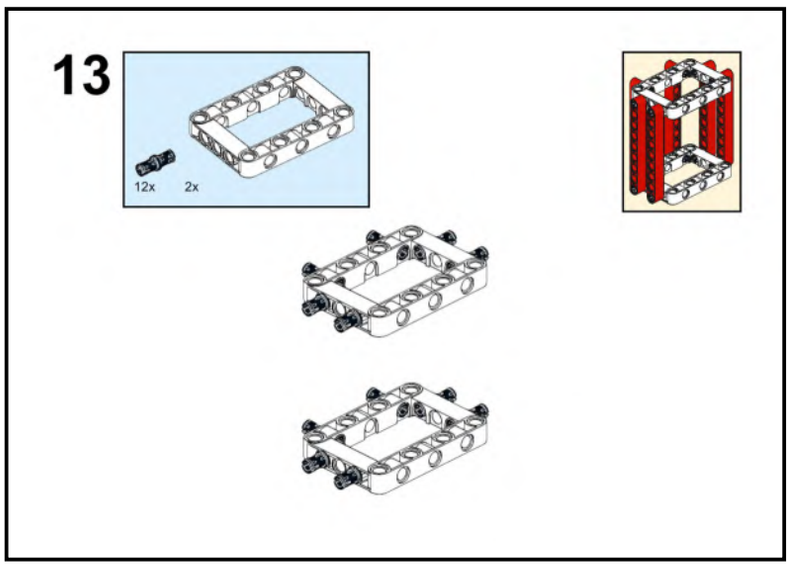


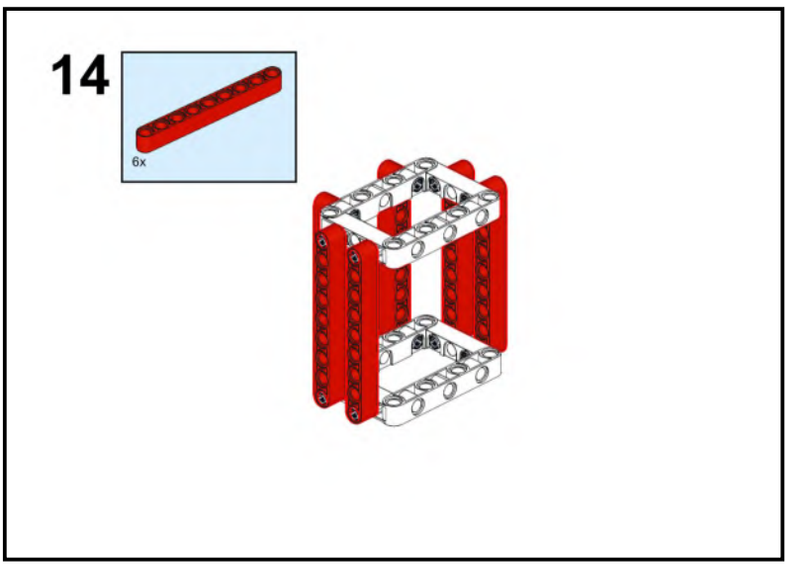


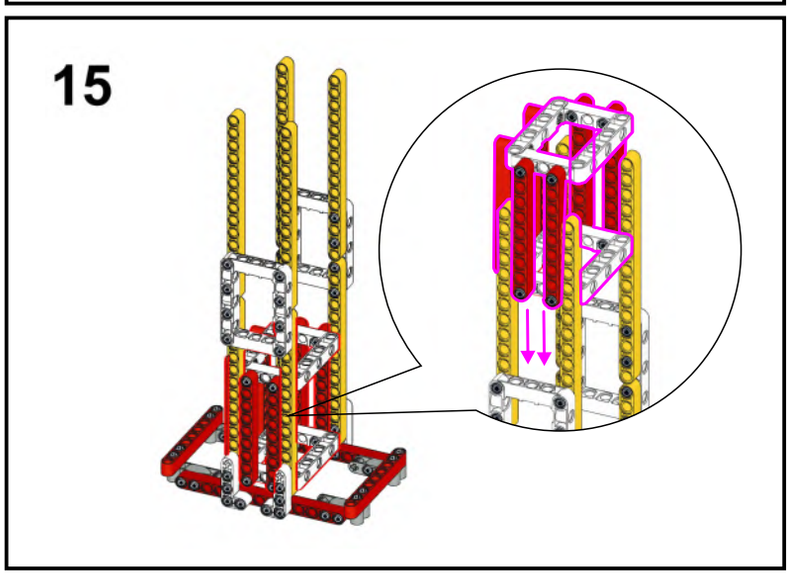


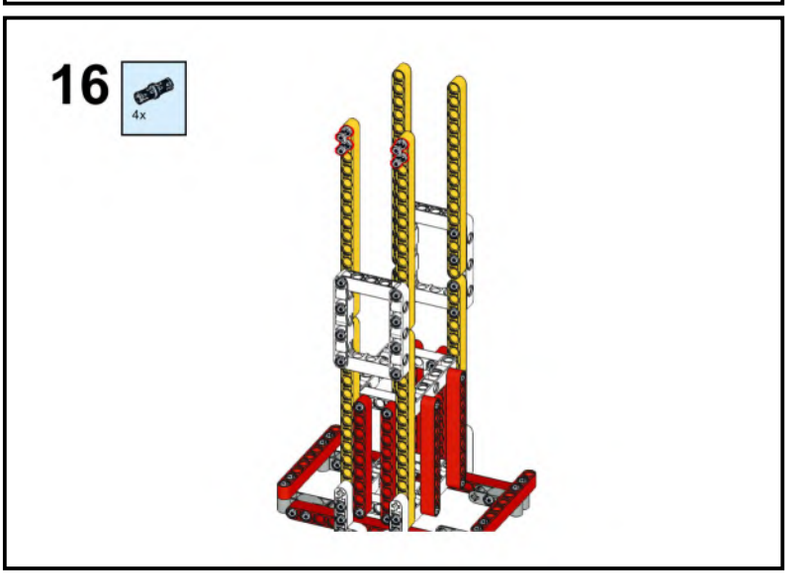


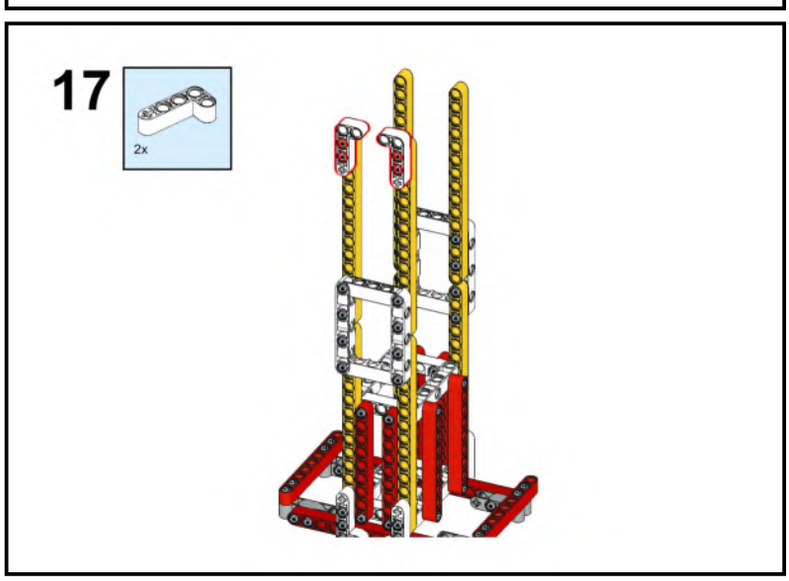
https://osoyoo.com/?p=44354

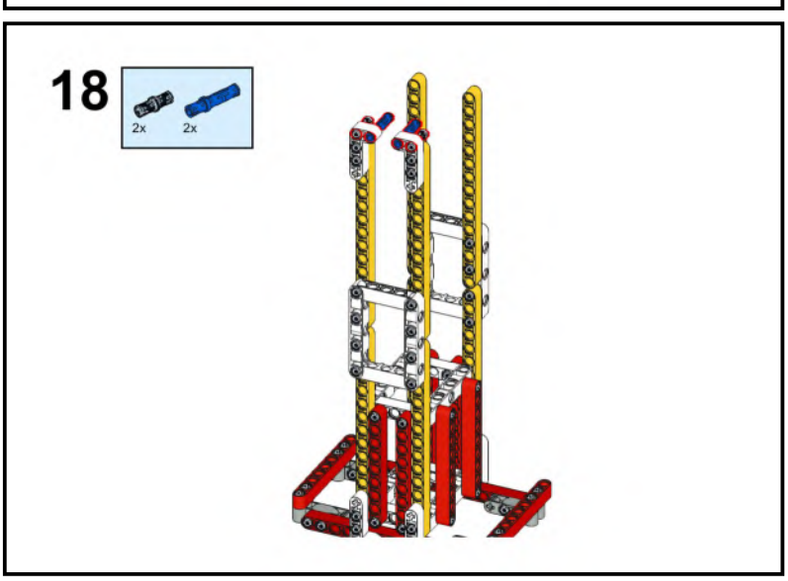




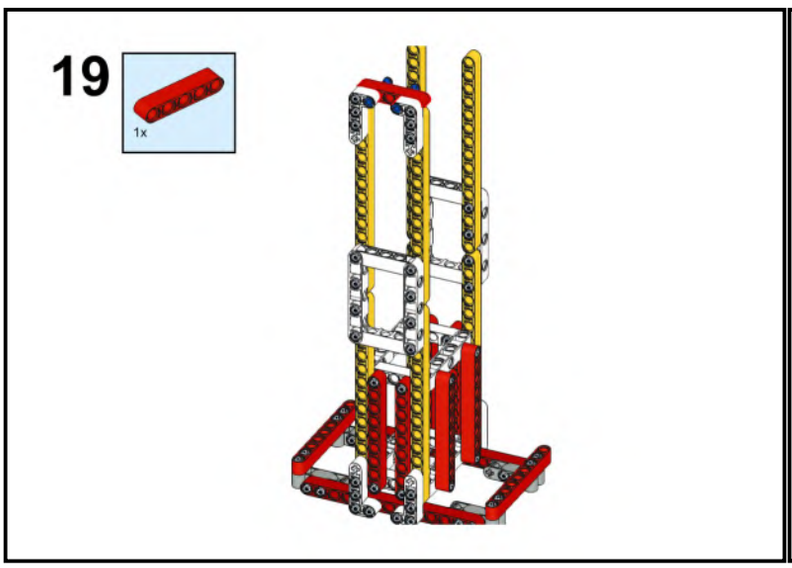


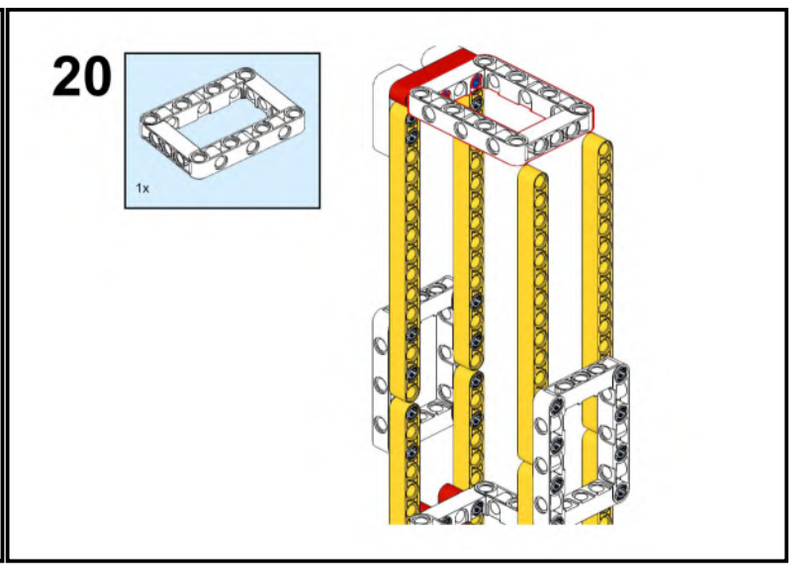


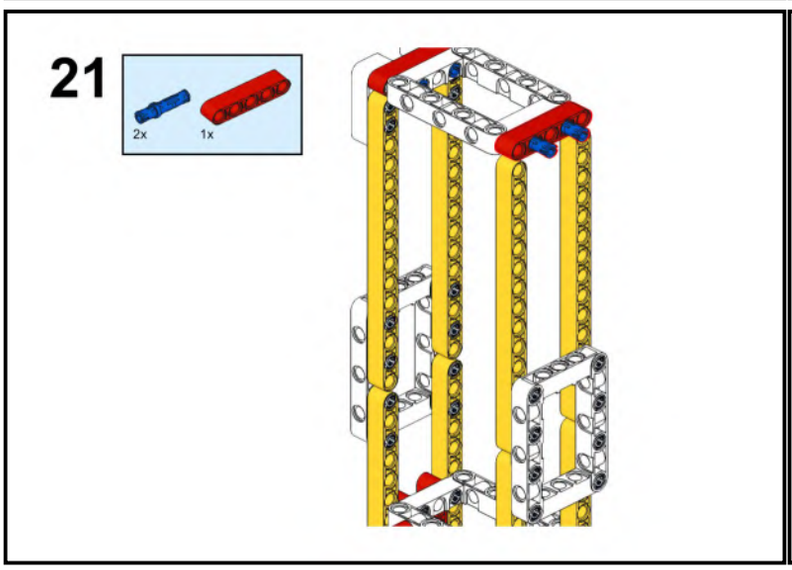


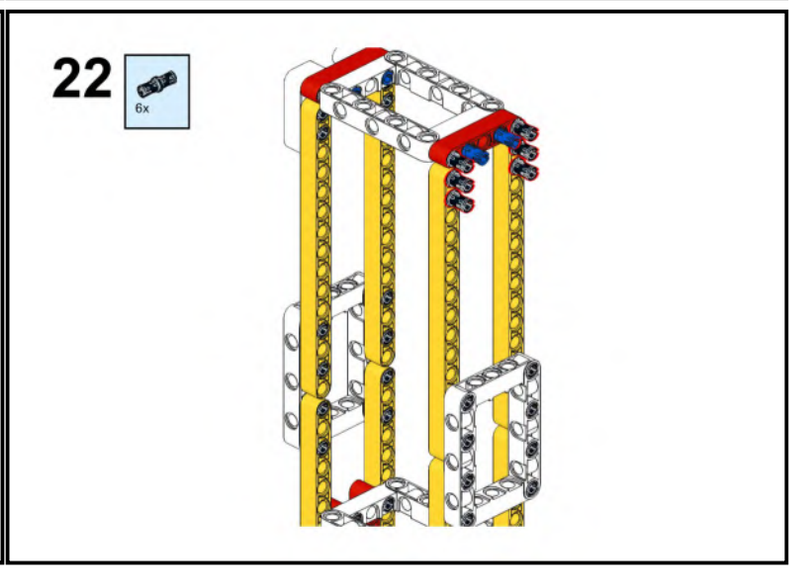


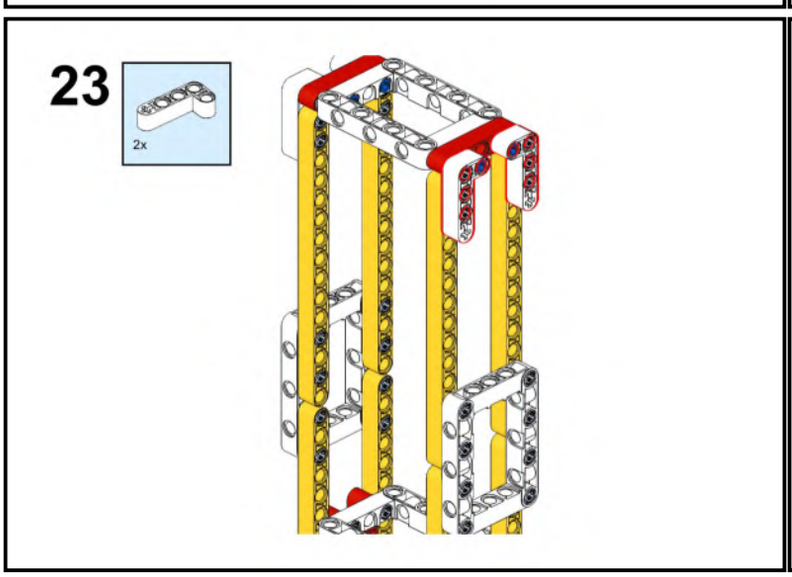
https://osoyoo.com/?p=44354

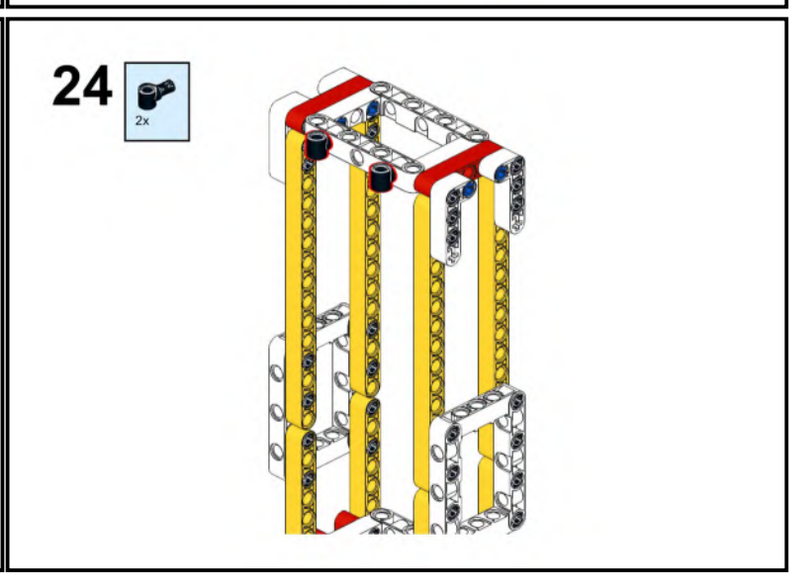






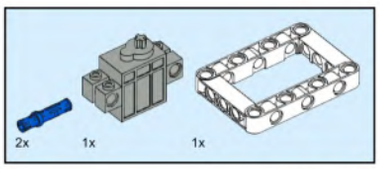


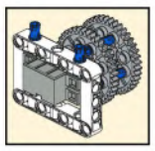


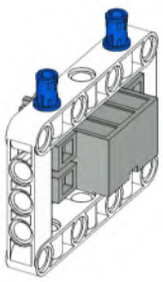


https://osoyoo.com/?p=44354

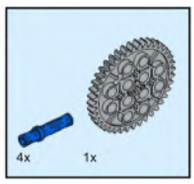
25

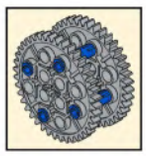


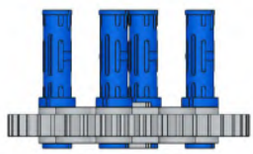




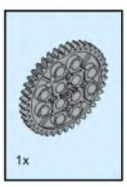
26

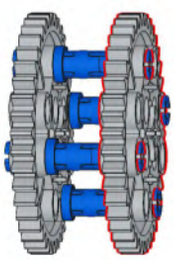




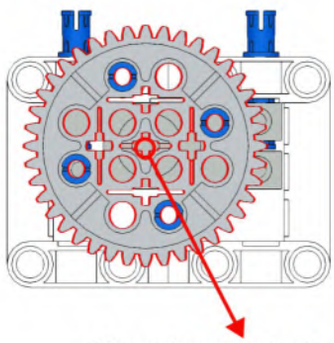


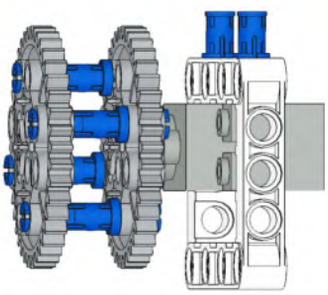
27



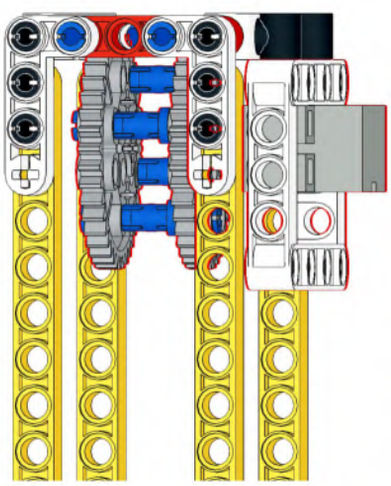


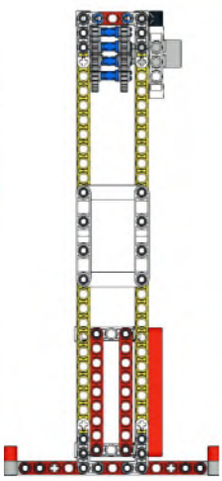
28



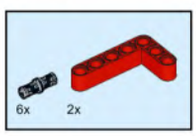


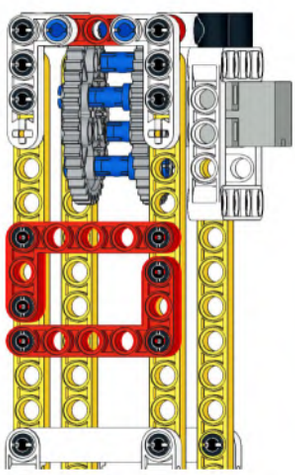
29





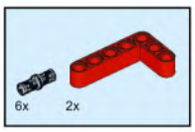
30

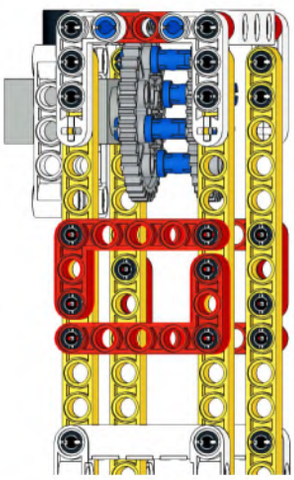




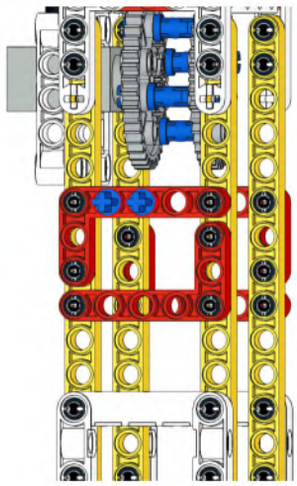
https://osoyoo.com/?p=44354

31

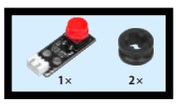


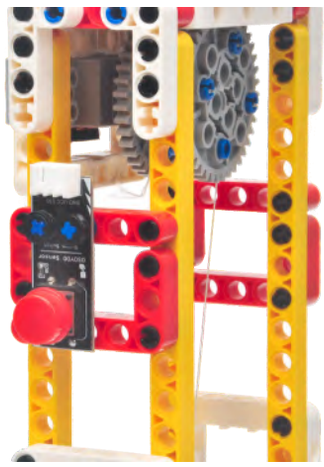


32

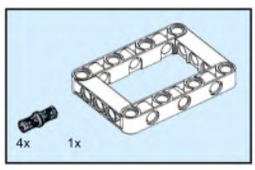


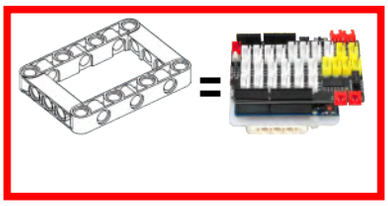
33

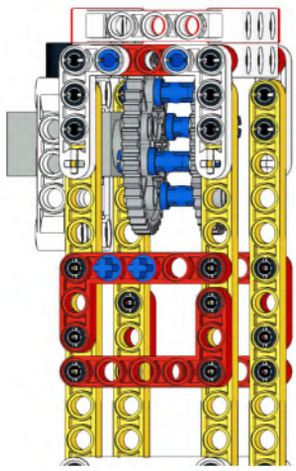




34







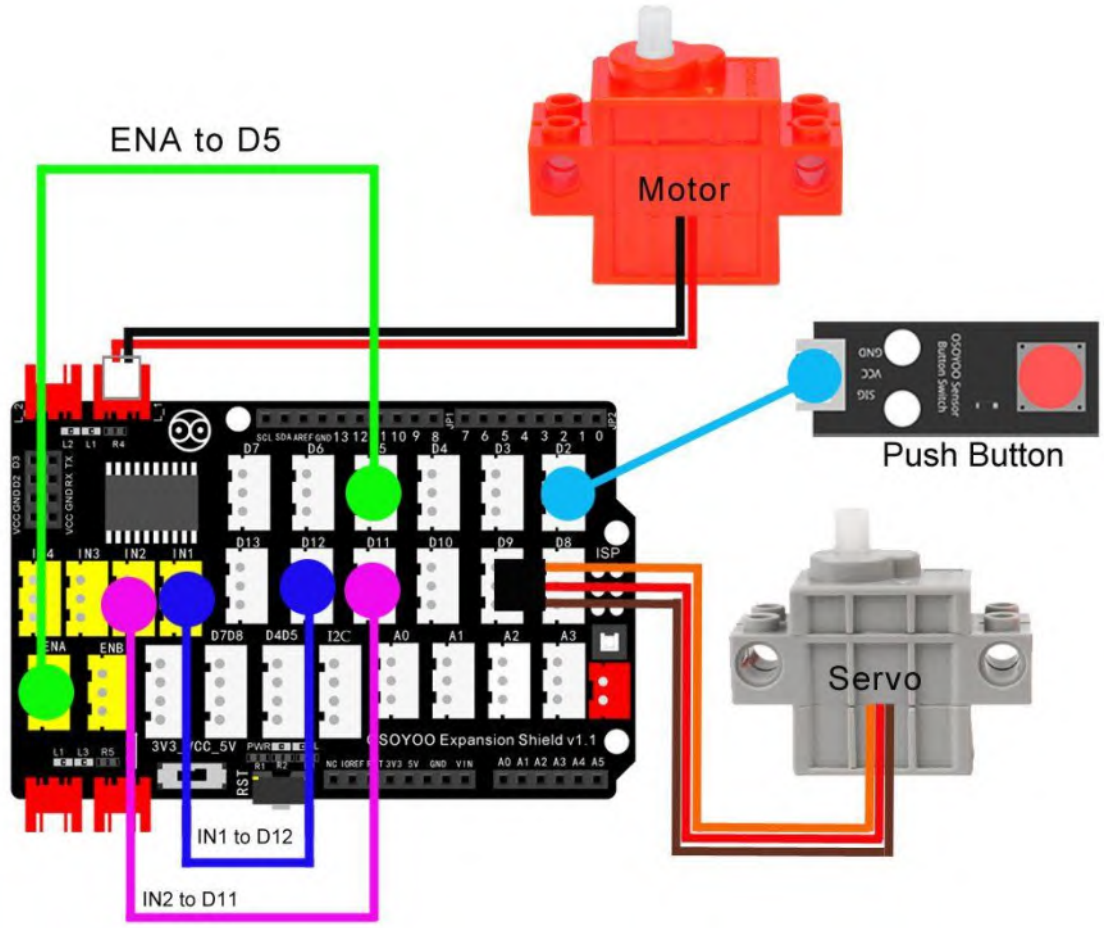
35

https://osoyoo.com/?p=44354

CIRCUIT CONNECTION

Connect wires as per following picture:

1. Motor(red) to L1 or L2
2. Push Button to D2 port
3. Servo(grey) to D9 port
4. IN1 to D12
5. IN2 to D11
6. ENA to D5

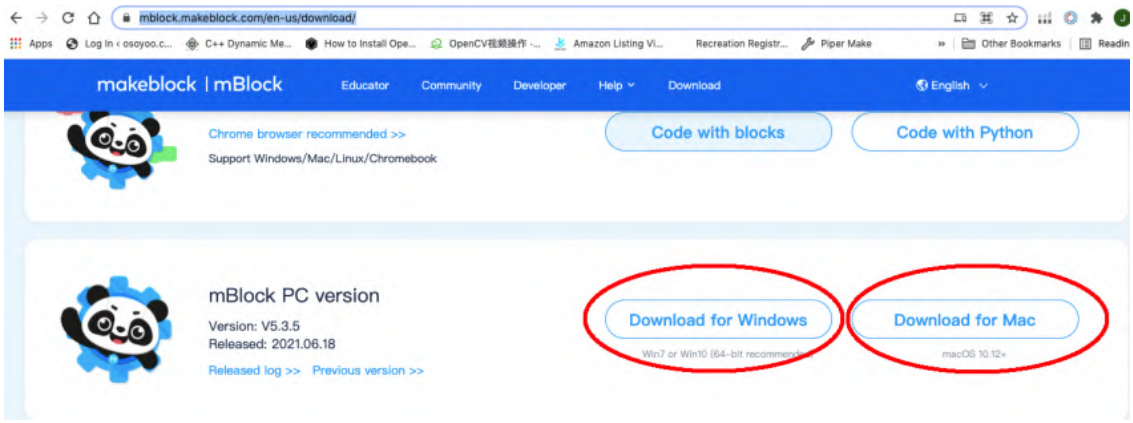


HOW TO CODE

Note: In this kit, we use mblock as programming tool, if you want to learn more about mblock, please visit preparation before class 1: https://osoyoo.com/2021/12/01/preparation-before-class-1

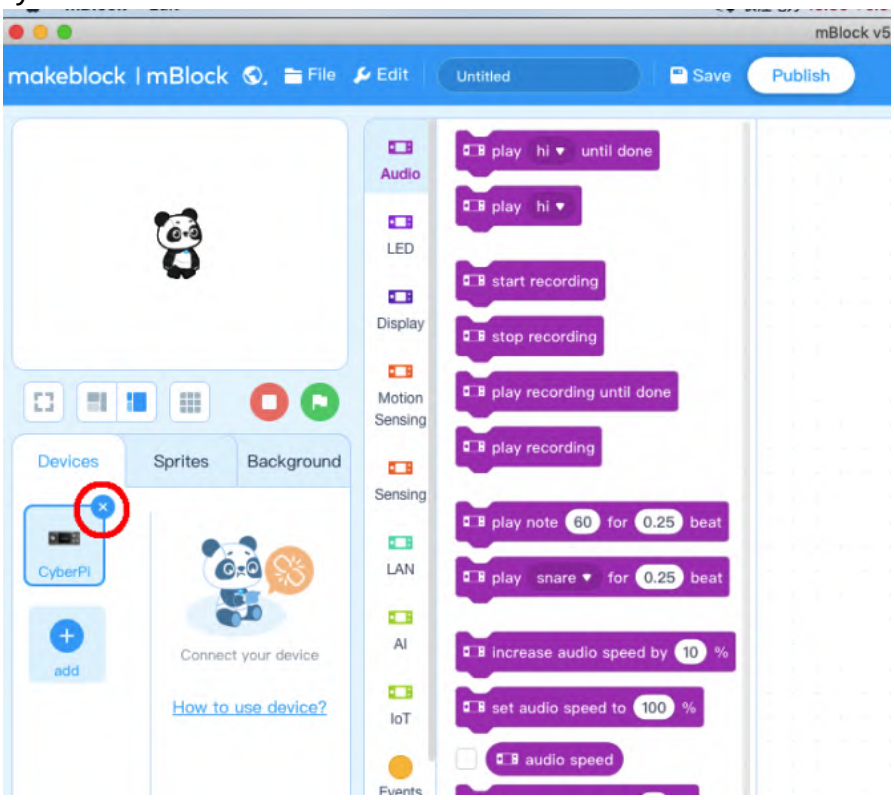
Step 1) Download mBlock PC from https://mblock.makeblock.com/en-us/download/, select the download file as per your computer OS type:

https://osoyoo.com/?p=44354



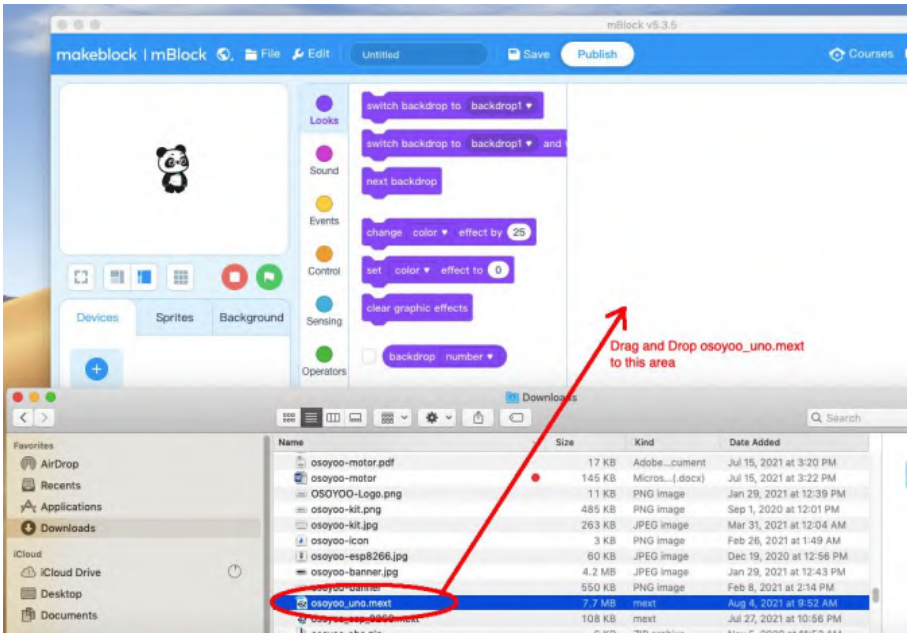
Step 2) Download OSOYOO_UNO.mext device file from https://osoyoo.com/driver/mblock/osoyoo_uno.mext

Step 3) Run the mBlock PC software by double click the lovely Panda icon. you will see mBlock UI as following picture. Please delete the default device CyberPi by click the cross in the red circle.

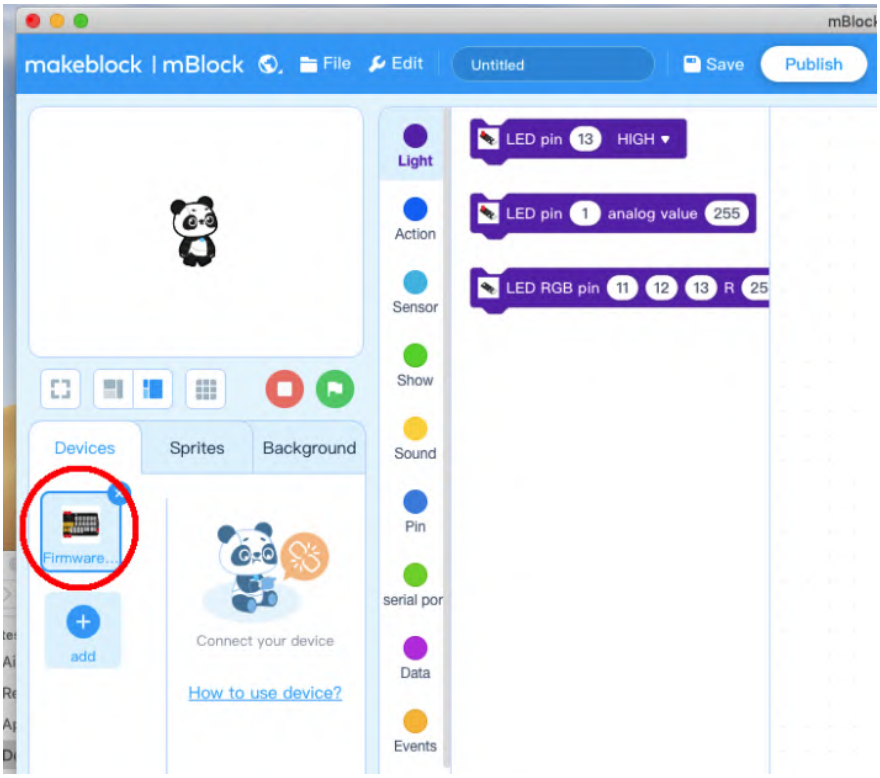


Step 4) Drag and Drop osoyoo_uno_mext file(downloaded in Step 2) to mBlock software as following:

https://osoyoo.com/?p=44354



Now you will see a new device firmware in mBlock, see following picture:

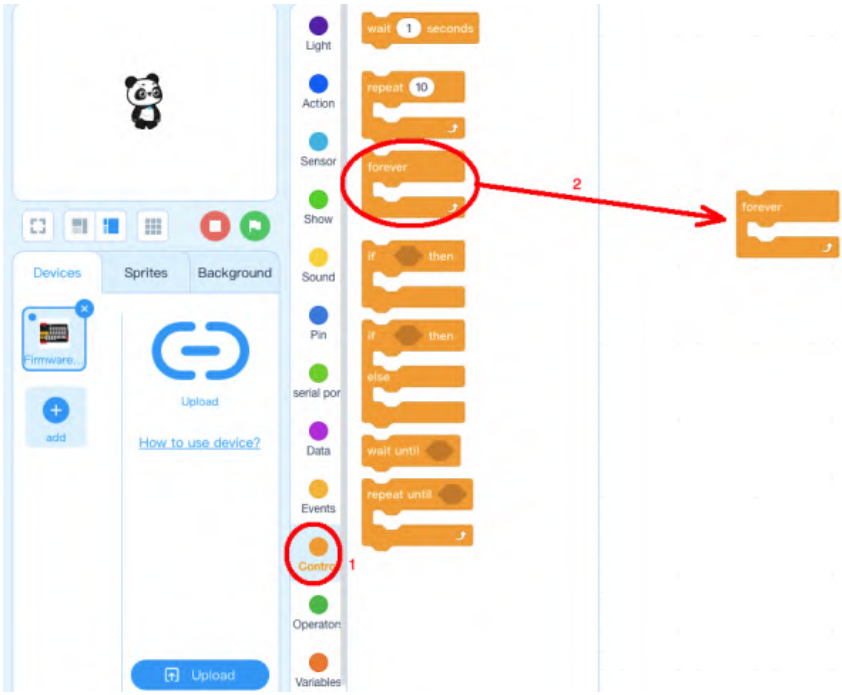


Now mBlock software and OSOYOO_UNO device firmware have been successfully installed in our PC!

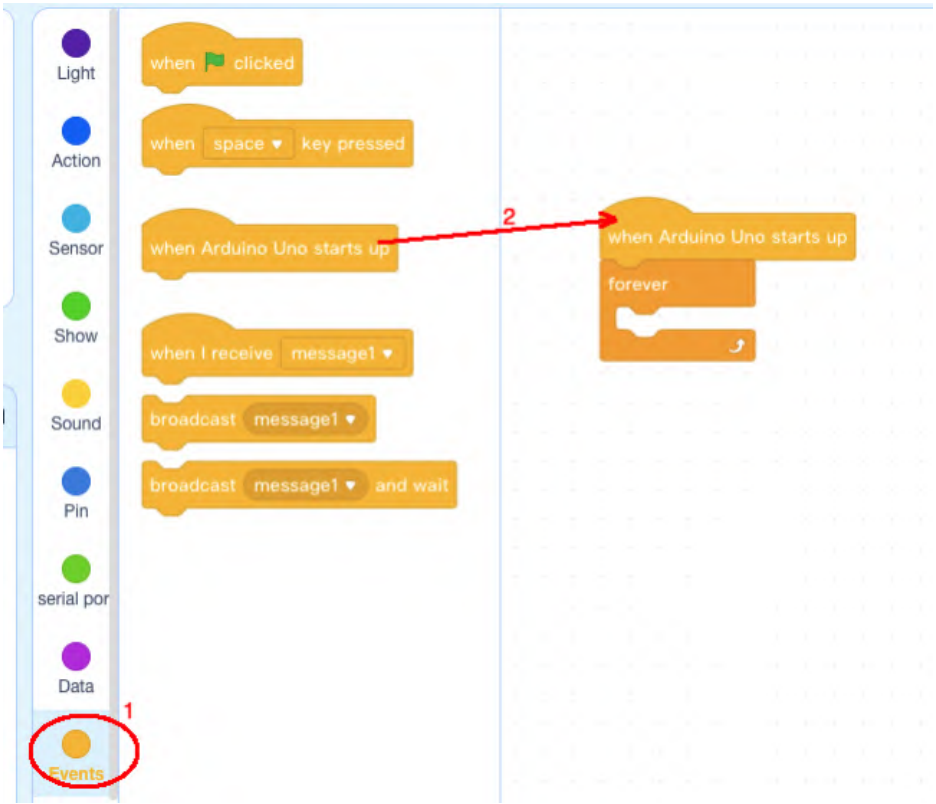
Now we will show you how to use blocks to make our Oscillating Pedestal Fan into reality.

https://osoyoo.com/?p=44354

Step 1: Click Control, then Drag and drop Forever block to programming area as following:

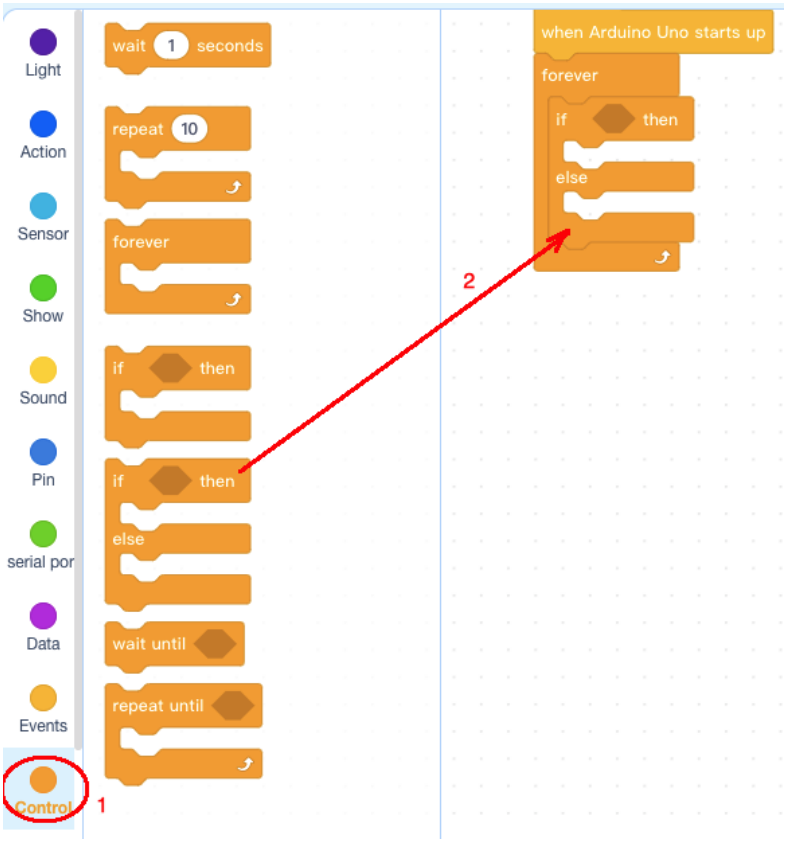


Step 2: Click Events, add when Arduino Uno starts up block to the top:

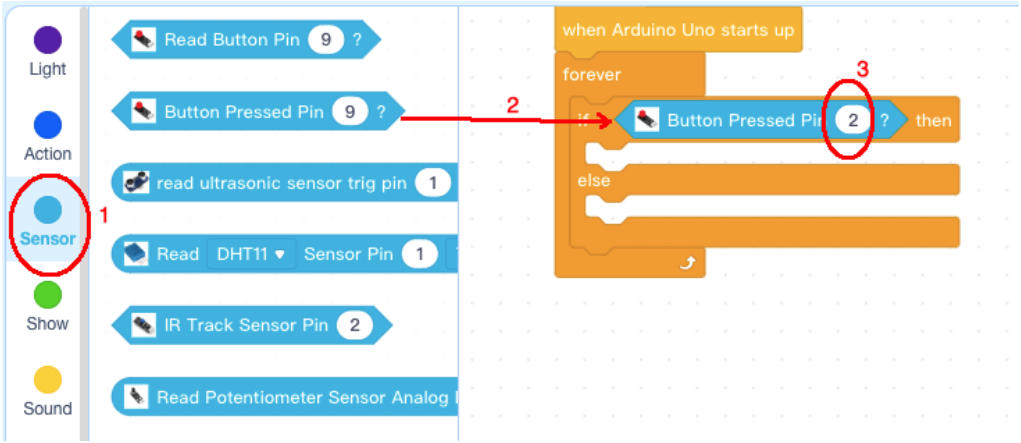


https://osoyoo.com/?p=44354

Step 3: Click **Control**, drag if else block to **forever** loop,

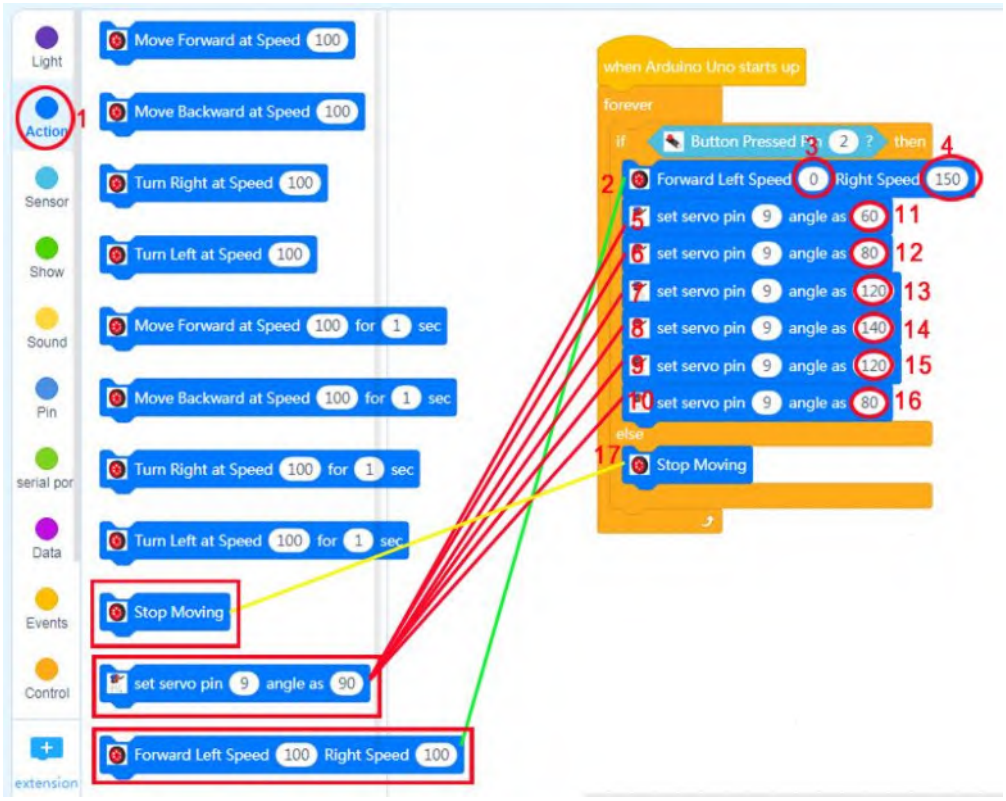


Step 4: Click **Sensor**, Add **Button Pressed** blocks to **if** condition area, change Pin number to 2:

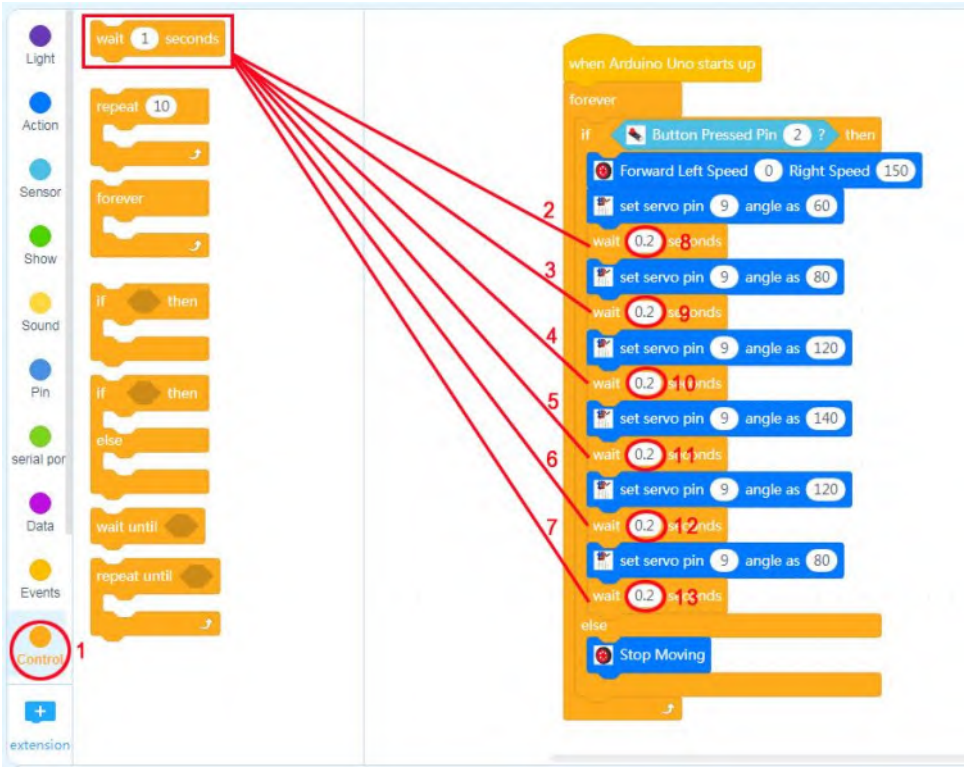


Step 5: Click **Action** , then drag **Move Left Right Speed** block, set **Servo Pin** blocks, and **Stop Moving** blocks as following:

https://osoyoo.com/?p=44354



Step 6: Click **Control**, then add 6 pcs **wait** block under each set **servo pin** block, change wait time to 0.2 seconds

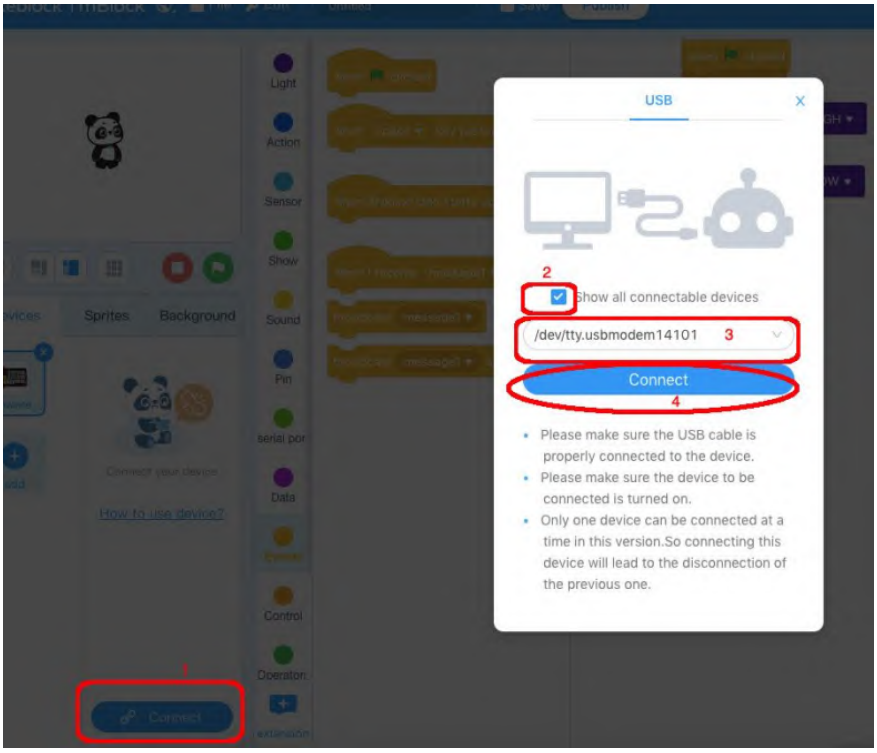


Now all the programming blocks have been completed! From above picture, the logic is pretty straightforward:
When Arduino is started, computer will enter a dead loop which will check the button status, when button is pressed, the Fan will rotate at speed 150, at the same time servo will oscillate from 60 degree position to 140 degree position. Each location will stop 0.2 seconds.

When you release the button, the servo and fan will stop after a short time.

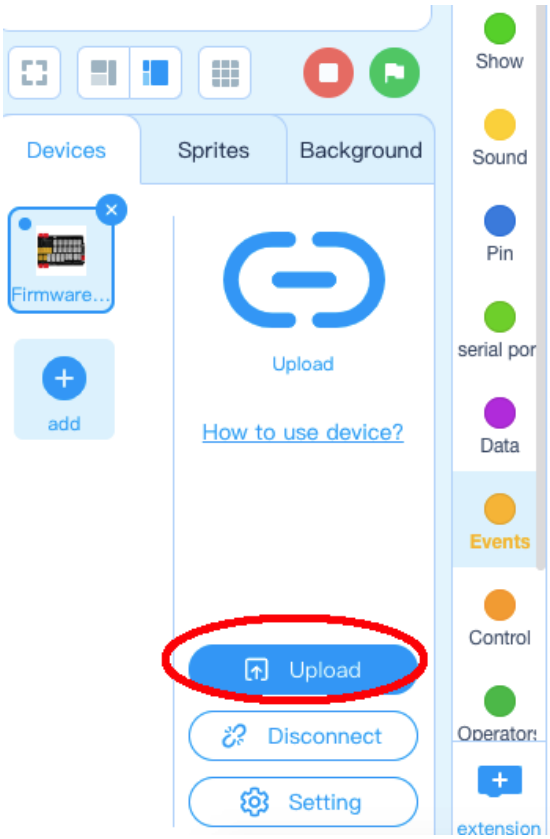
Step 7: Upload the program to Arduino

1) you need connect your Arduino board to your PC with a USB cable first. Then click the Connect button in the bottom of the mBlock software, you will see a USB window pop up,
2) select Show all connectable device check box , then a device drop-down menu will show up,
3) select your Arduino port from device drop-down menu
4) click Connect button to connect your PC to Arduino



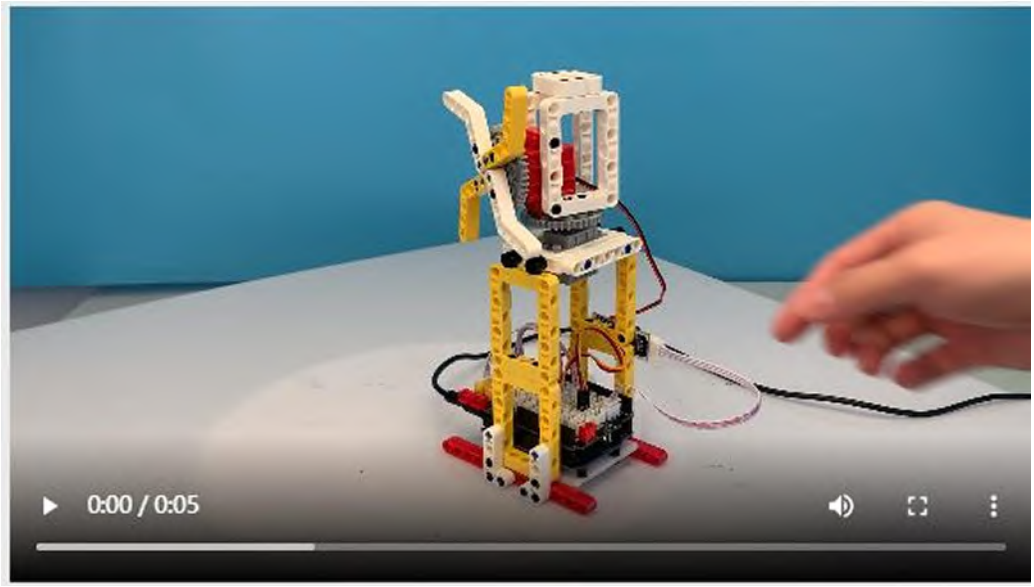
5)After you PC is connected to Arduino UNO board, please click Upload button in the bottom of your software, then the code will be uploaded to Arduino UNO board:

https://osoyoo.com/?p=44354



HOW TO PLAY

Now turn on the power switch in the Magic board, the Arduino will start to work. Press the button on D2, your fan begins to rotate and servo start to oscillate. When you release the button, fan and servo will stop moving.



https://osoyoo.com/picture/Block_kit/lesson3/4.mp4

https://osoyoo.com/?p=44354

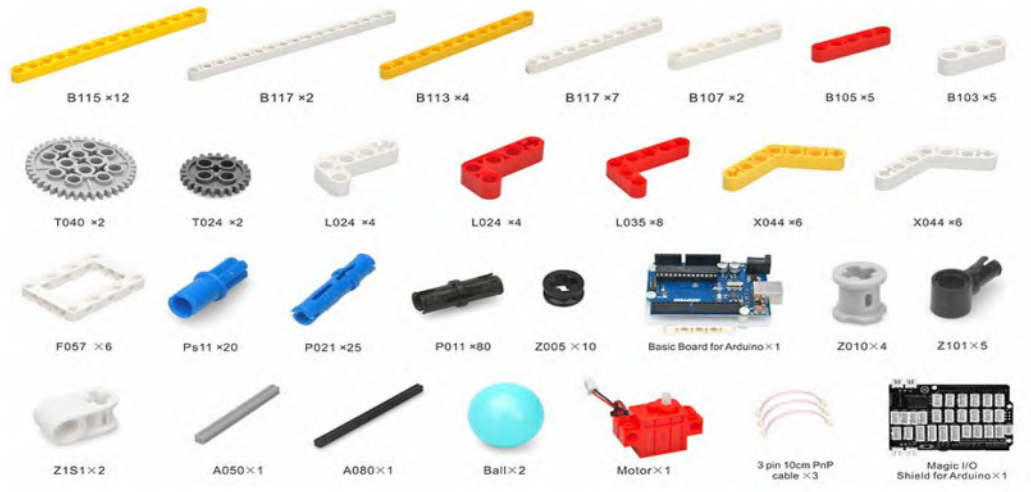
Lesson 4: Spinning Ball

OBJECTIVE

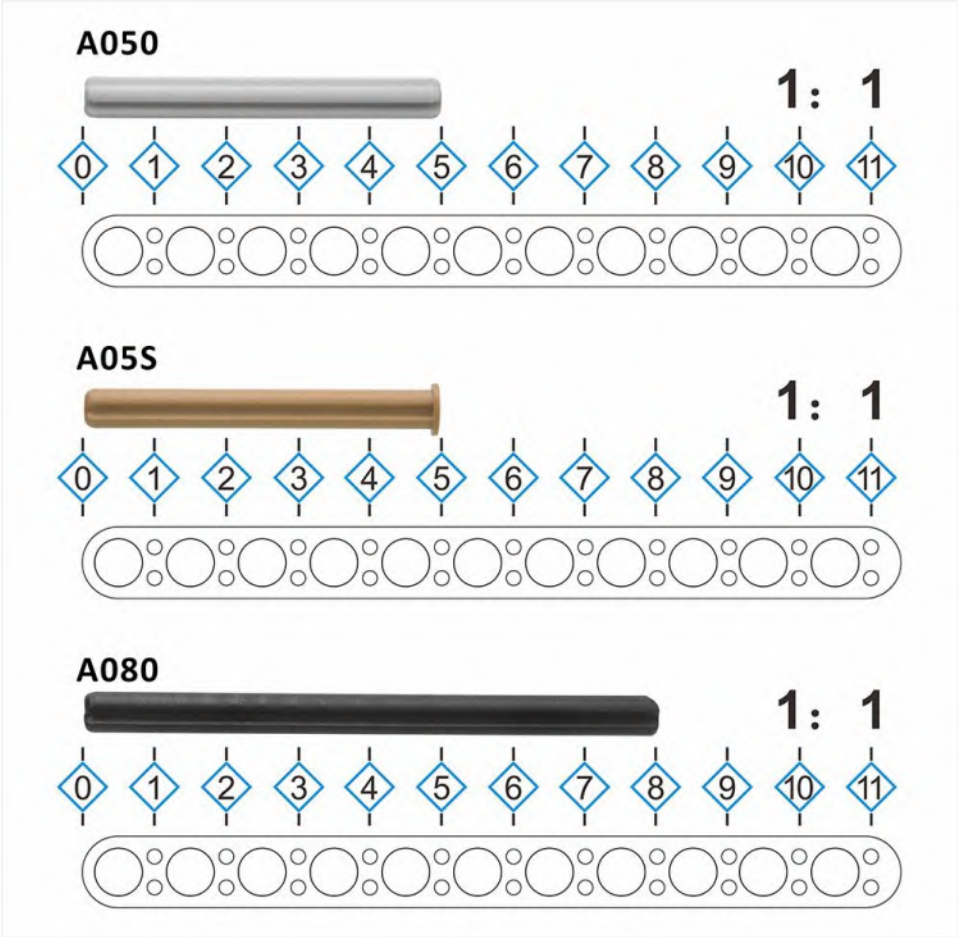
In this lesson, we use OSOYOO mini bricks to make a Spinning Ball Toy.

PARTS & DEVICES

Please prepare the following parts to complete this project.



https://osoyoo.com/?p=44354

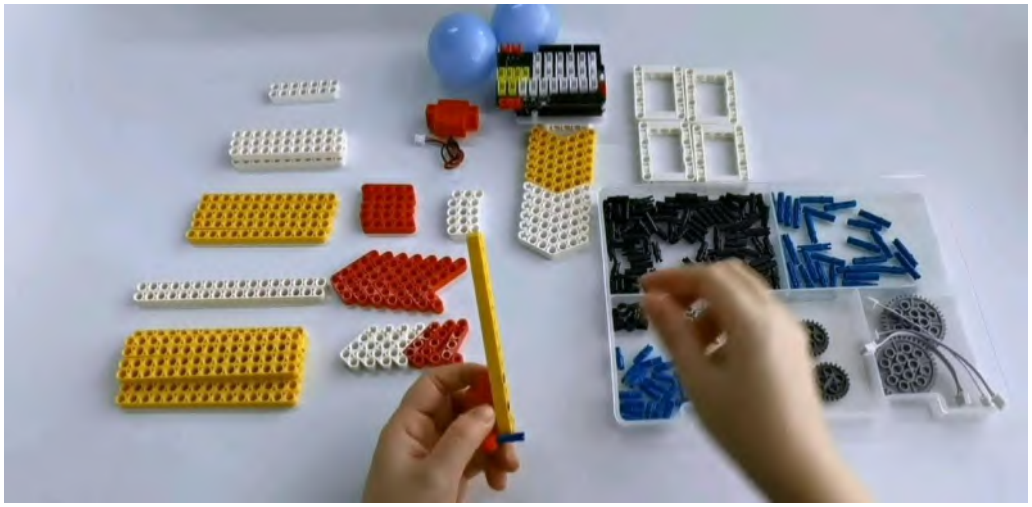


HOW TO BUILD

Before you build an elevator with blocks, please according to the Preparation before class 3: https://osoyoo.com/2021/12/01/preparation-before-class-3

Please visit this link to watch video about Building Blocks:
https://youtu.be/PoTajLijLBg

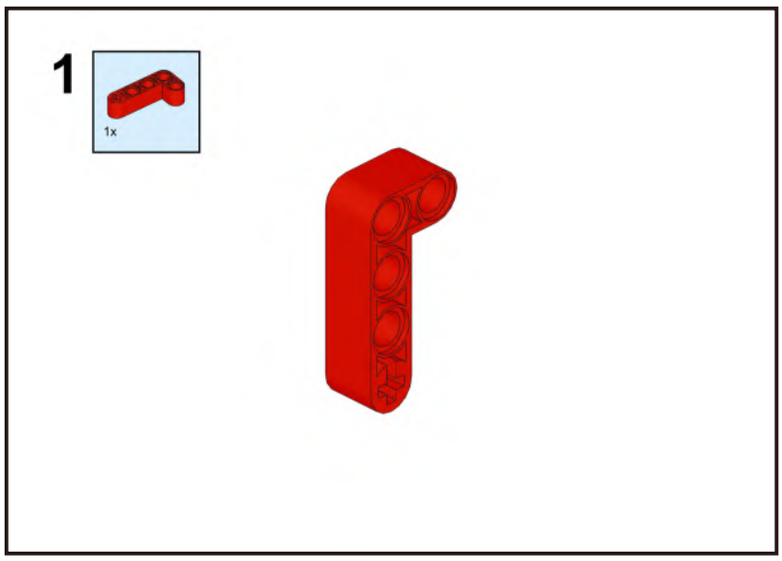
https://osoyoo.com/?p=44354

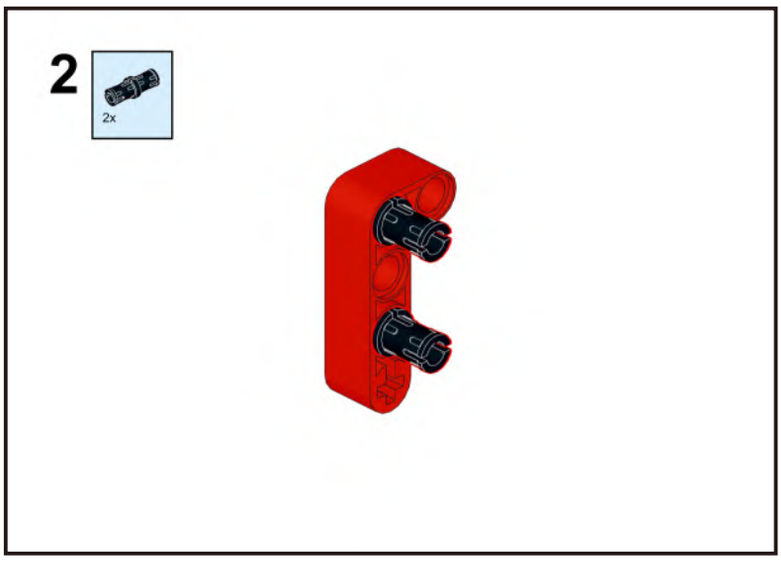


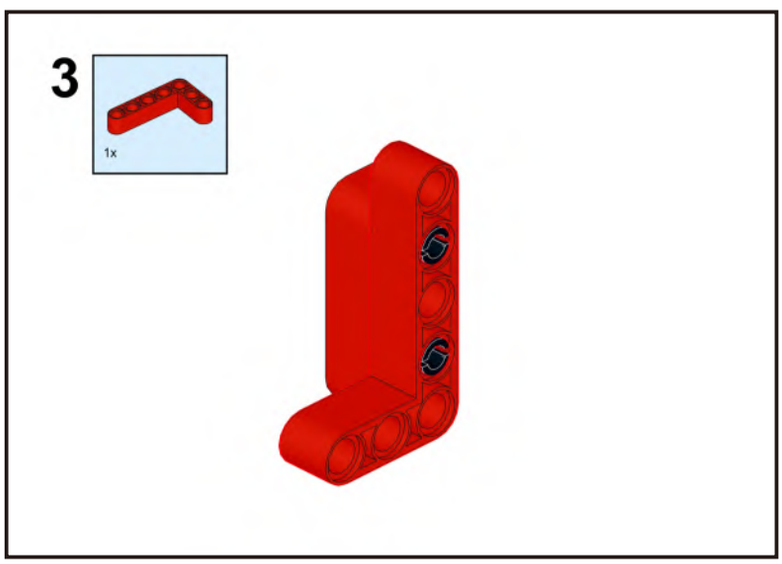
Please follow the instruction to build the blocks (Download link: https://osoyoo.com/picture/Block_kit/lesson4/lesson4.pdf)

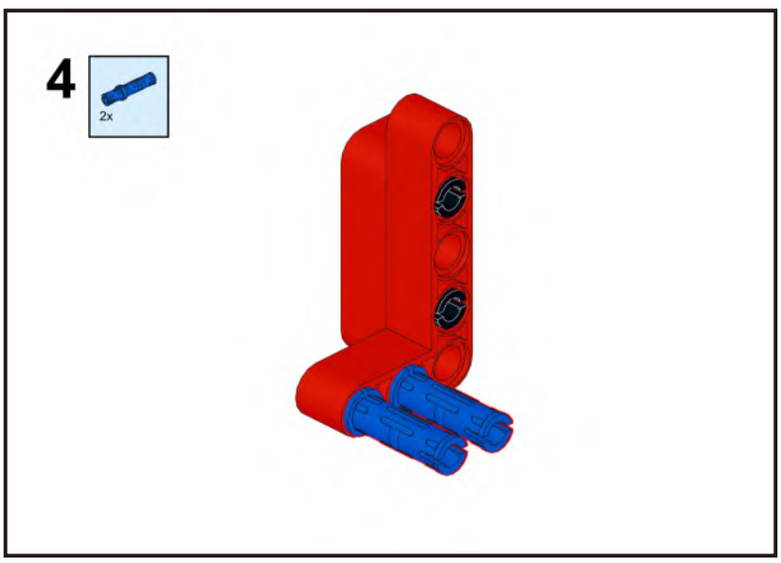
Note：the color of the building block is subject to the actual product, which does not affect the use.

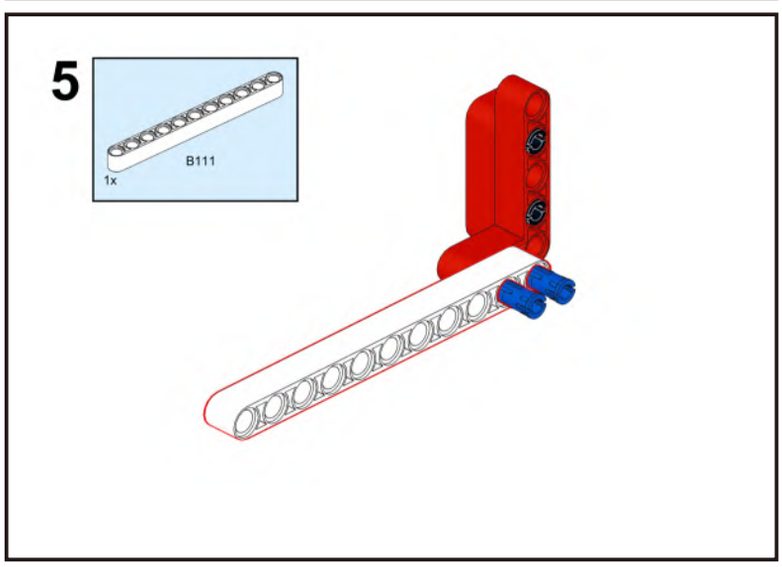
https://osoyoo.com/?p=44354

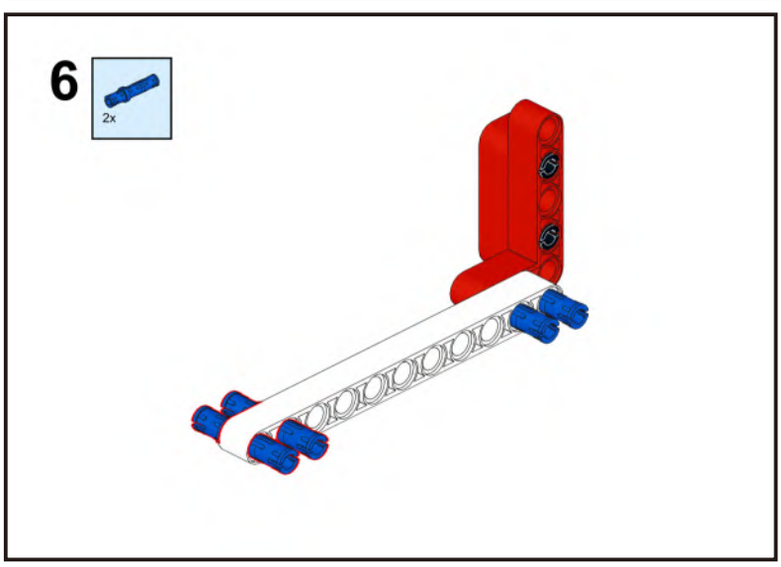




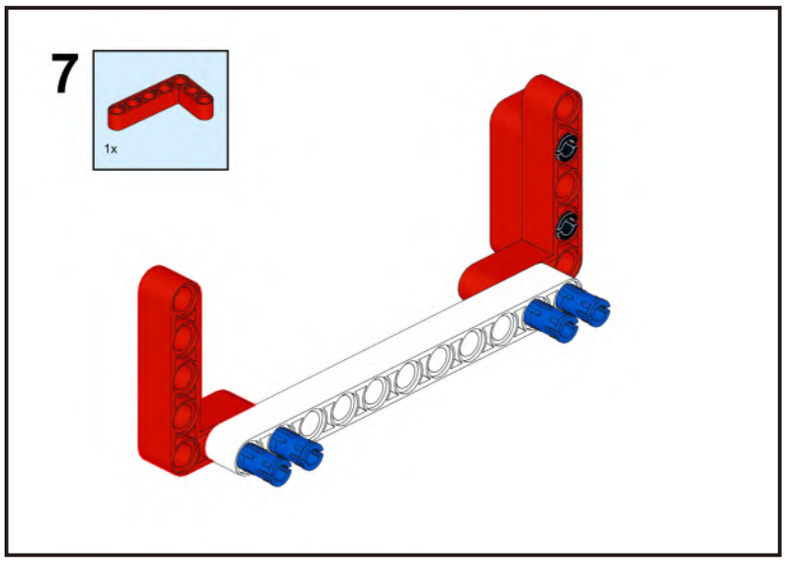


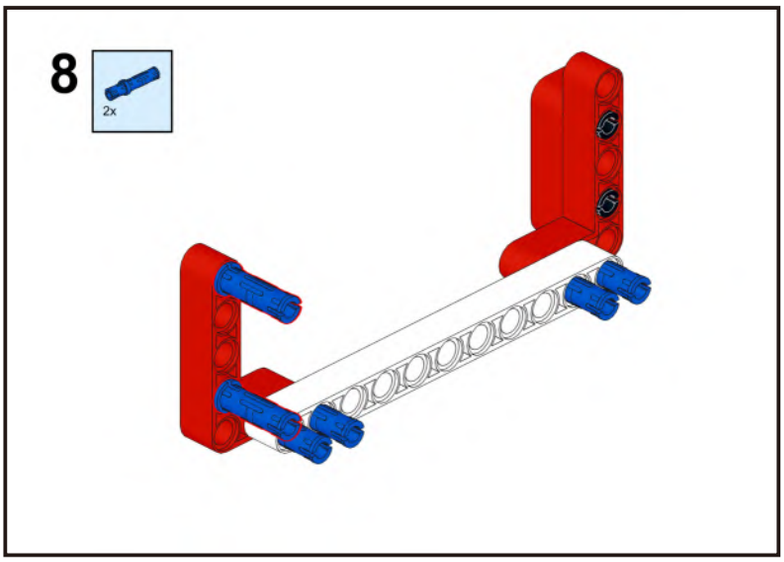


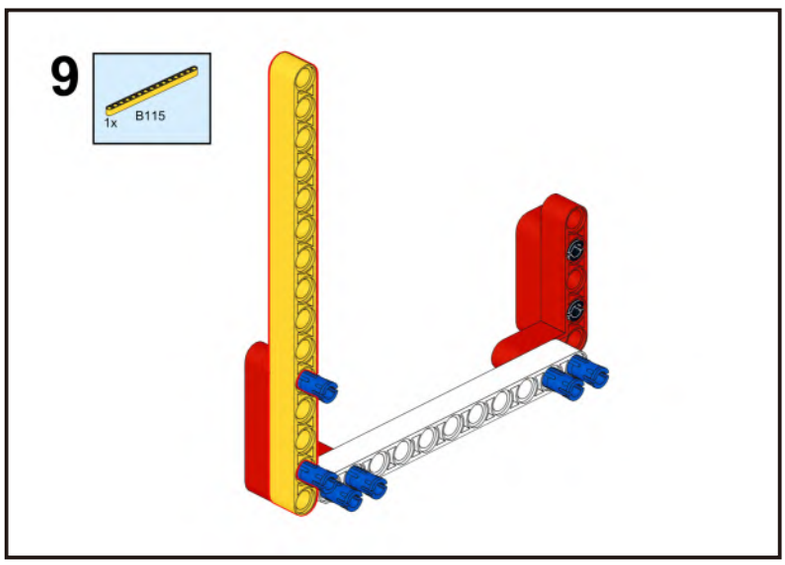


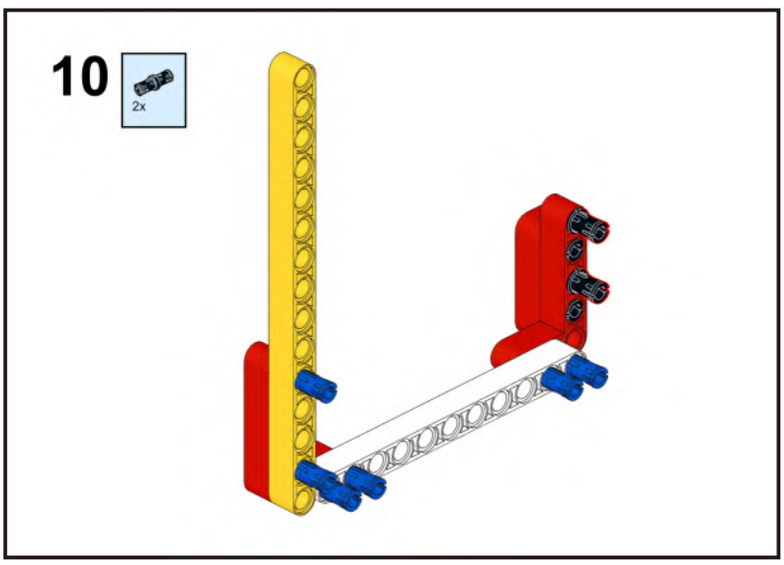


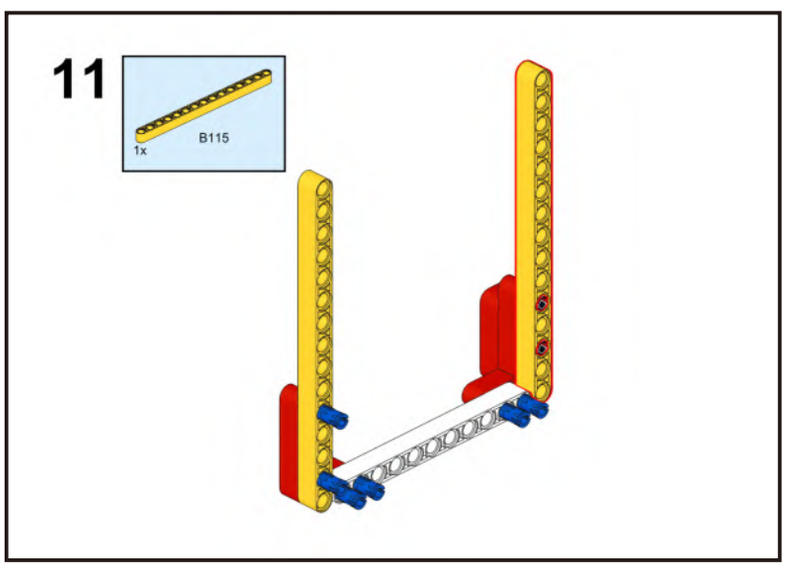
https://osoyoo.com/?p=44354

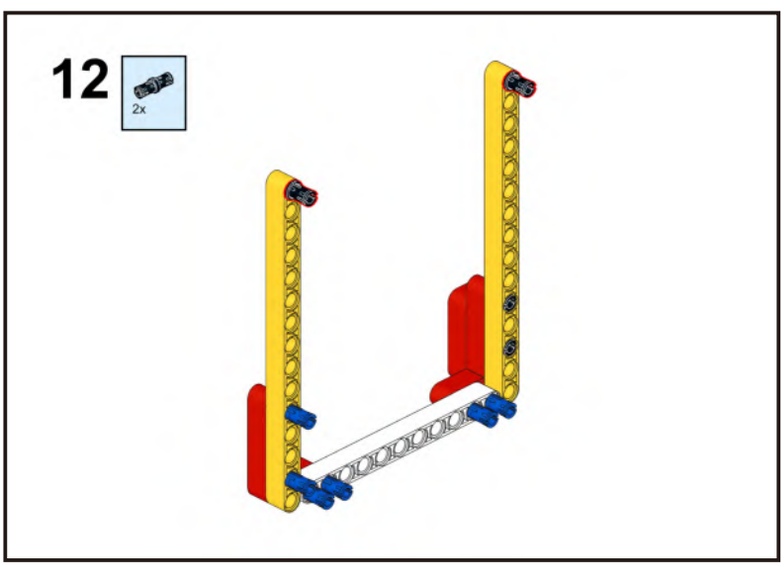






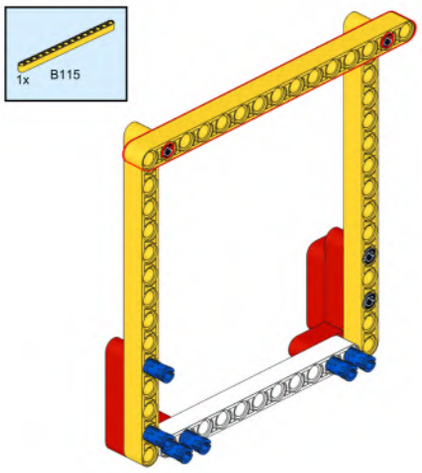




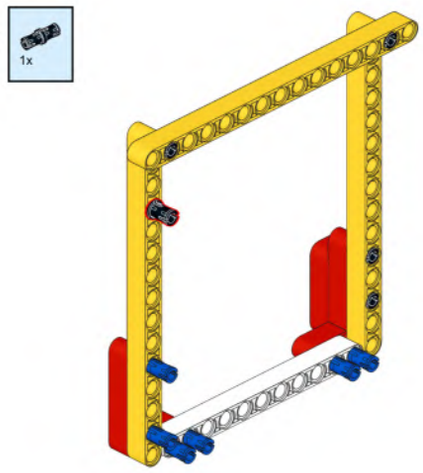


https://osoyoo.com/?p=44354

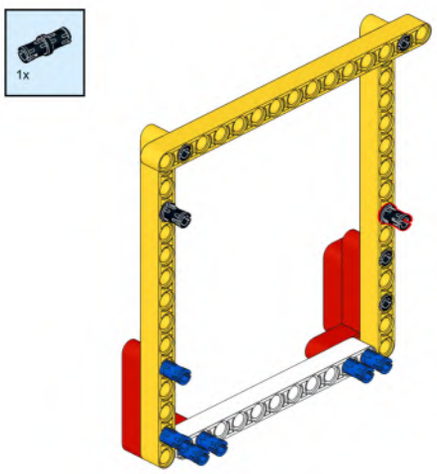
13



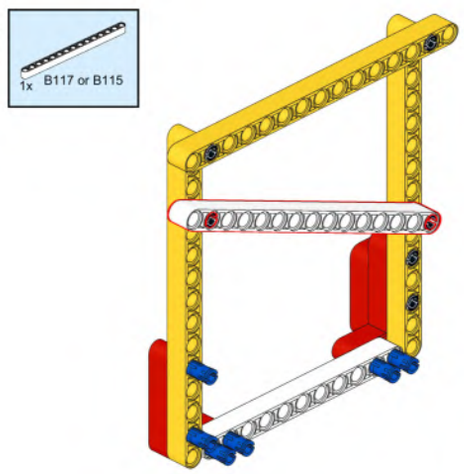
14



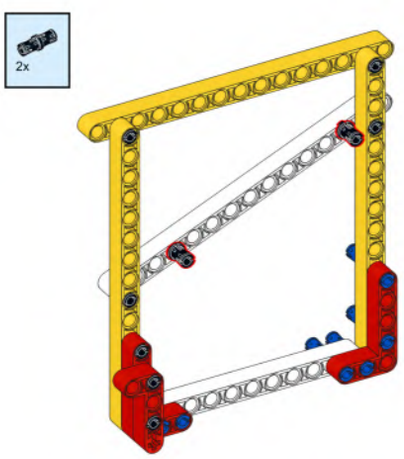
15



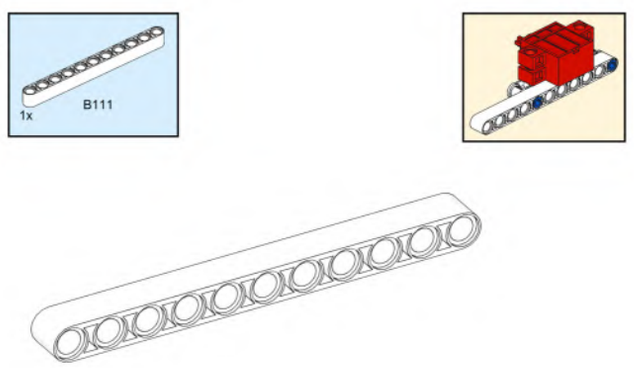
16



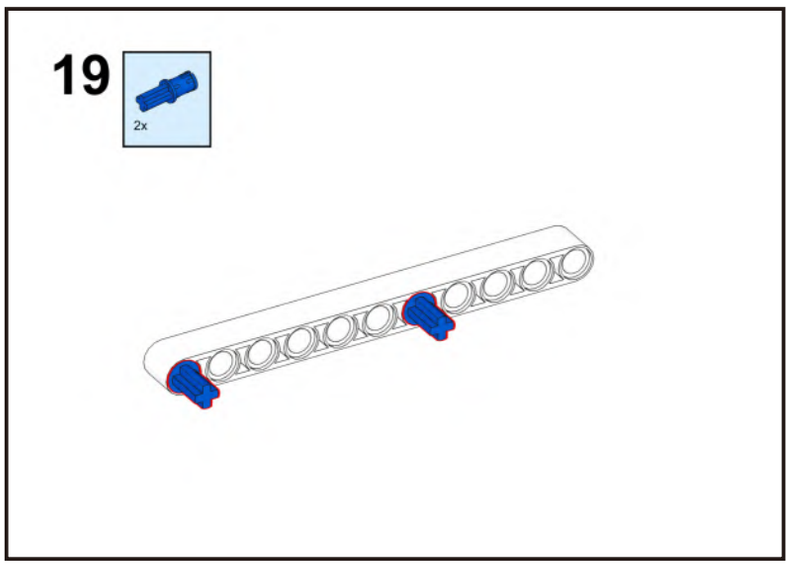
17

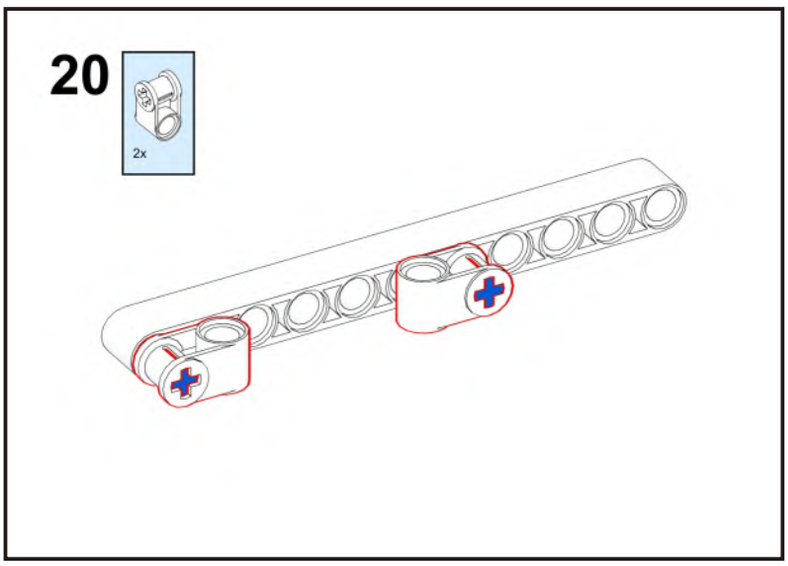


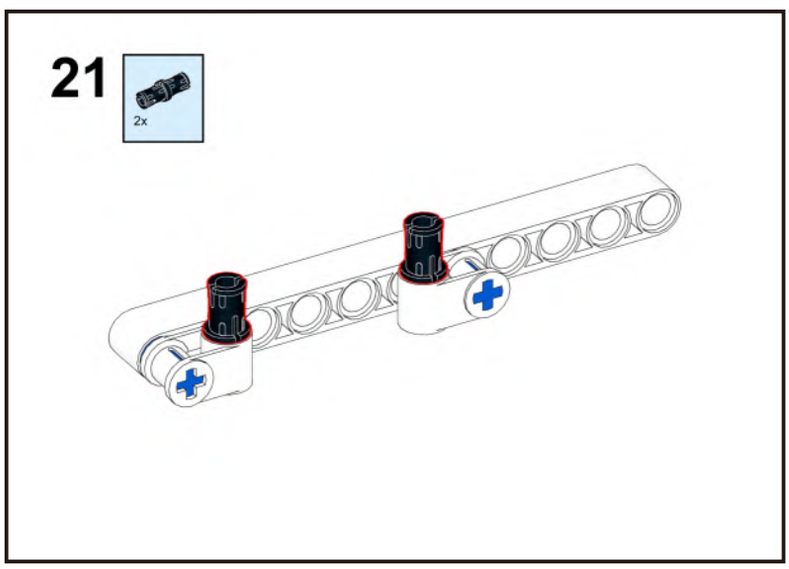
18

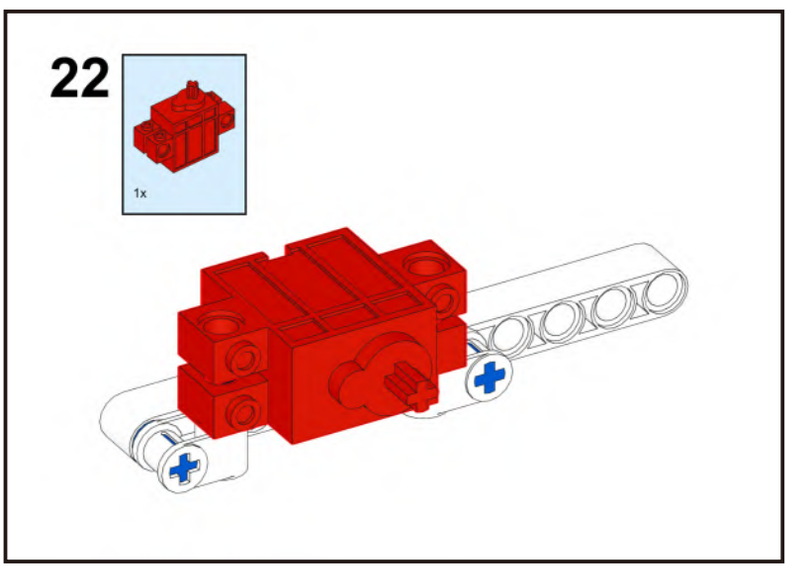


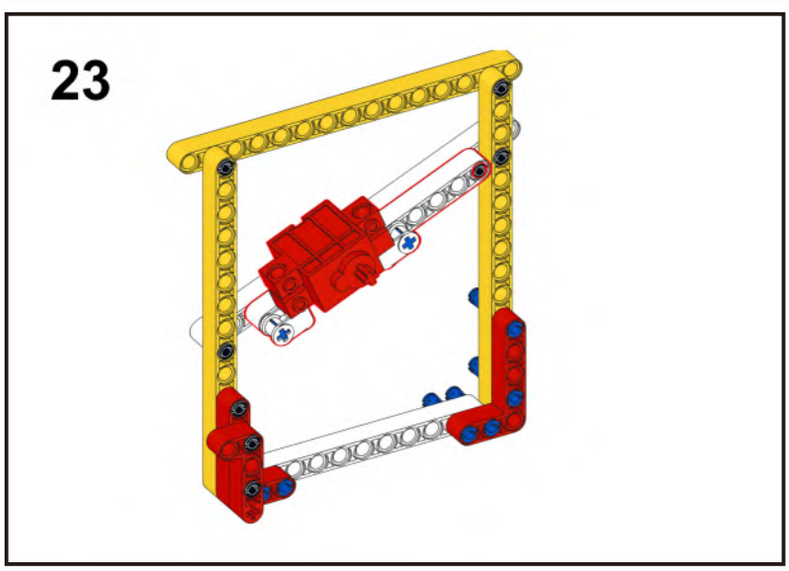
https://osoyoo.com/?p=44354

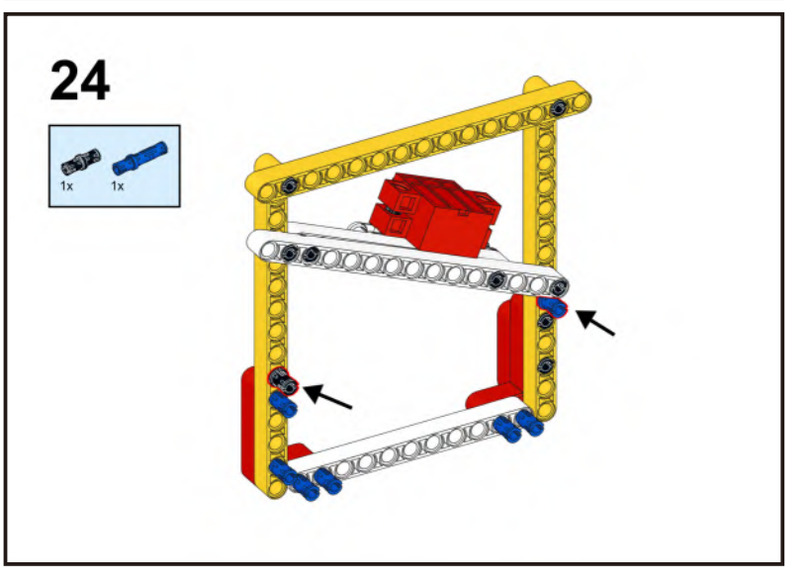




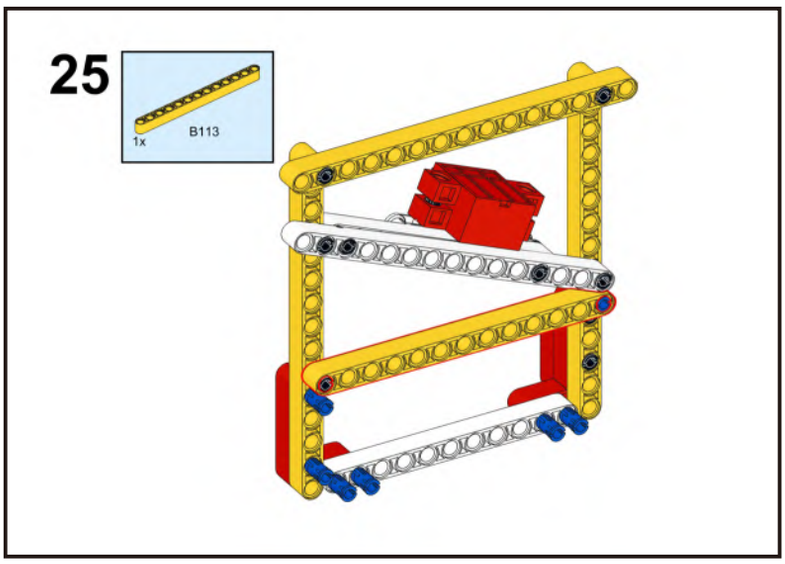


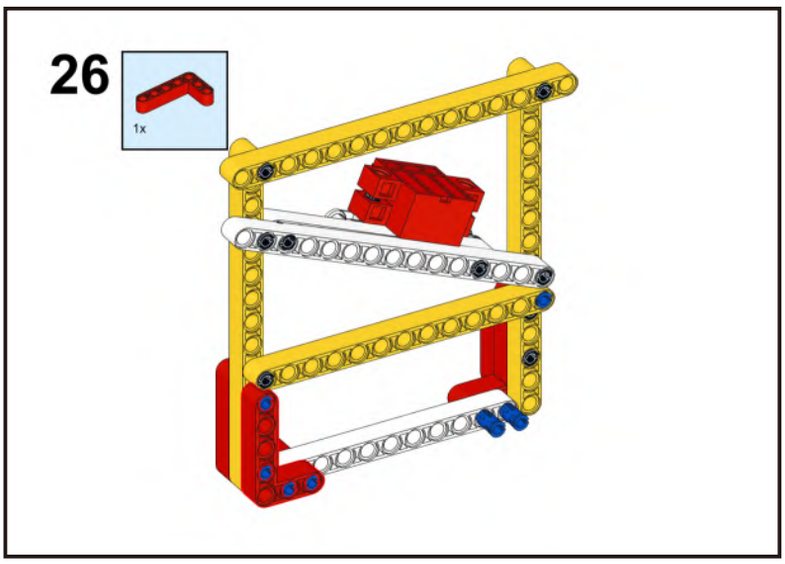


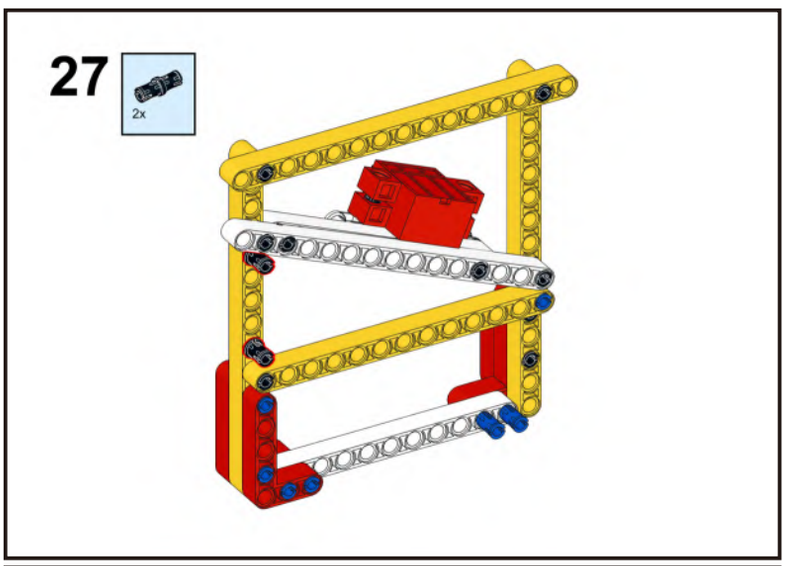


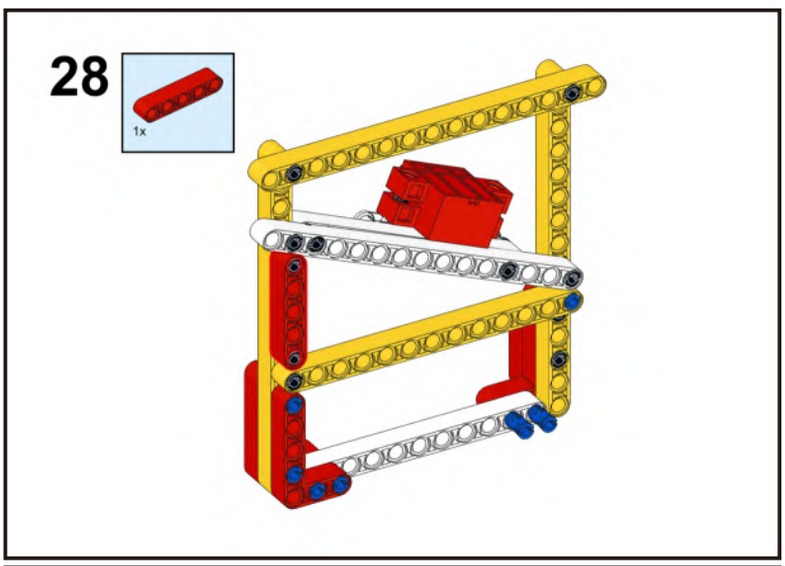


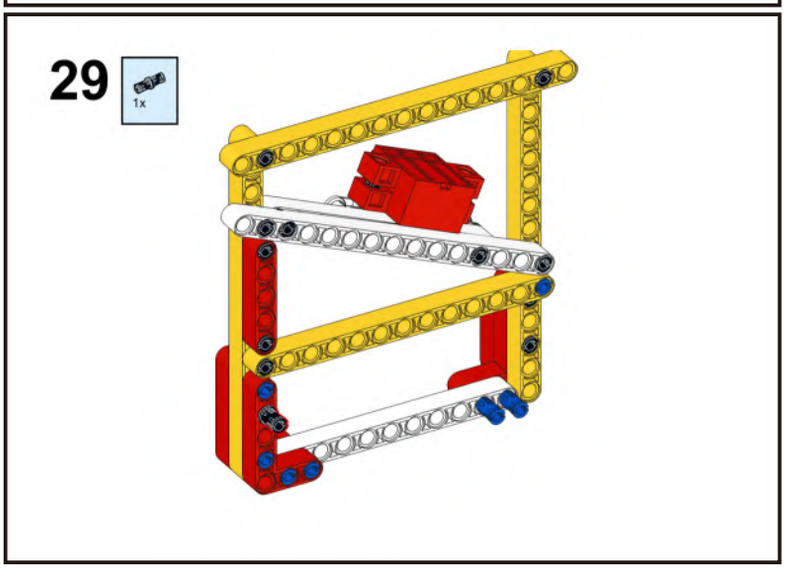
https://osoyoo.com/?p=44354

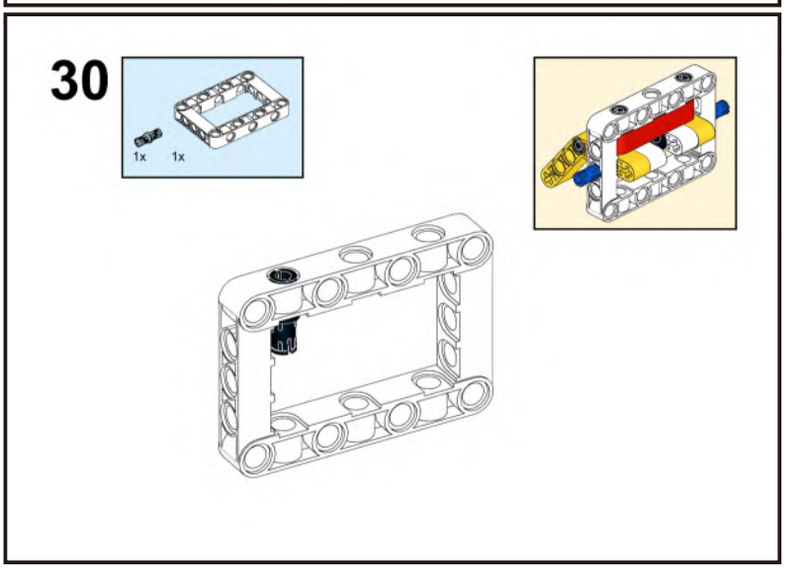




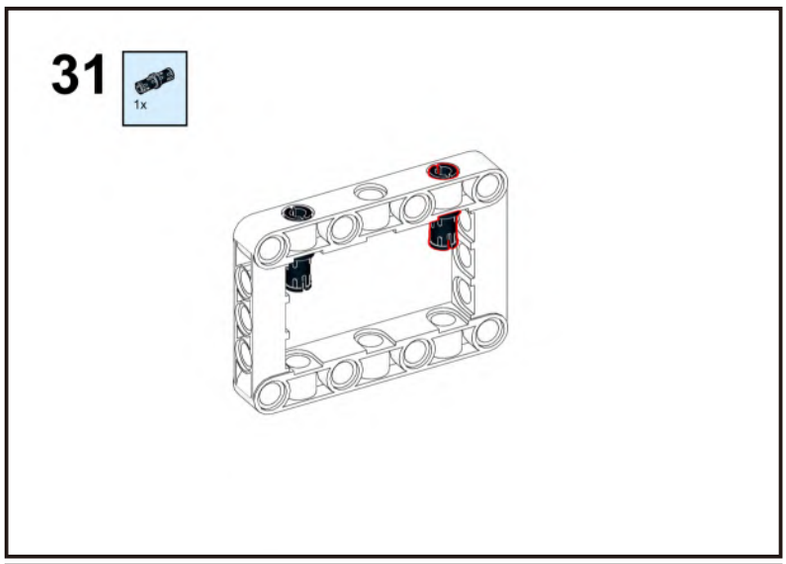


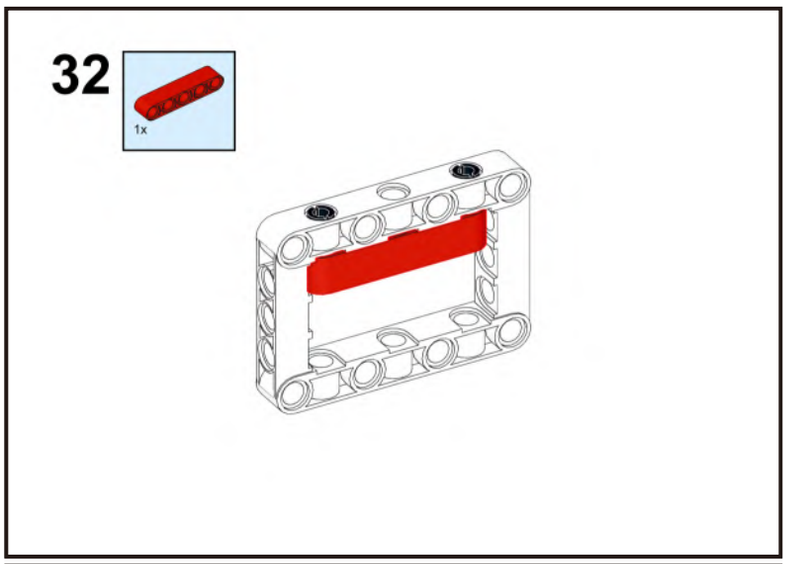


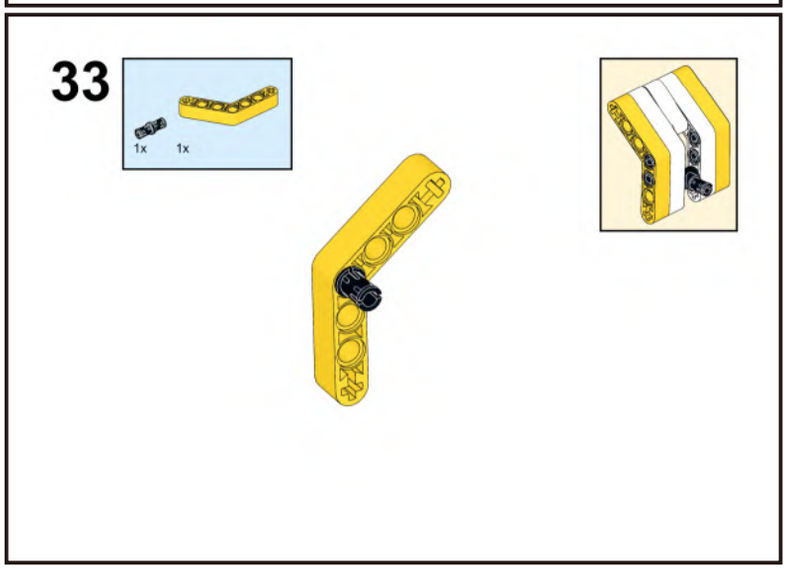


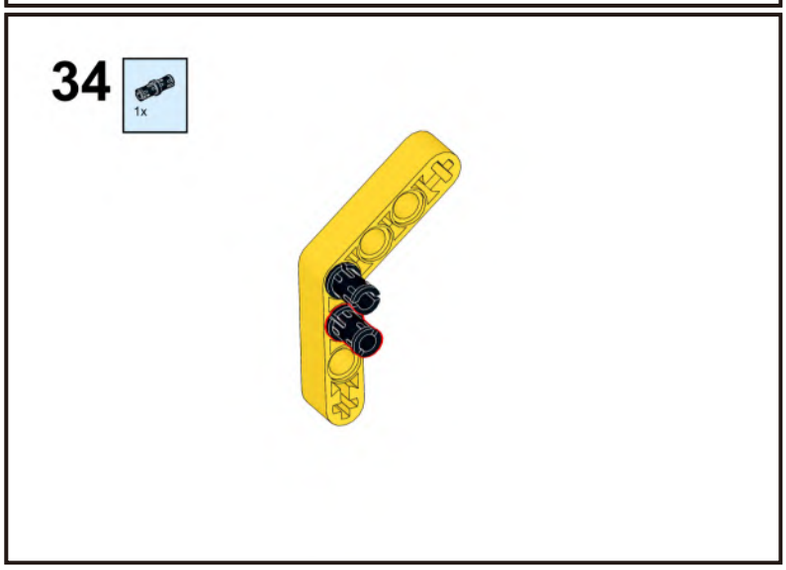


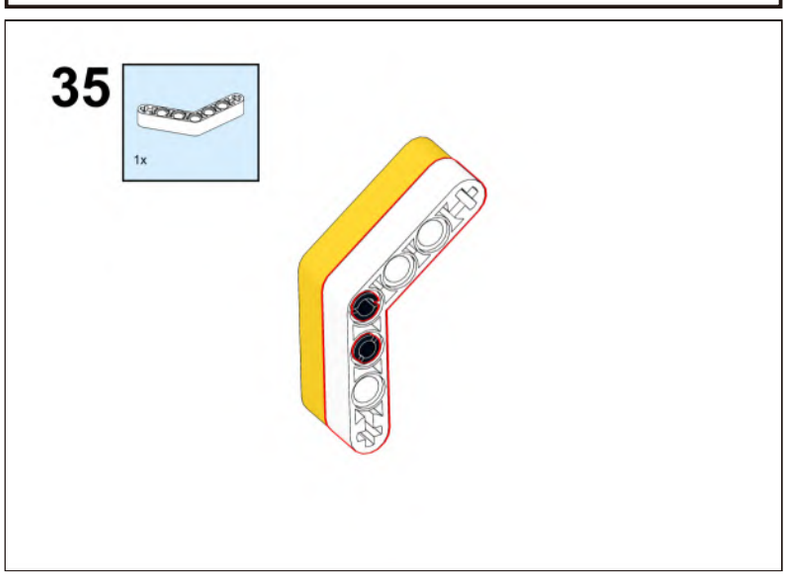
https://osoyoo.com/?p=44354

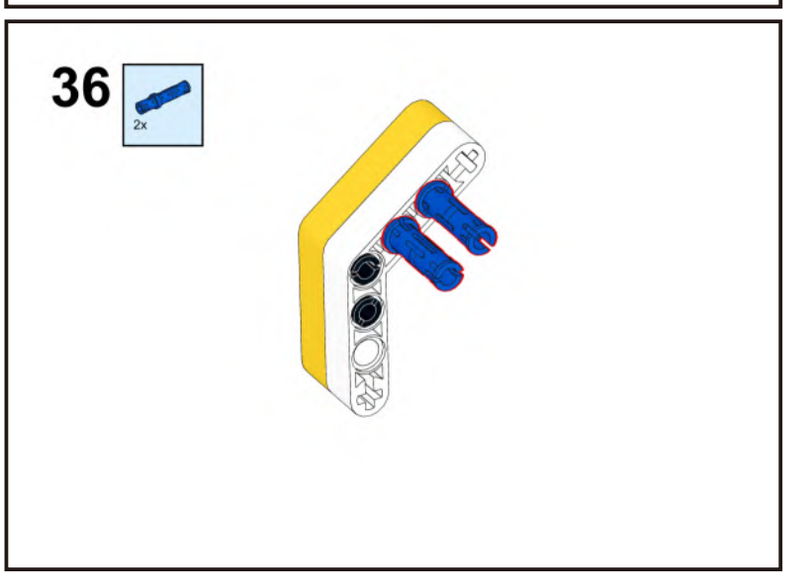






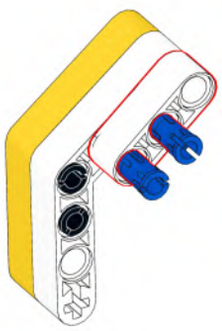




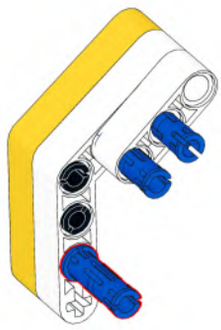


https://osoyoo.com/?p=44354

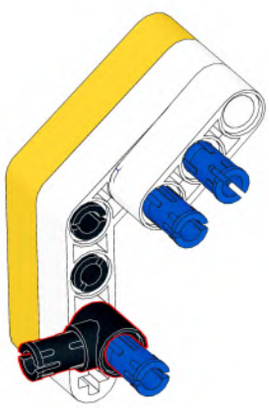
37



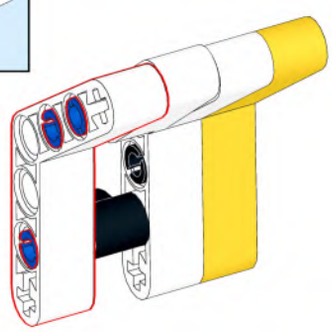
38



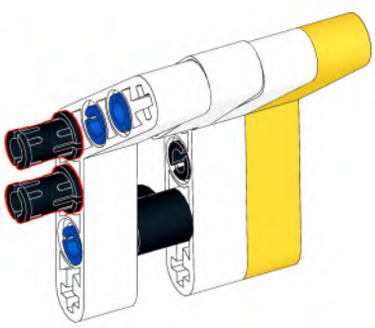
39



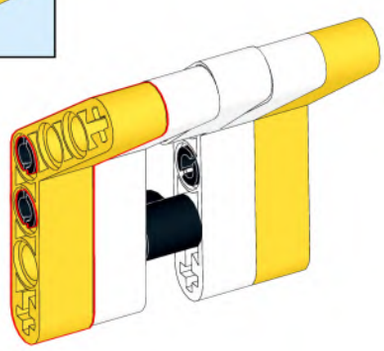
40



41

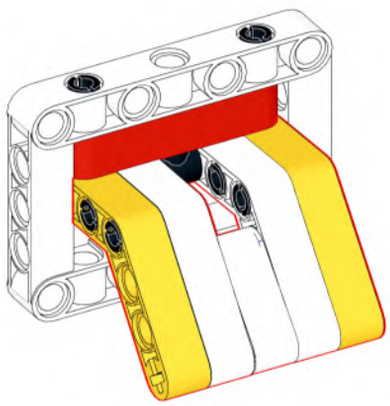


42



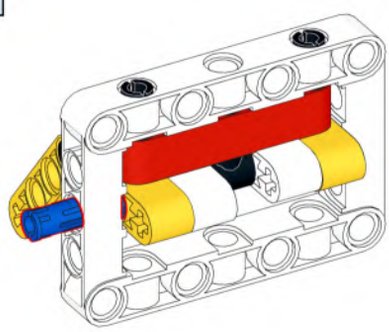
https://osoyoo.com/?p=44354

43



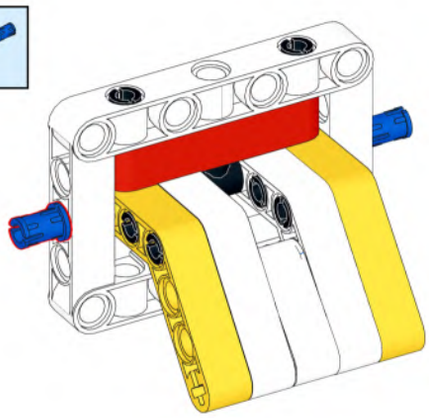
44

1x

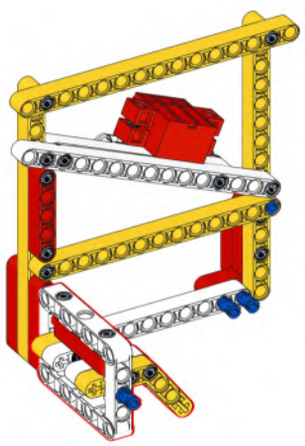


45

1x

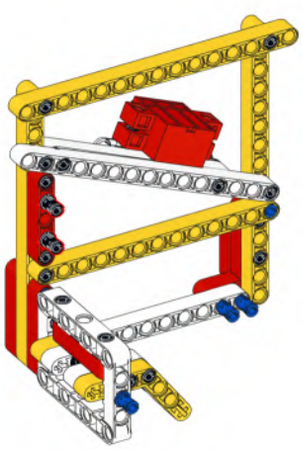


46



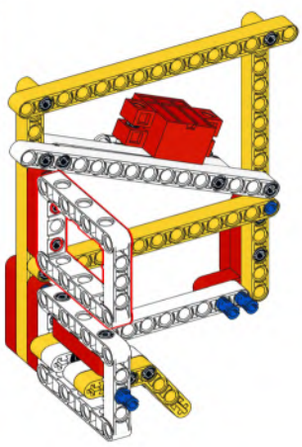
47

2x

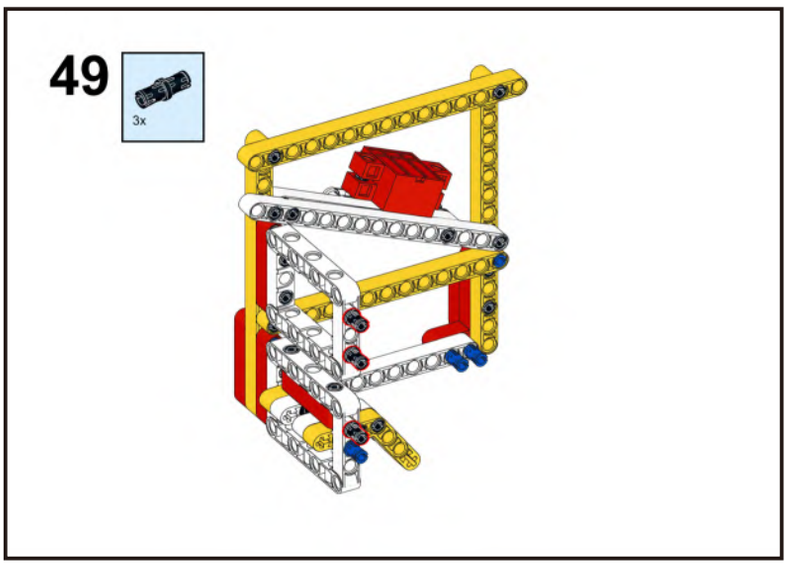


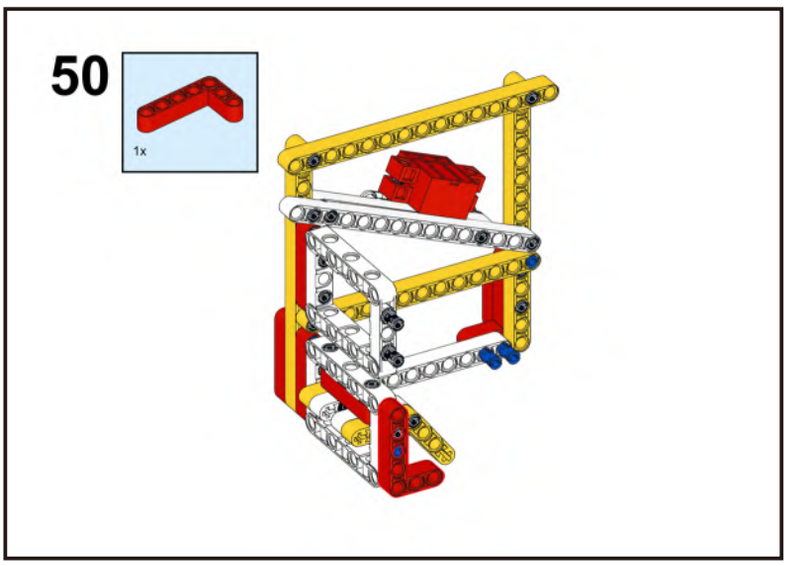
48

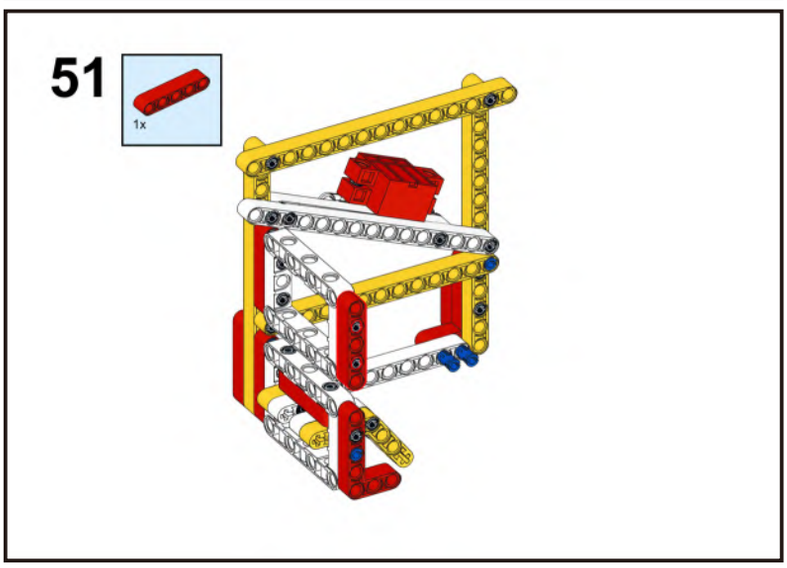
1x

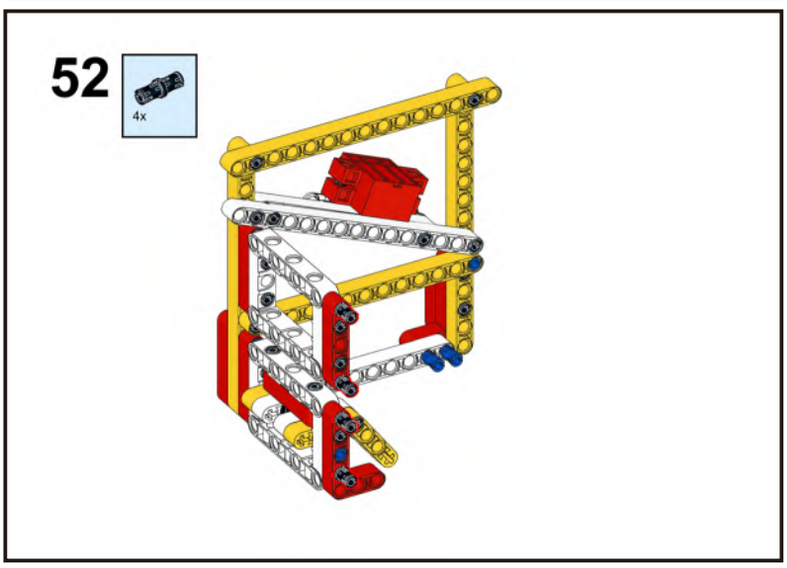


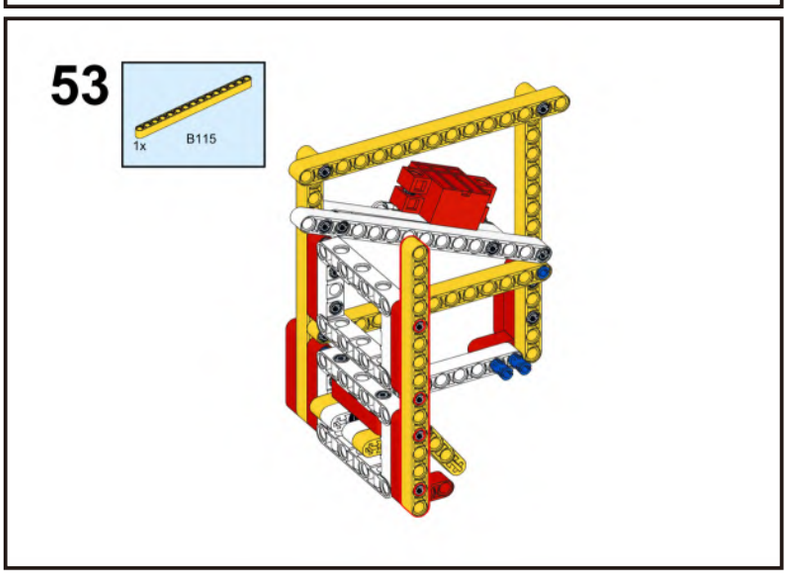
https://osoyoo.com/?p=44354

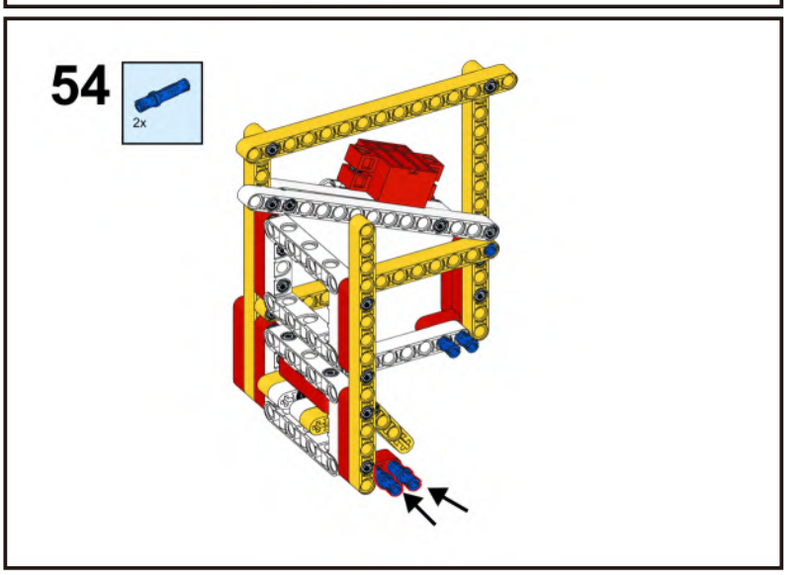




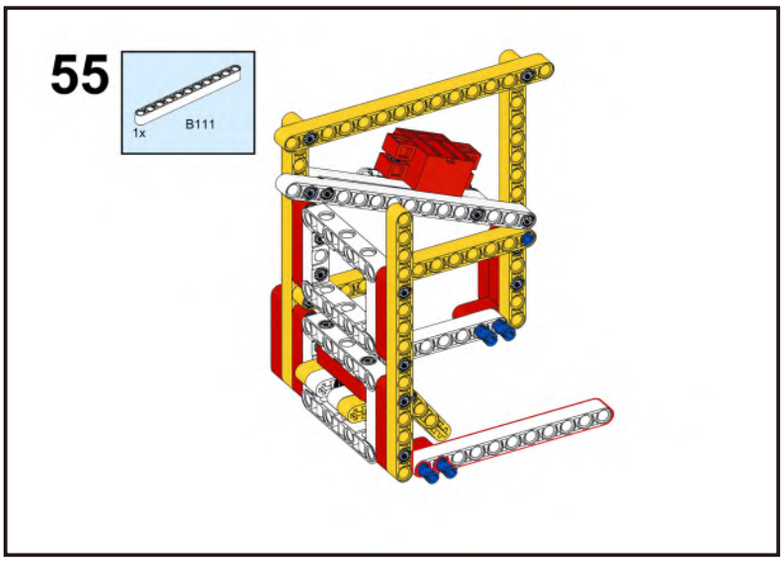


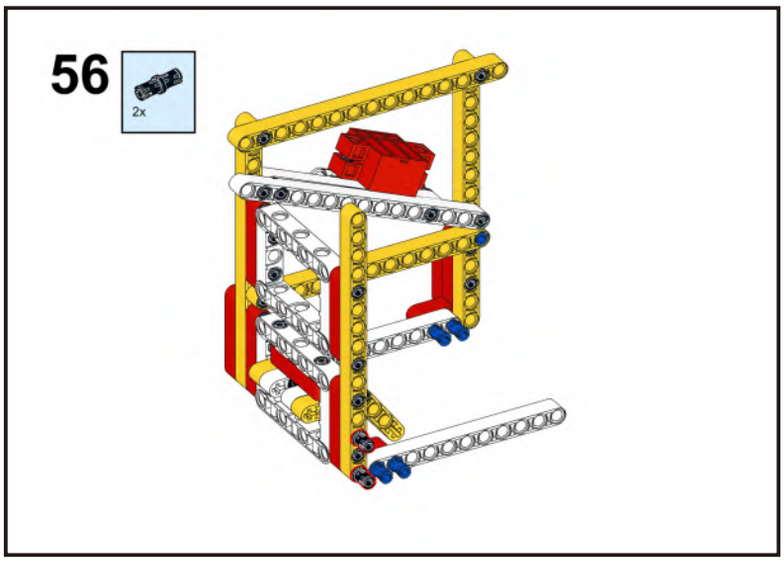


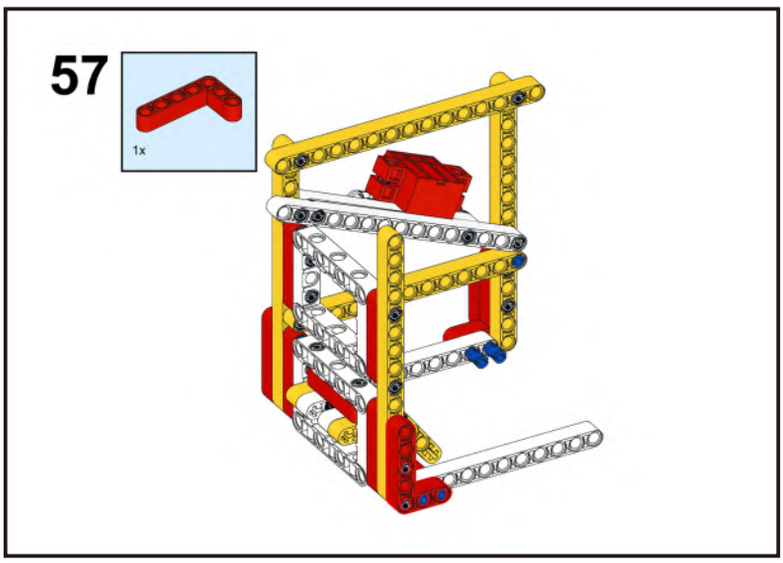


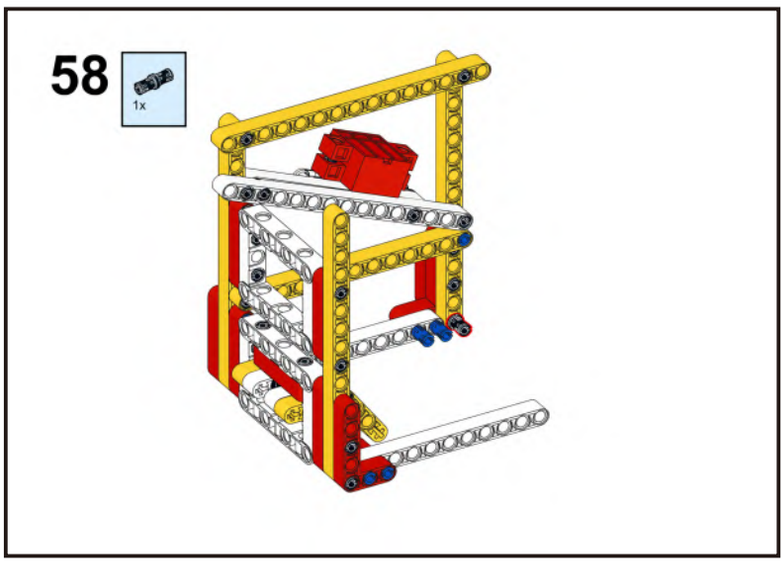


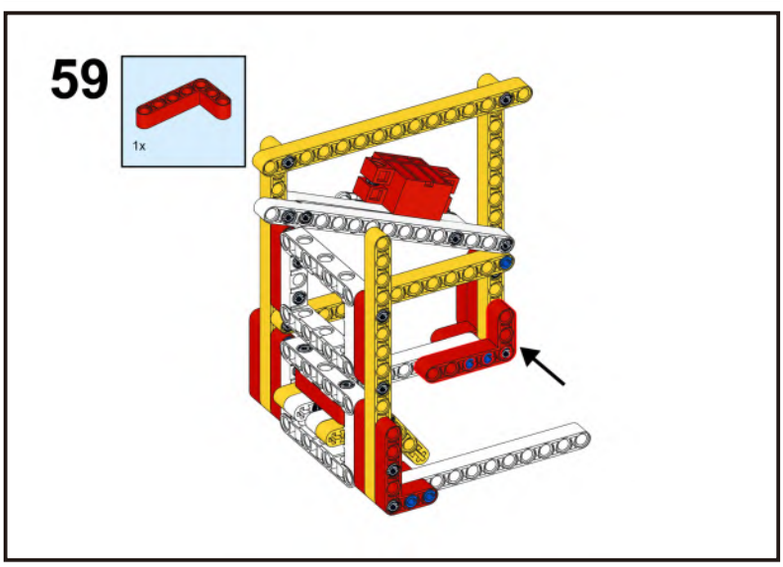
https://osoyoo.com/?p=44354

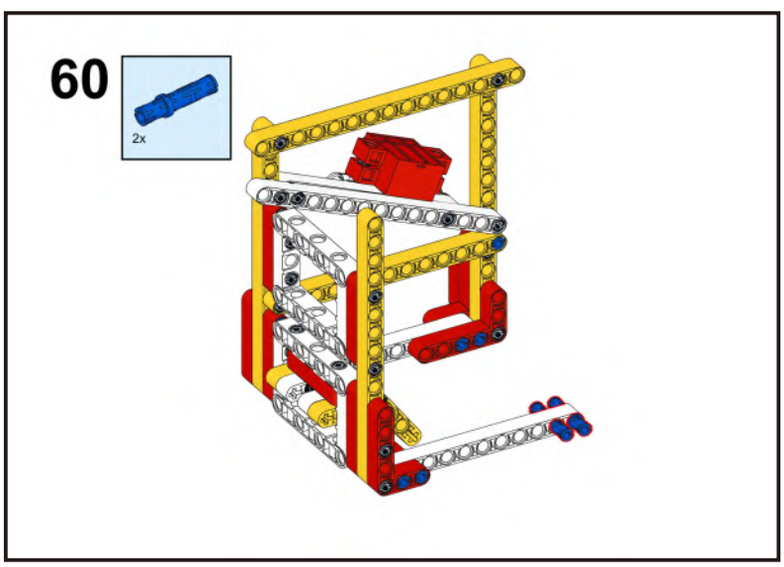




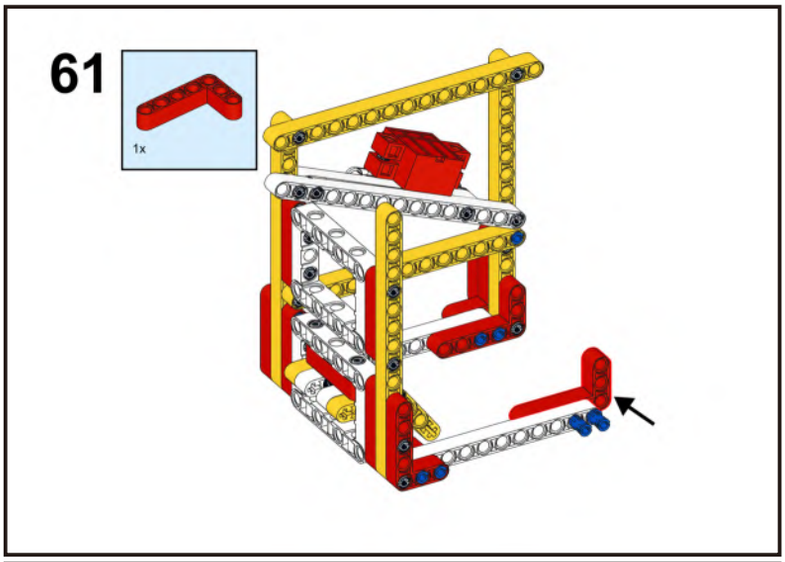


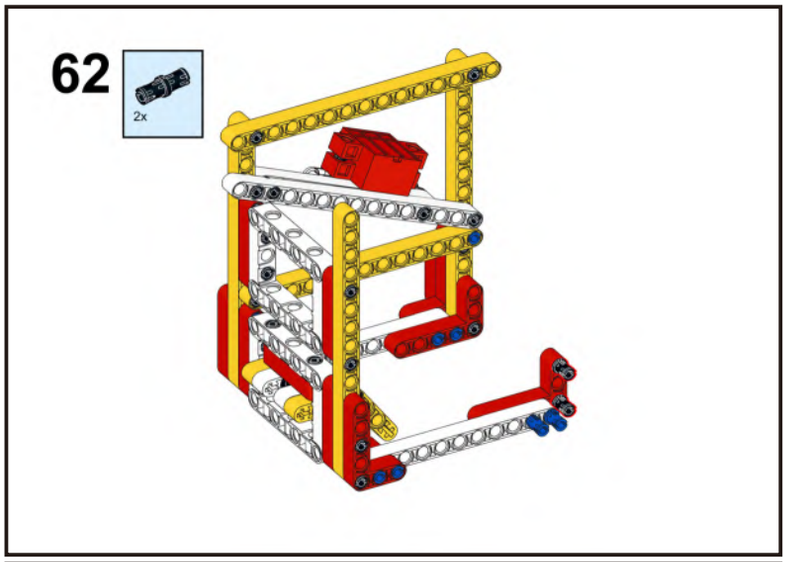


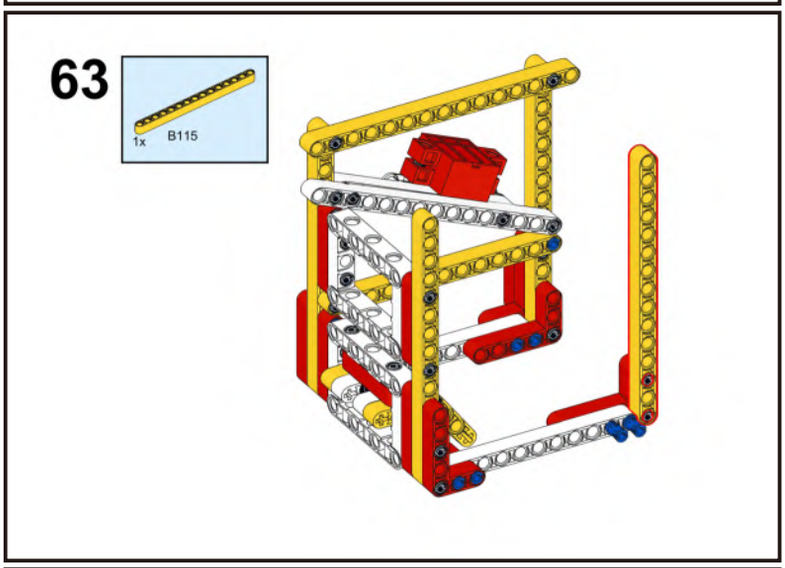


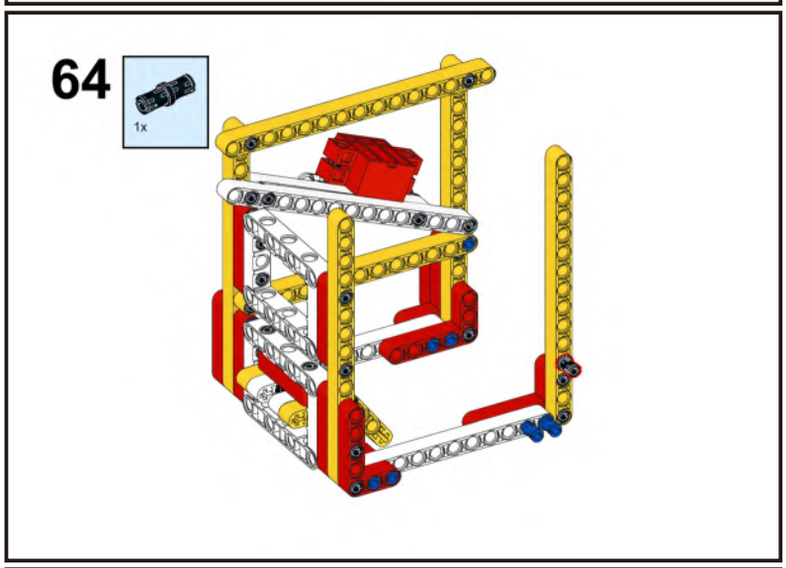


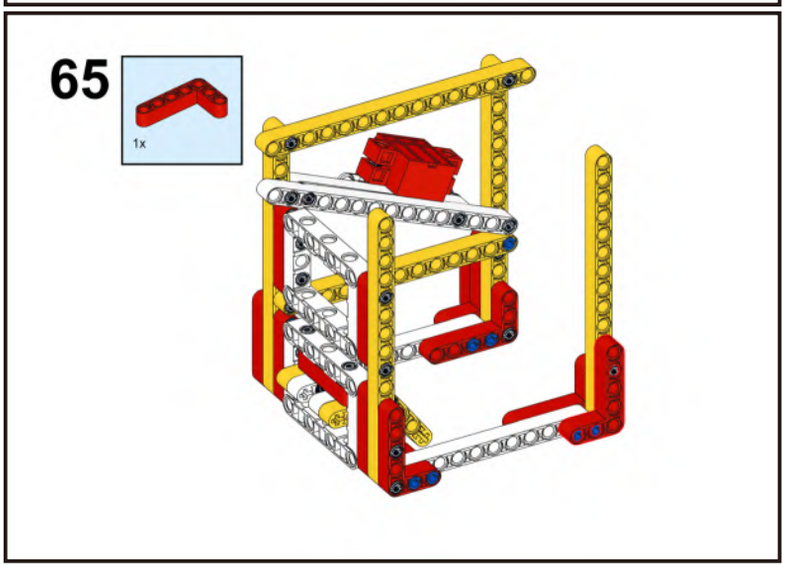
https://osoyoo.com/?p=44354

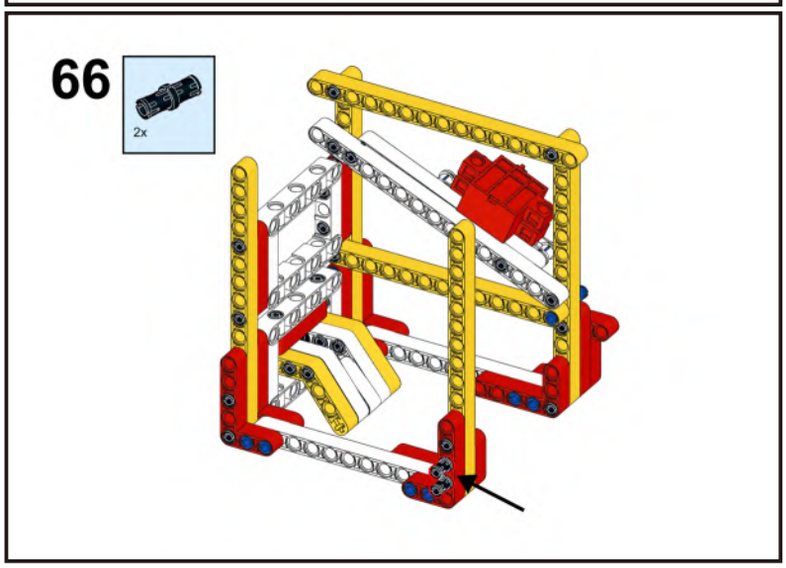




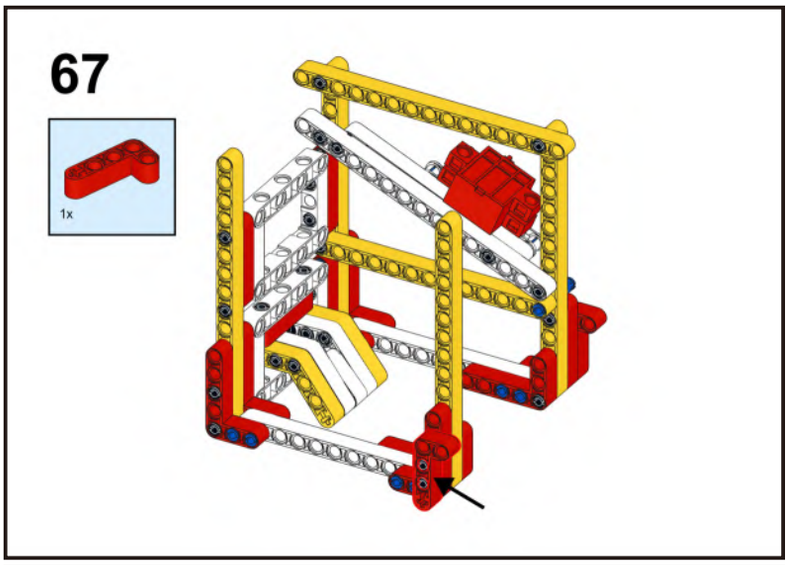


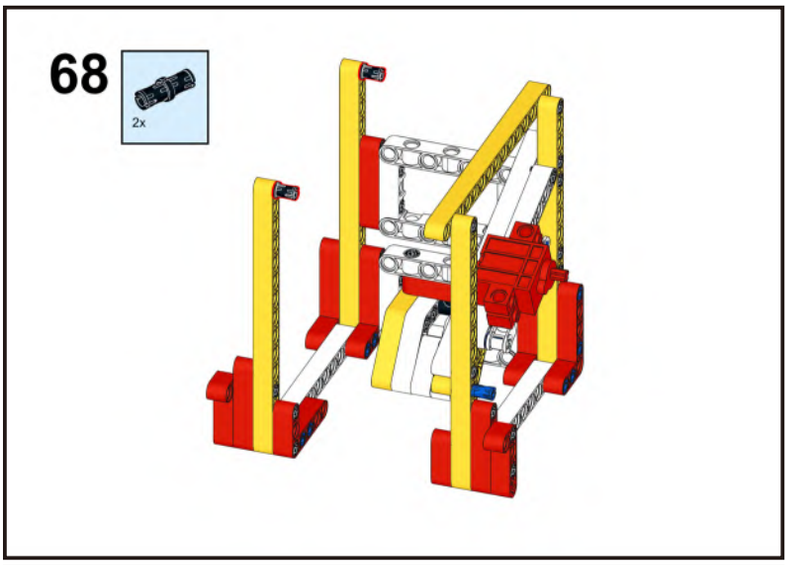


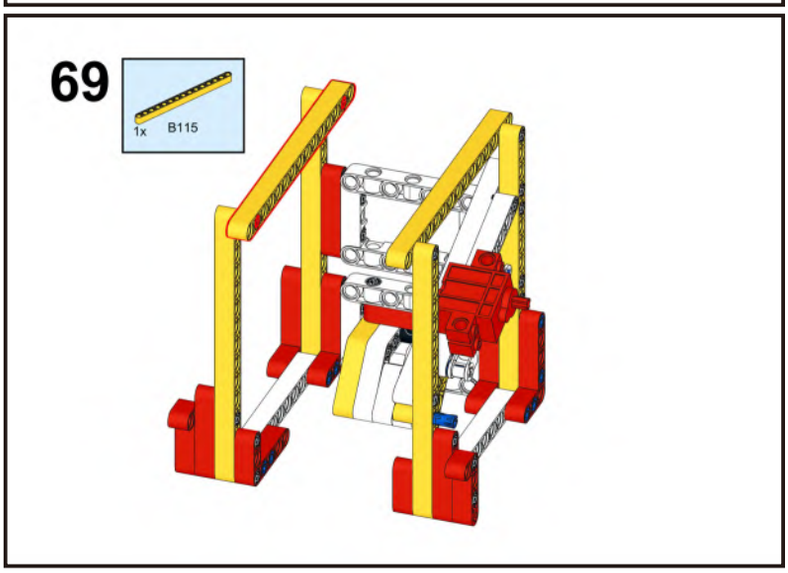


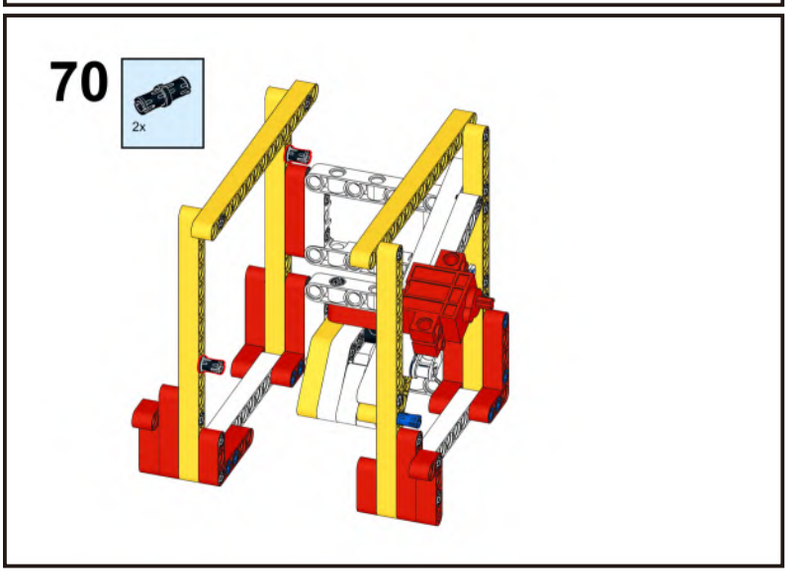


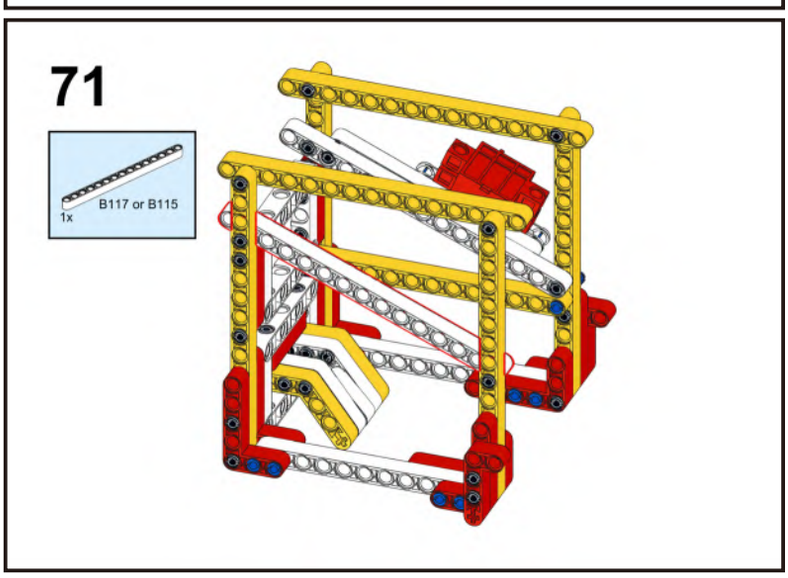
https://osoyoo.com/?p=44354

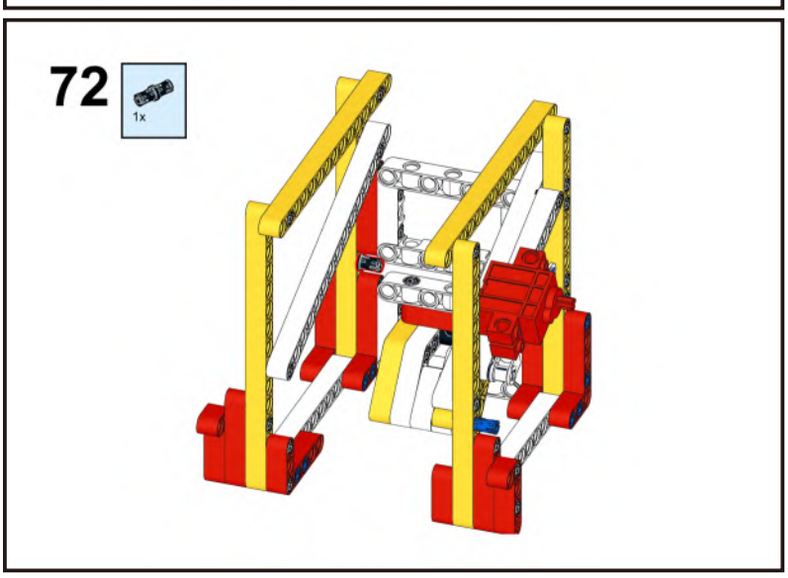




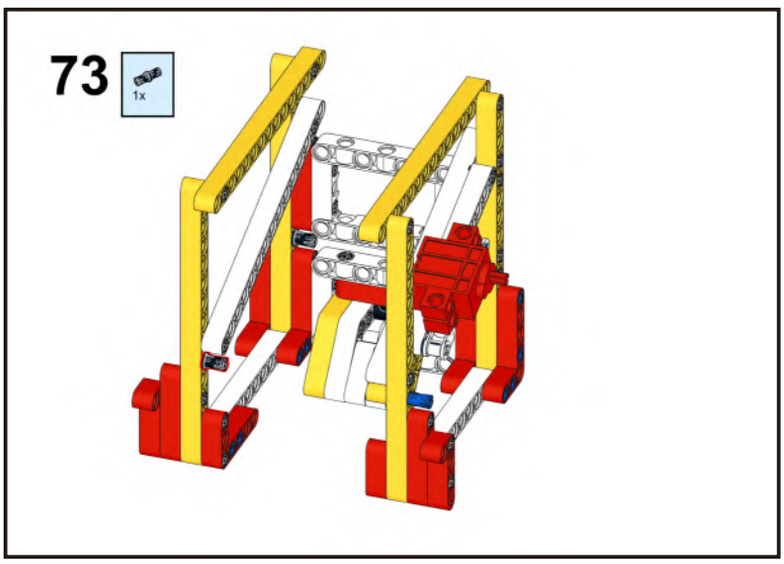


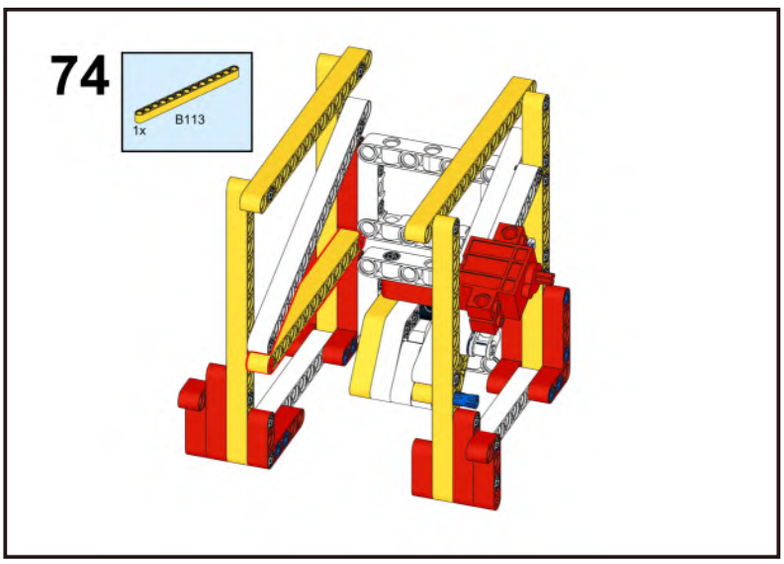


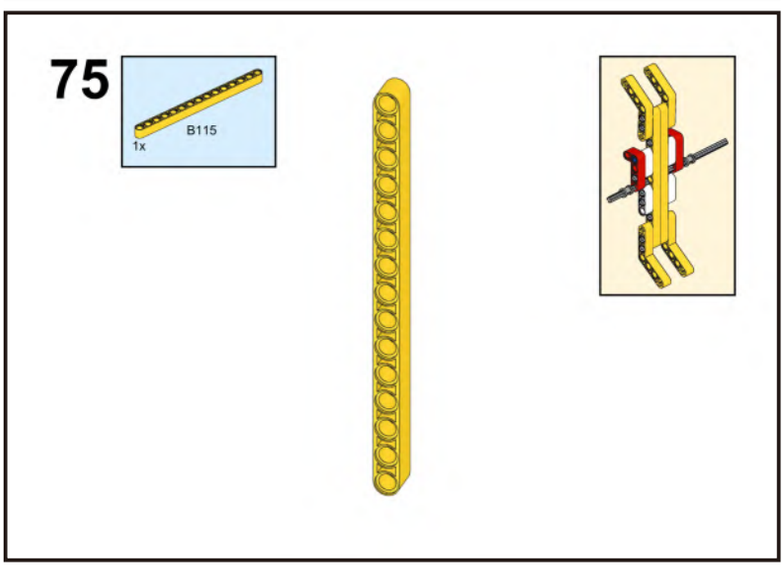


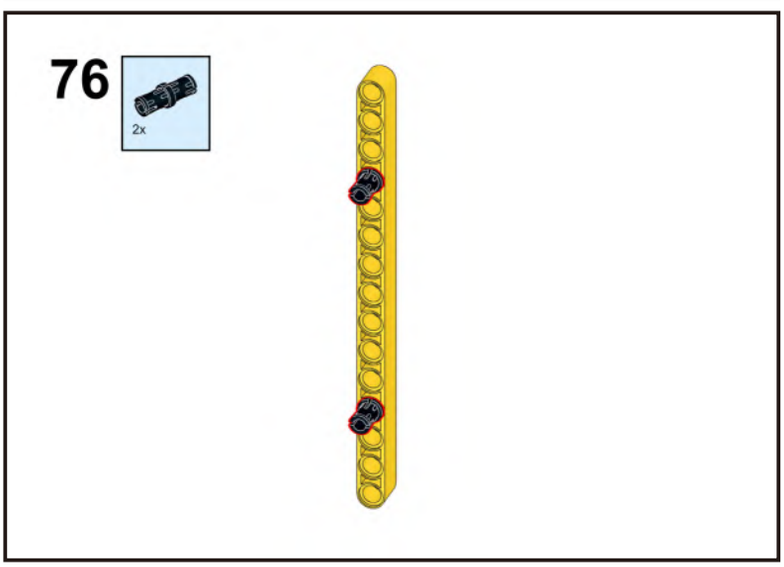


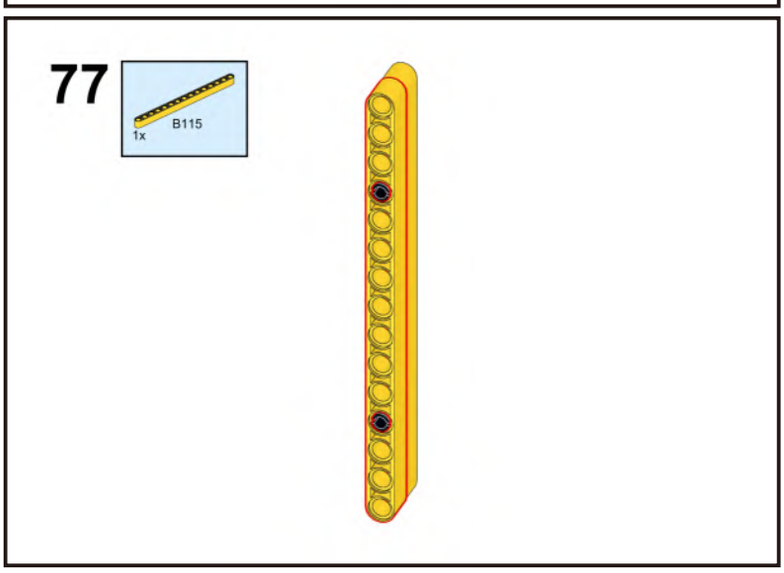
https://osoyoo.com/?p=44354

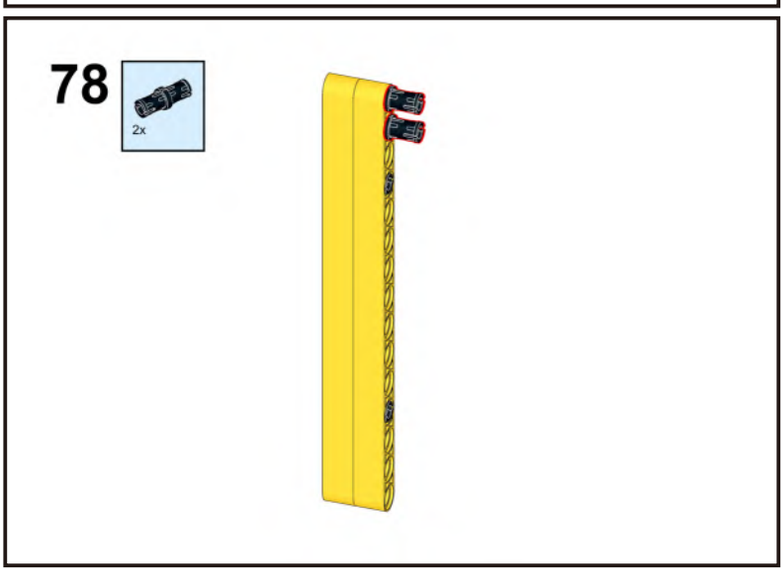




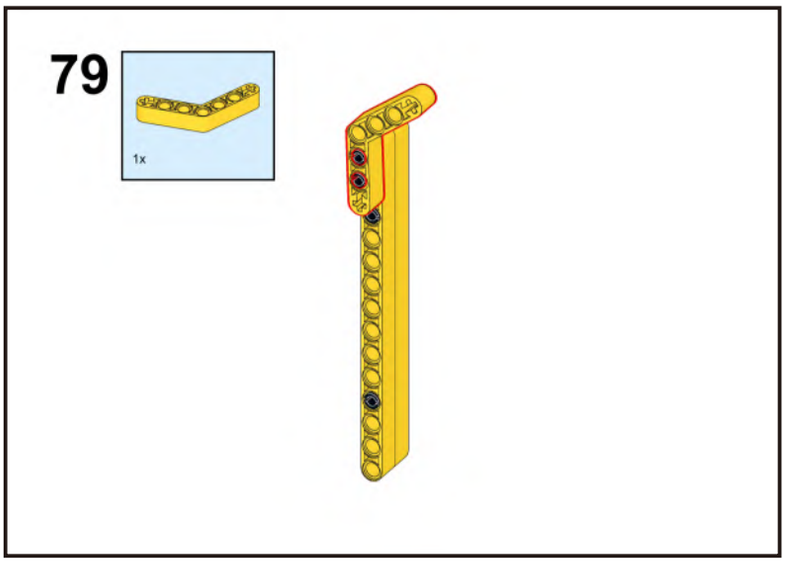


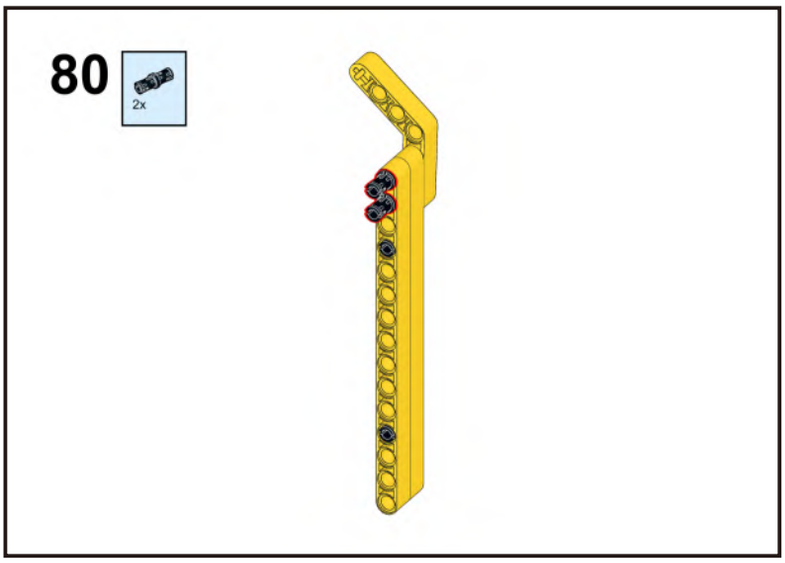


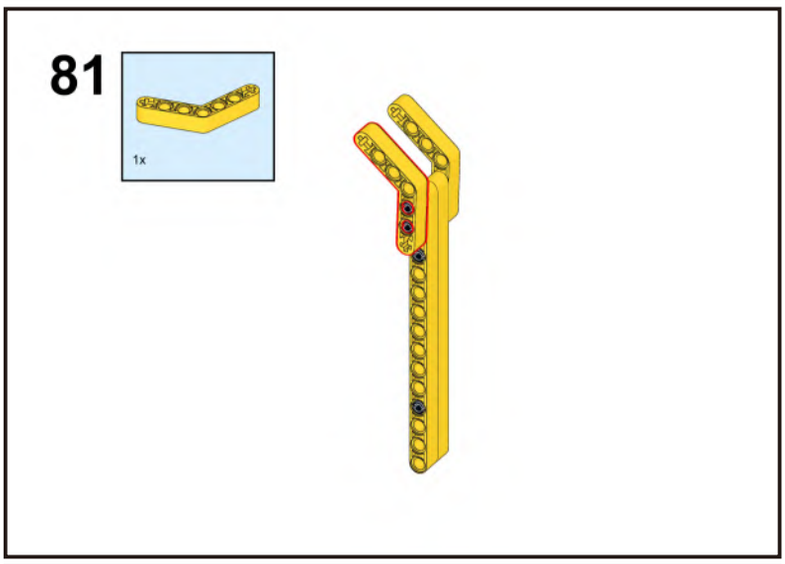


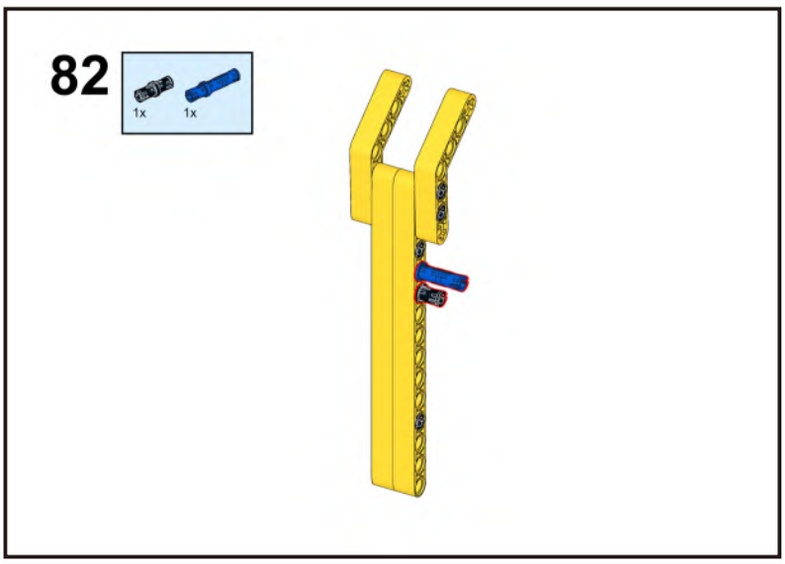


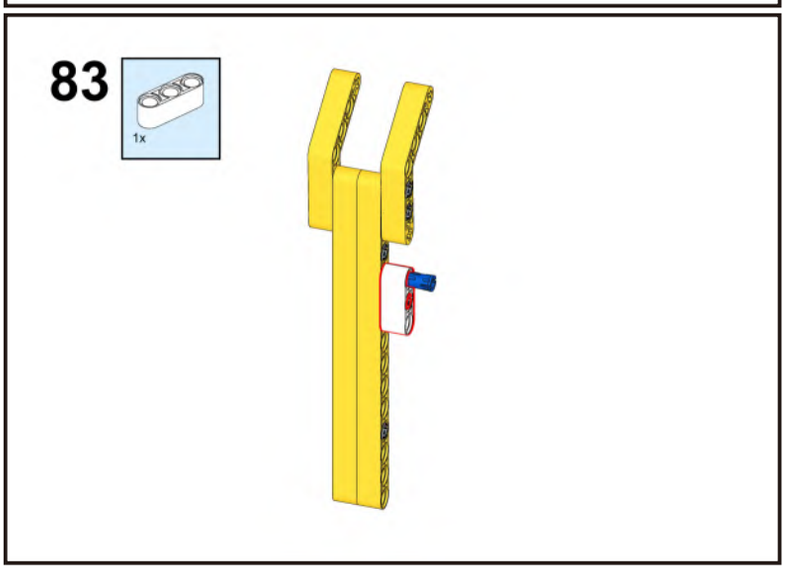
https://osoyoo.com/?p=44354

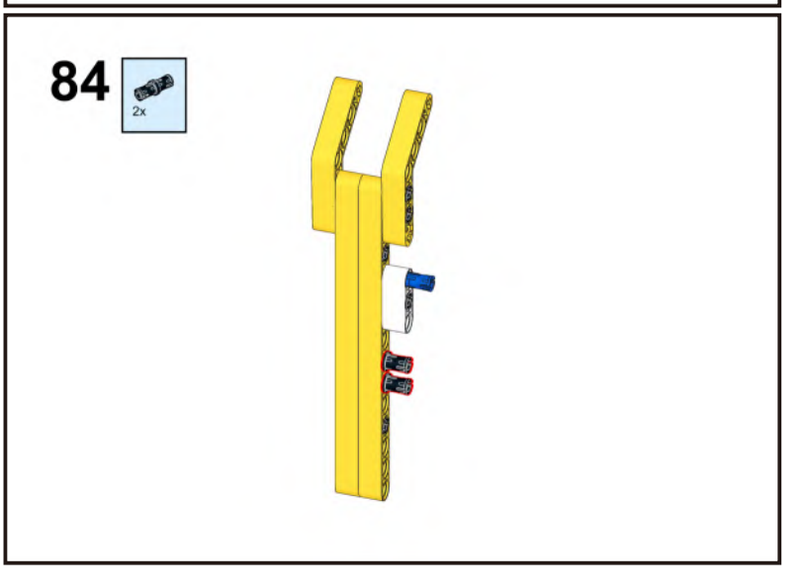




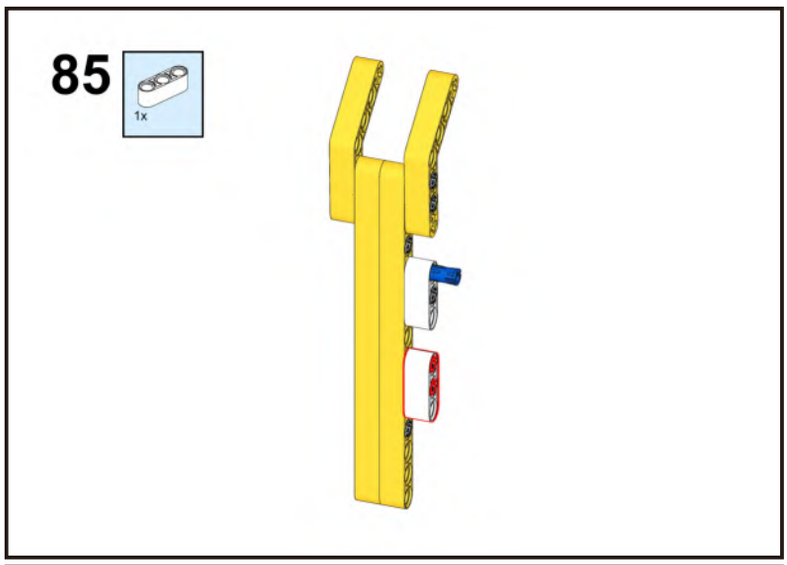


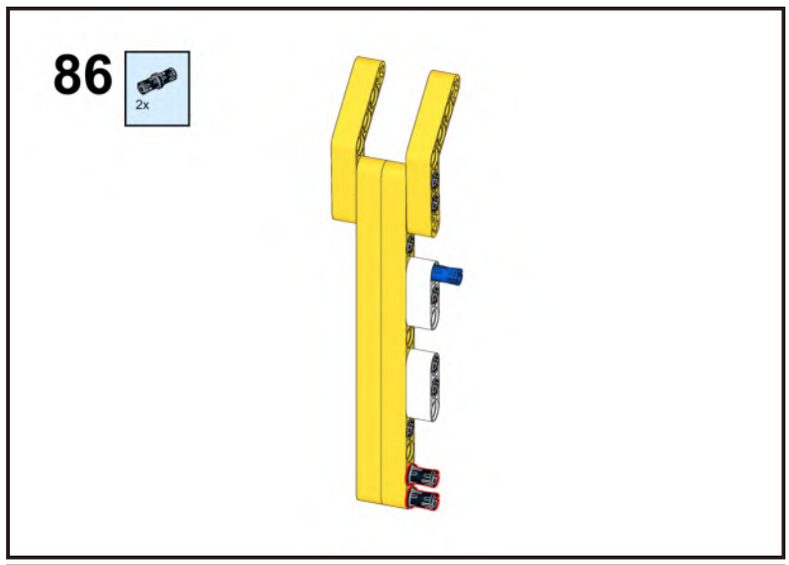


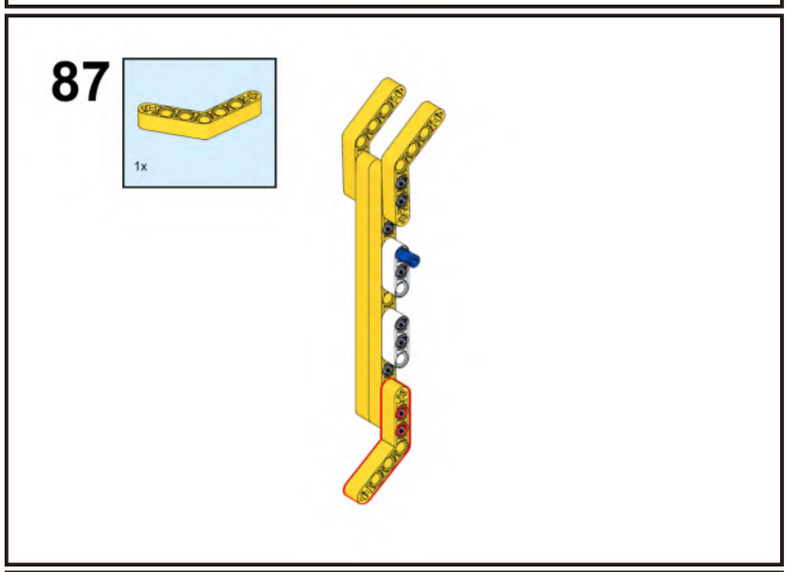


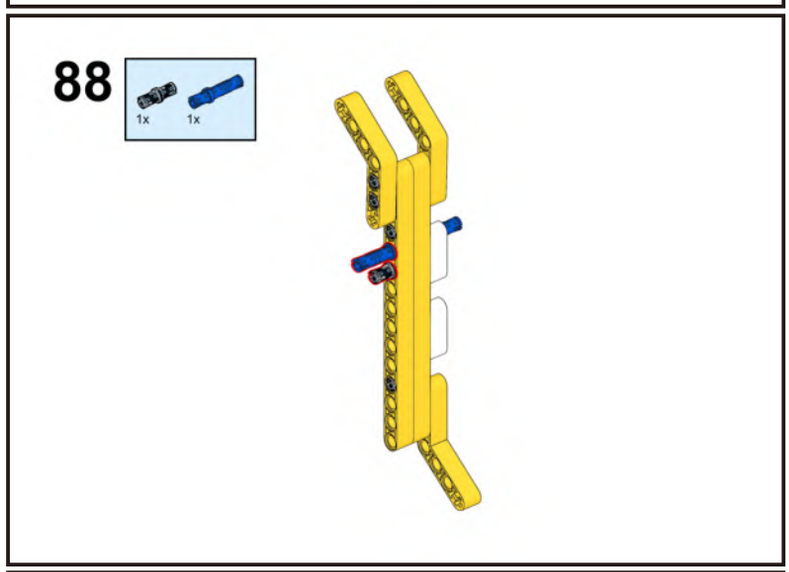


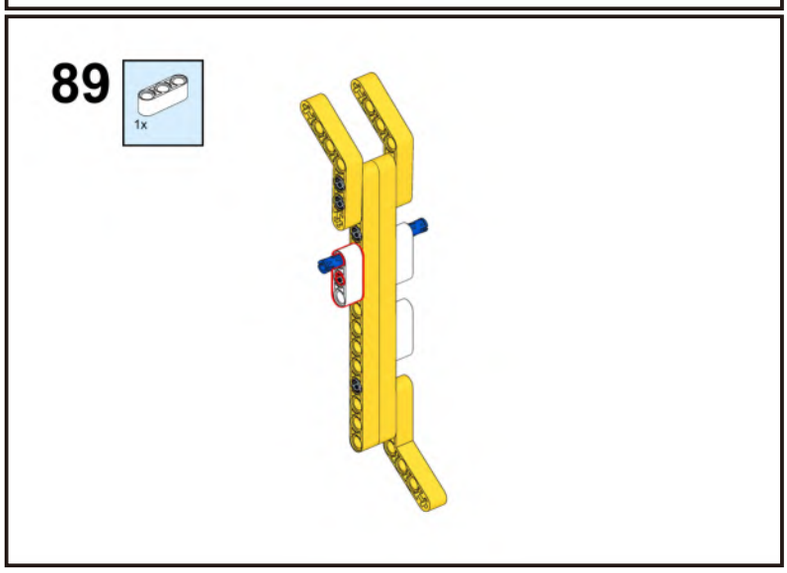
https://osoyoo.com/?p=44354

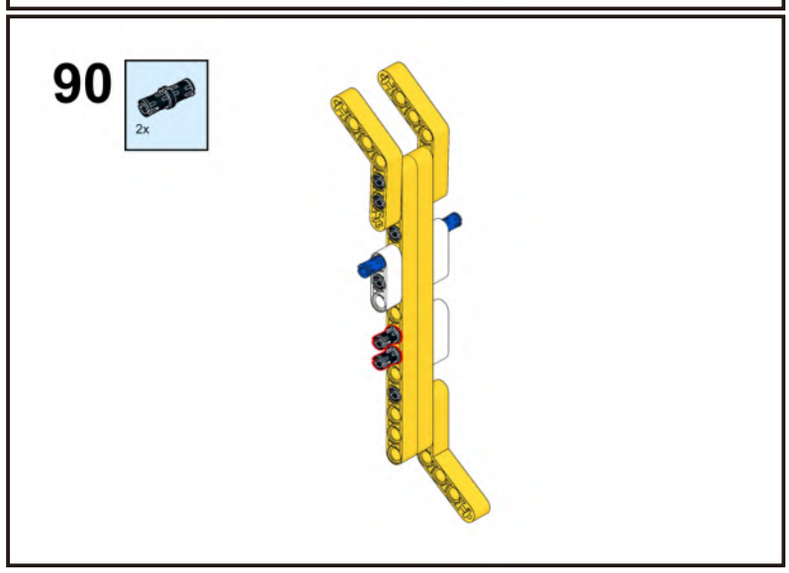






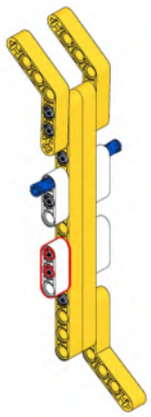




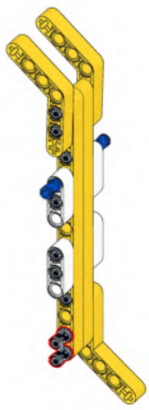


https://osoyoo.com/?p=44354

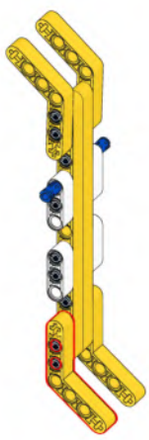
91



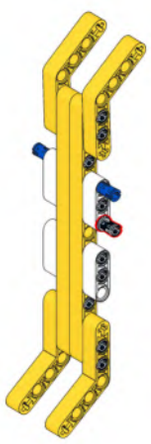
92



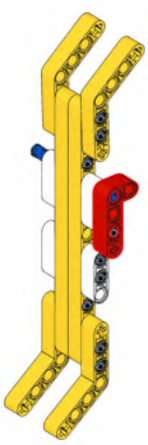
93



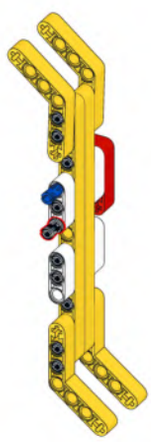
94



95

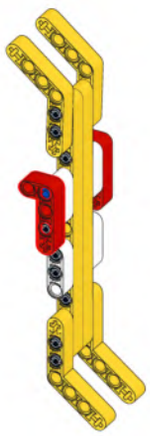


96

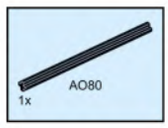


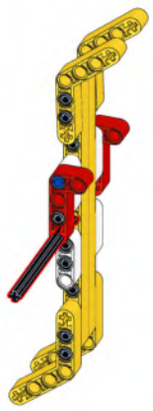
https://osoyoo.com/?p=44354

97

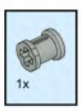


98

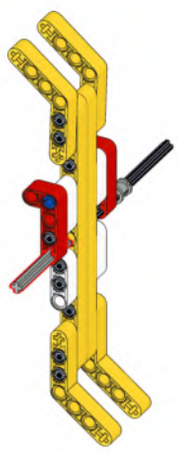




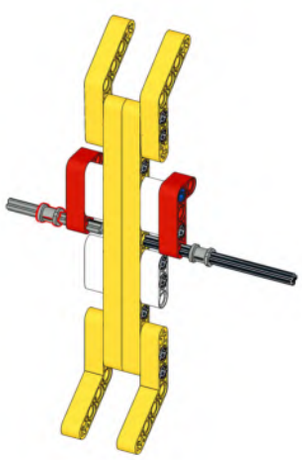
99



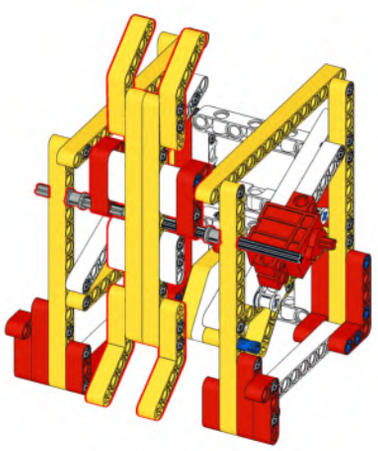
100



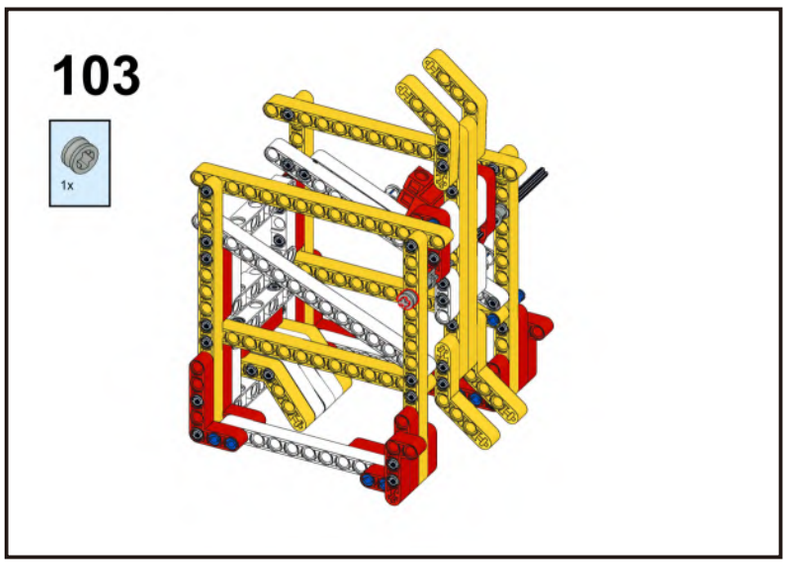
101

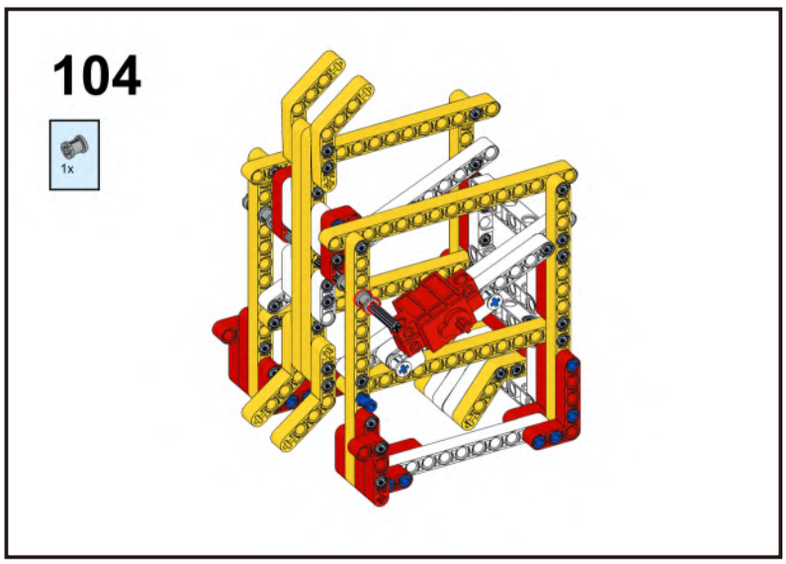


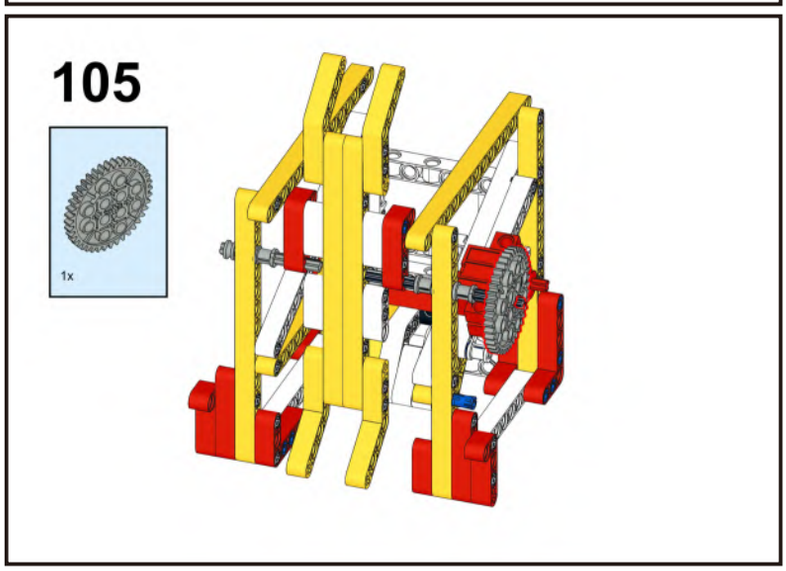
102

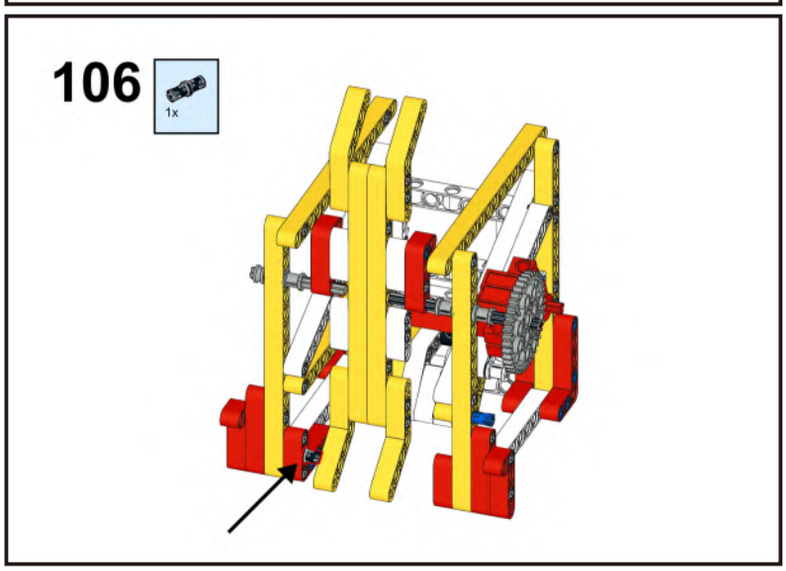


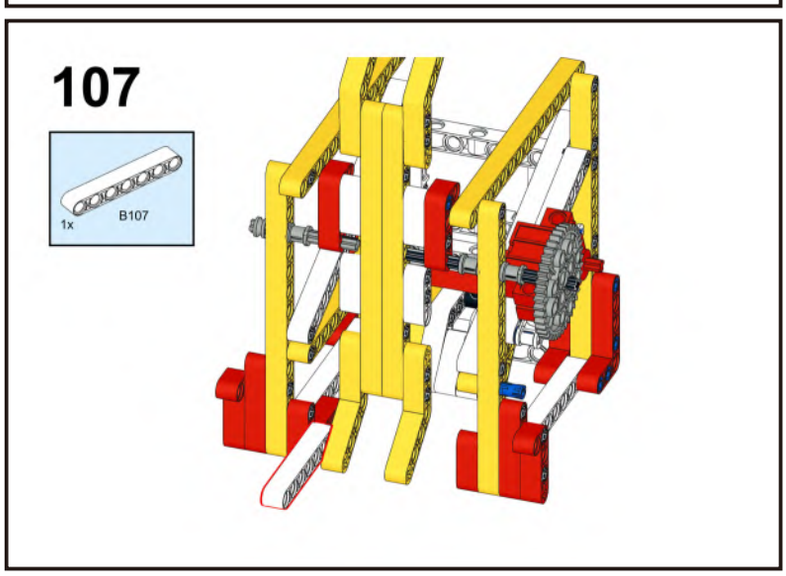
https://osoyoo.com/?p=44354

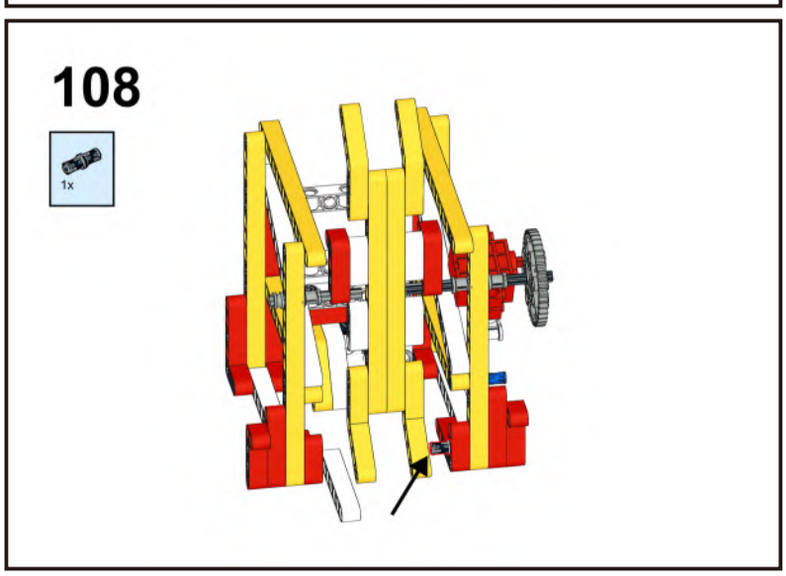




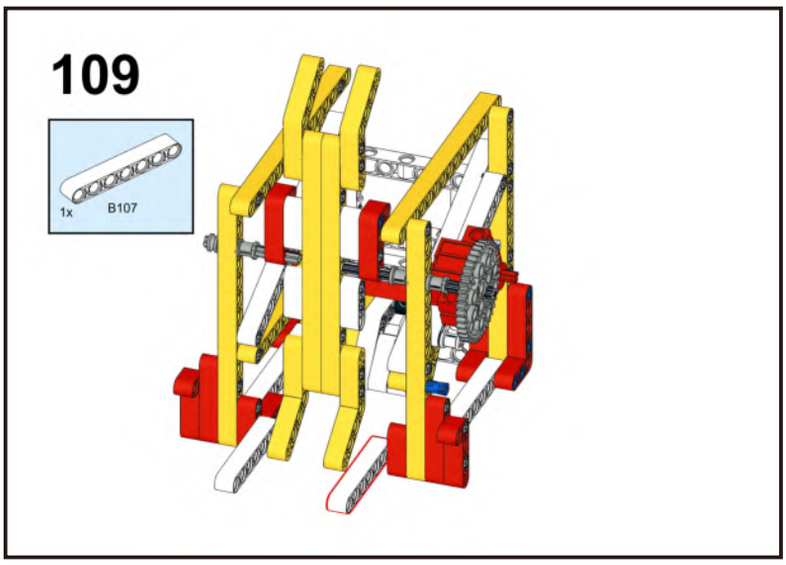


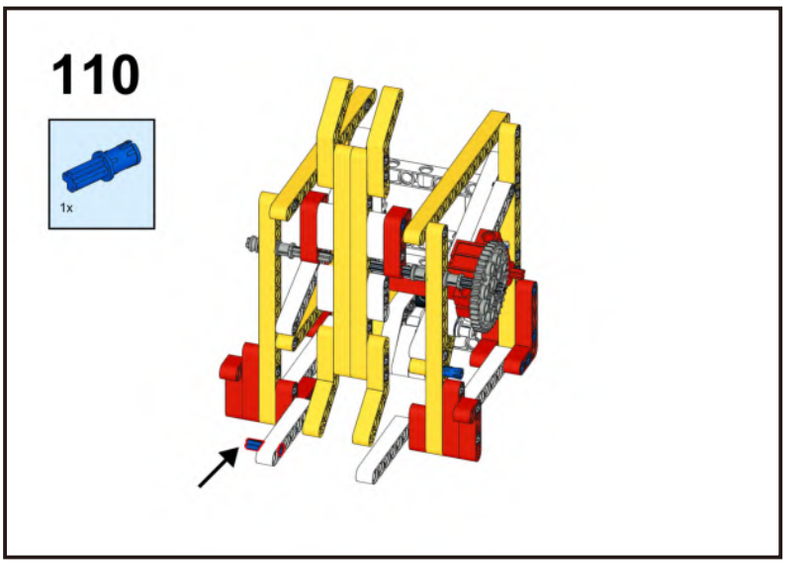


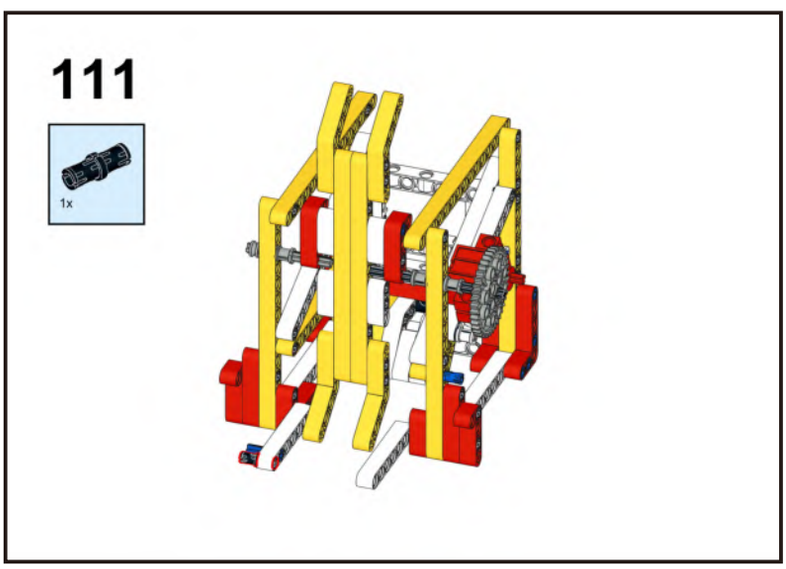


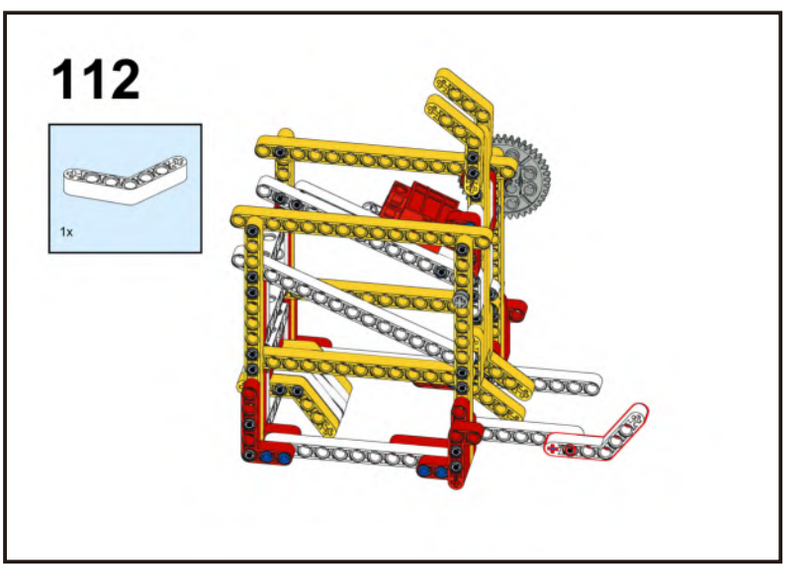


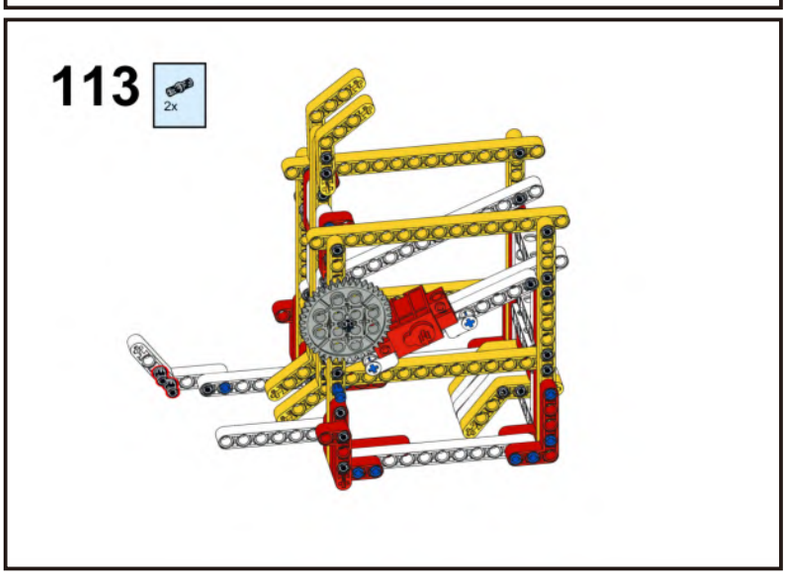
https://osoyoo.com/?p=44354

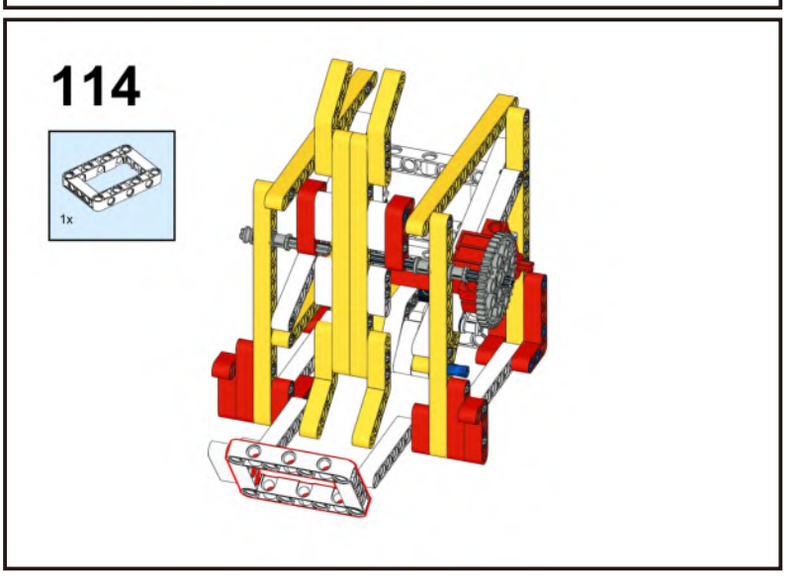






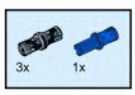


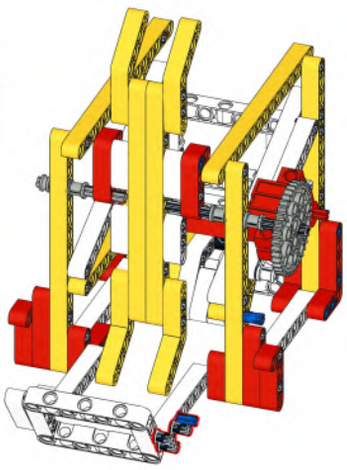




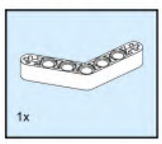
https://osoyoo.com/?p=44354

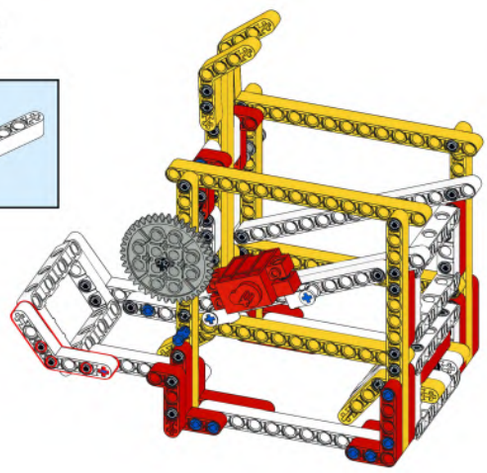
115



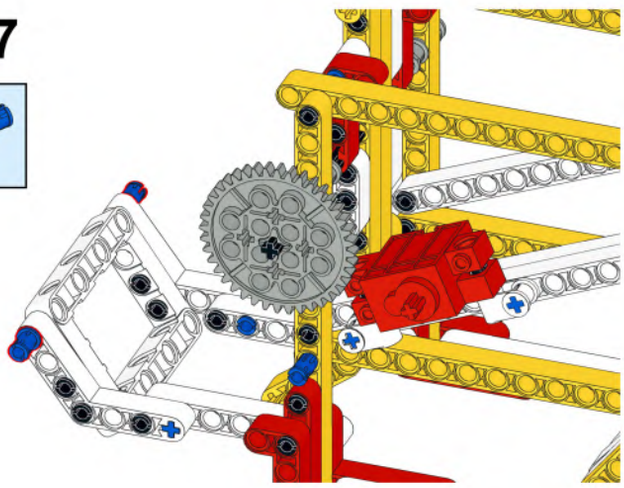


116

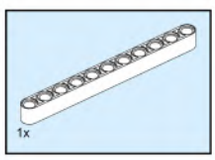


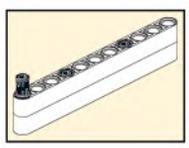


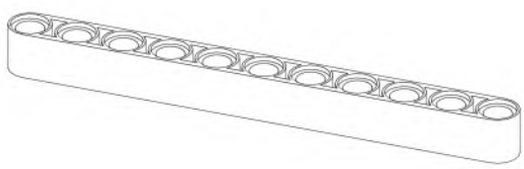
117



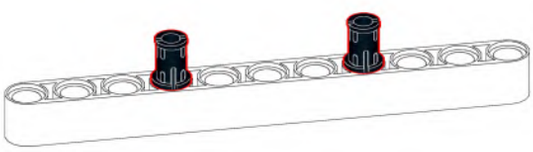
118



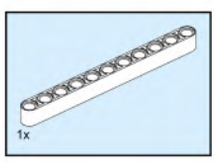


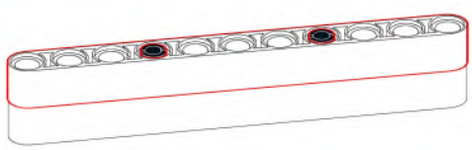


119



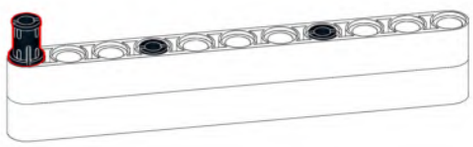
120



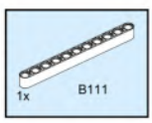


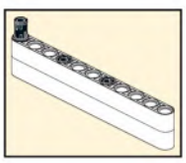
https://osoyoo.com/?p=44354

121

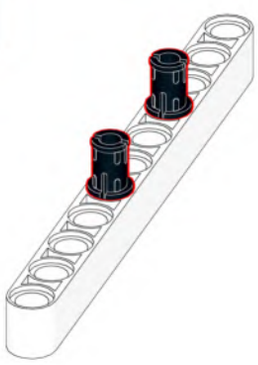


122

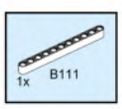


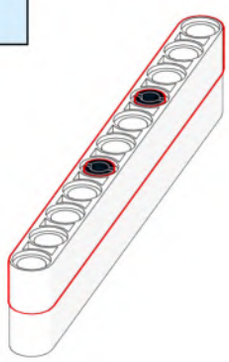


123



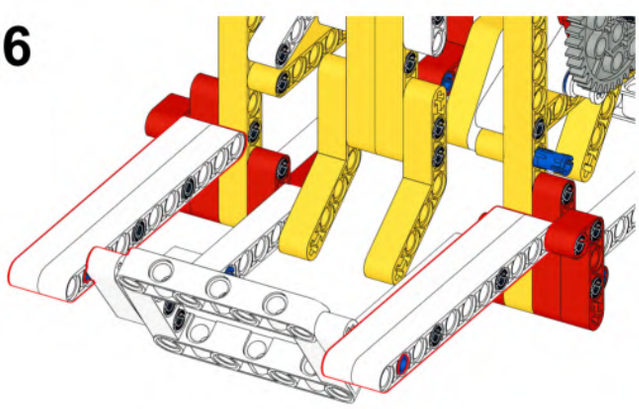
124



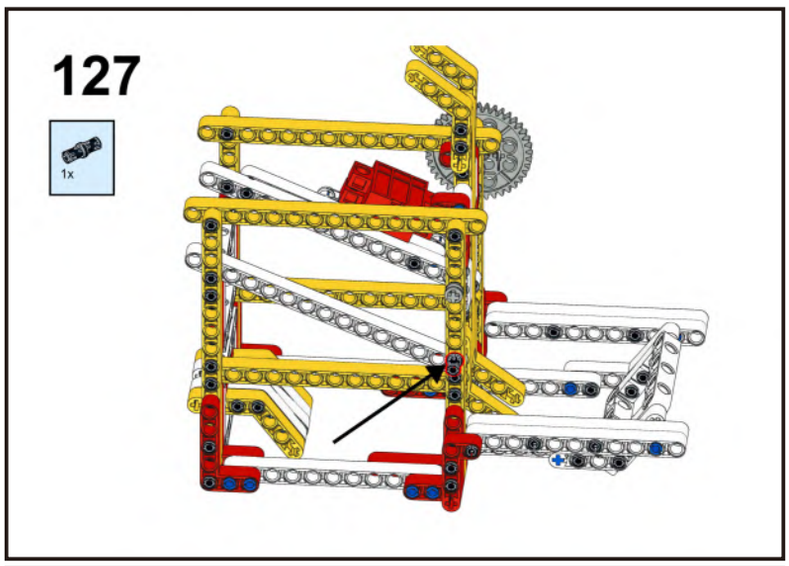


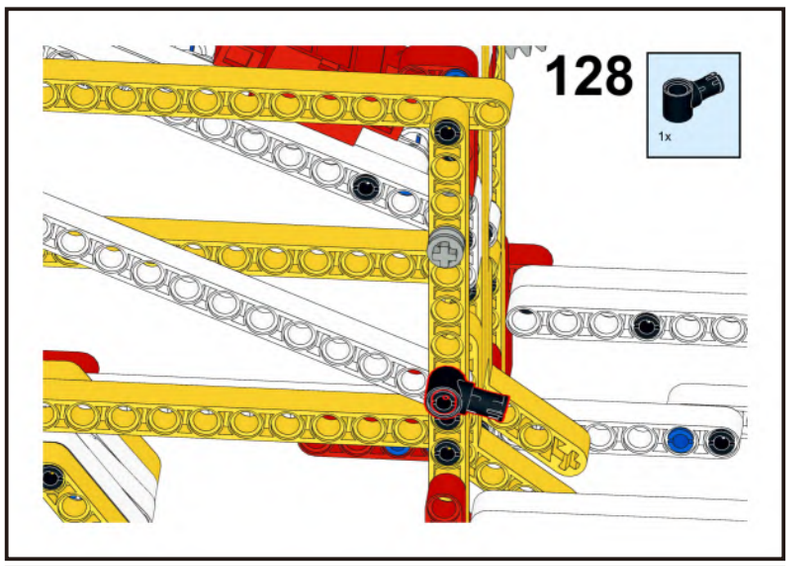
125

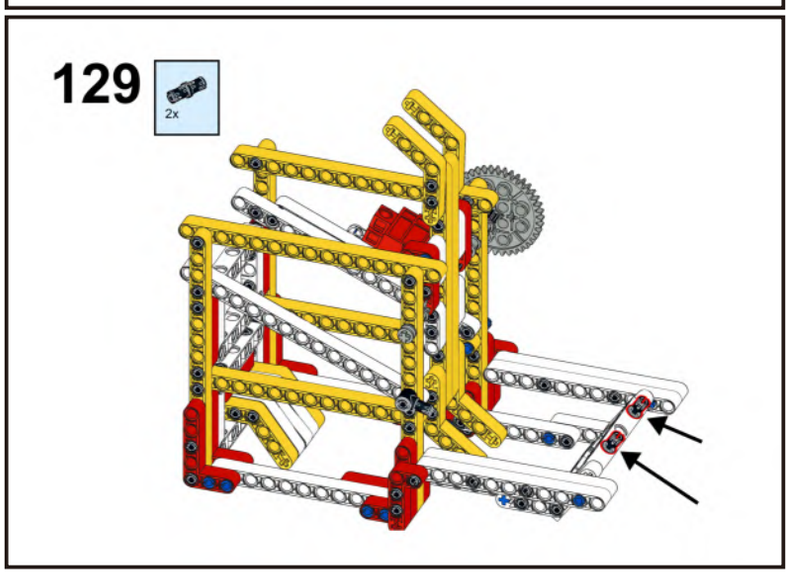
126

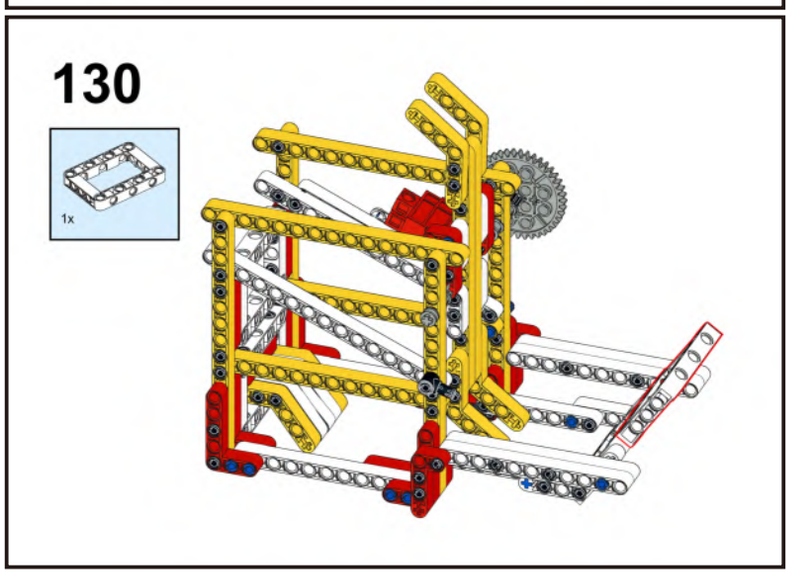


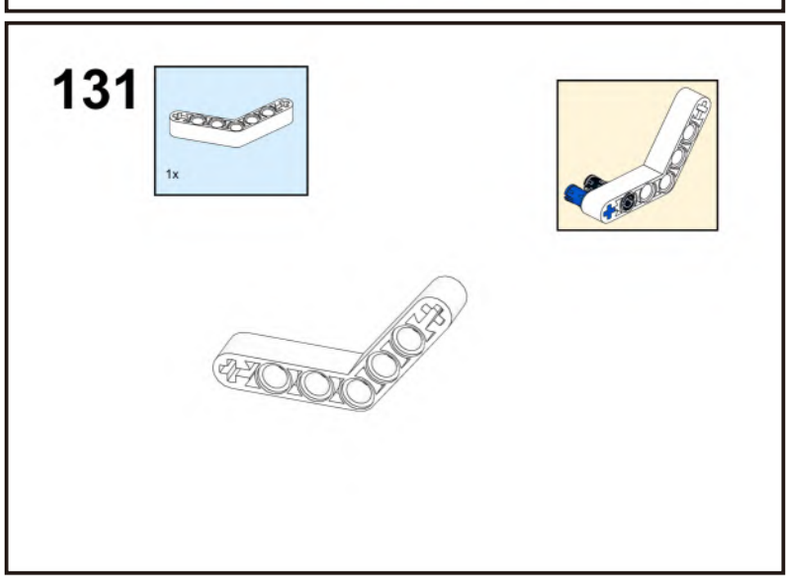
https://osoyoo.com/?p=44354

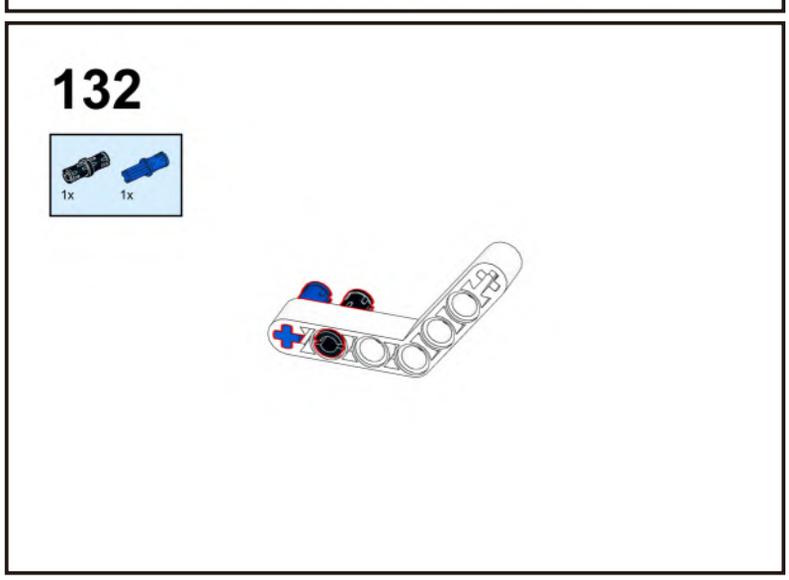




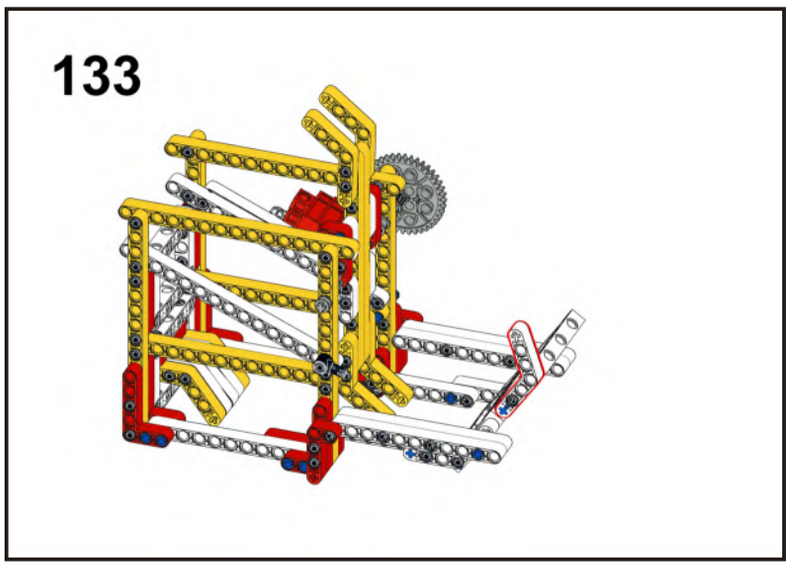


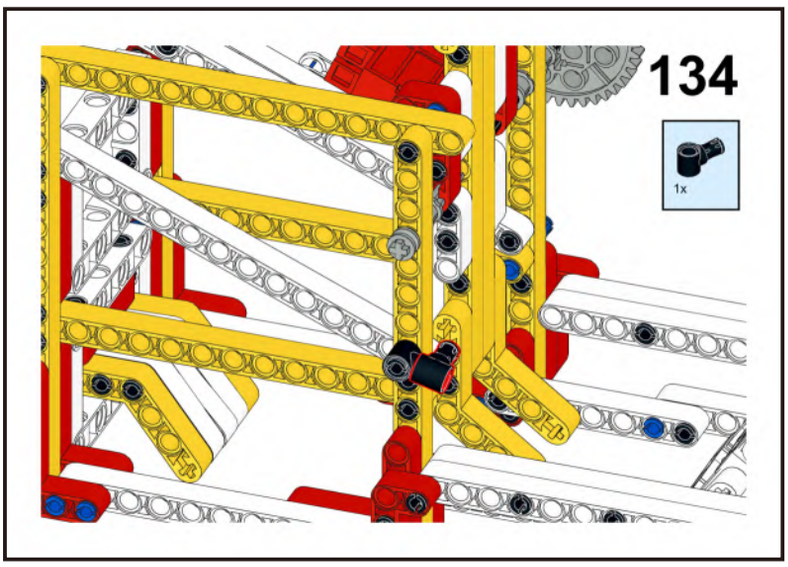


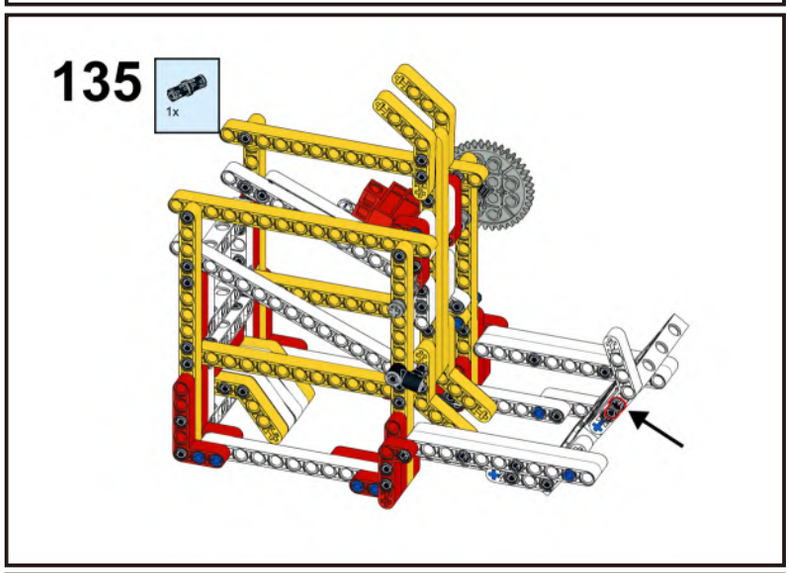


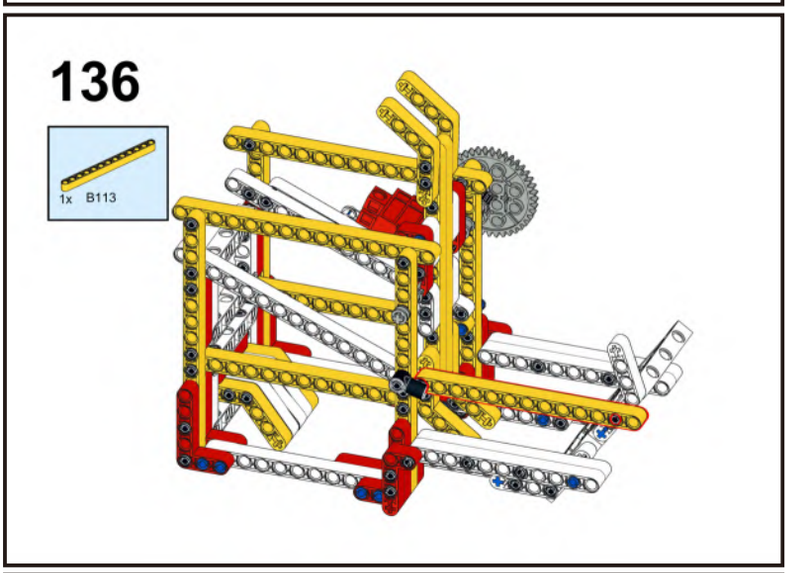


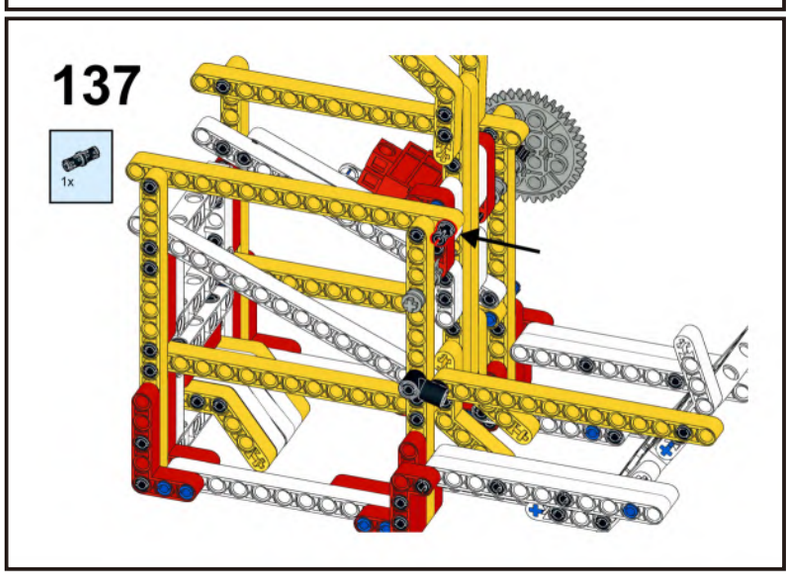
https://osoyoo.com/?p=44354

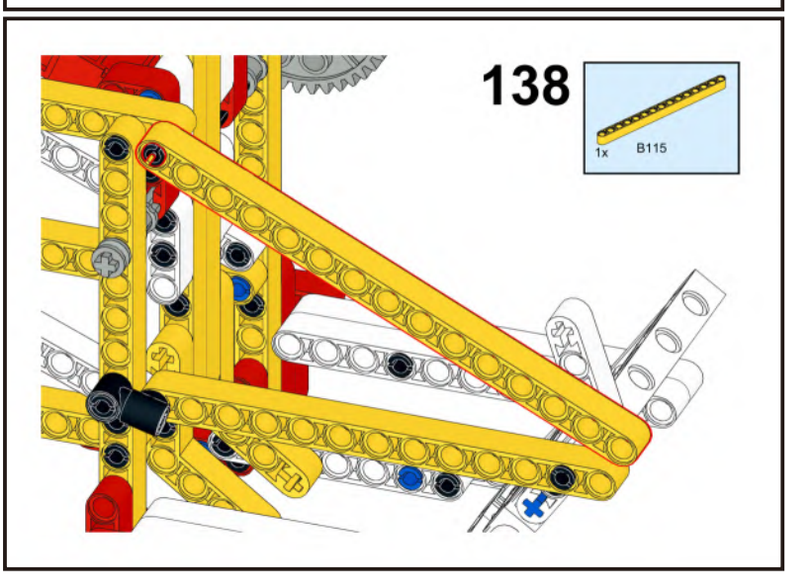




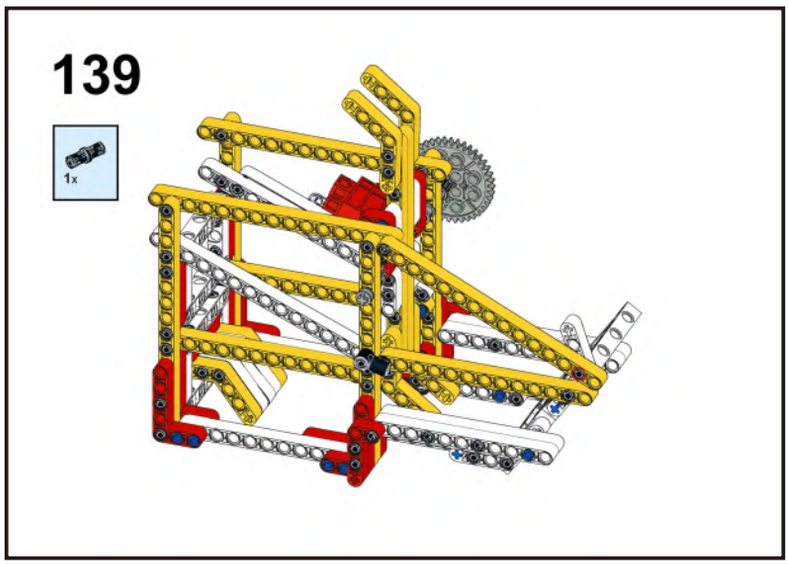


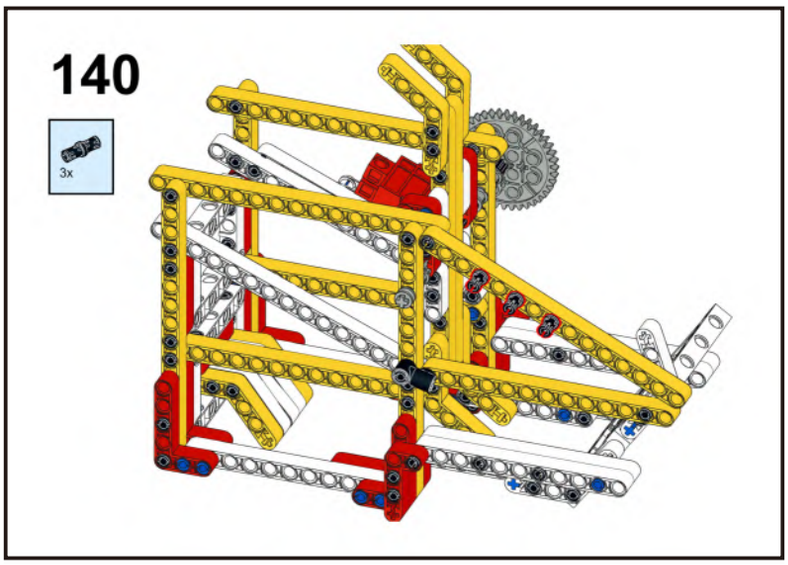


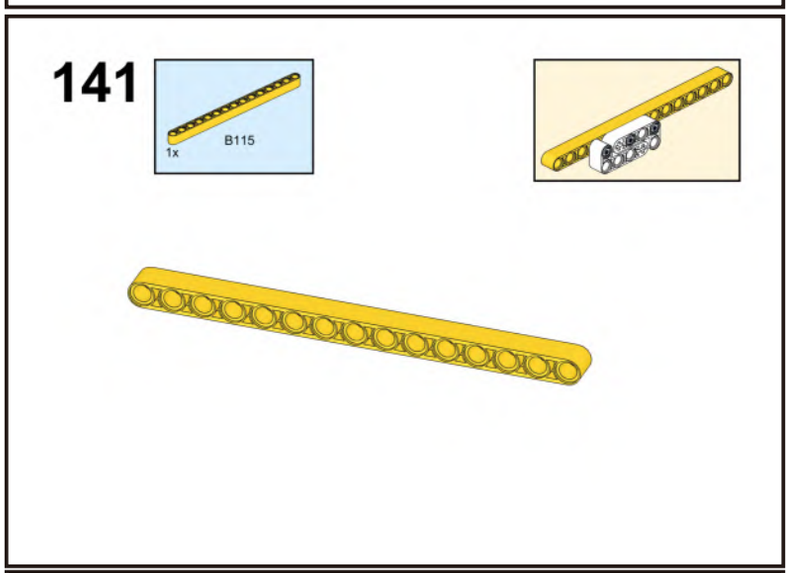


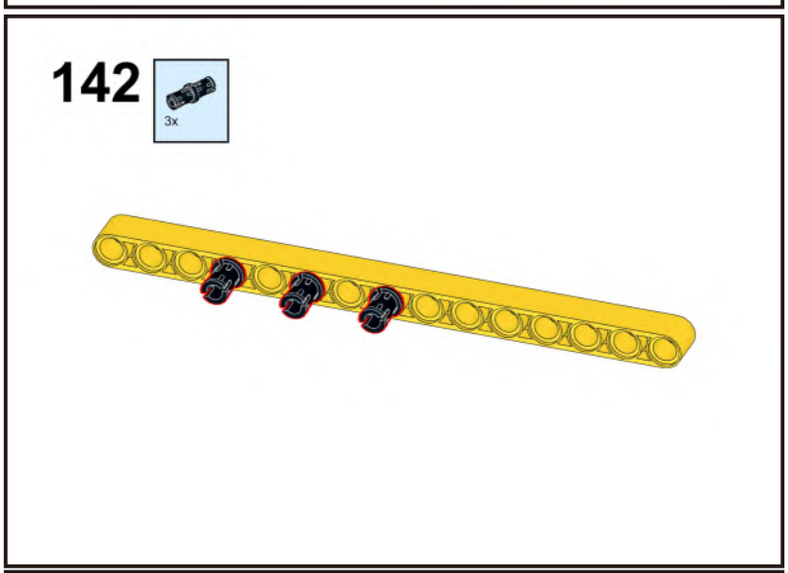


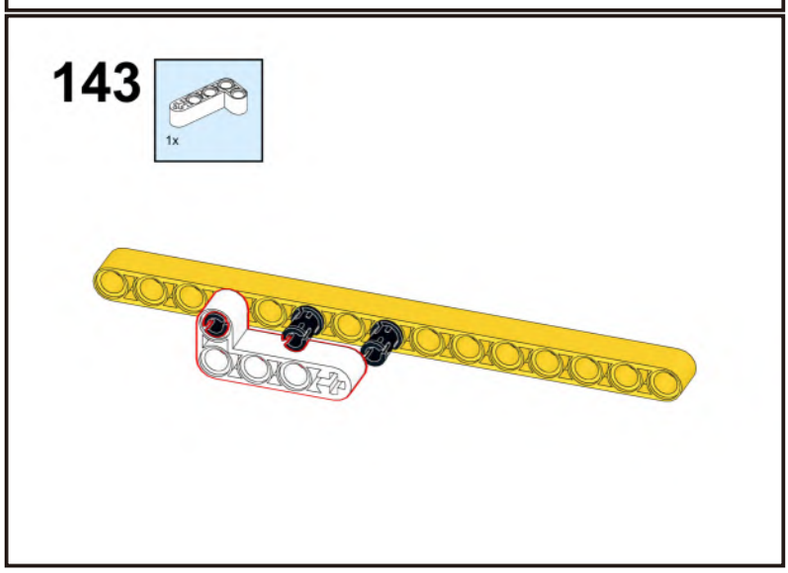
https://osoyoo.com/?p=44354

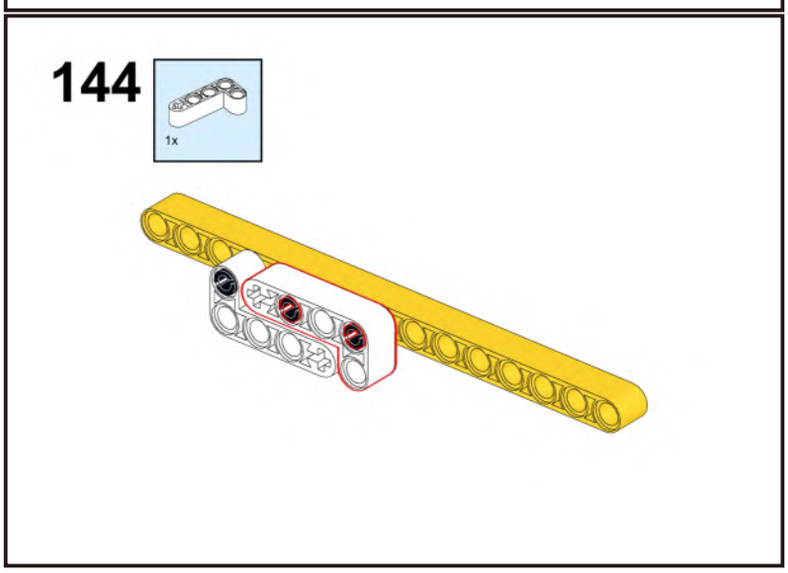






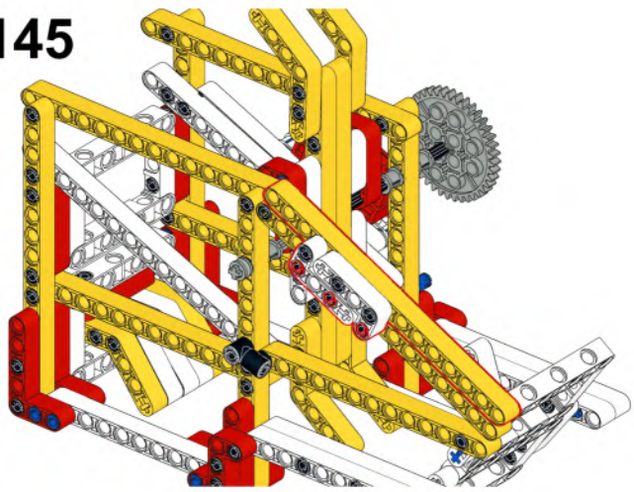




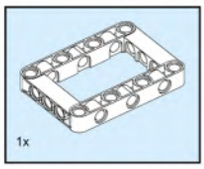


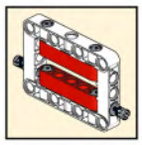
https://osoyoo.com/?p=44354

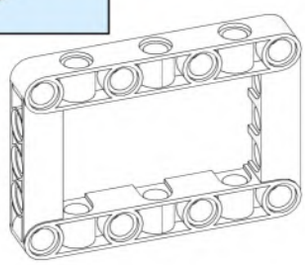
145



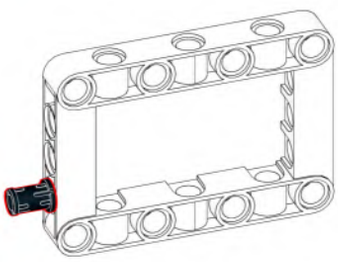
146



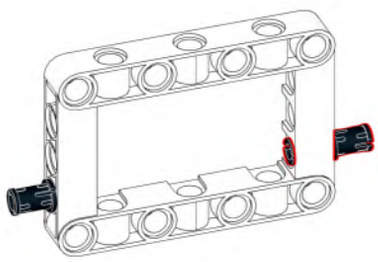




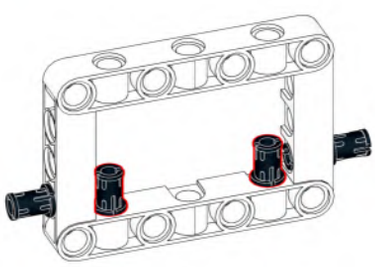
147



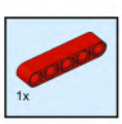
148

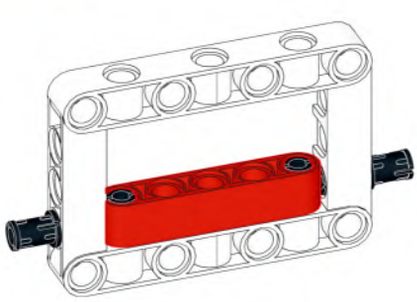


149



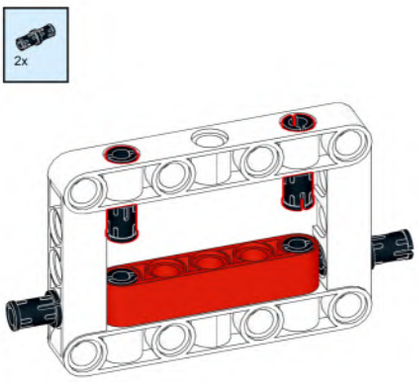
150



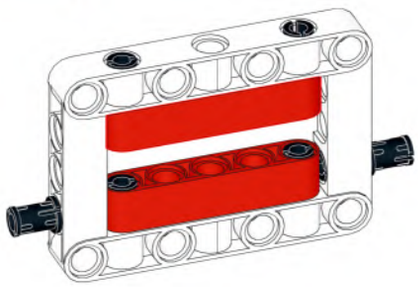


https://osoyoo.com/?p=44354

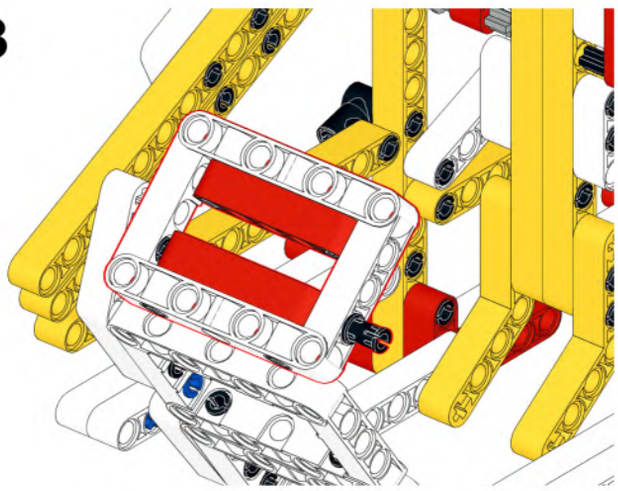
151



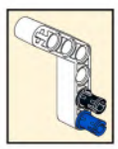
152



153

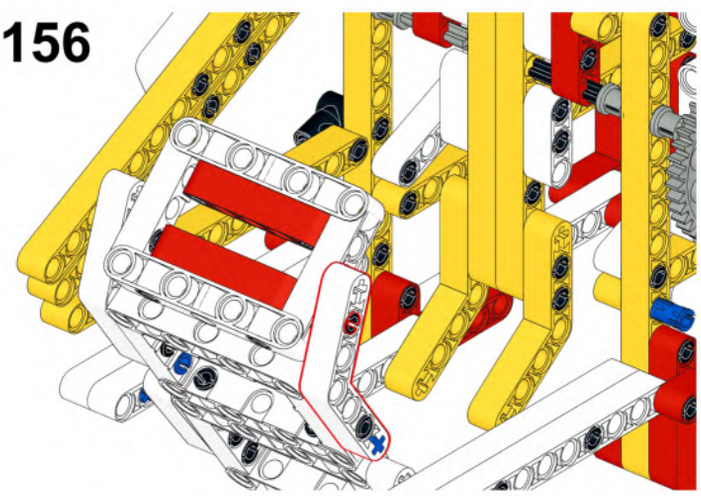


154

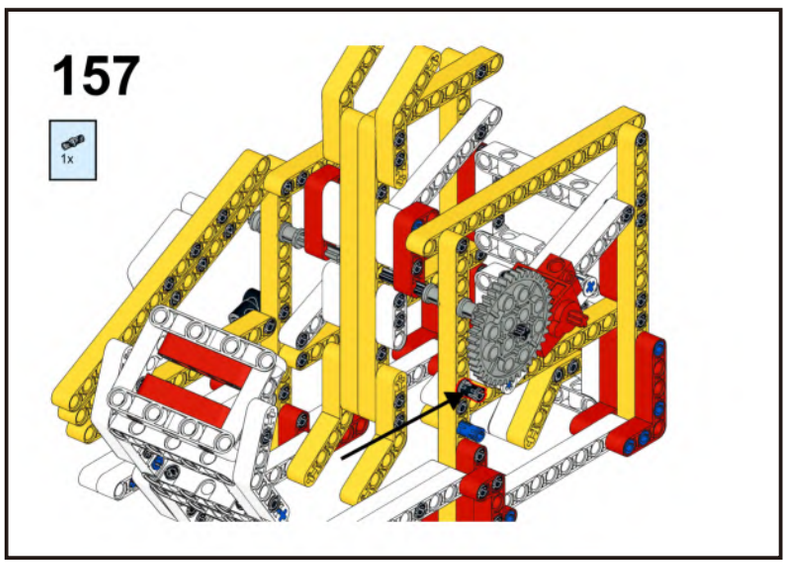


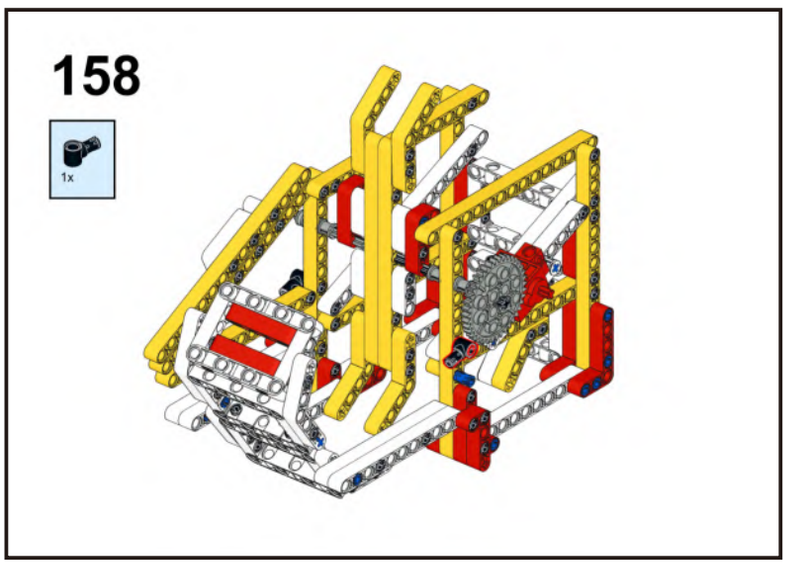
155

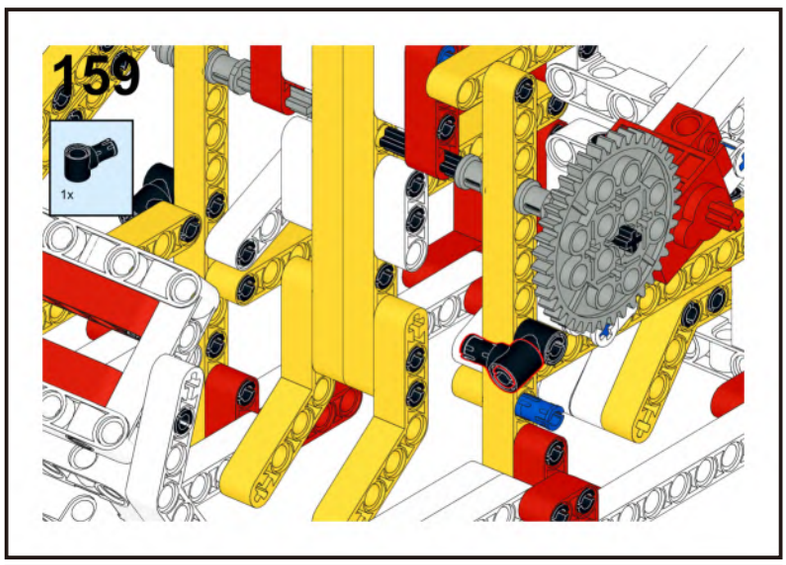
156

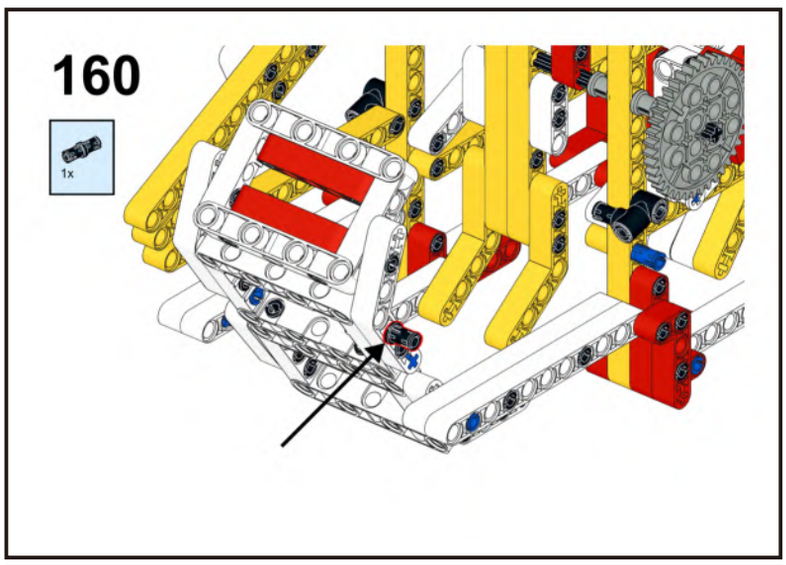


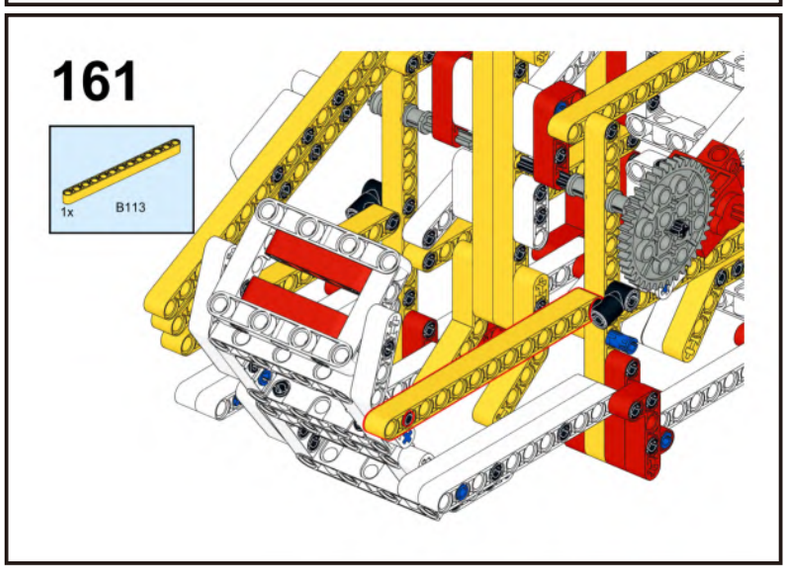
https://osoyoo.com/?p=44354

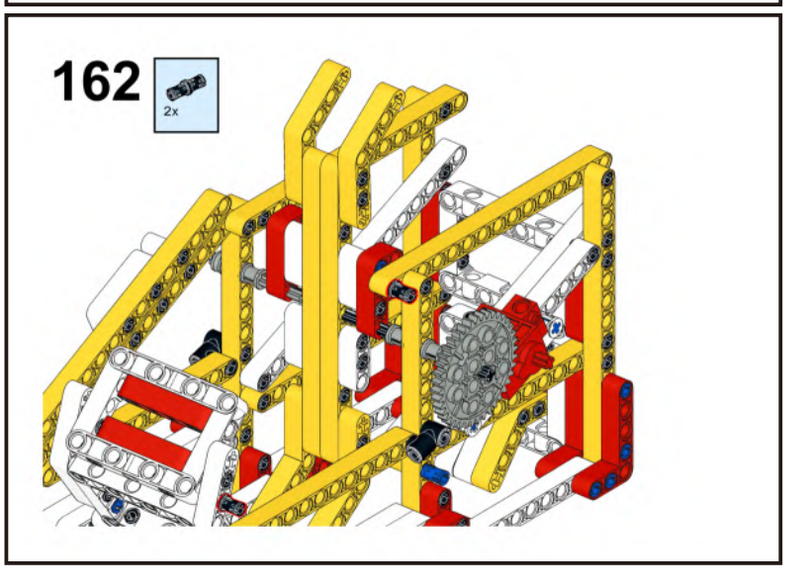




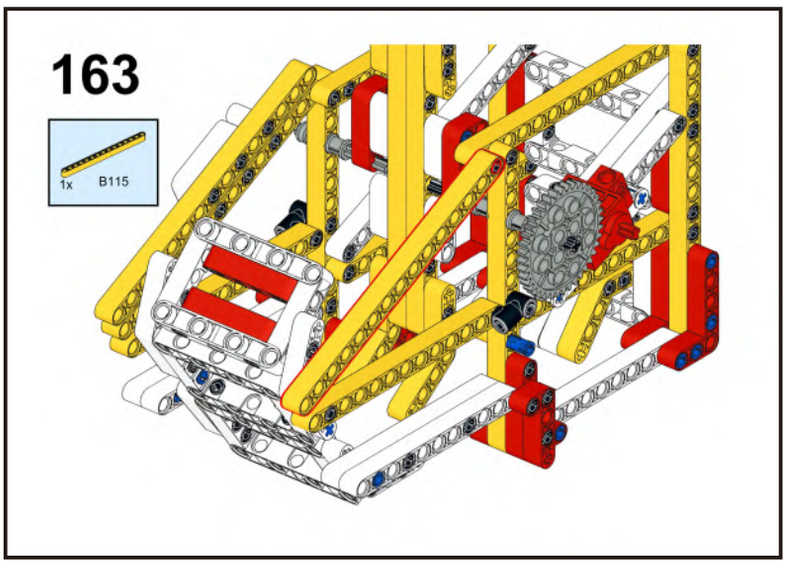


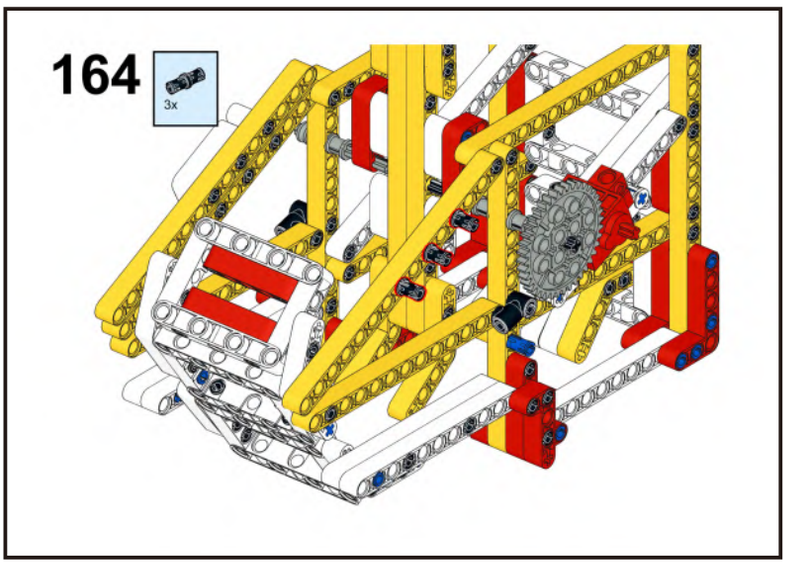


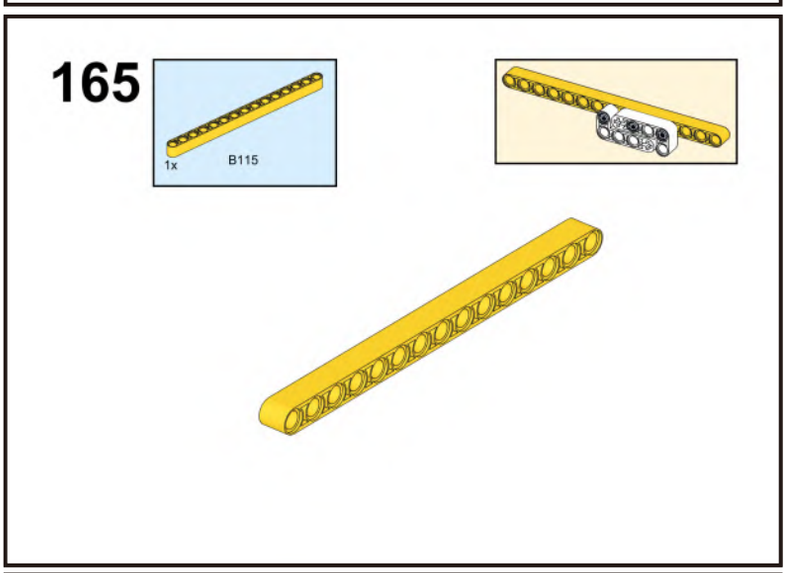


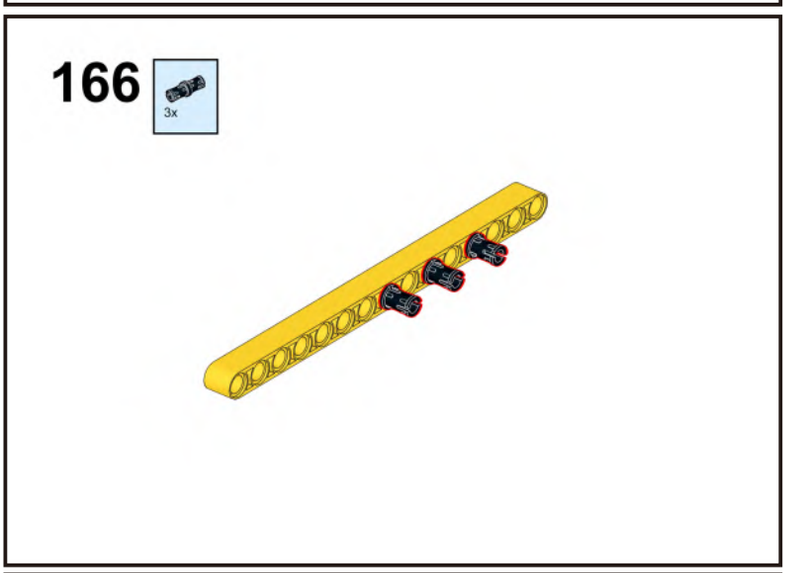


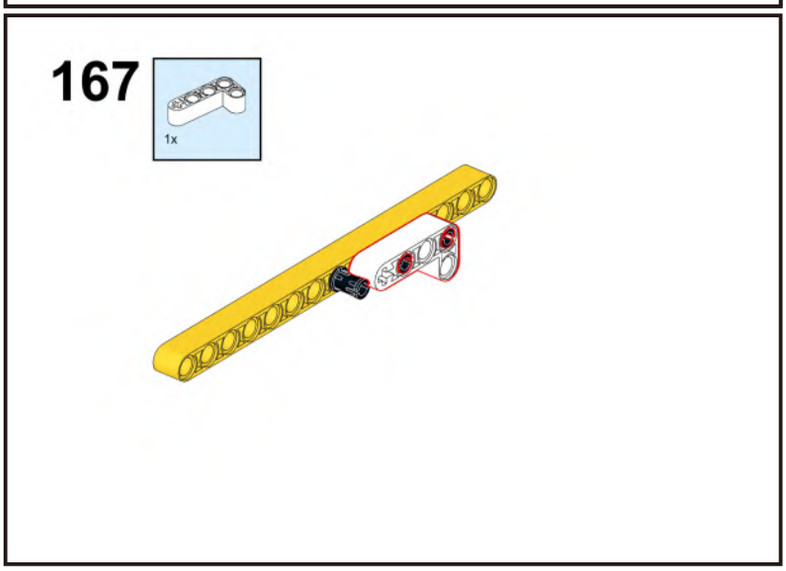
https://osoyoo.com/?p=44354

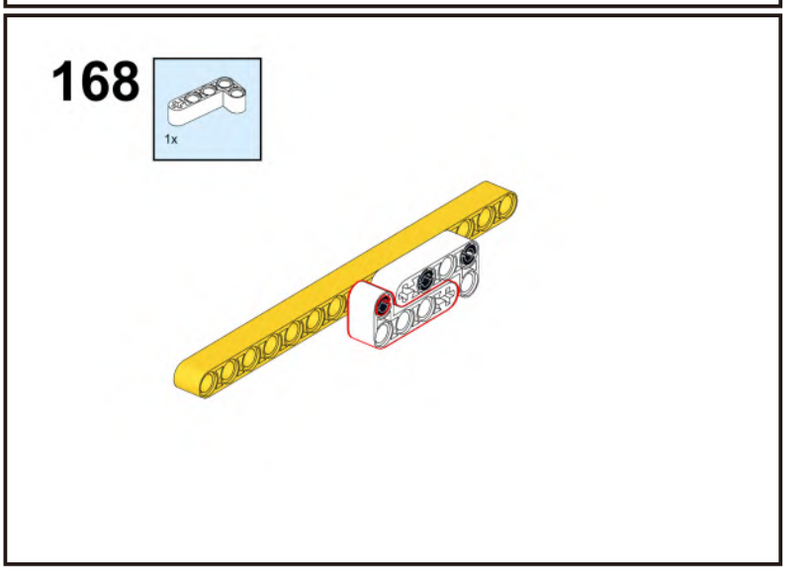






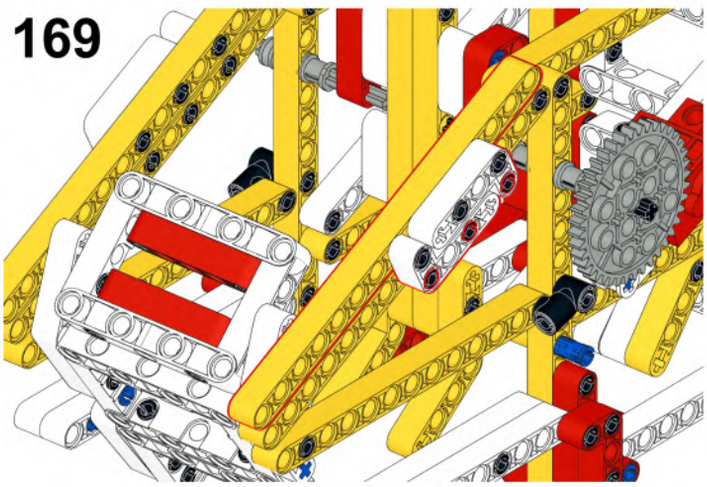




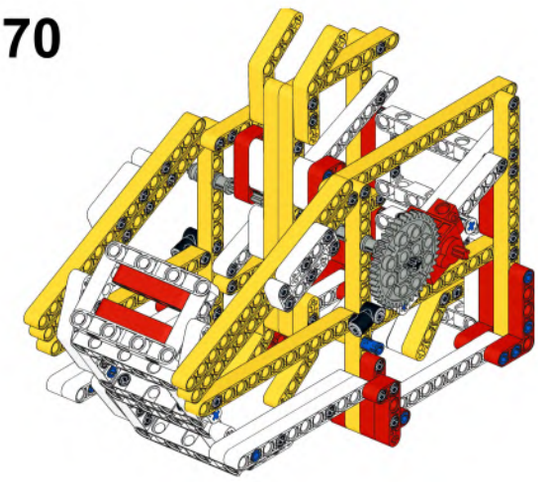


https://osoyoo.com/?p=44354

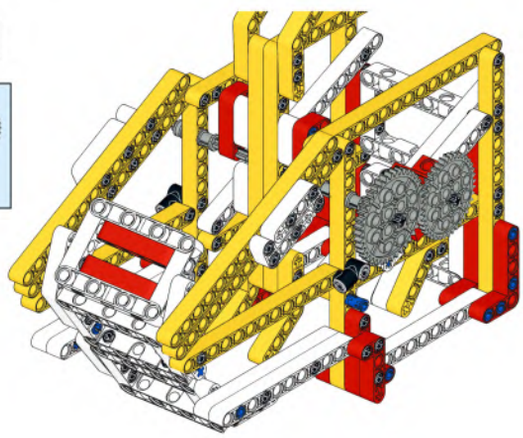
169



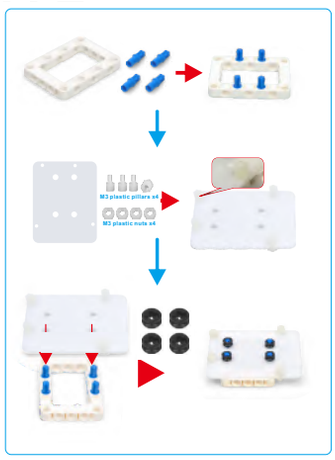
170

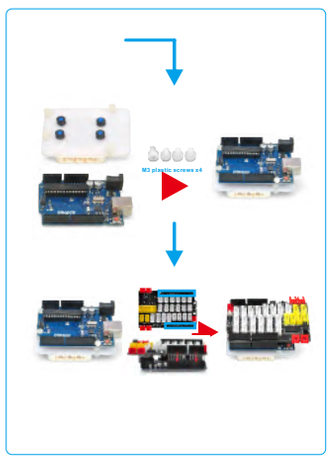


171

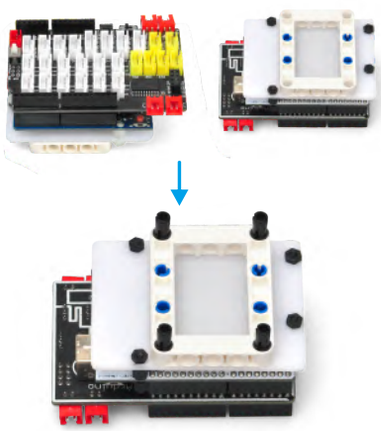


172



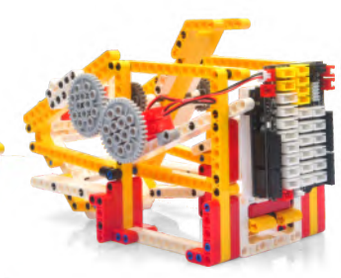


173



174

front

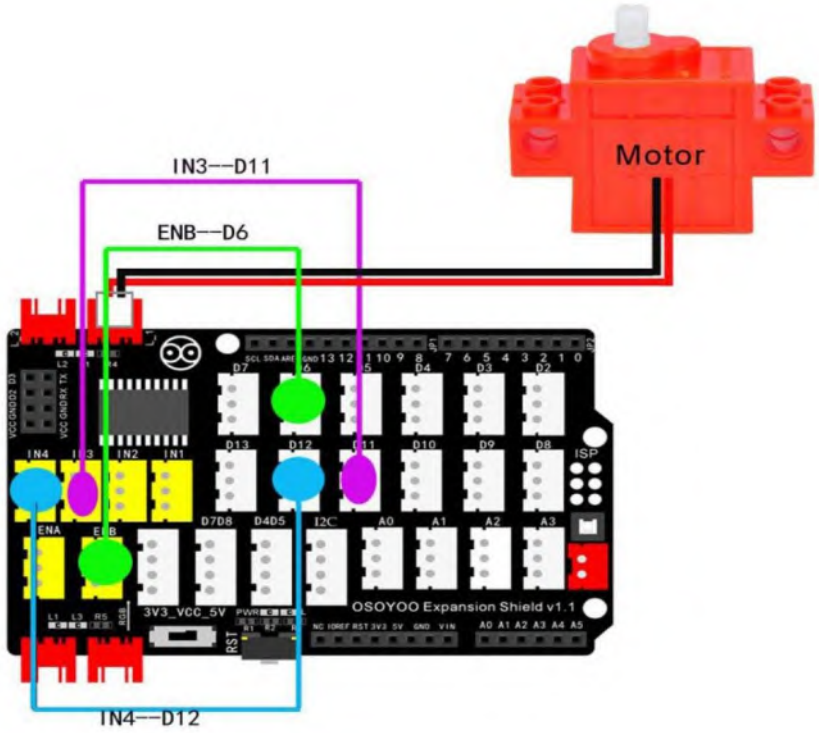


back

https://osoyoo.com/?p=44354

CIRCUIT CONNECTION

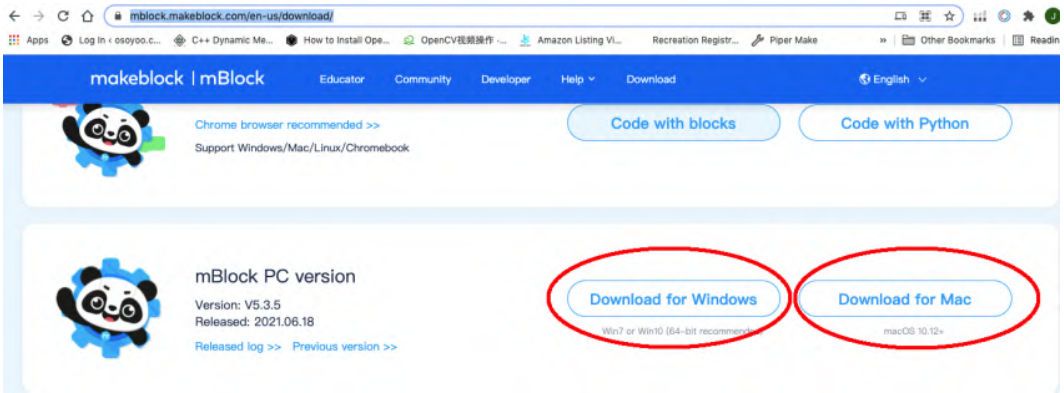
Connect Motor to L1, ENB--D6 ; IN4--D12; IN3-D11



HOW TO CODE

Note: In this kit, we use mblock as programming tool, if you want to learn more about mblock, please visit preparation before class 1: https://osoyoo.com/2021/12/01/preparation-before-class-1

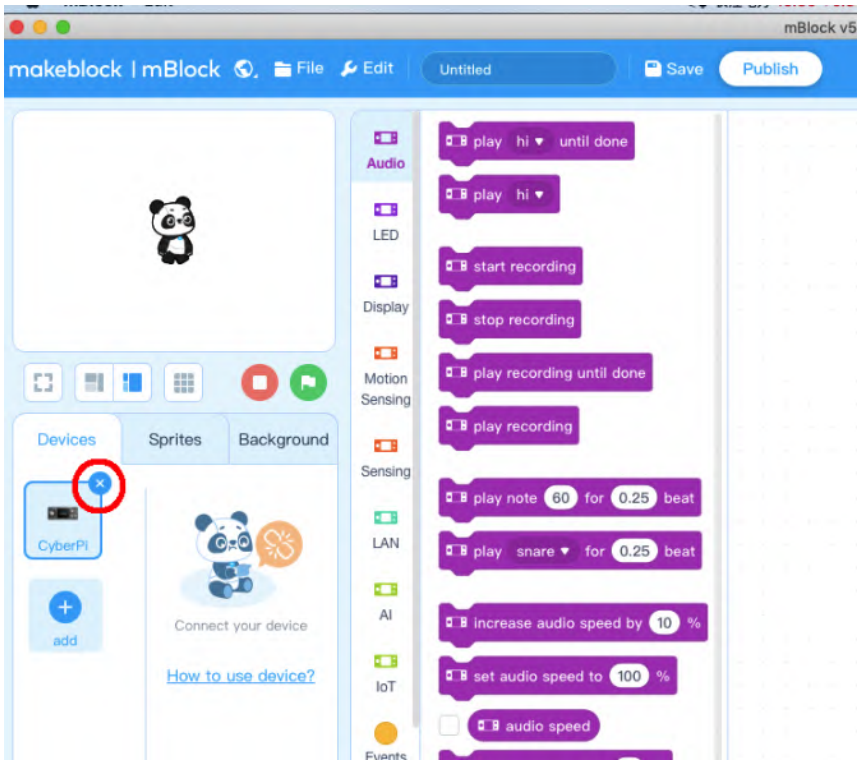
Step 1) Download mBlock PC from https://mblock.makeblock.com/en-us/download/, select the download file as per your computer OS type:



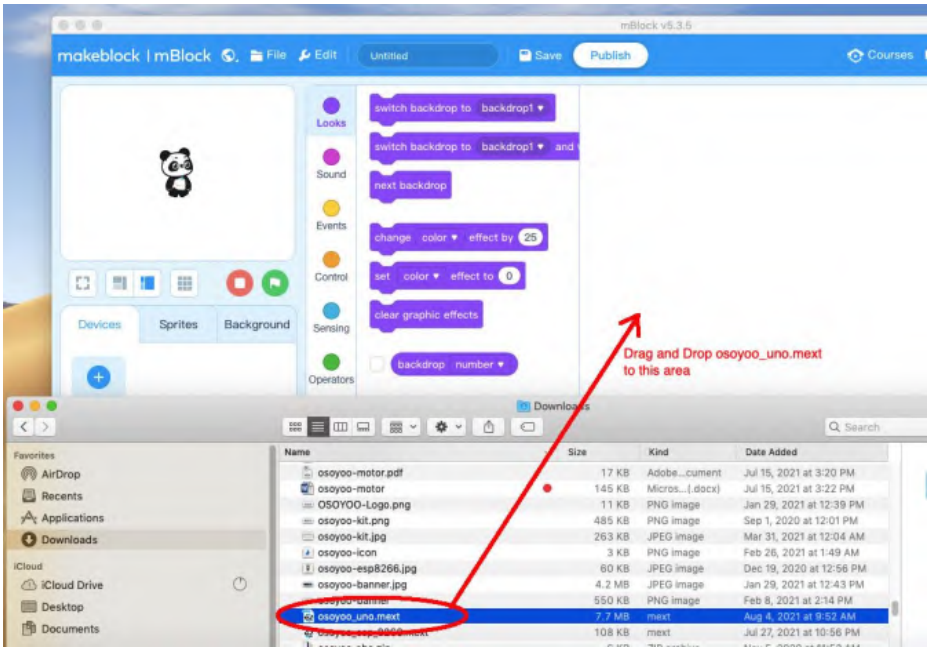
Step 3) Run the mBlock PC software by double click the lovely Panda icon. you

https://osoyoo.com/?p=44354

will see mBlock UI as following picture. Please delete the default device CyberPi by click the cross in the red circle.

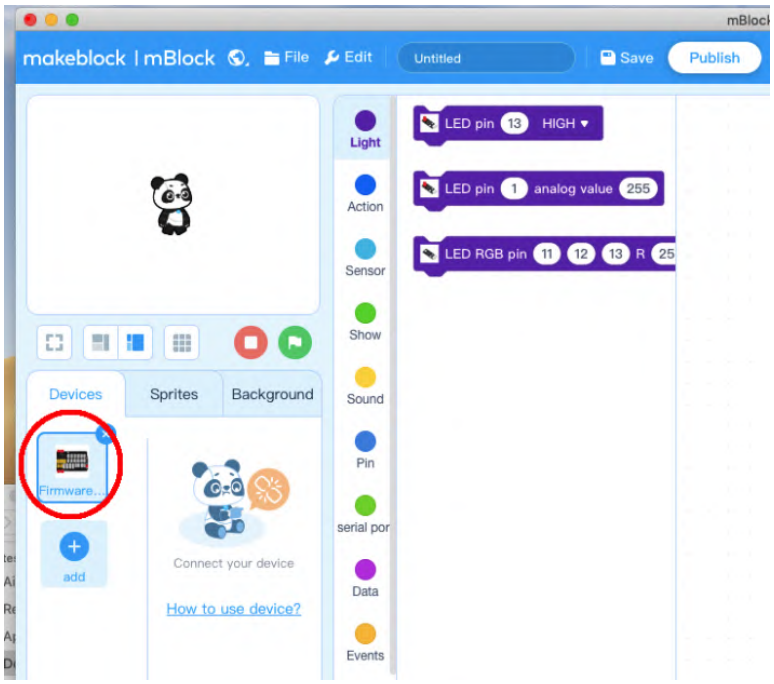


Step 4) Drag and Drop osoyoo_uno_mext file(downloaded in Step 2) to mBlock software as following:



Now you will see a new device firmware in mBlock, see following picture:

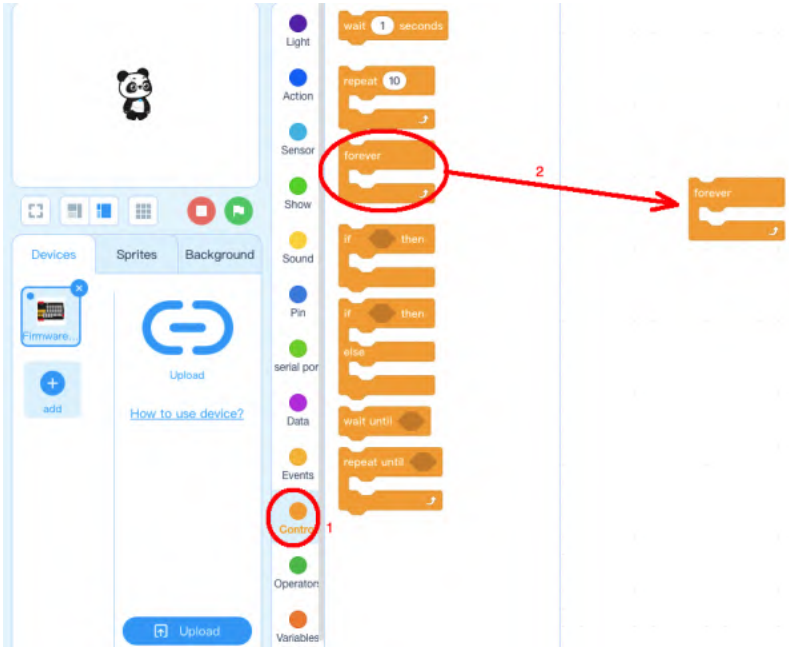
https://osoyoo.com/?p=44354



Now mBlock software and OSOYOO_UNO device firmware have been successfully installed in our PC!

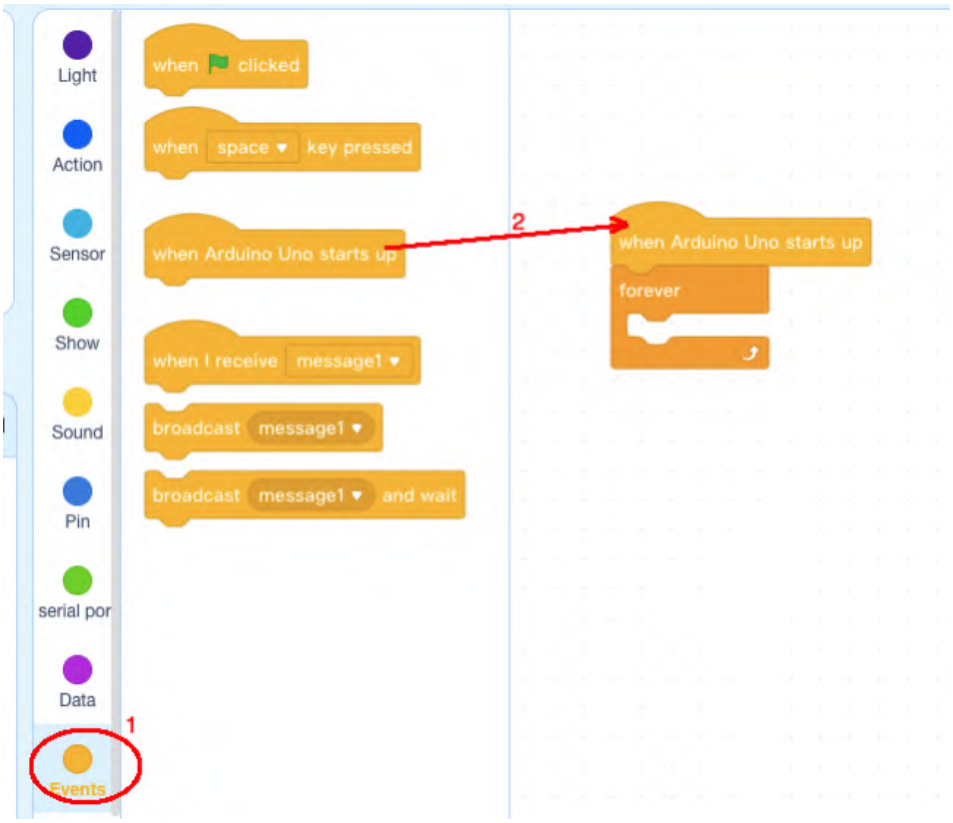
Now we will show you how to use blocks to make our Oscillating Pedestal Fan into reality.

Step 1: Click **Control**, then Drag and drop **Forever** block to programming area as following:

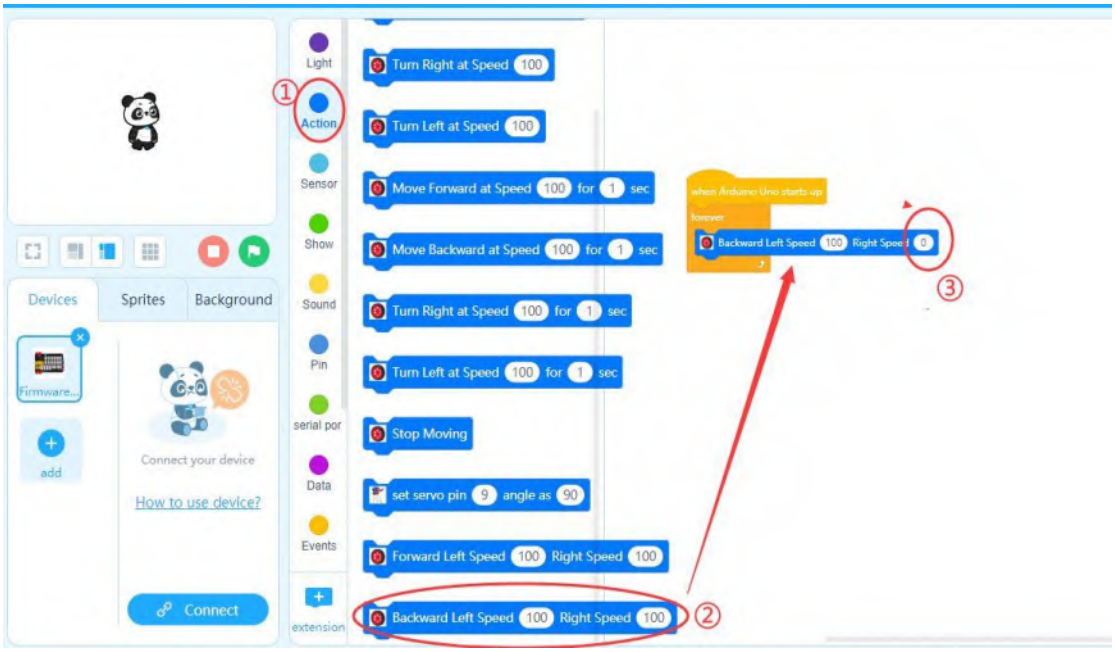


https://osoyoo.com/?p=44354

Step 2: Click **Events**, add **when Arduino Uno starts** up block to the top:



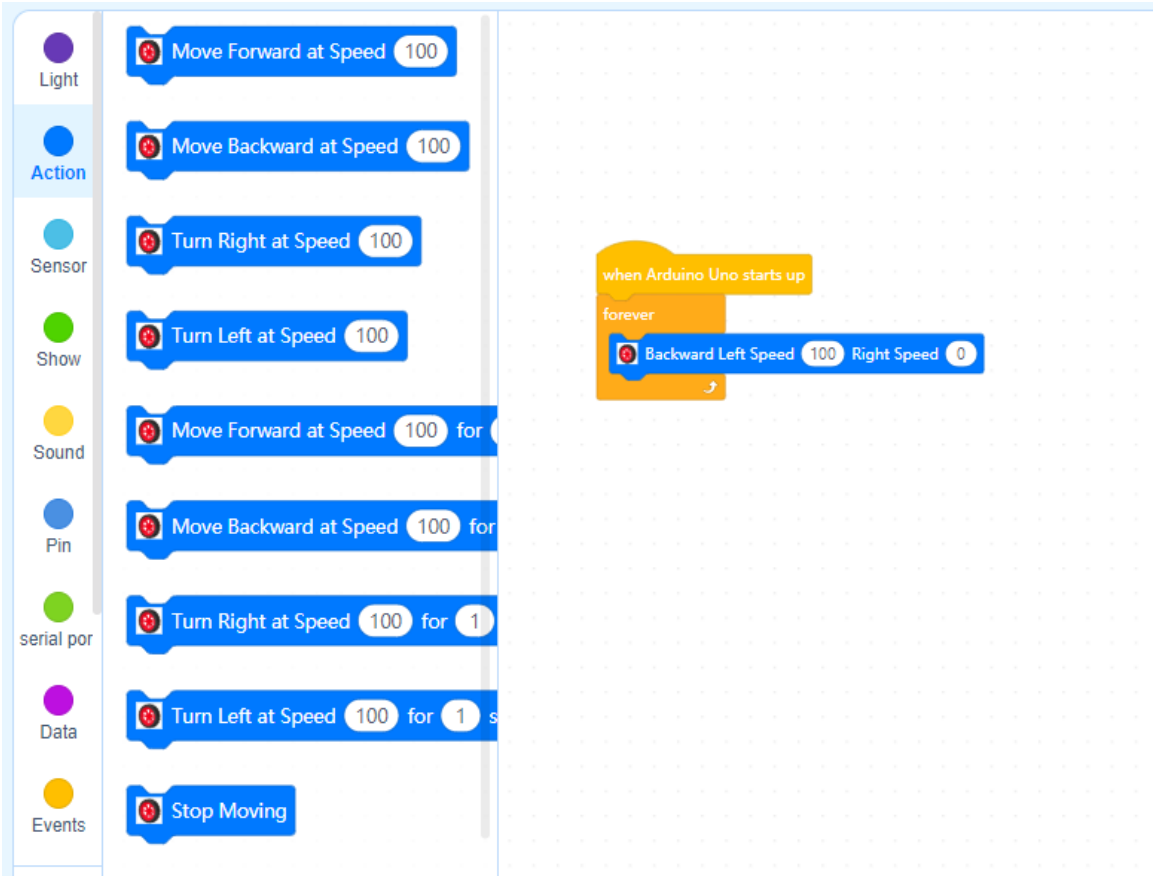
Step 3) Click **Action** , then drag **Backward left speed 100 to Right speed 100** blocks to **forever** block as following:



https://osoyoo.com/?p=44354

Then change the **Backward left speed 100 to Right speed 100** to **Backward left speed 100 to Right speed 0**.

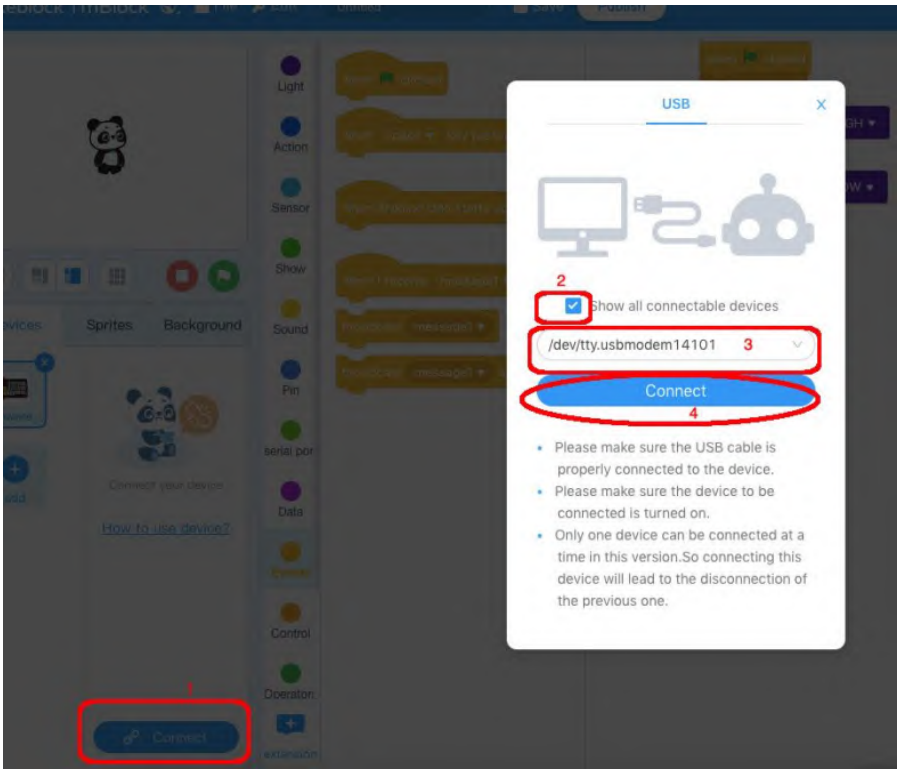
Now all the programming blocks have been completed!



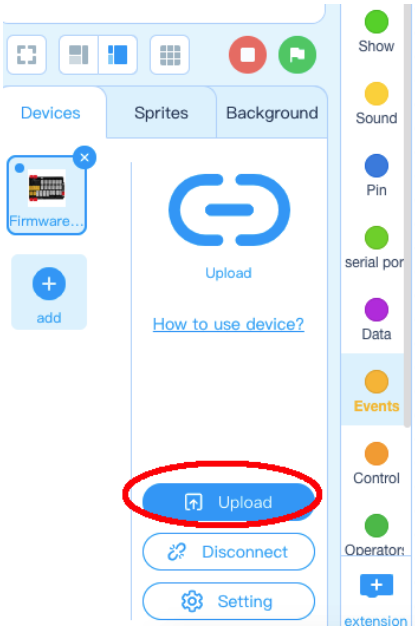
Upload the program to Arduino

1) you need connect your Arduino board to your PC with a USB cable first. Then click the Connect button in the bottom of the mBlock software, you will see a USB window pop up,
2) select **Show all connectable device** check box , then a device drop-down menu will show up,
3) select your **Arduino port** from device drop-down menu
4) click **Connect** button to connect your PC to Arduino

https://osoyoo.com/?p=44354

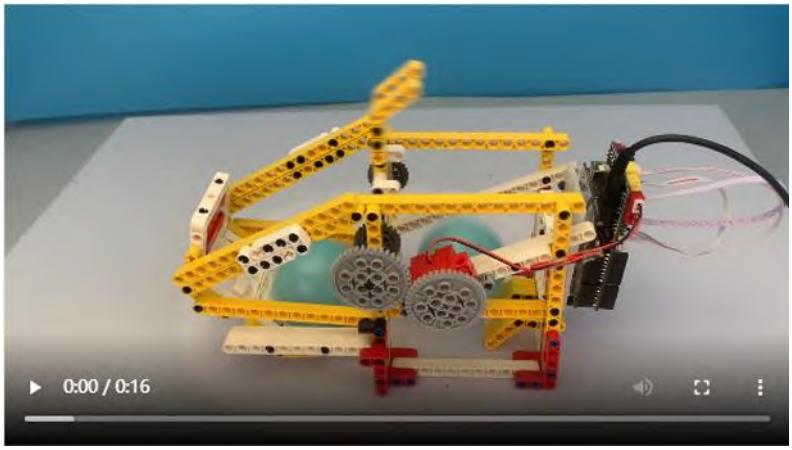


5)After you PC is connected to Arduino UNO board, please click **Upload** button in the bottom of your software, then the code will be uploaded to Arduino UNO board:



https://osoyoo.com/?p=44354

Now turn on the power switch in the Magic board, the Arduino will start to work.



https://osoyoo.com/picture/Block_kit/lesson4/1-5.mp4

https://osoyoo.com/?p=44354

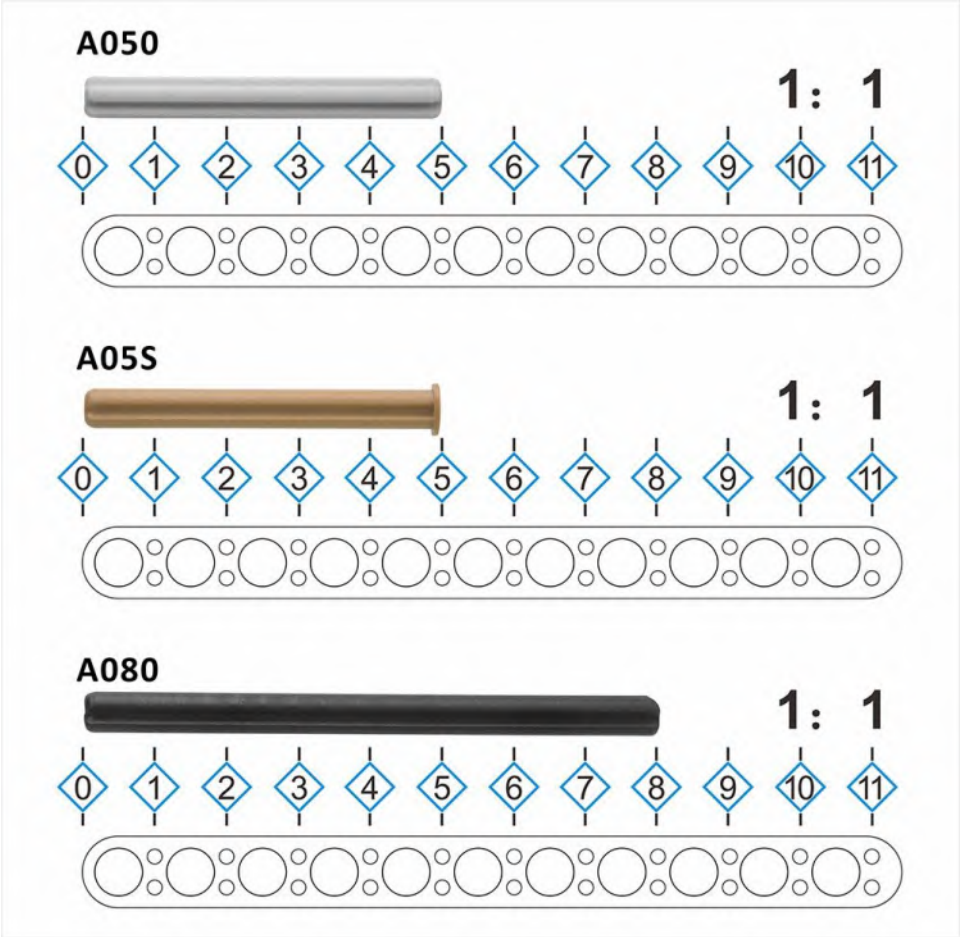
Lesson 5: Tower crane

OBJECTIVE

In this lesson, we use OSOYOO mini bricks to make a tower crane.

PARTS & DEVICES

https://osoyoo.com/?p=44354



HOW TO BUILD

Before you build an elevator with blocks, please according to the Preparation before class 3: https://osoyoo.com/2021/12/01/preparation-before-class-3

https://osoyoo.com/?p=44354

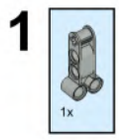
Please visit this link to watch video about Building Blocks:
https://youtu.be/XoR6yXXqTtM

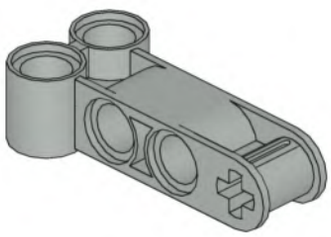
Please follow the instruction to build the blocks (Download link: https://osoyoo.com/picture/Block_kit/lesson5/lesson5.pdf)

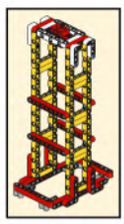
Note:
The color of the building block is subject to the actual product, which does not affect the use.

https://osoyoo.com/?p=44354

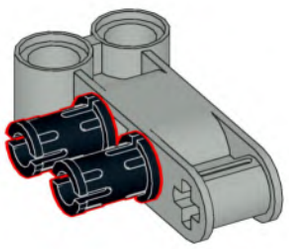
1



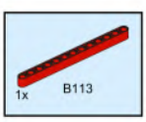




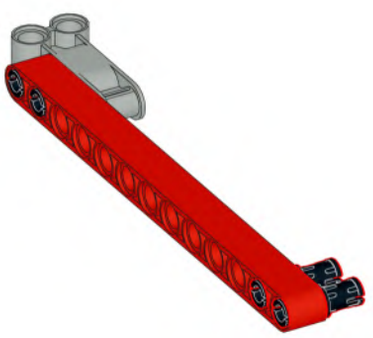
2



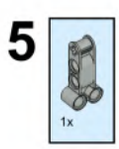
3

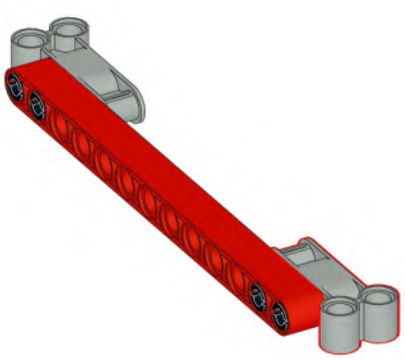


4

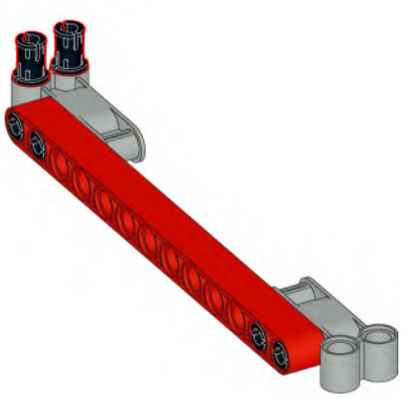


5

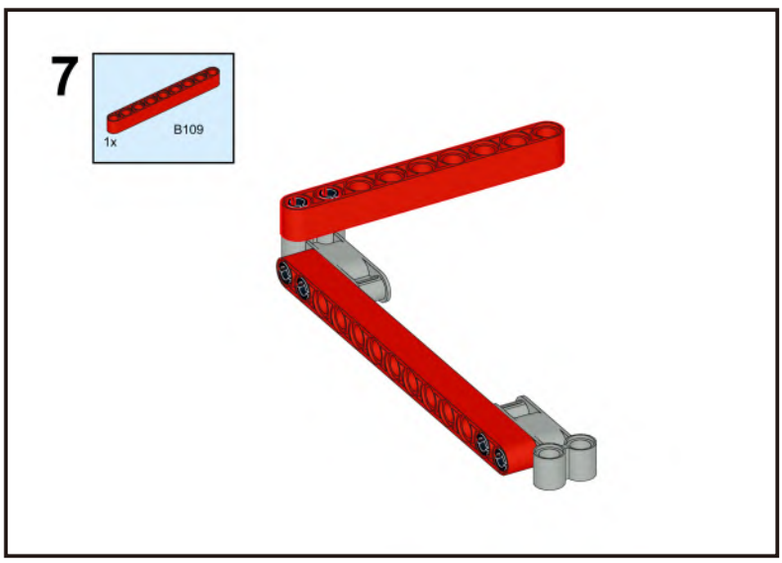


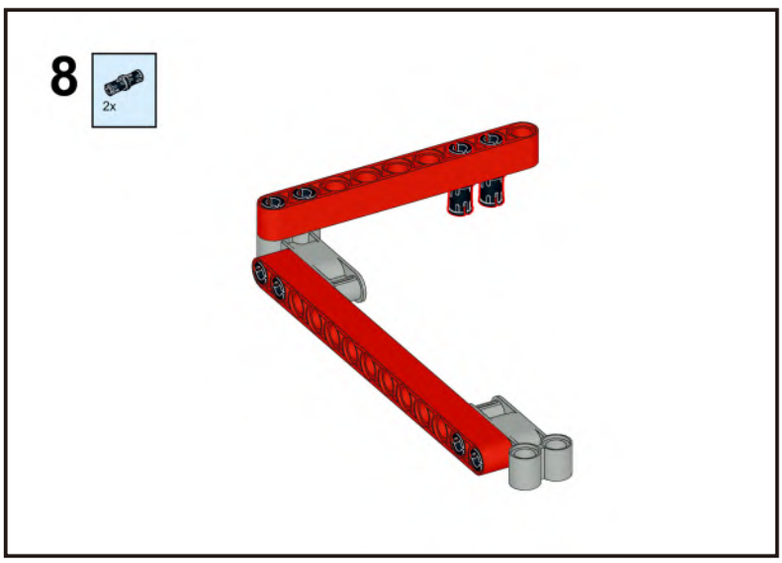


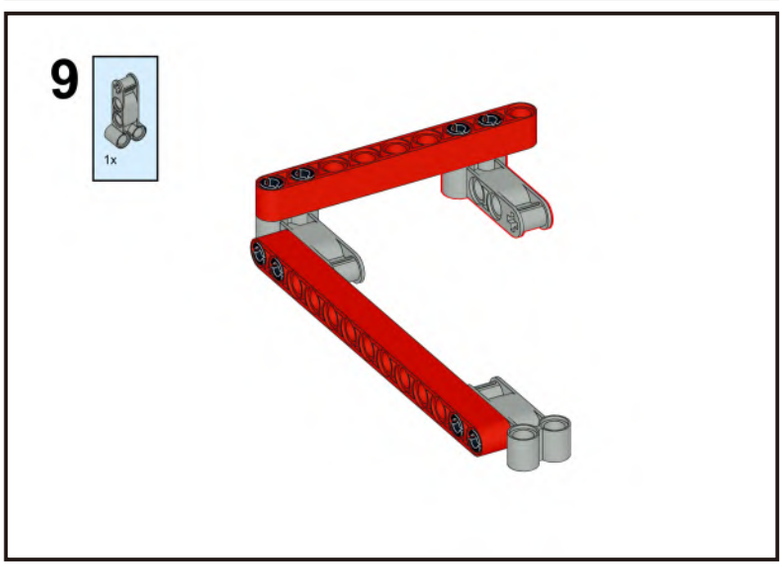
6

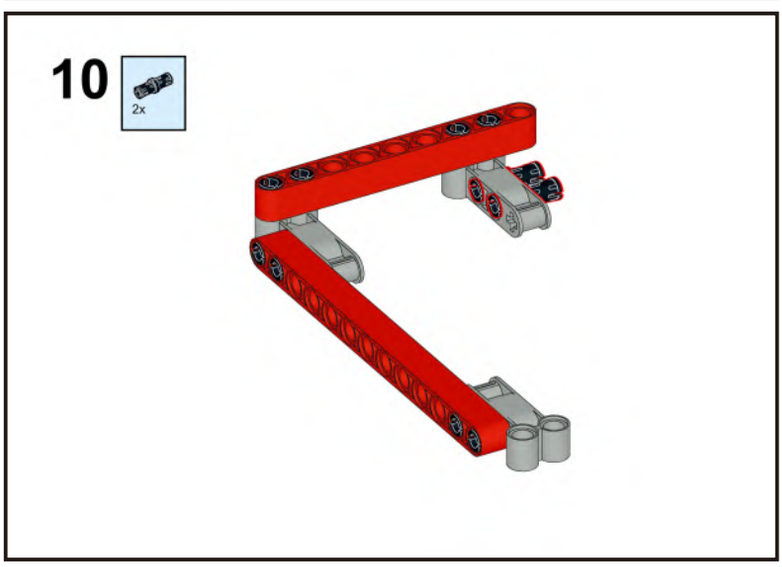


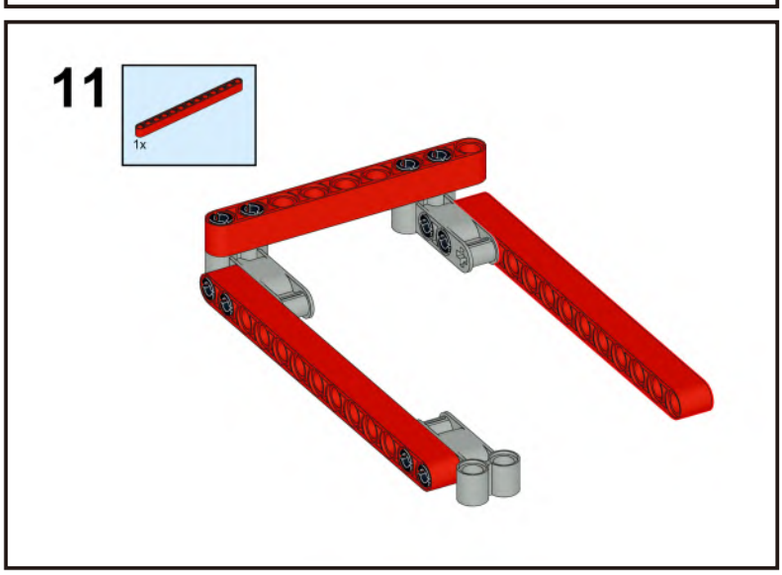
https://osoyoo.com/?p=44354

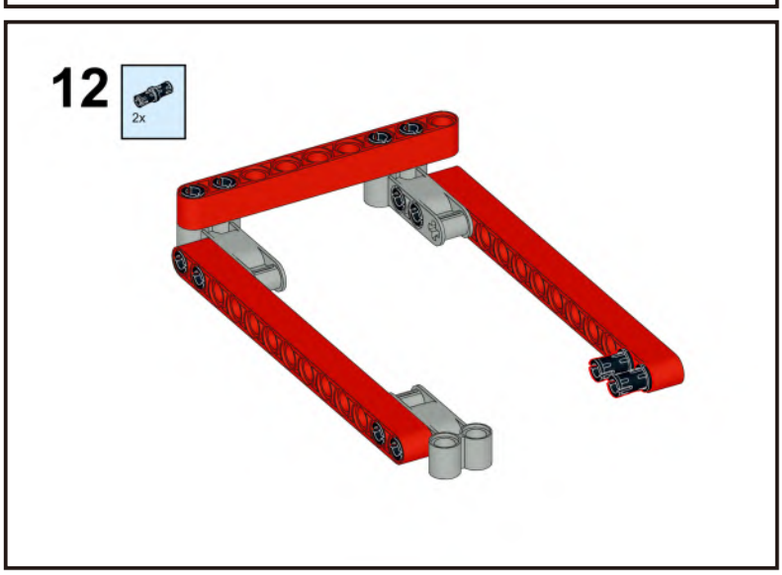




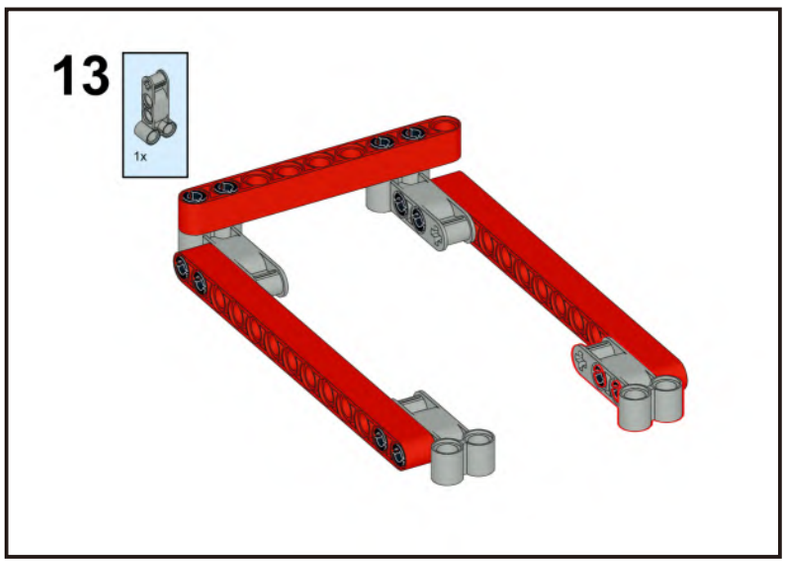


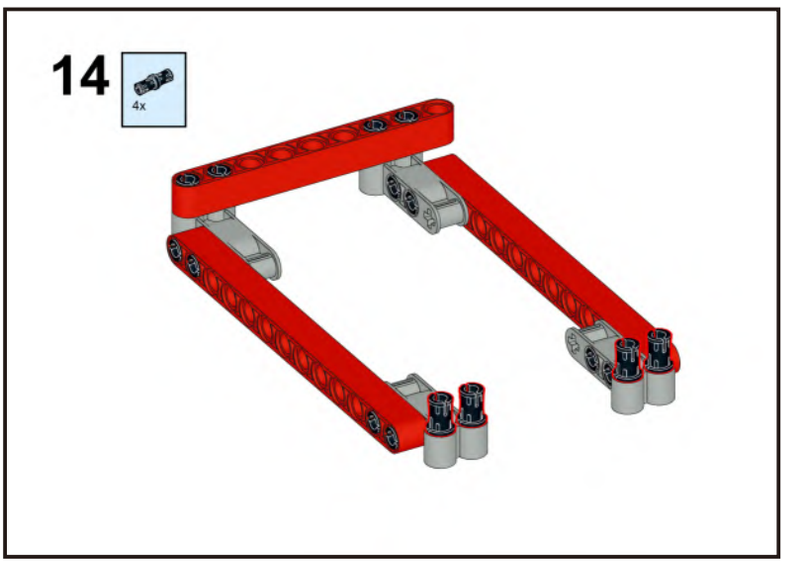


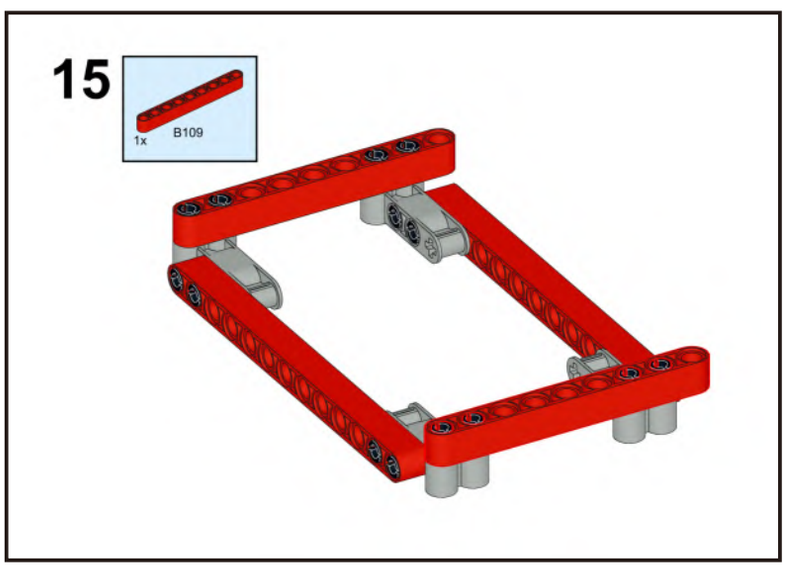


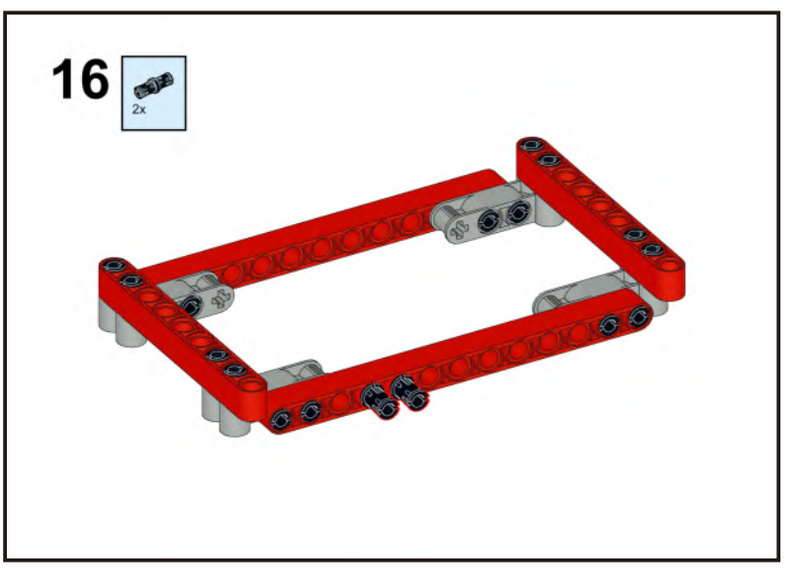


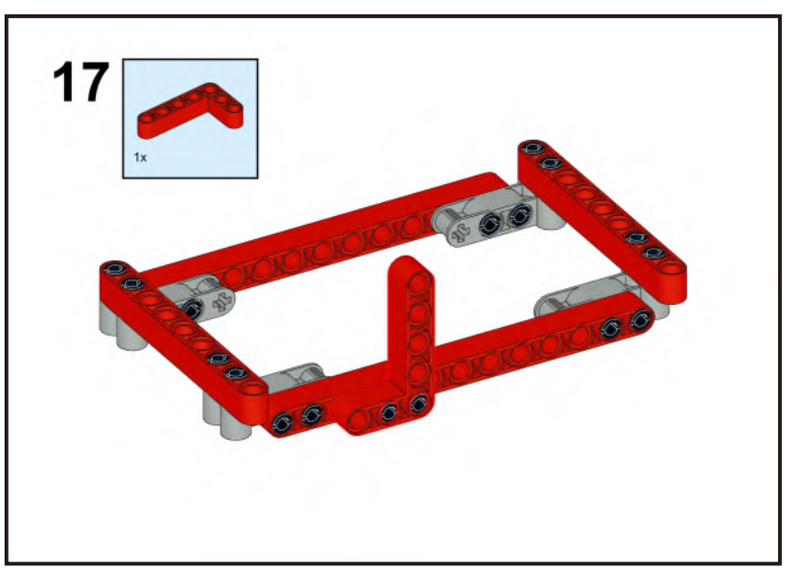
https://osoyoo.com/?p=44354

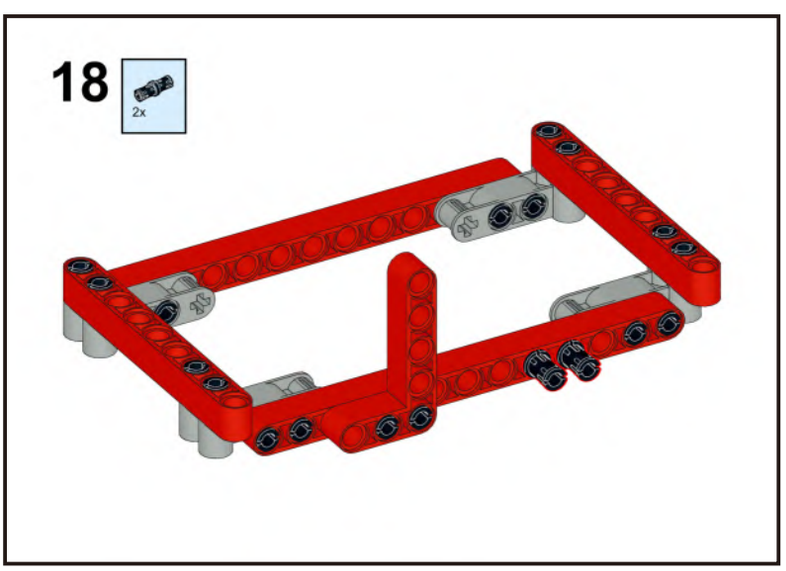




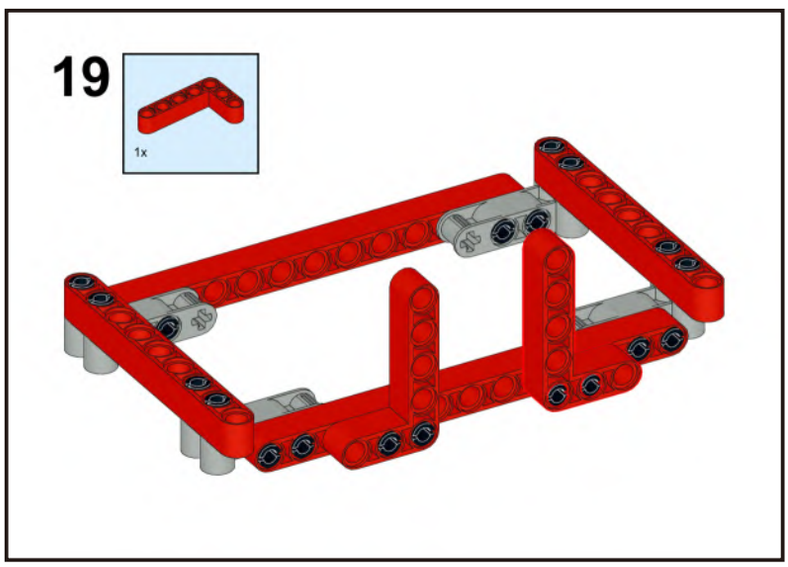


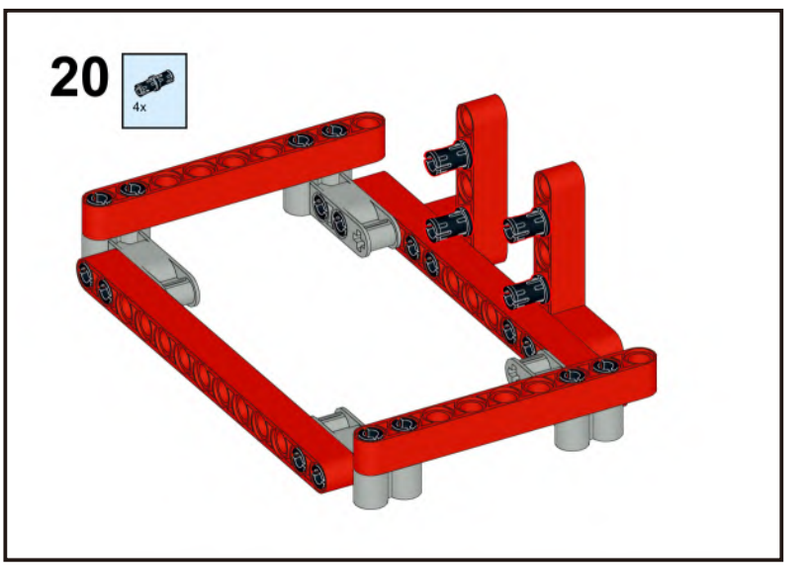


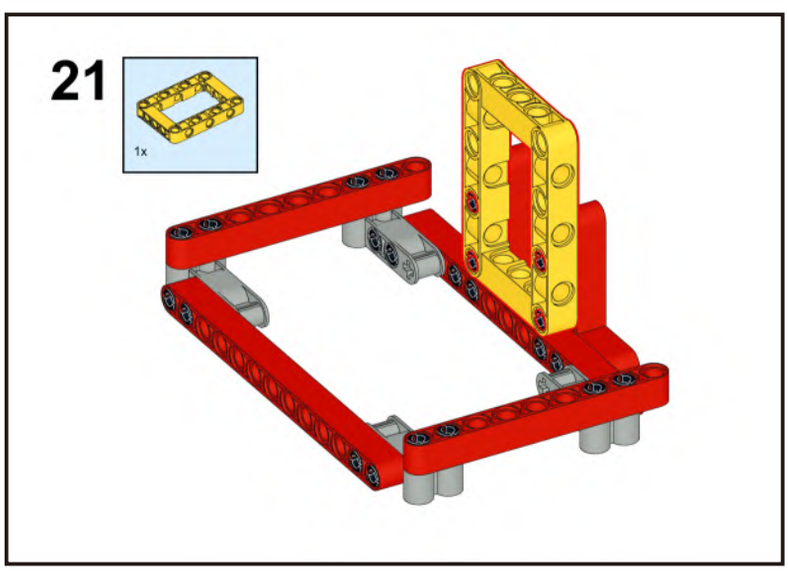


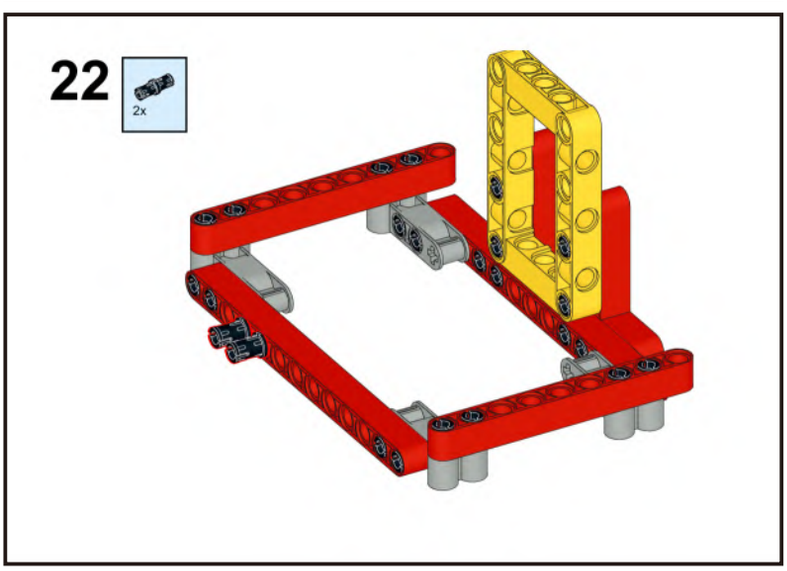


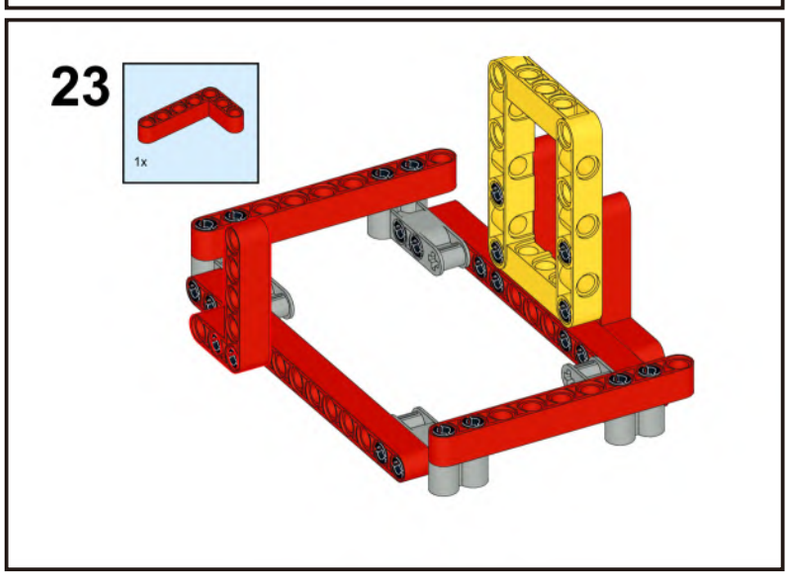
https://osoyoo.com/?p=44354

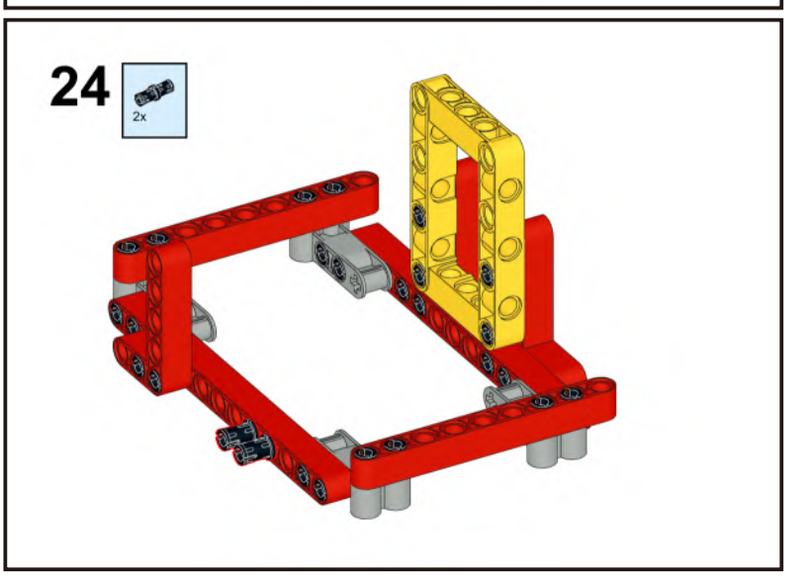




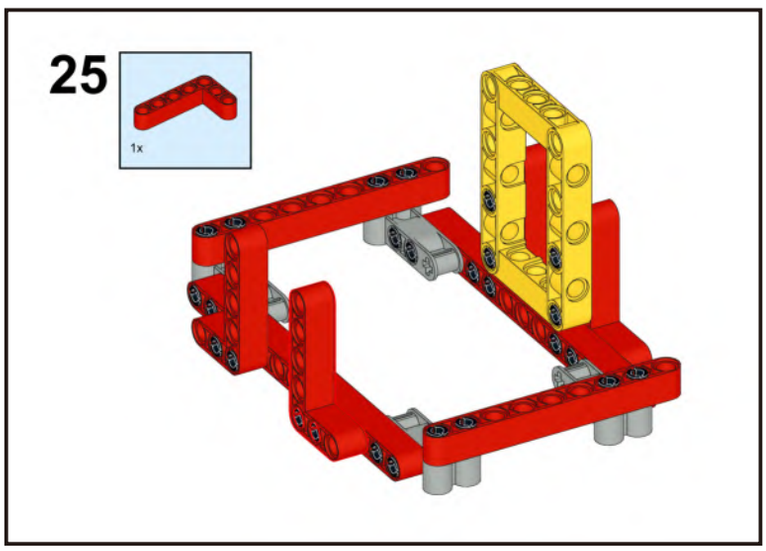


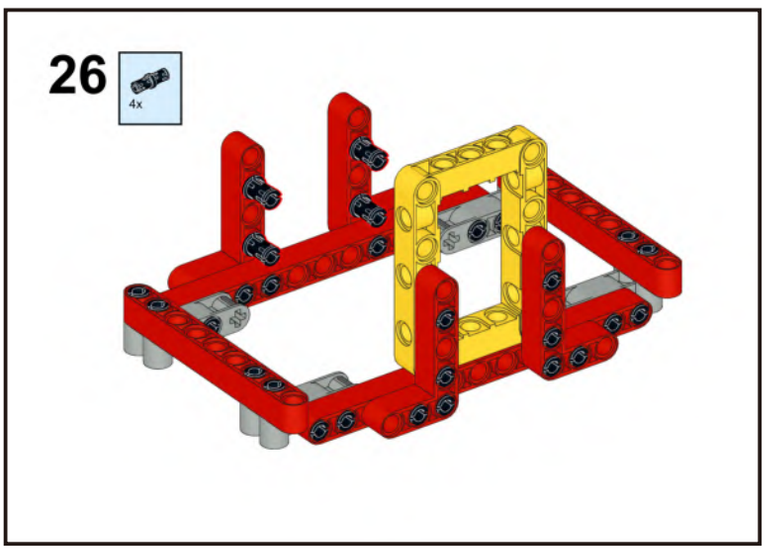


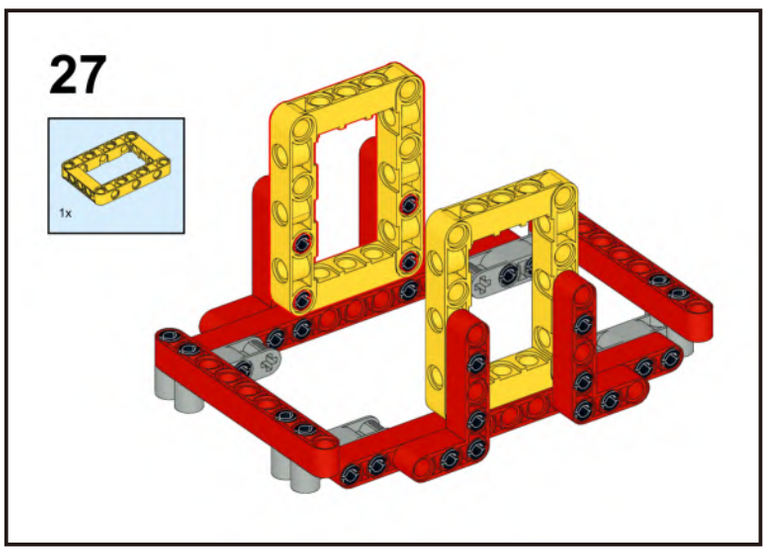


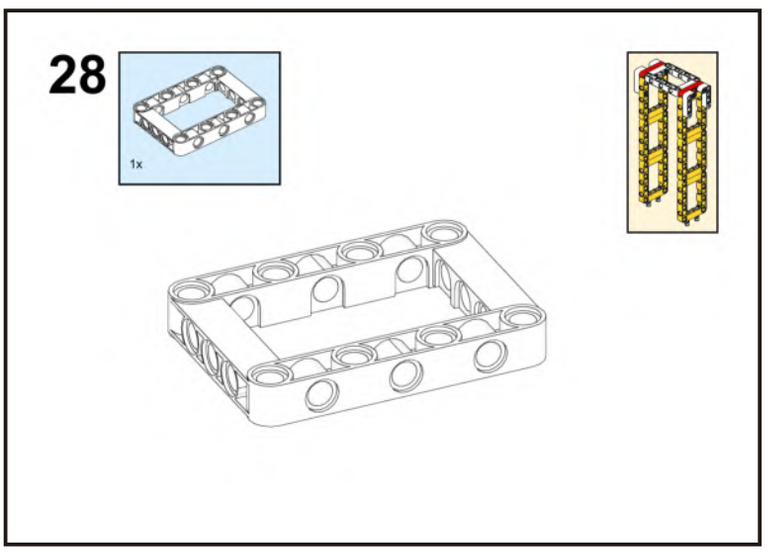


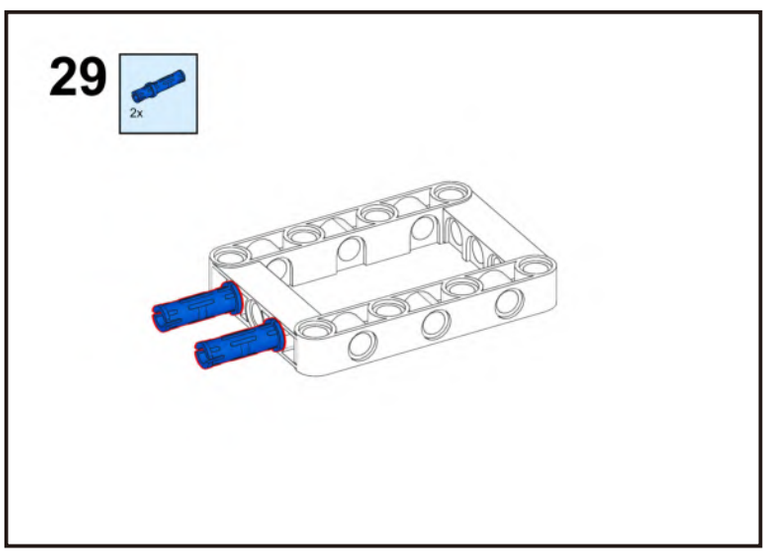
https://osoyoo.com/?p=44354

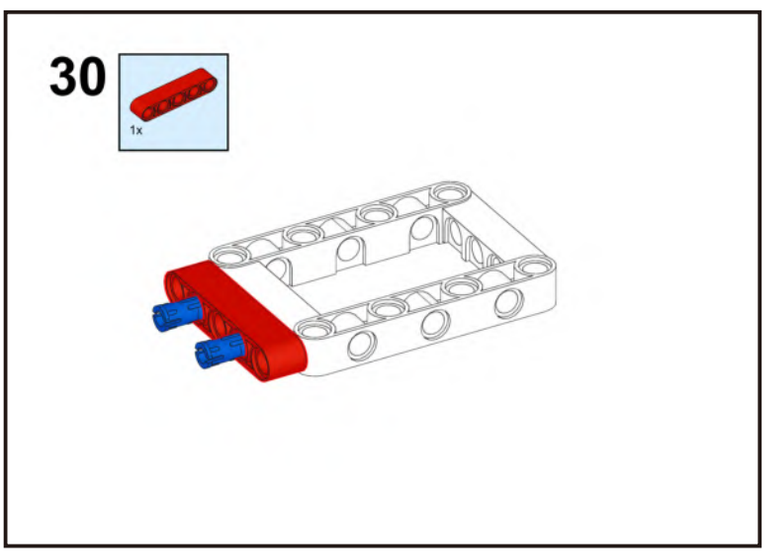




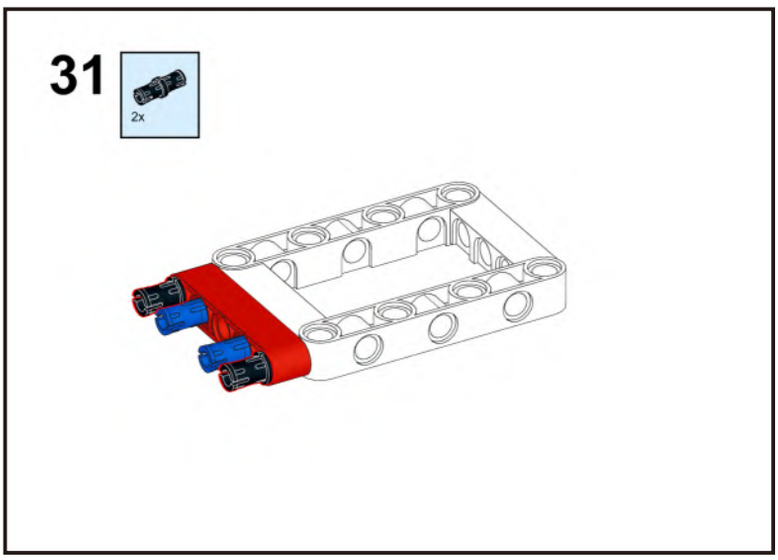


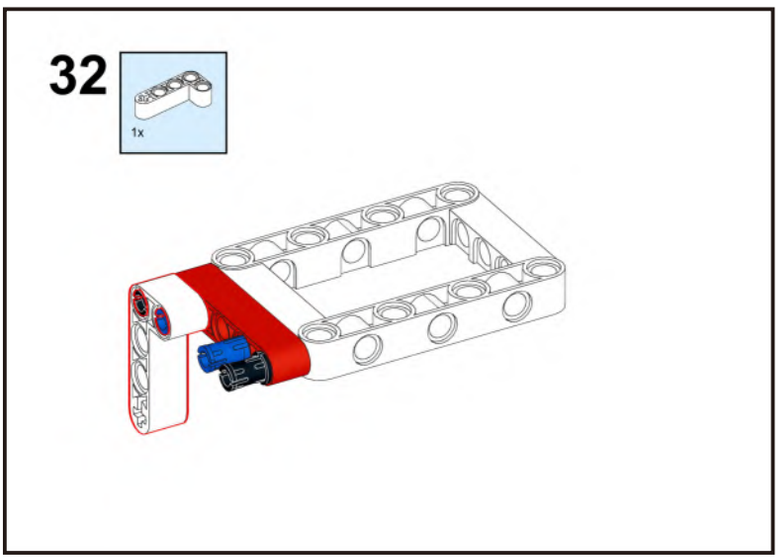


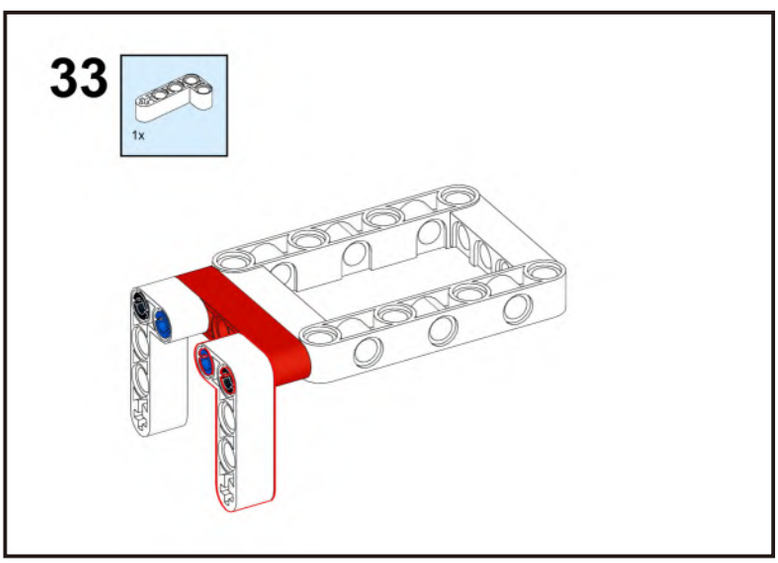


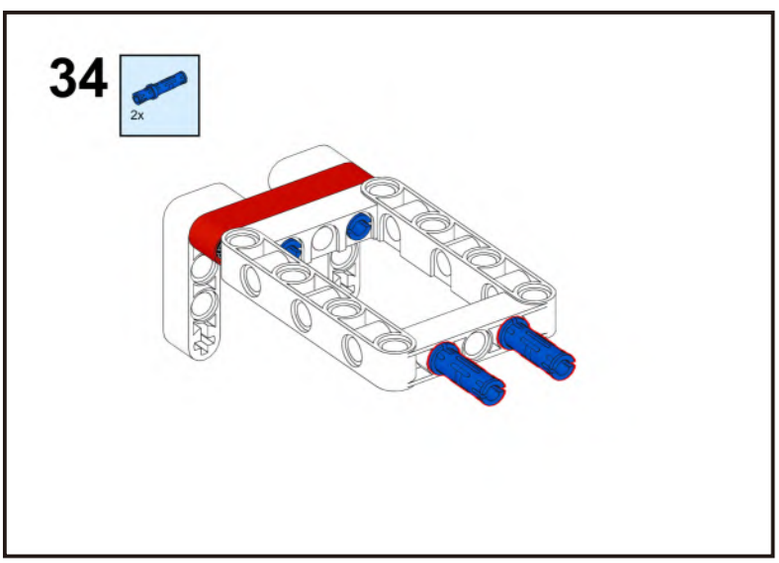


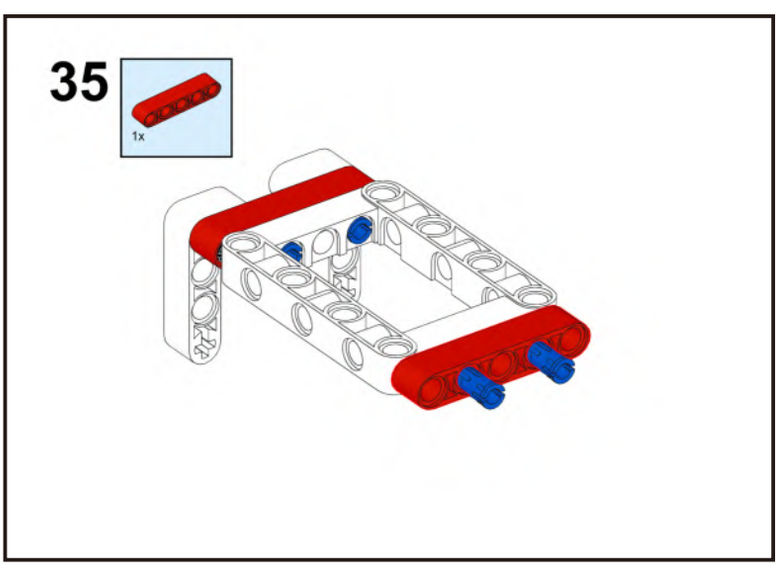
https://osoyoo.com/?p=44354

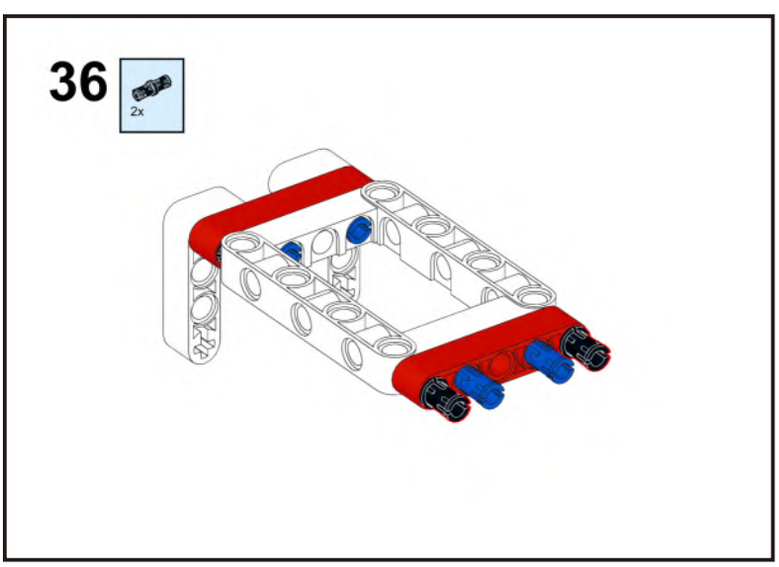




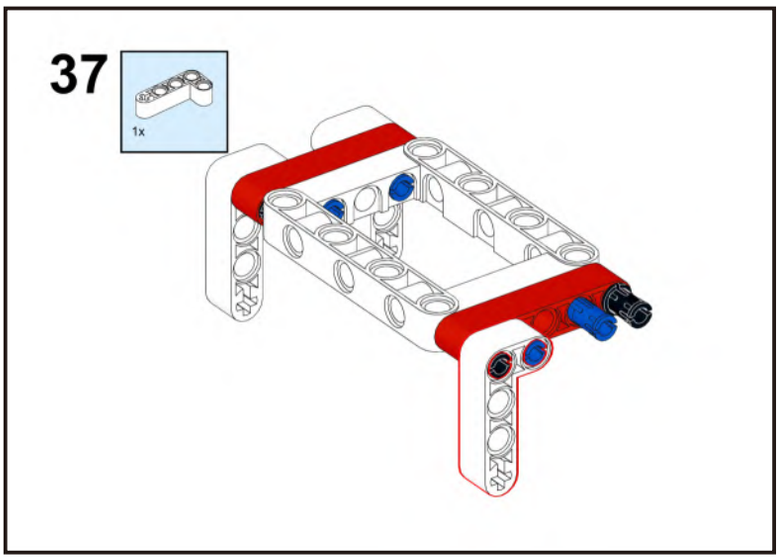


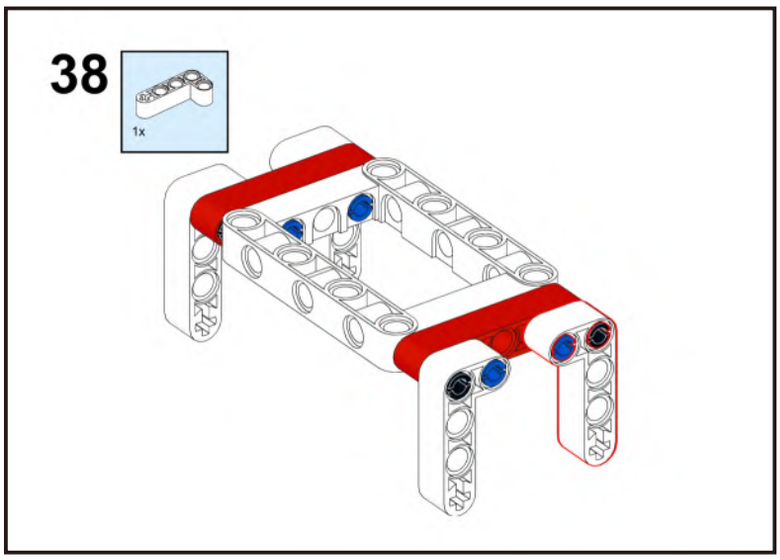


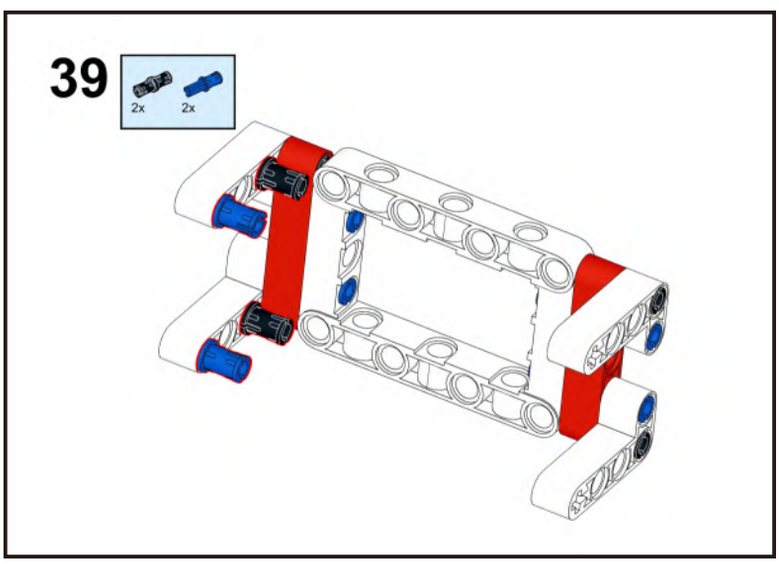


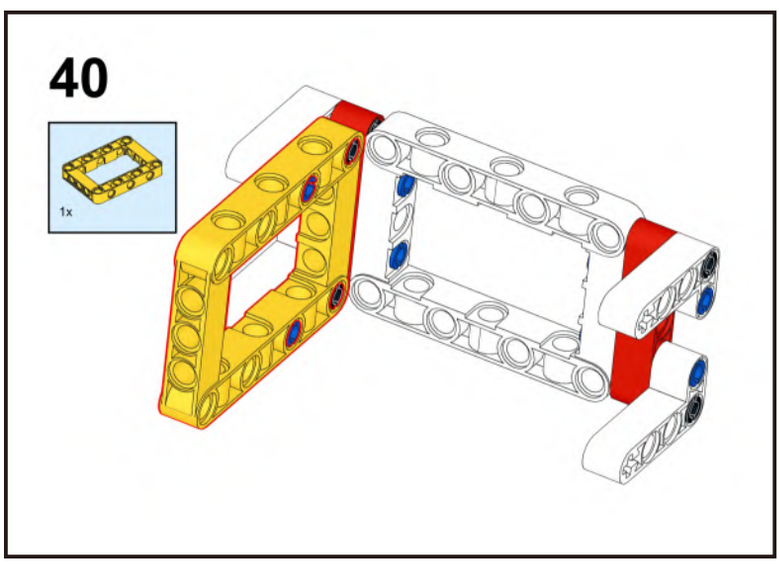


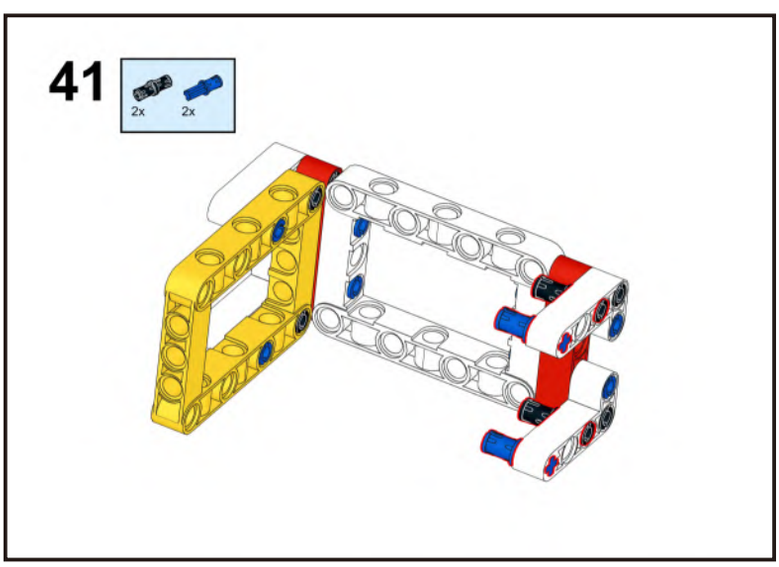
https://osoyoo.com/?p=44354

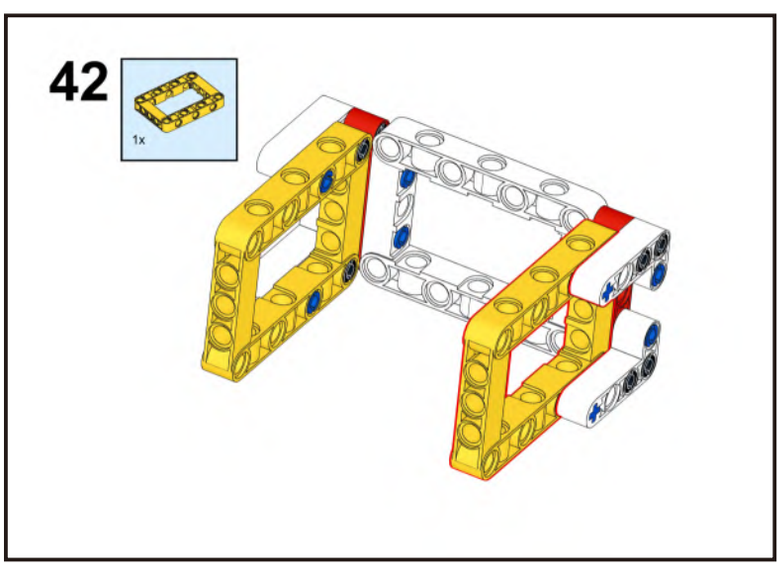




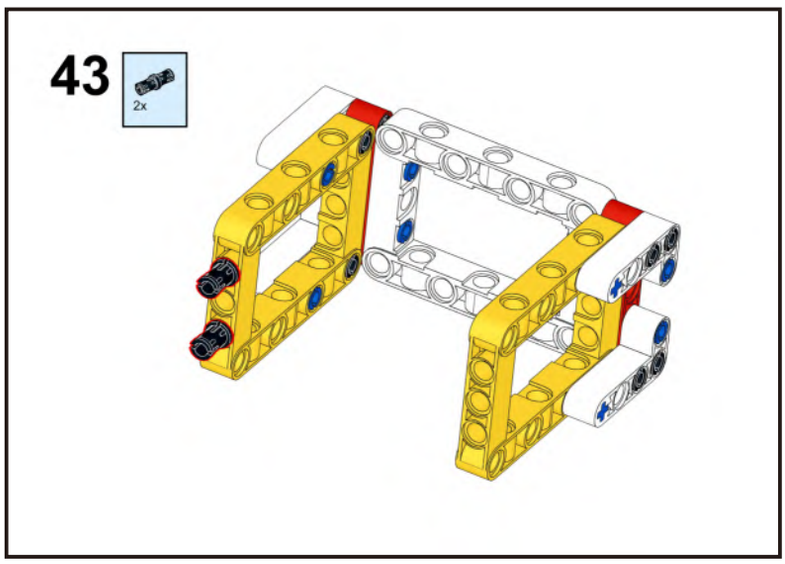


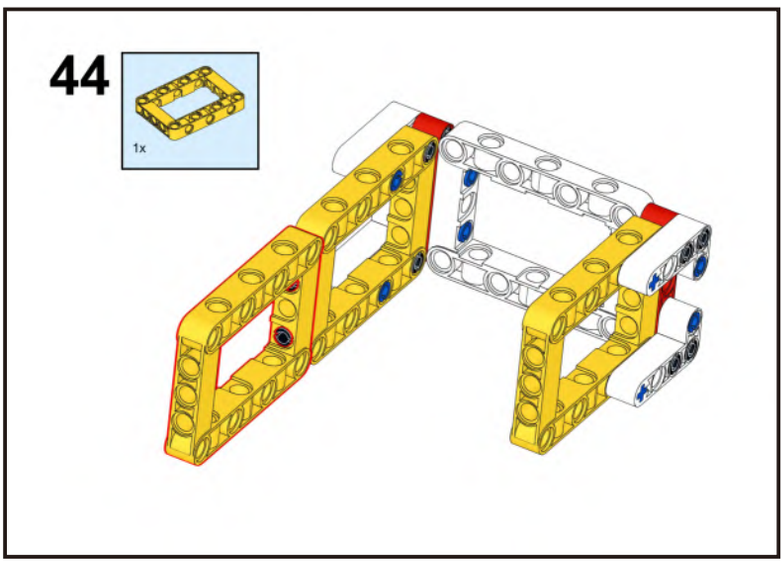


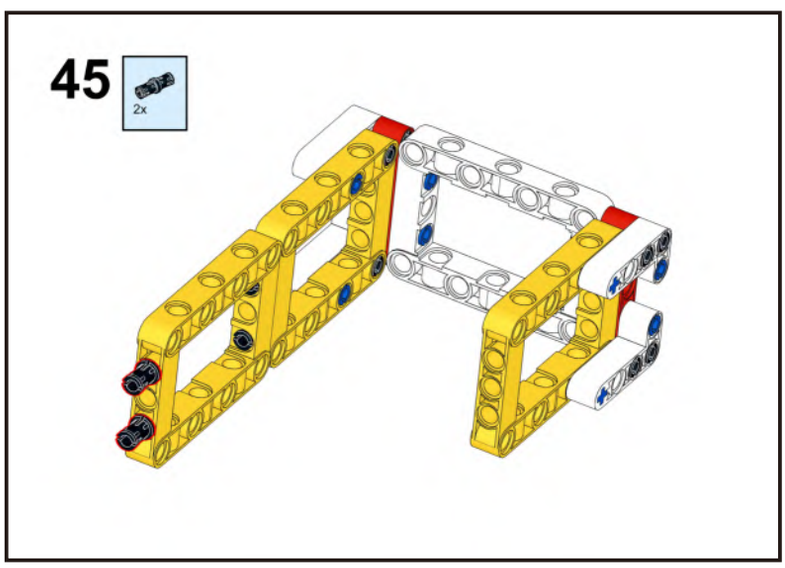


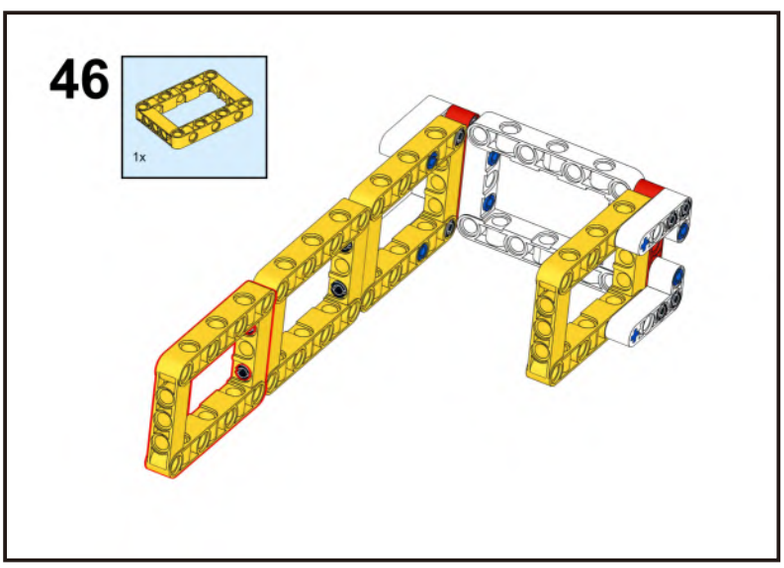


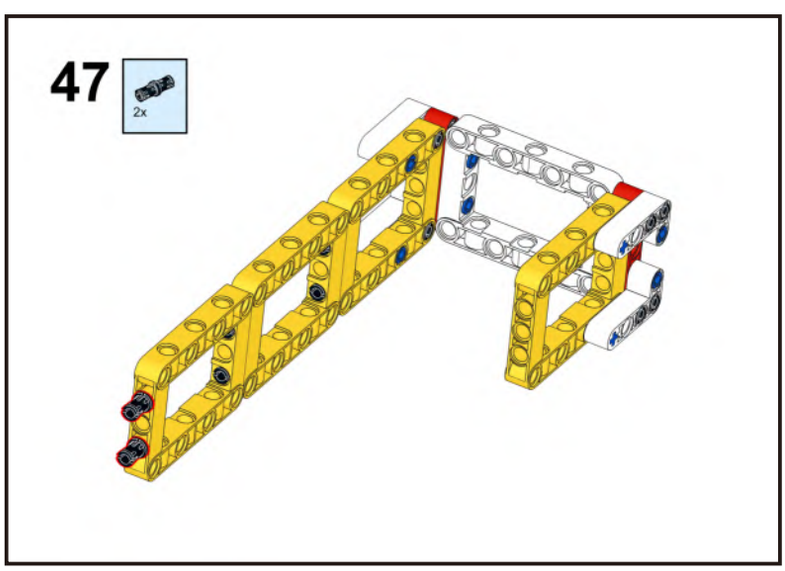
https://osoyoo.com/?p=44354

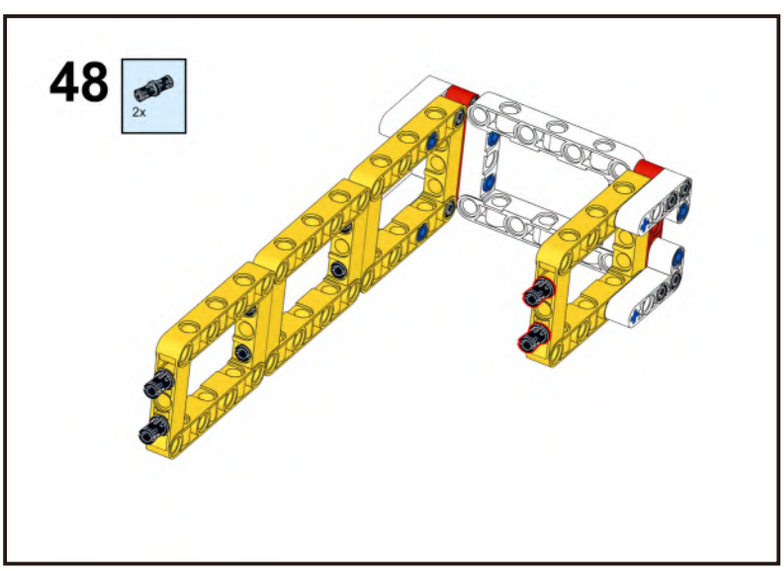




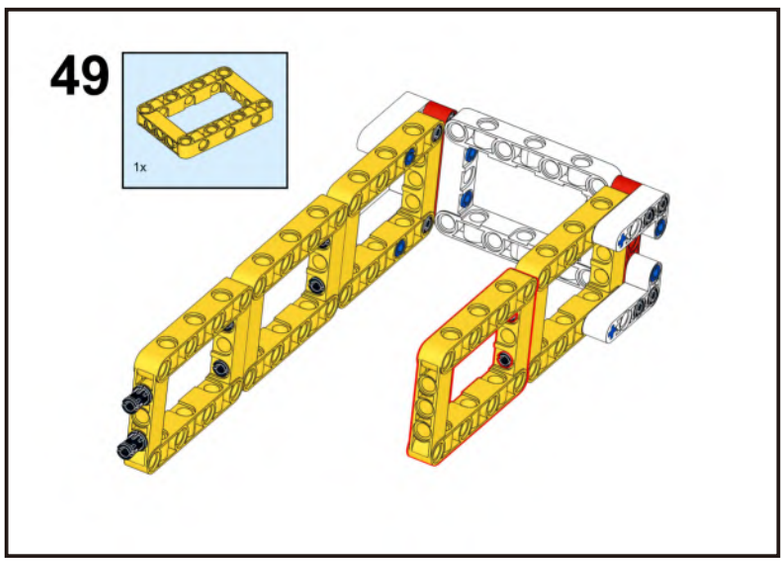


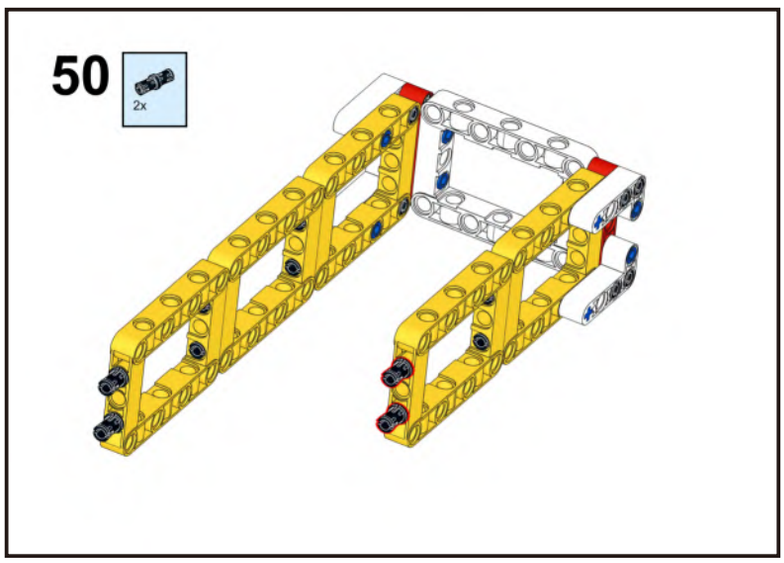


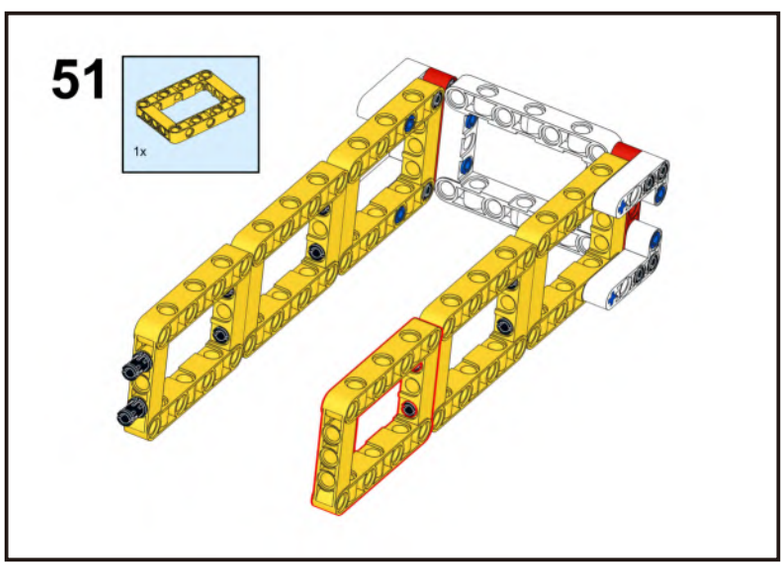


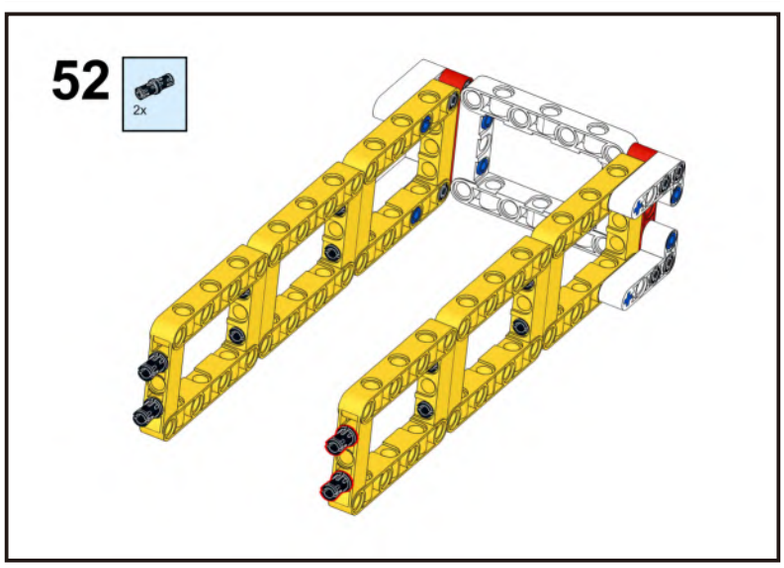


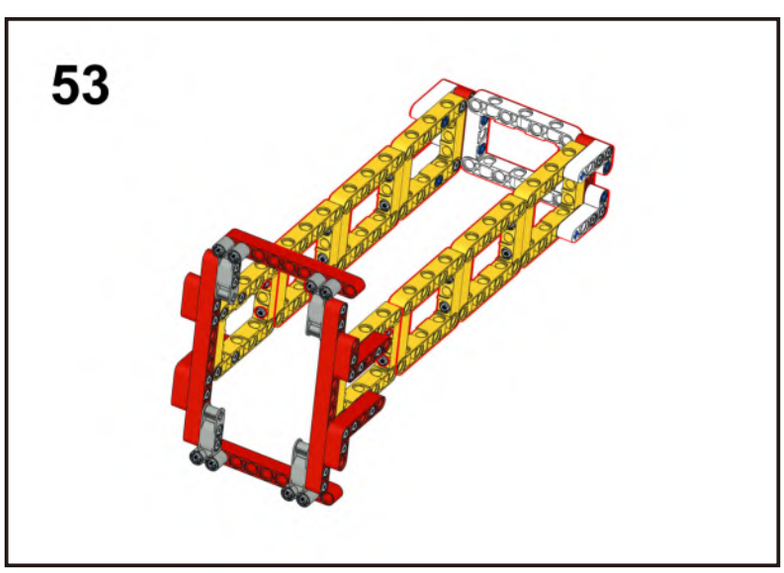
https://osoyoo.com/?p=44354

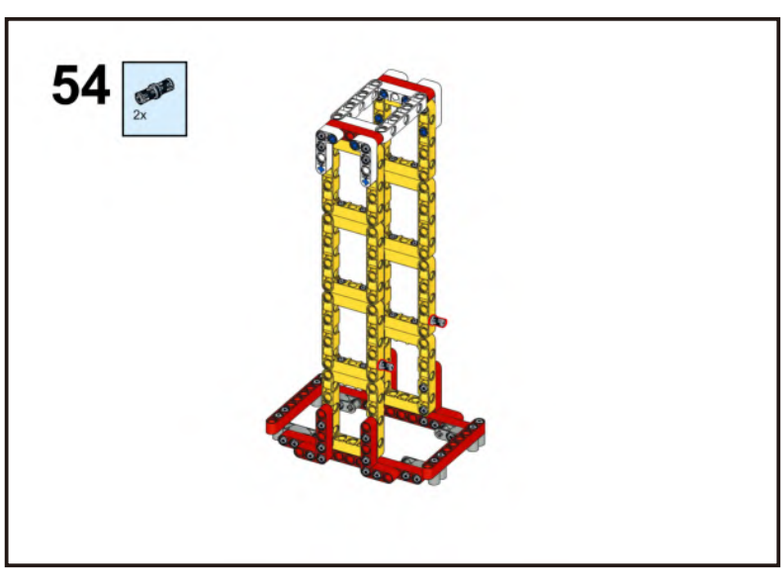




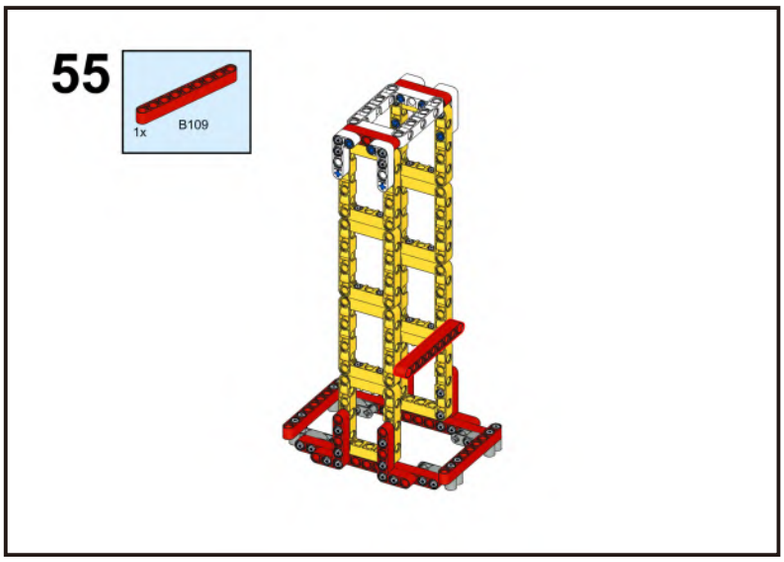


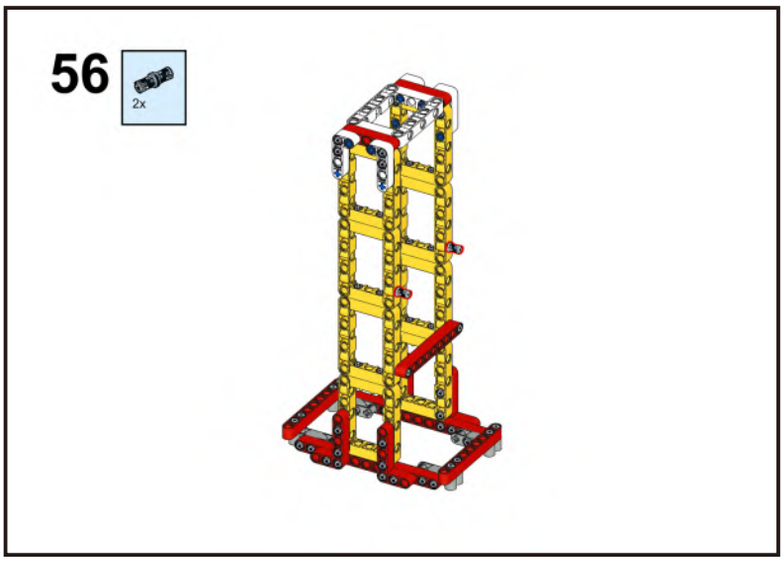


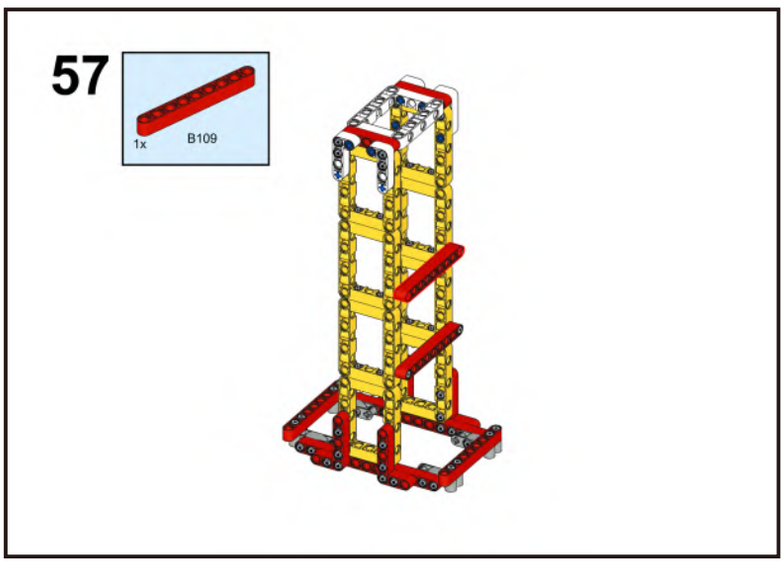


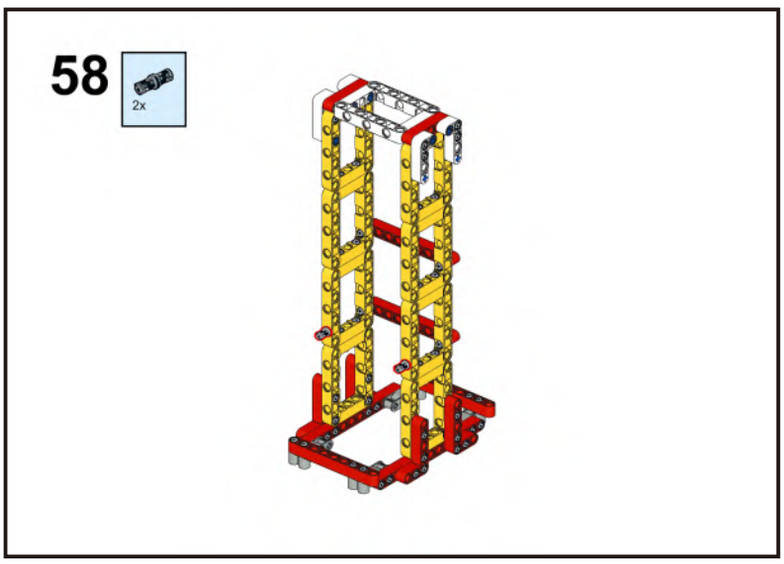


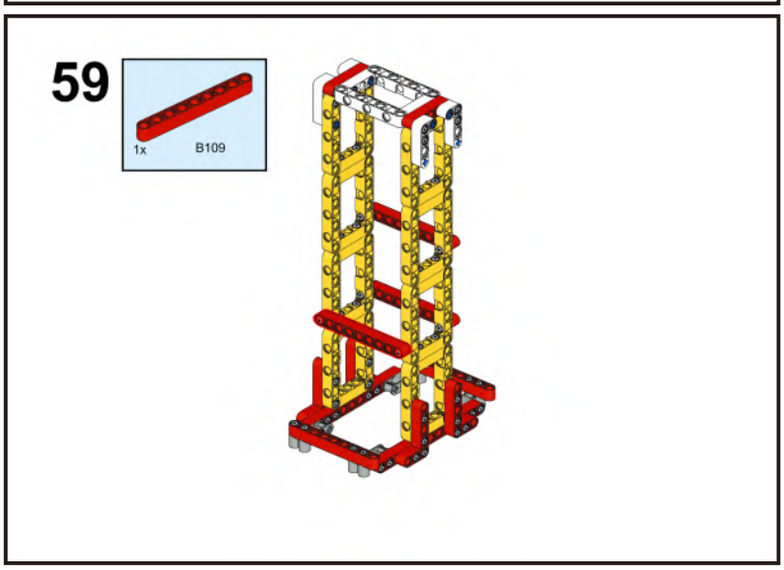
https://osoyoo.com/?p=44354

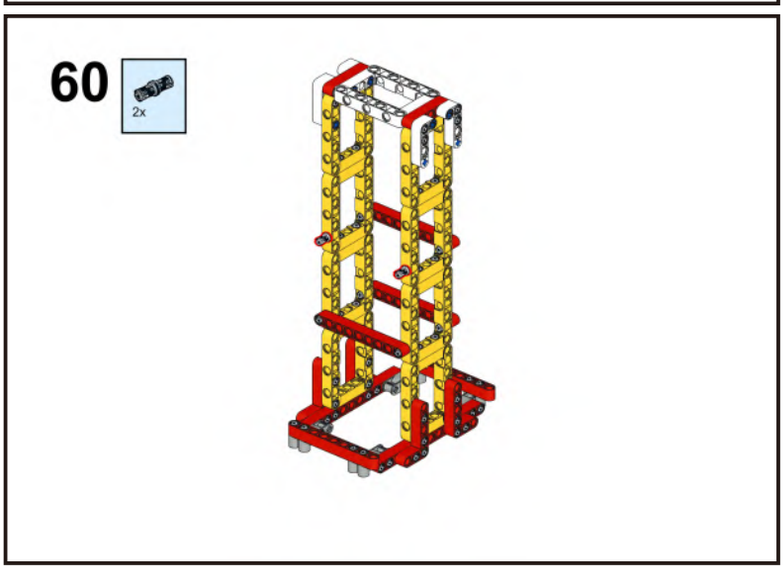






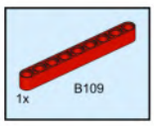


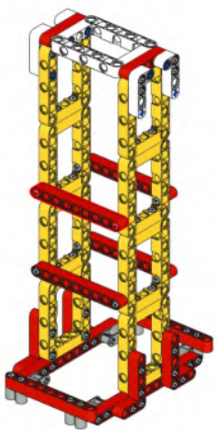




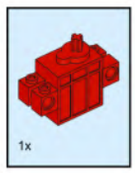
https://osoyoo.com/?p=44354

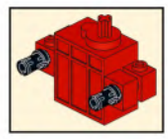
61

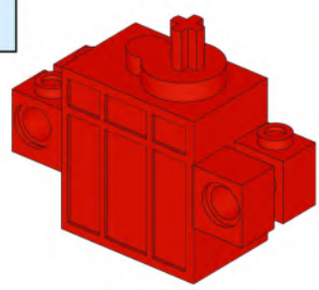




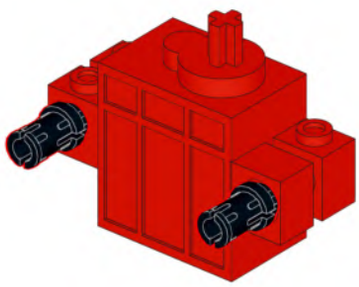
62



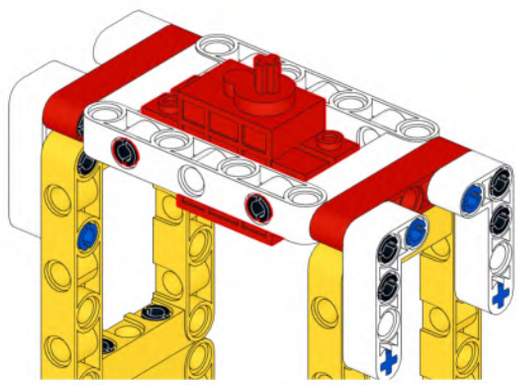




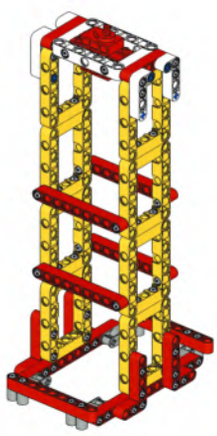
63



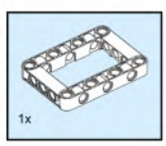
64

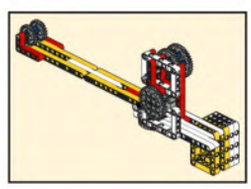


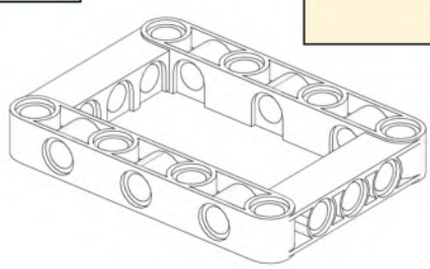
65



66

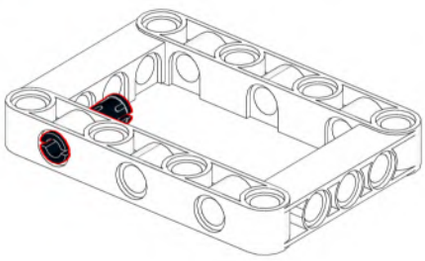




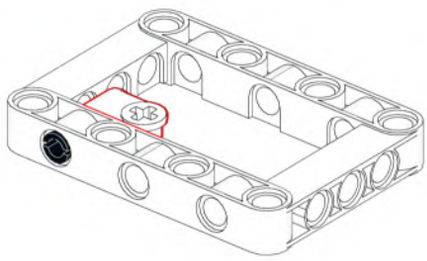


https://osoyoo.com/?p=44354

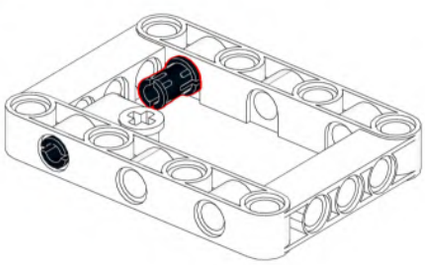
67



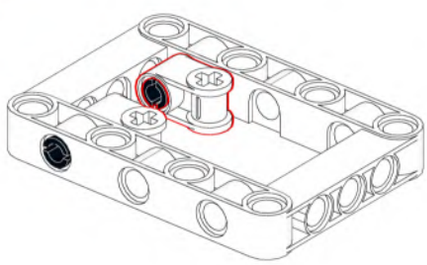
68



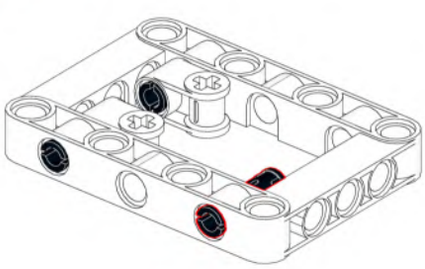
69



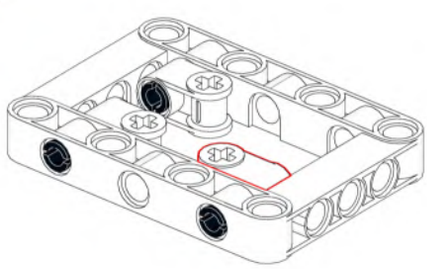
70



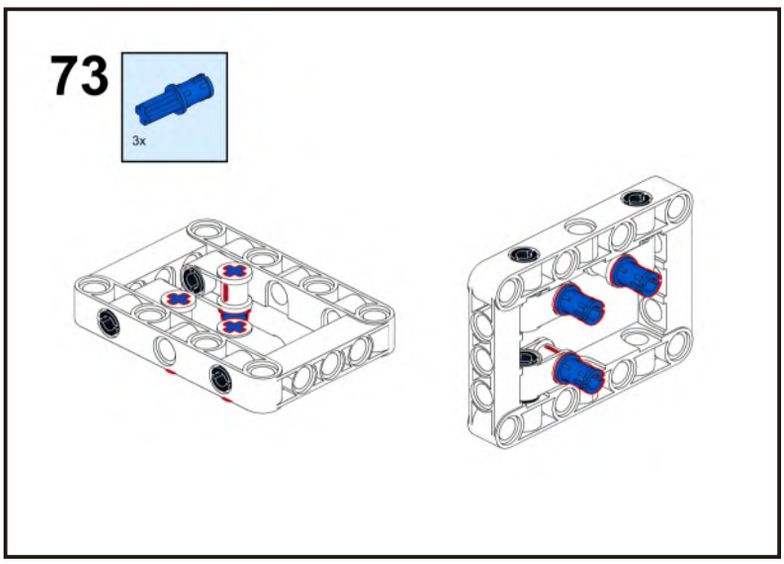
71

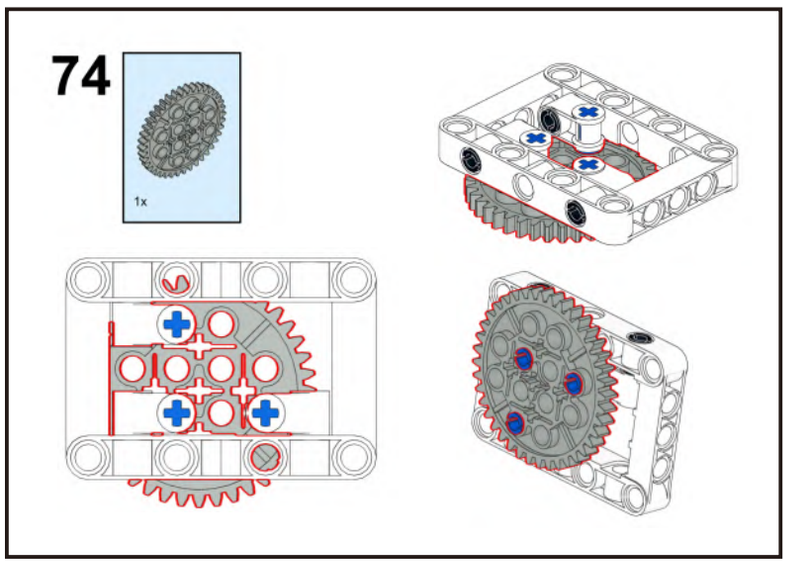


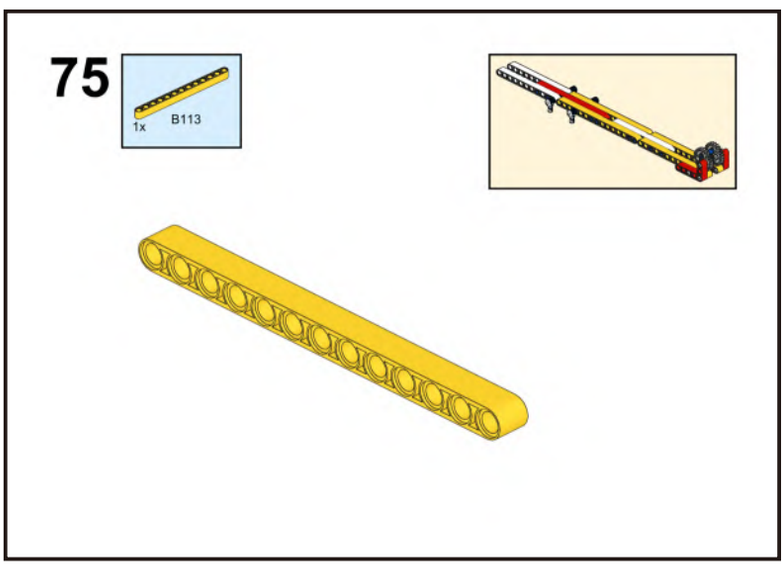
72

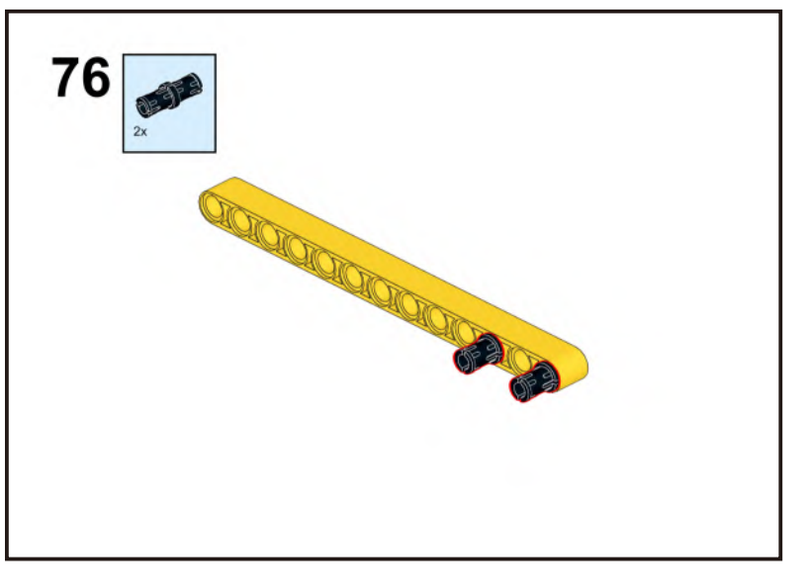


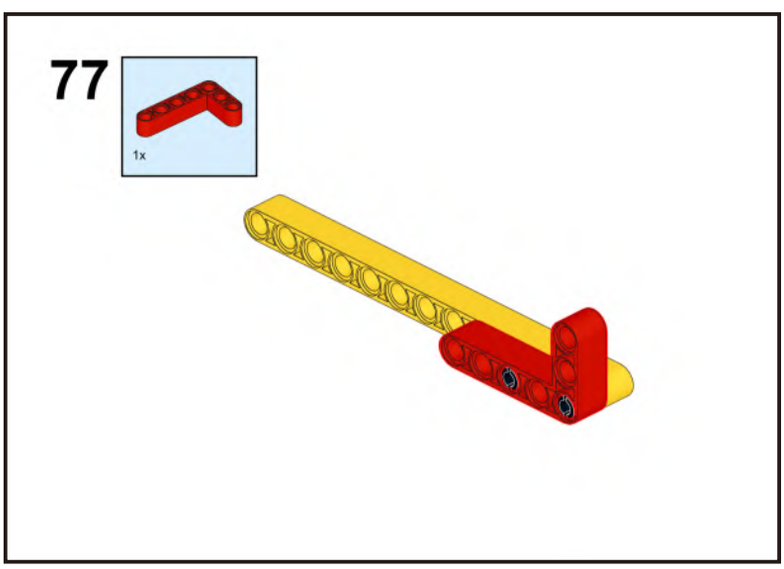
https://osoyoo.com/?p=44354

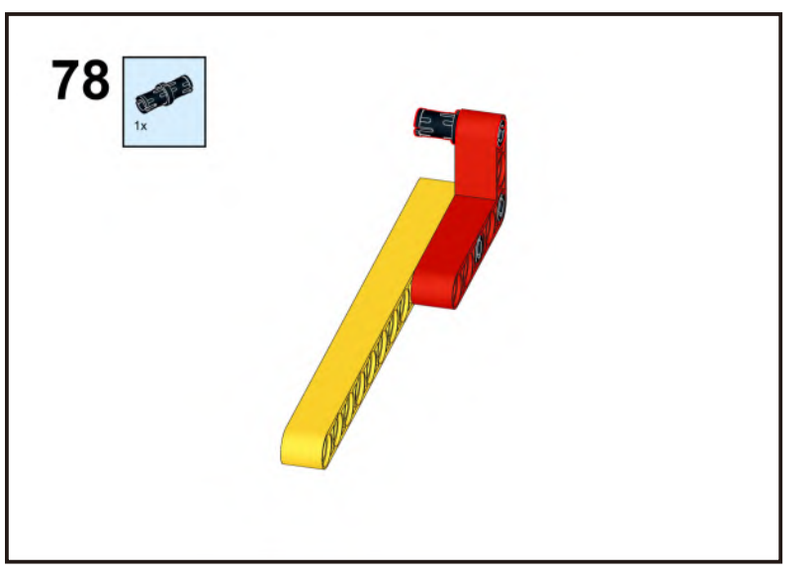




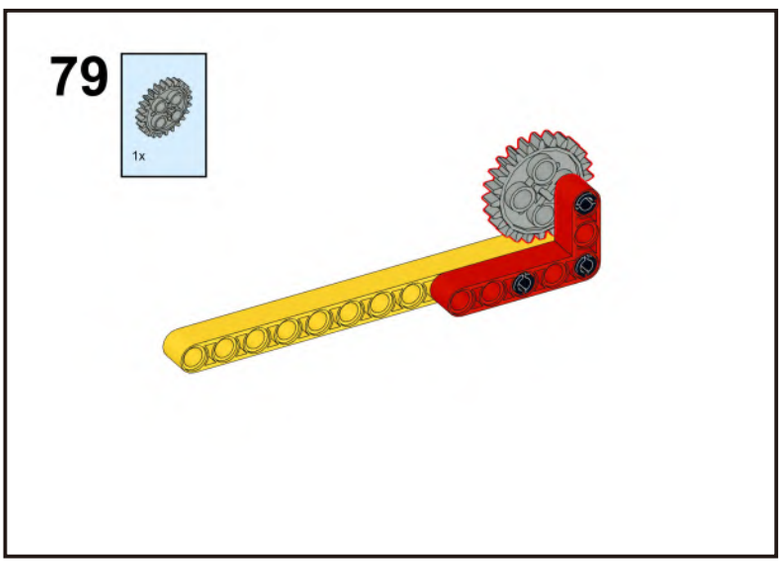


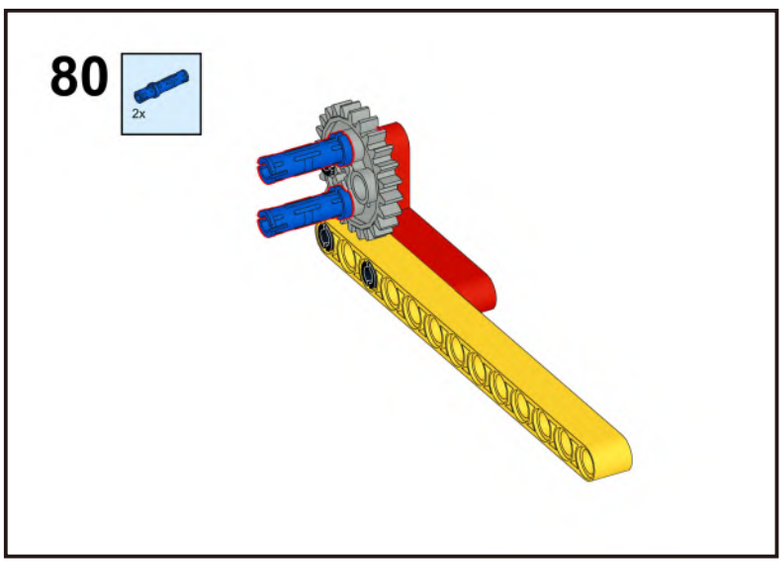


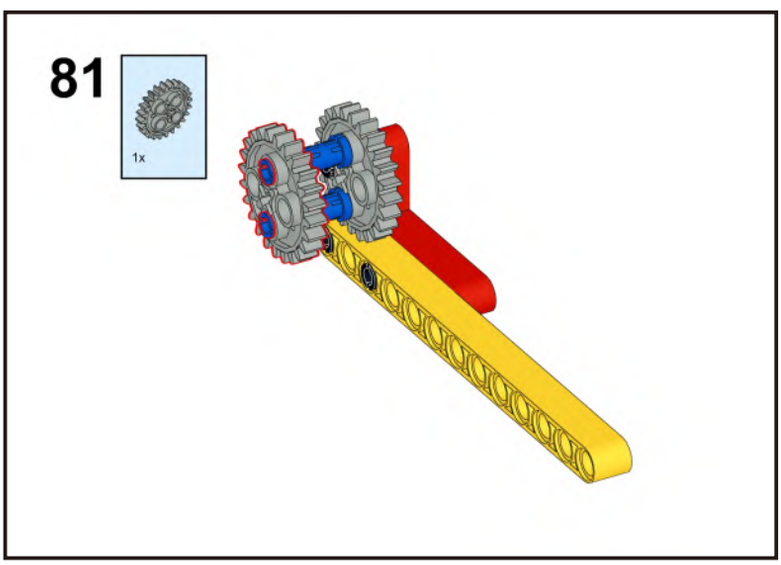


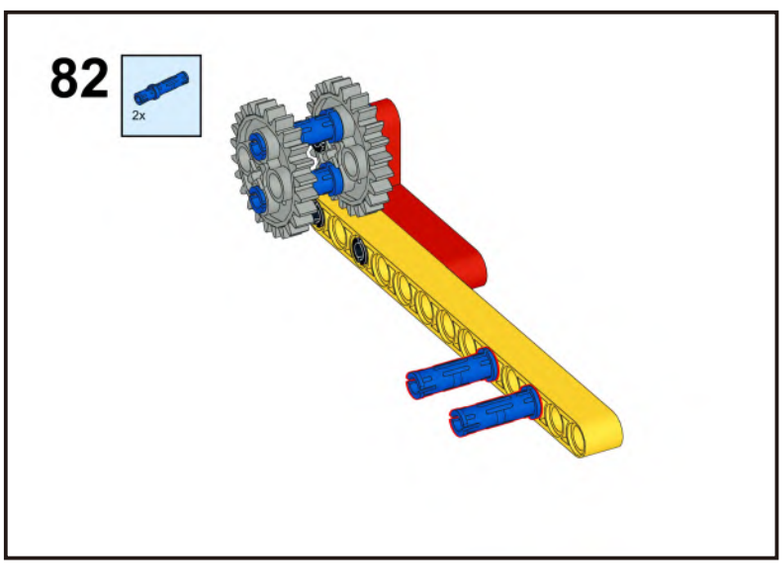


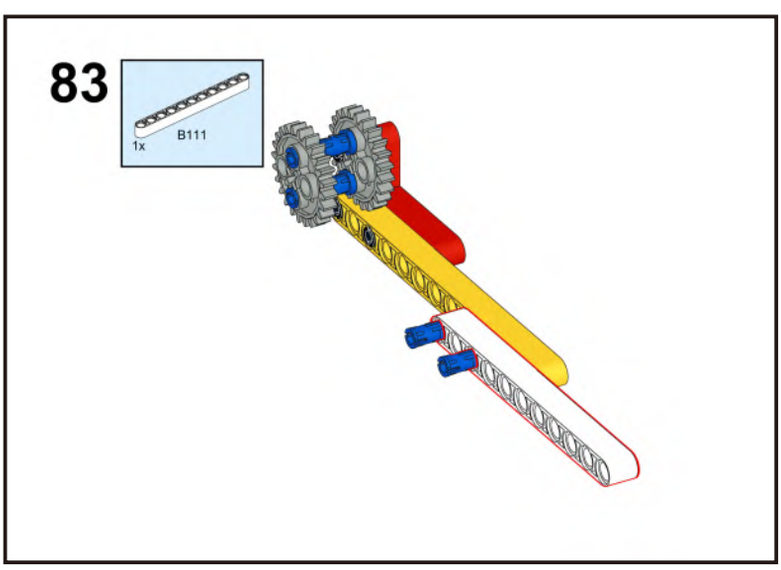
https://osoyoo.com/?p=44354

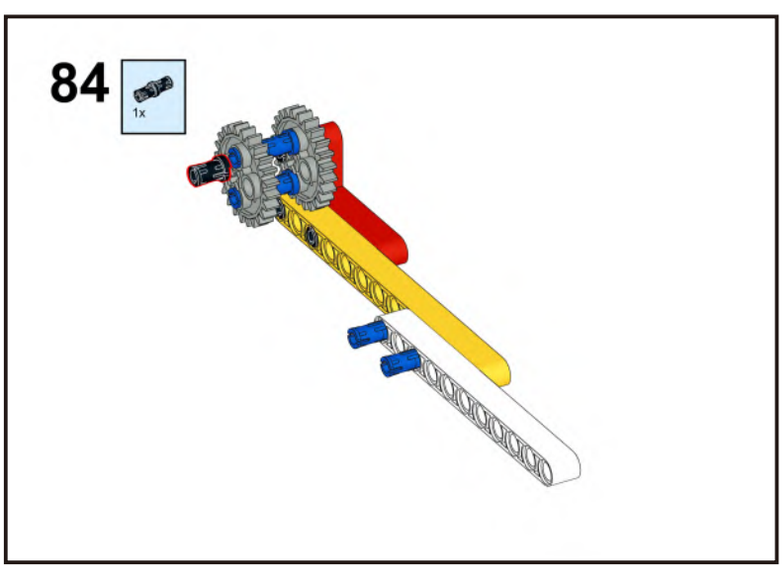




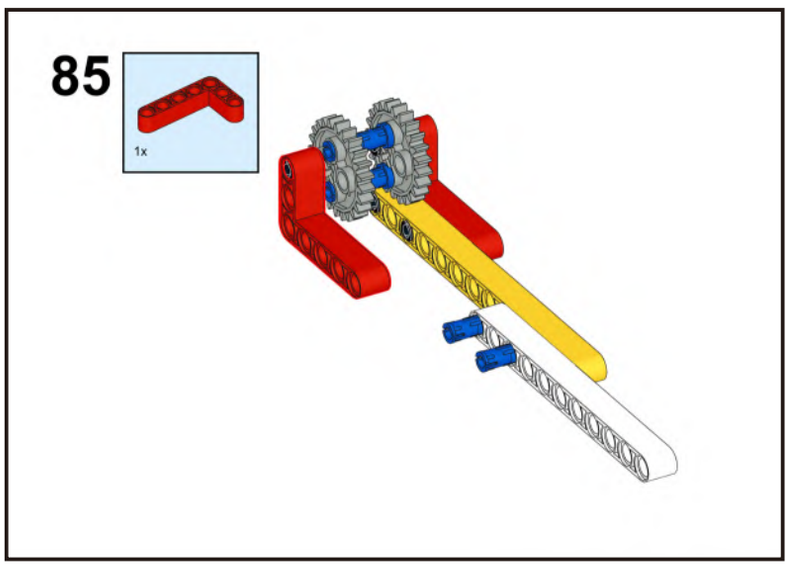


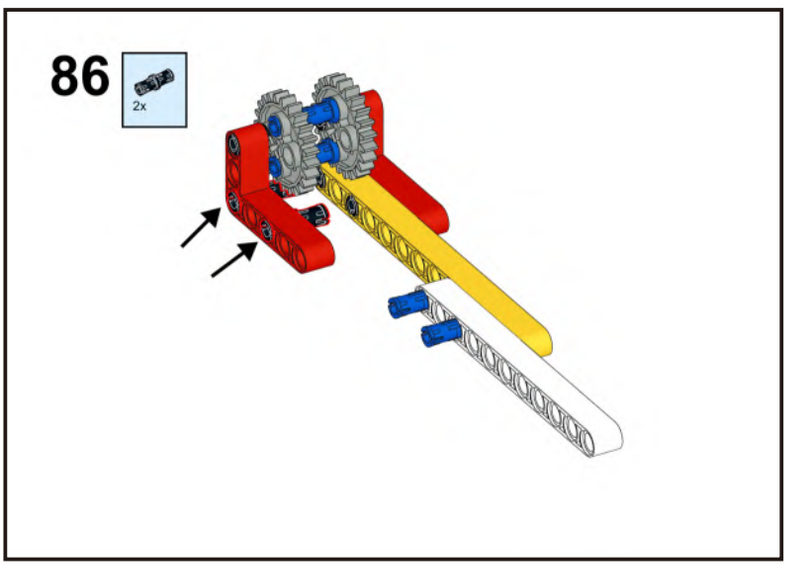


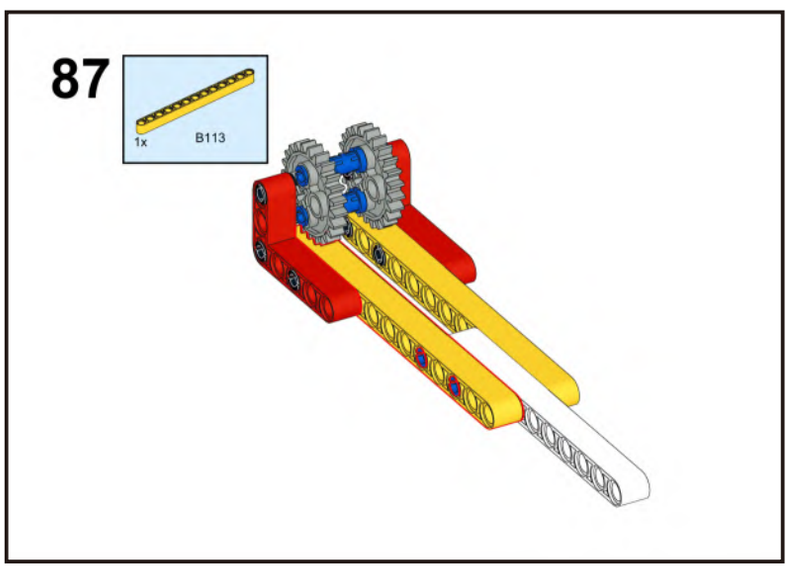


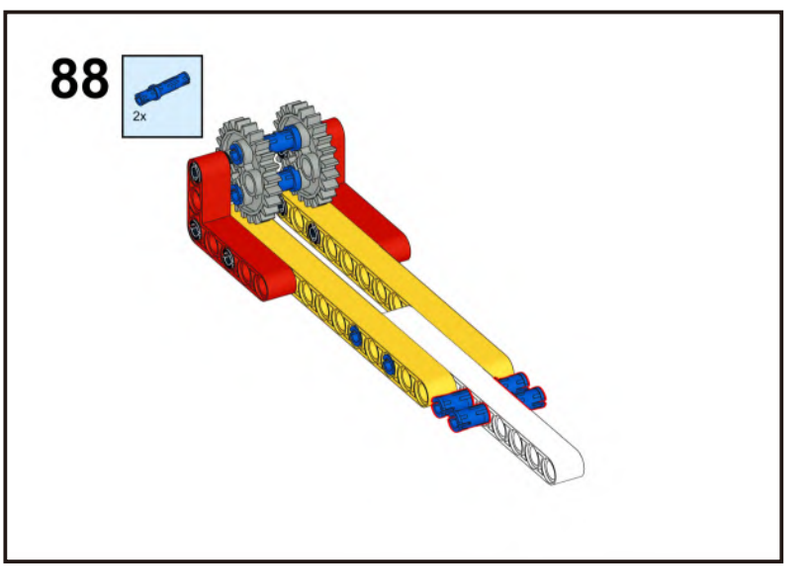


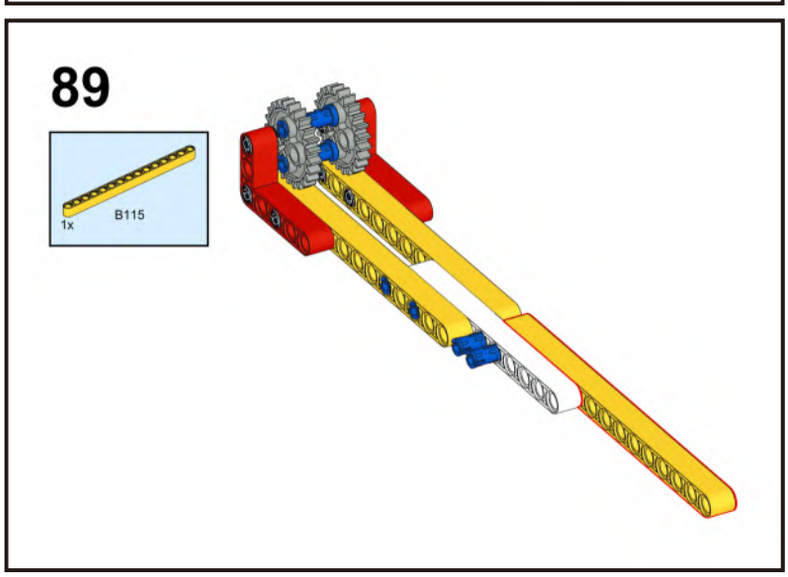
https://osoyoo.com/?p=44354

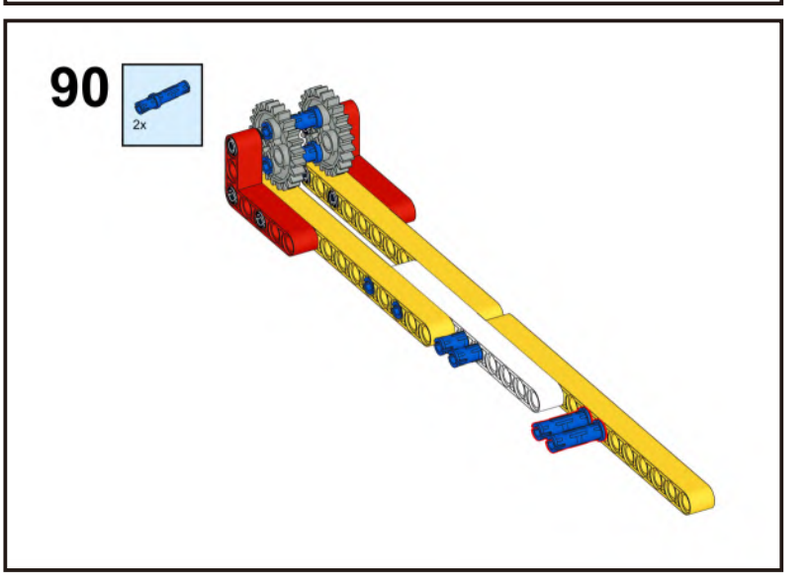




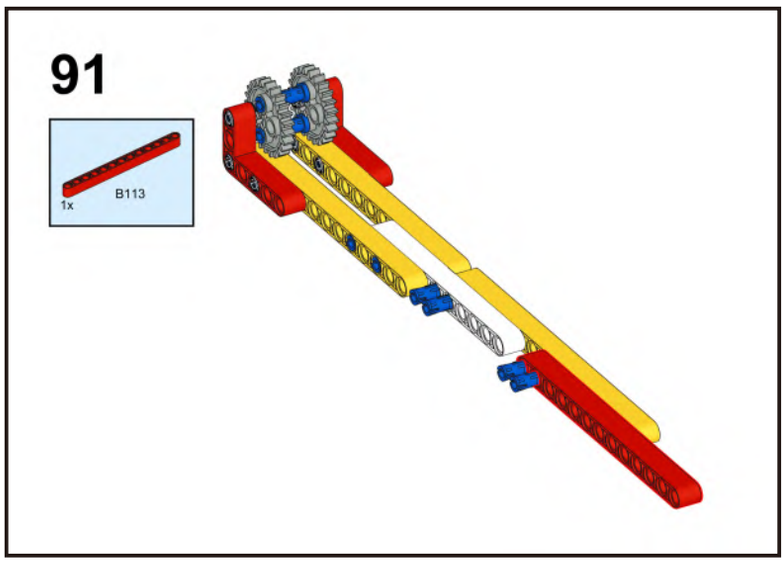


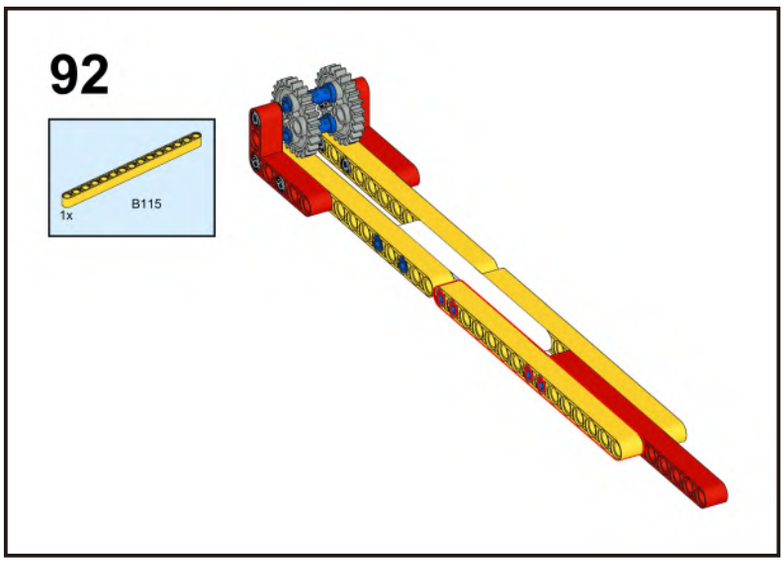


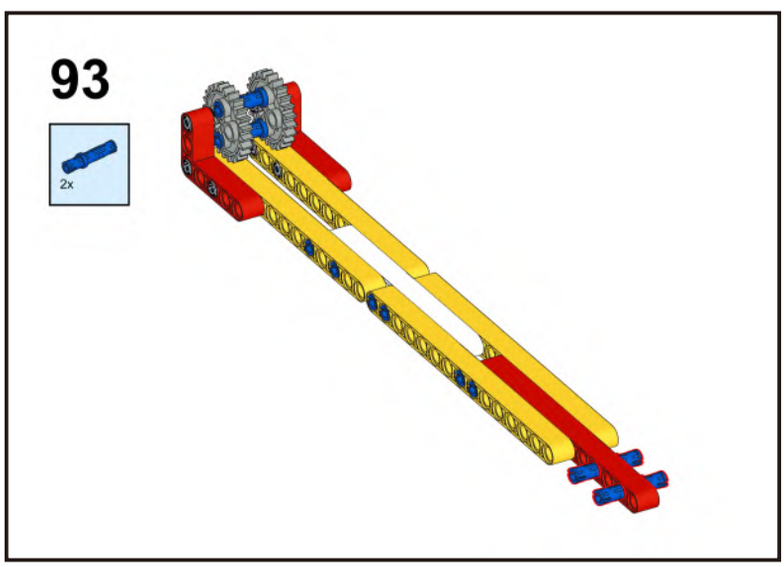


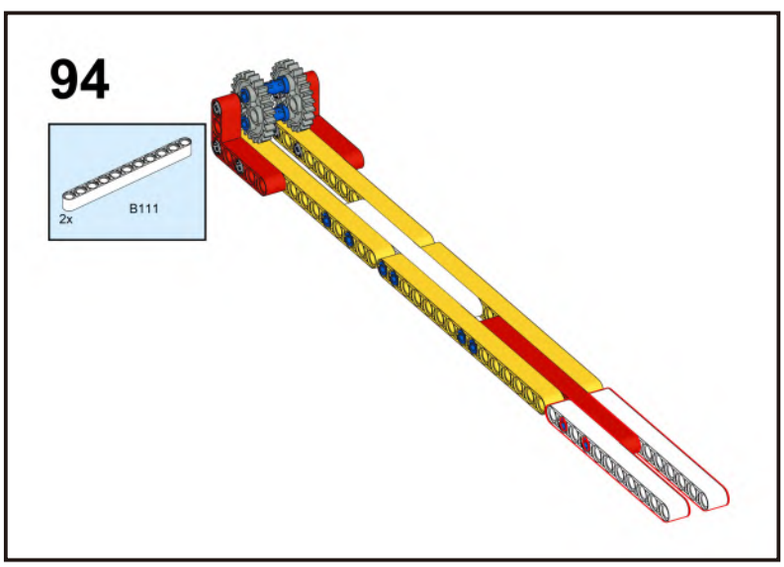


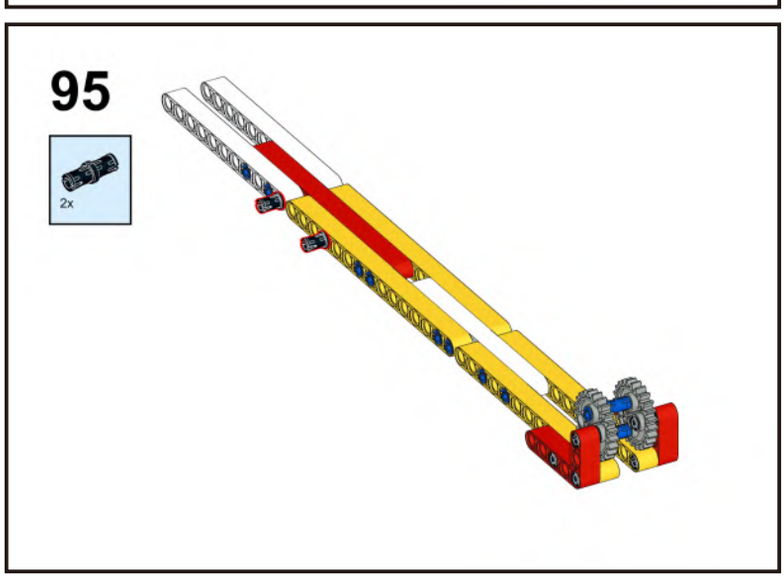
https://osoyoo.com/?p=44354

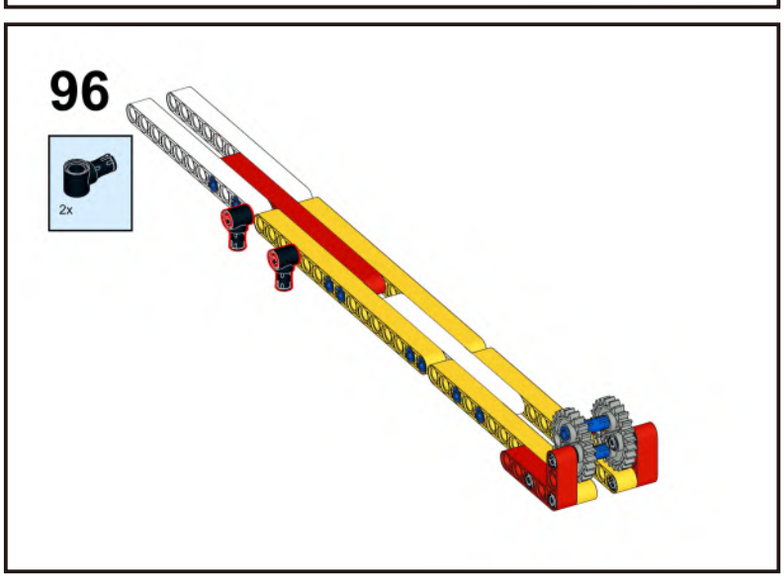






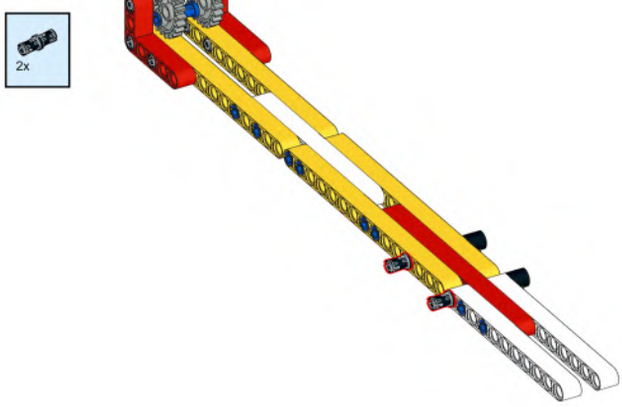






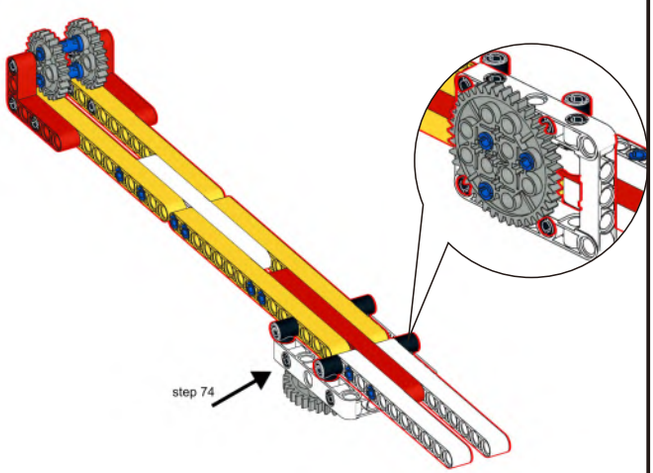
https://osoyoo.com/?p=44354

97

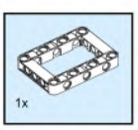


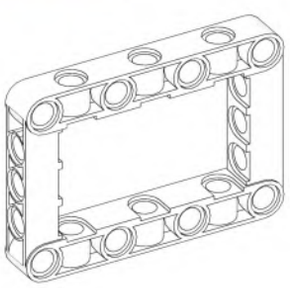
98

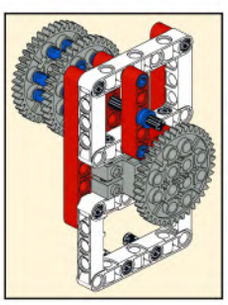
99



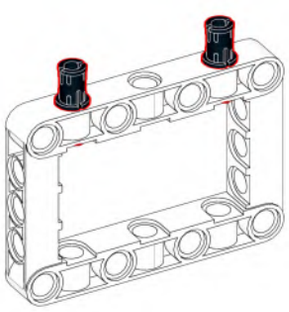
100



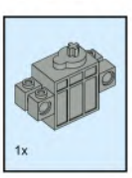


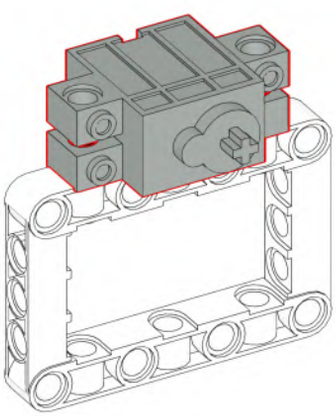


101



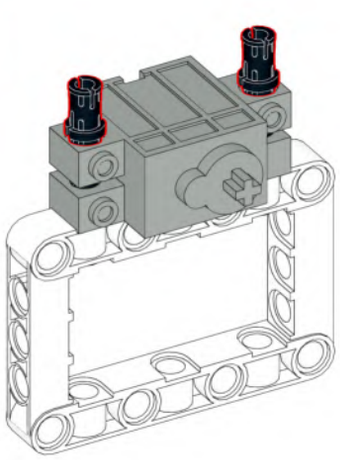
102



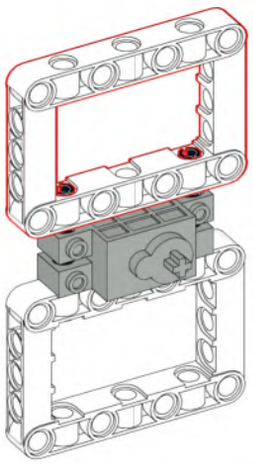


https://osoyoo.com/?p=44354

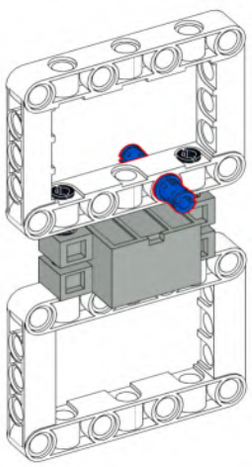
103



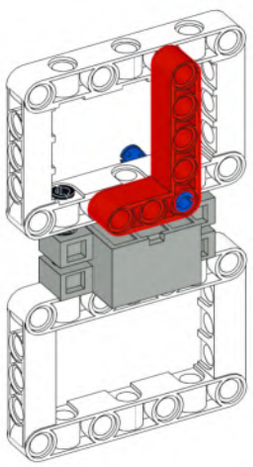
104



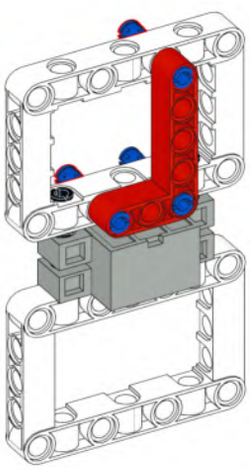
105



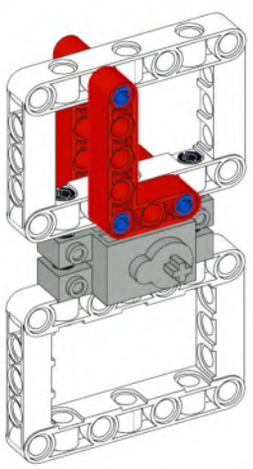
106



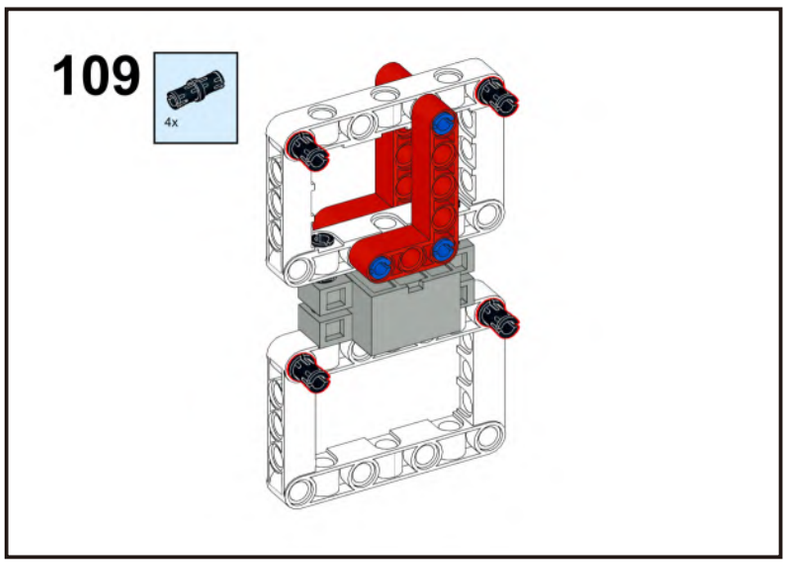
107

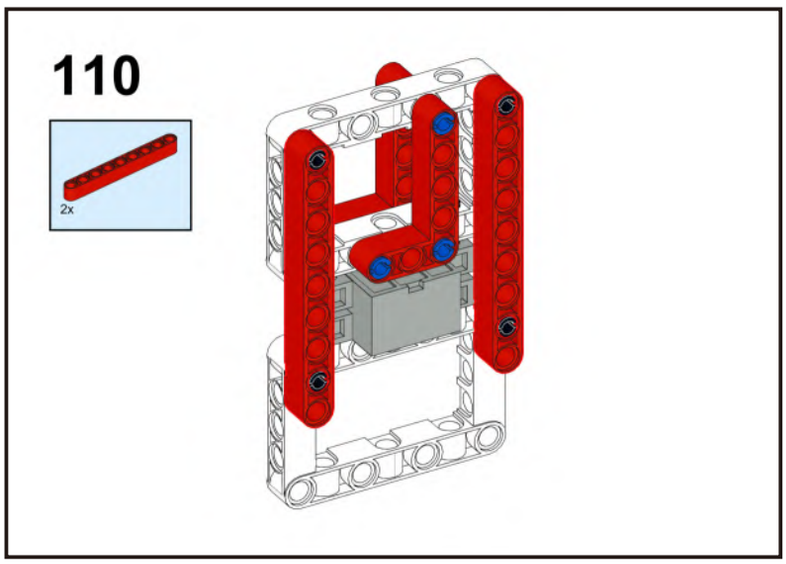


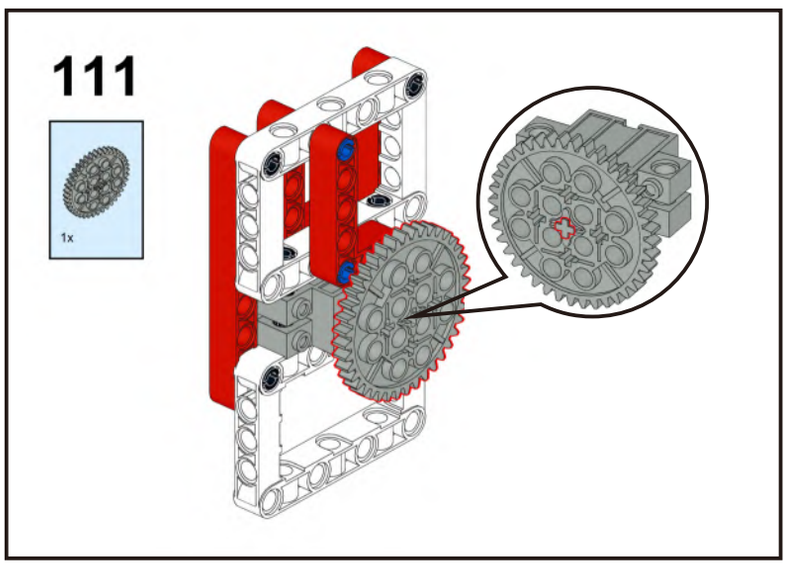
108

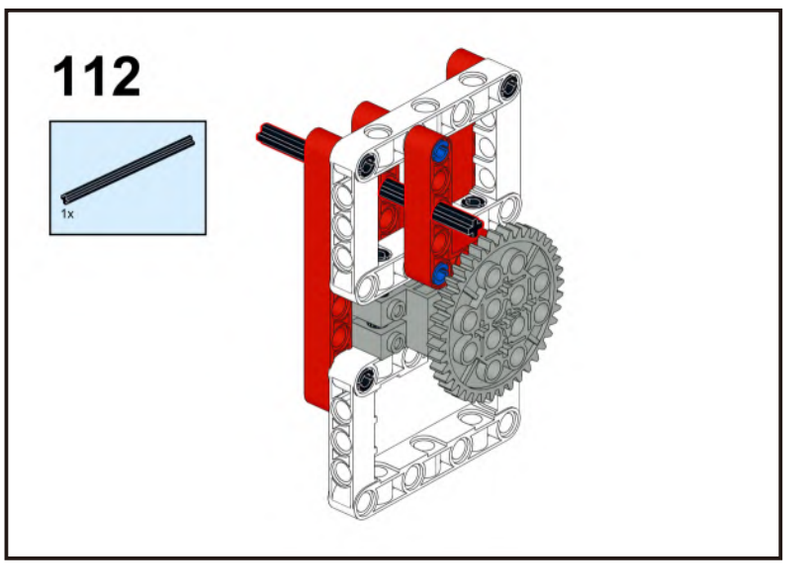


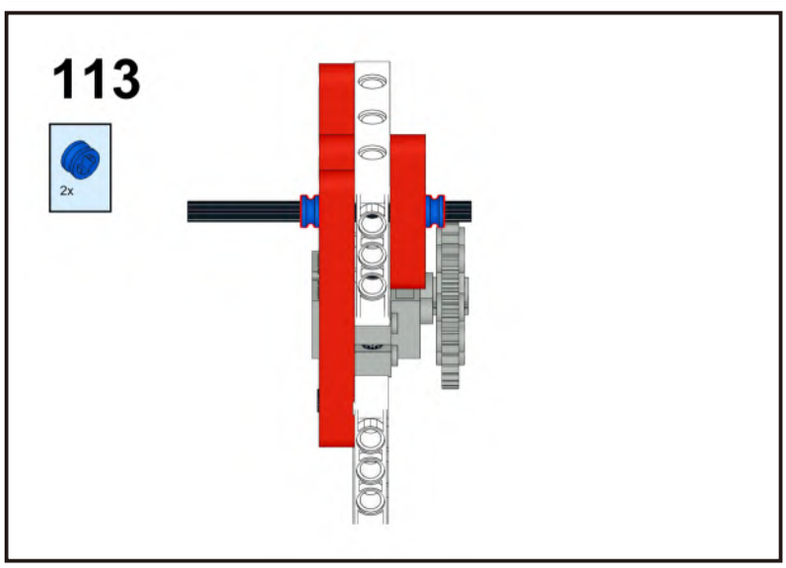
https://osoyoo.com/?p=44354

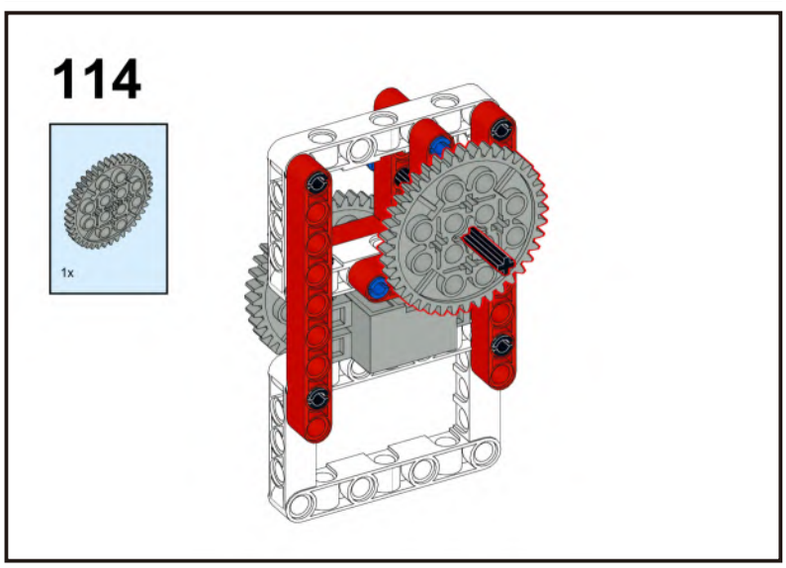






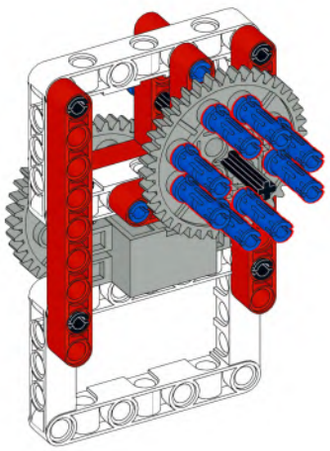




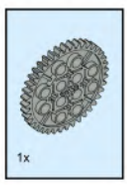


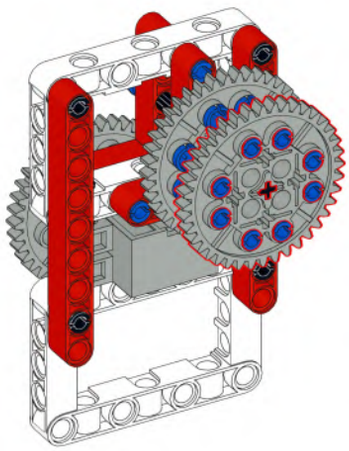
https://osoyoo.com/?p=44354

115

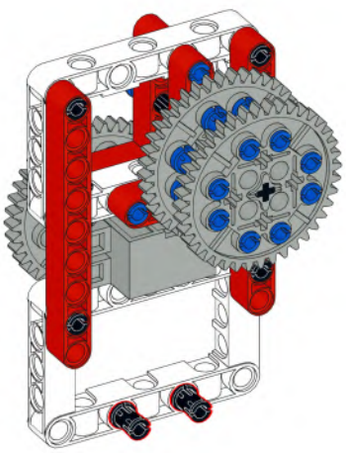


116

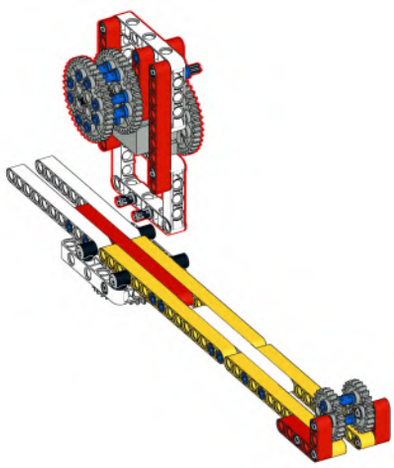




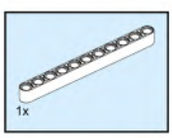
117

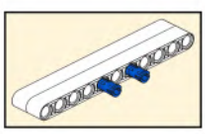


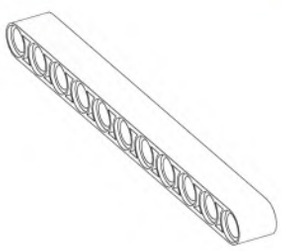
118



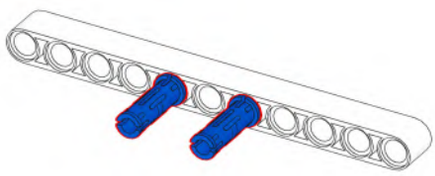
119





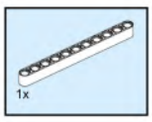


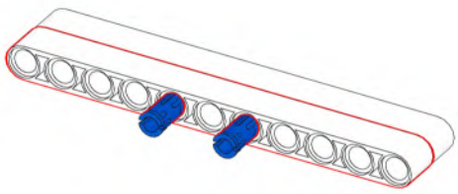
120



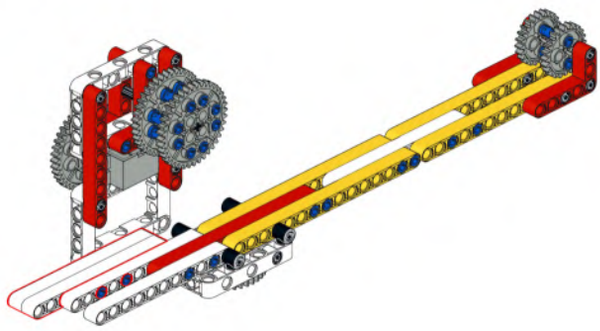
https://osoyoo.com/?p=44354

121

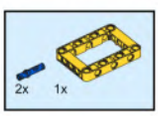


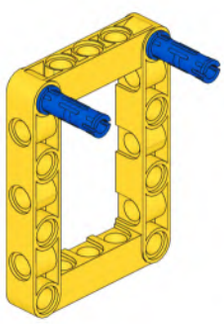


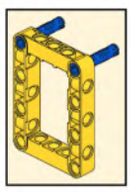
122



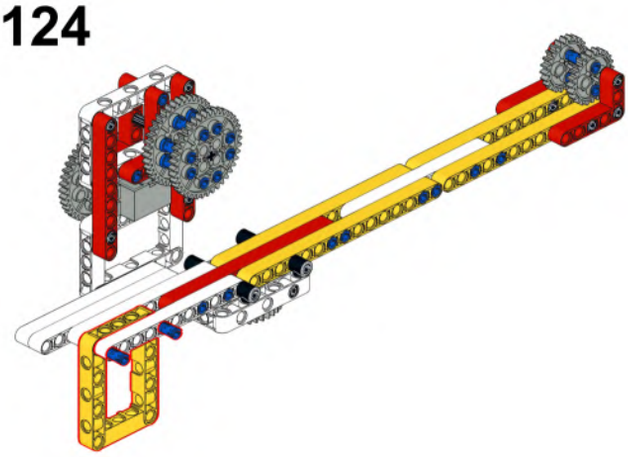
123



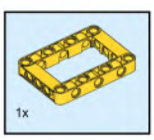


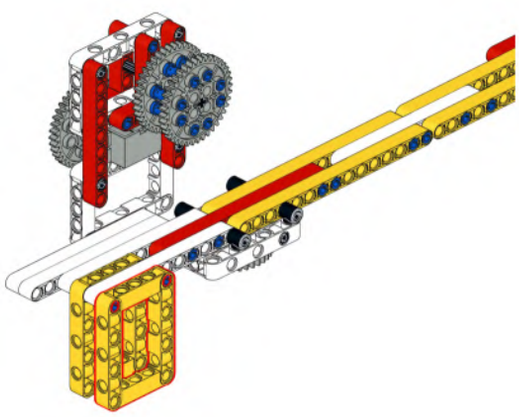


124

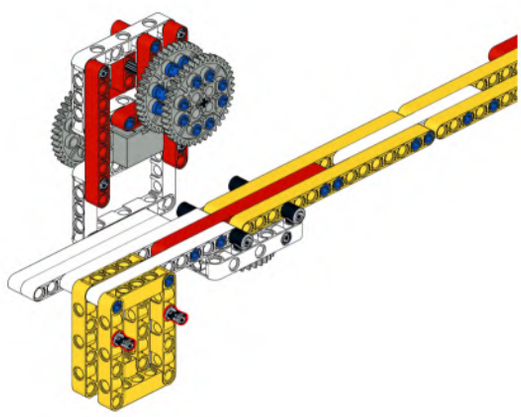


125

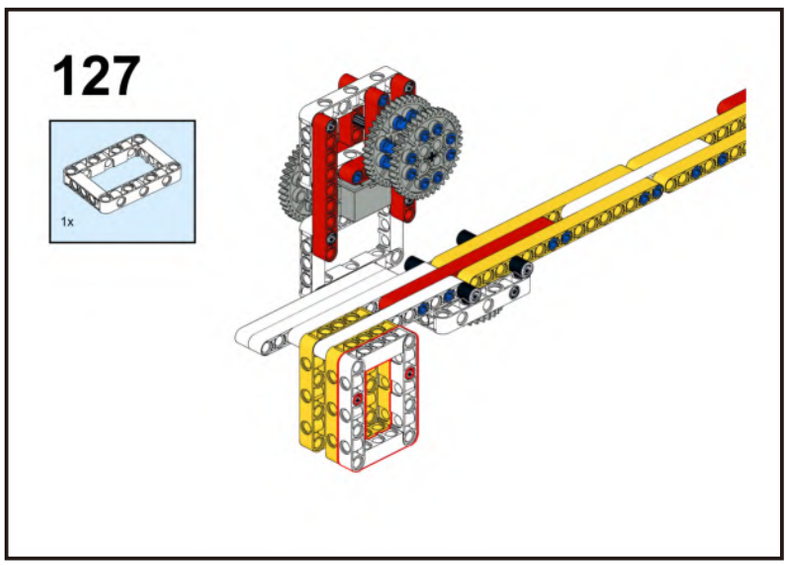


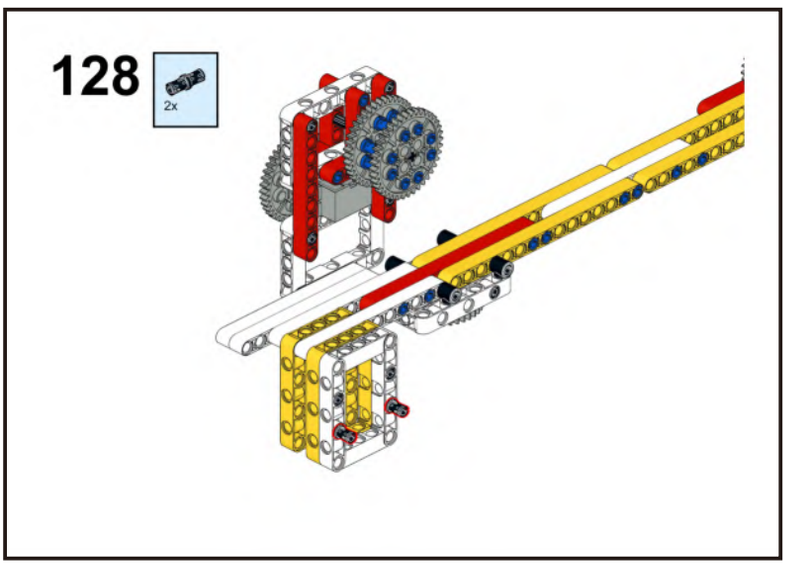


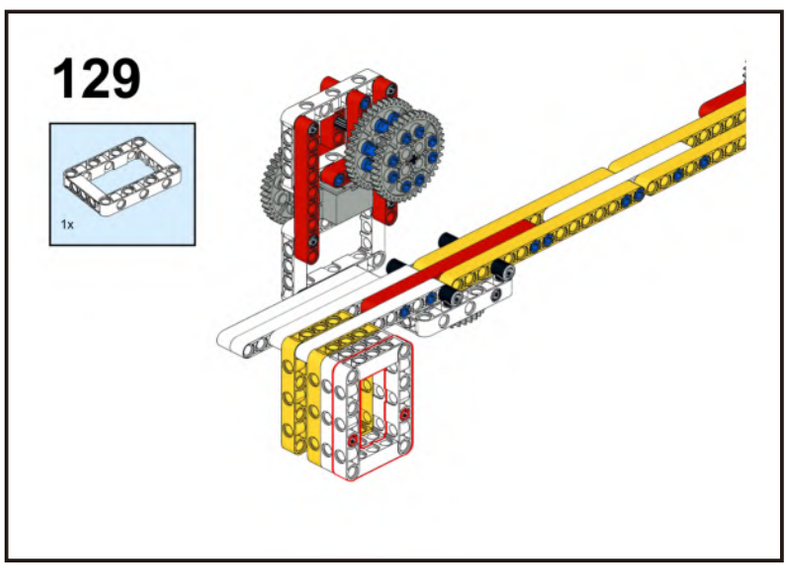
126

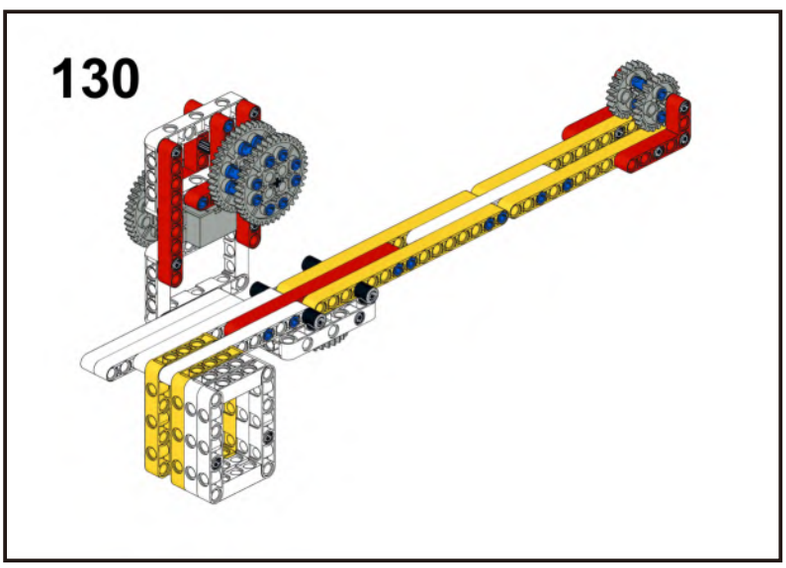


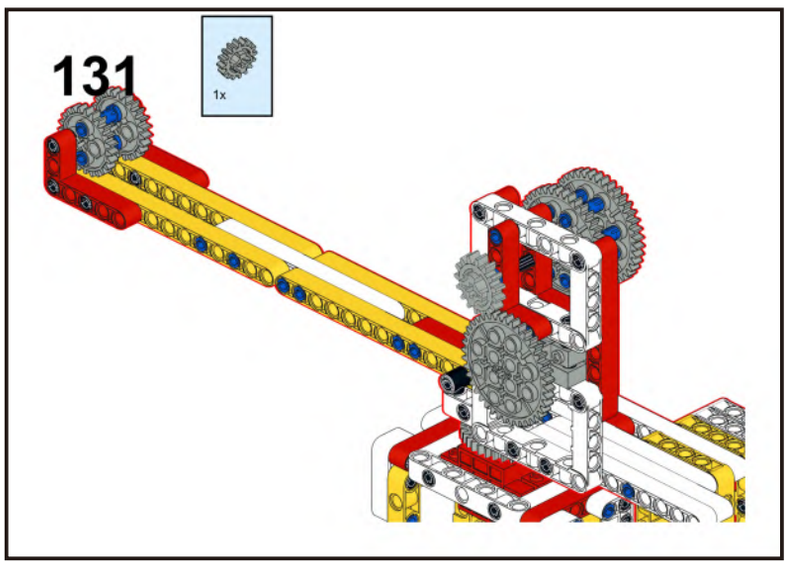
https://osoyoo.com/?p=44354

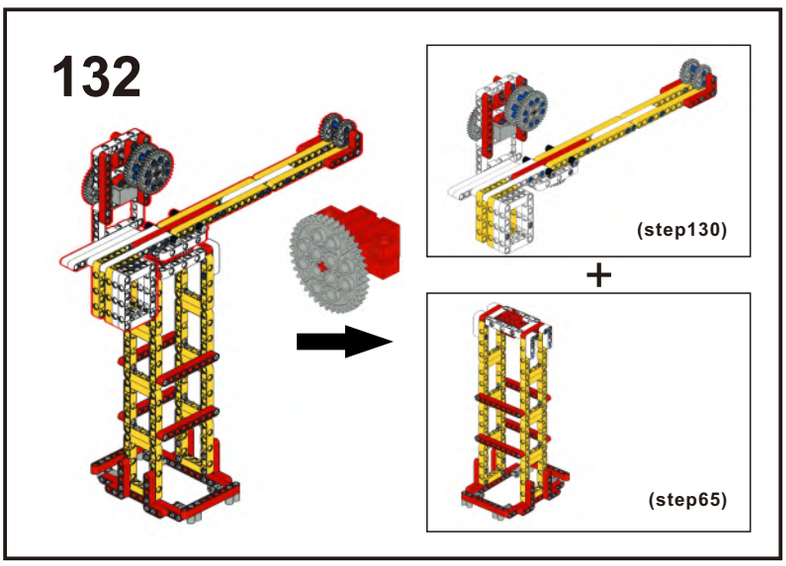




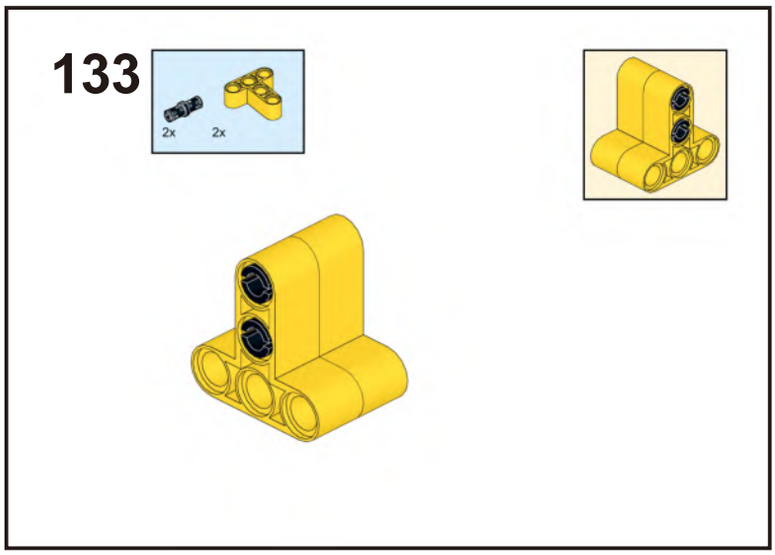


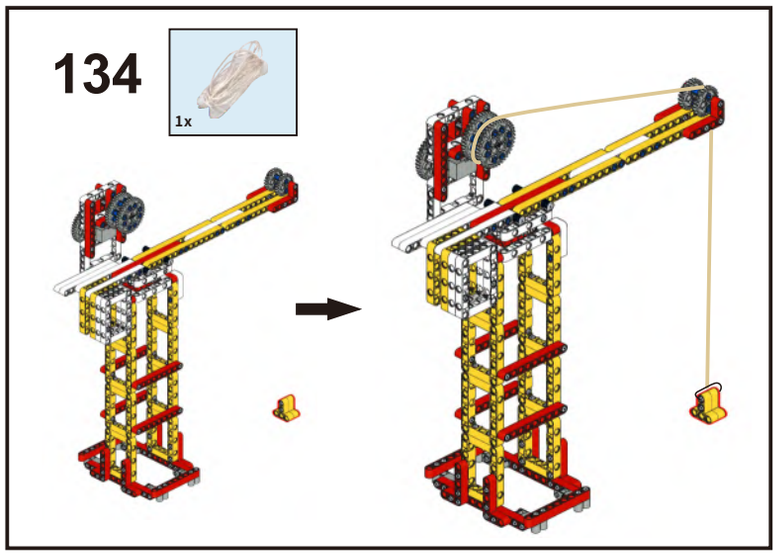


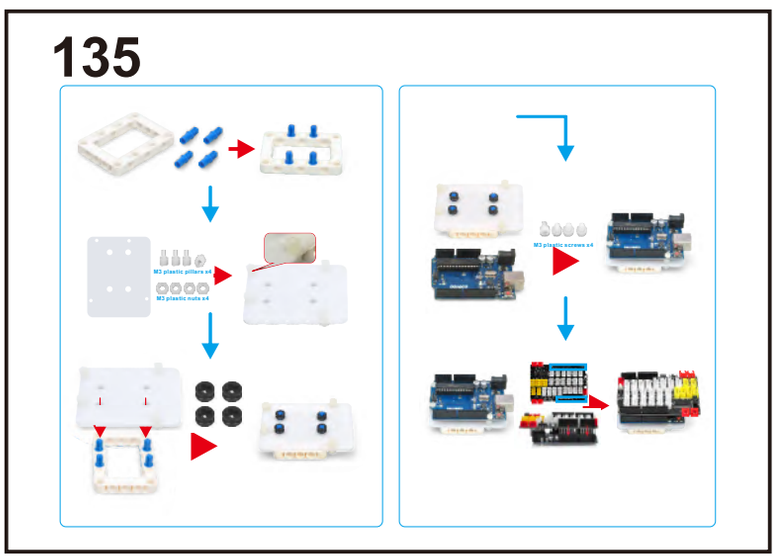


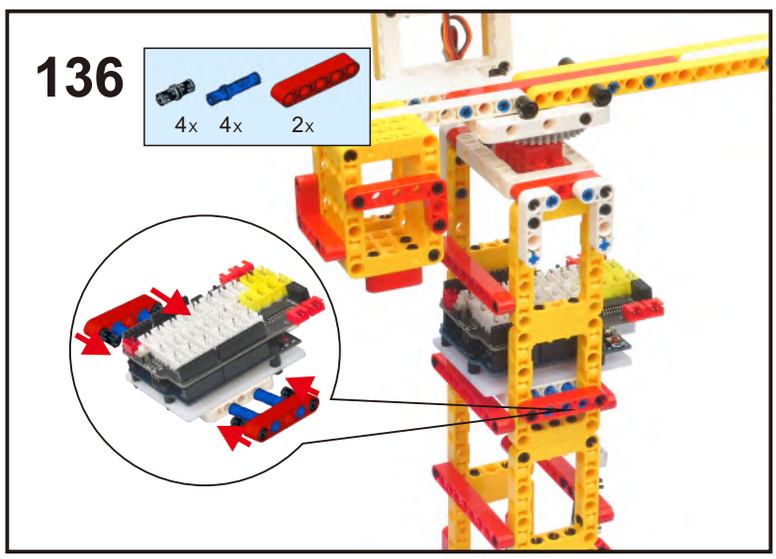


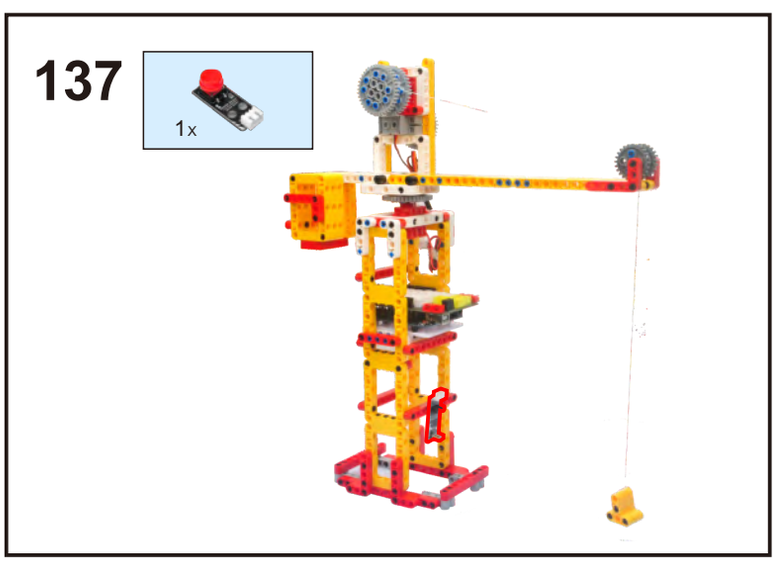
https://osoyoo.com/?p=44354







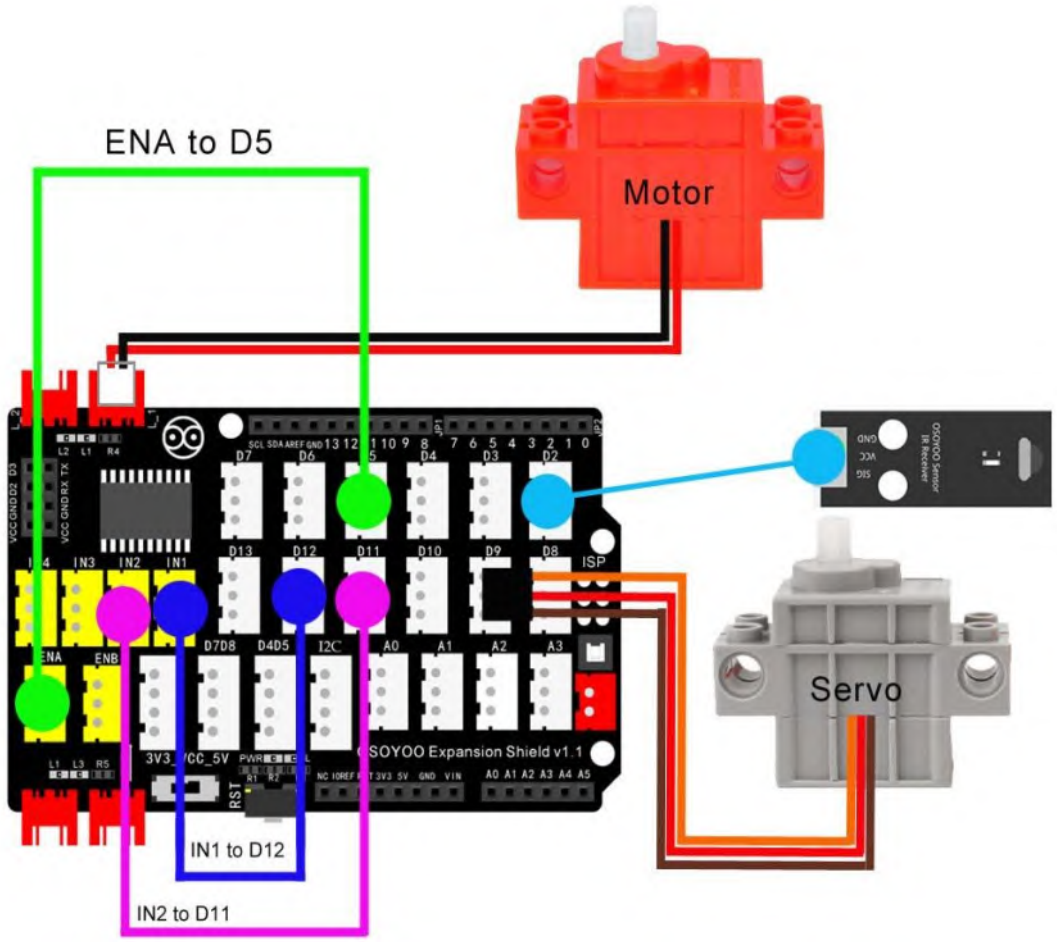




https://osoyoo.com/?p=44354

CIRCUIT CONNECTION

Connect the IR receiver module to D2 port, plug arm motor to L1 port, plug crane cable servo to D9 as following:



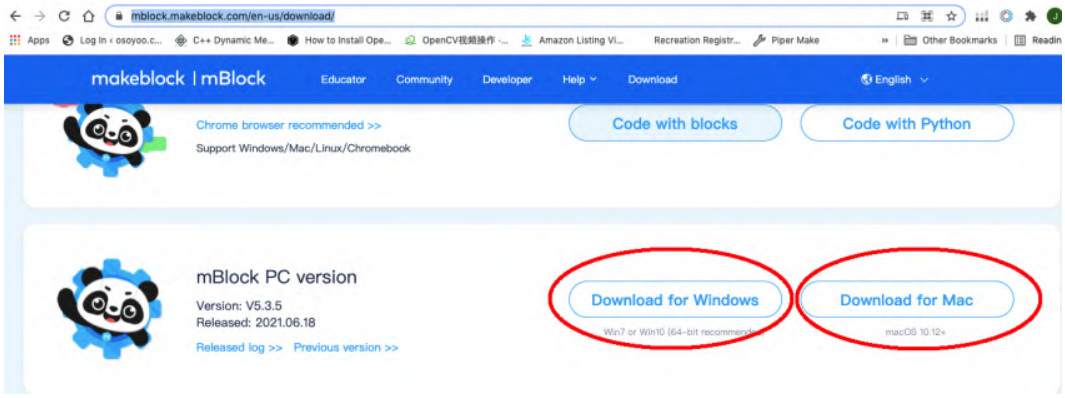
HOW TO CODE

Note: In this kit, we use mblock as programming tool, if you want to learn more about mblock, please visit preparation before class 1:

https://osoyoo.com/2021/12/01/preparation-before-class-1

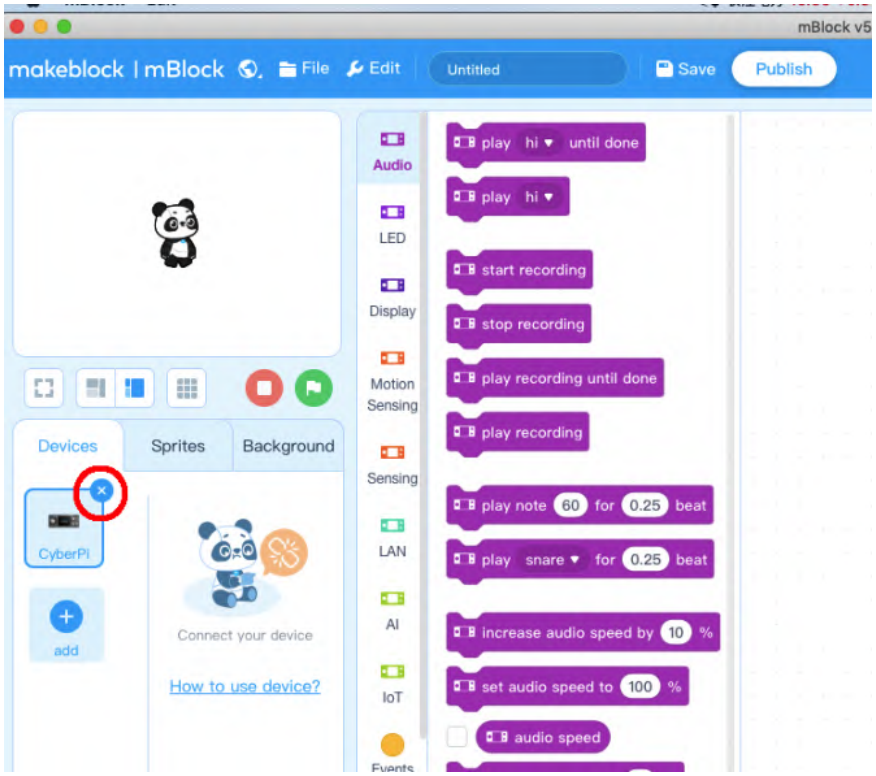
Step 1) If you haven't install mBlock software in your PC, please read Lesson 1, download and install the software.

https://osoyoo.com/?p=44354



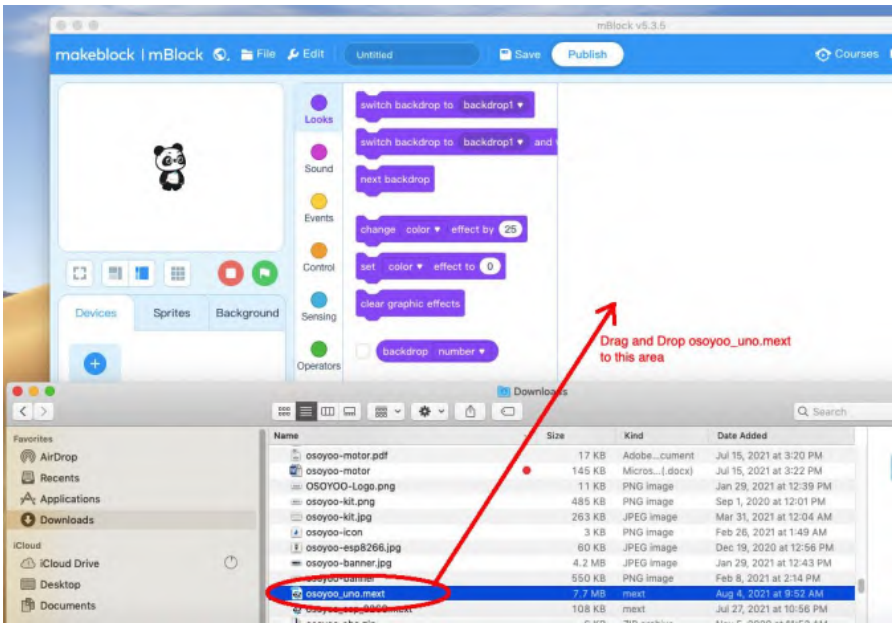
Step 2) Download OSOYOO_UNO.mext device file from https://osoyoo.com/driver/mblock/osoyoo_uno.mext

Step 3) Run the mBlock PC software by double click the lovely Panda icon. You will see mBlock UI as following picture. Please delete the default device CyberPi by click the cross in the red circle.

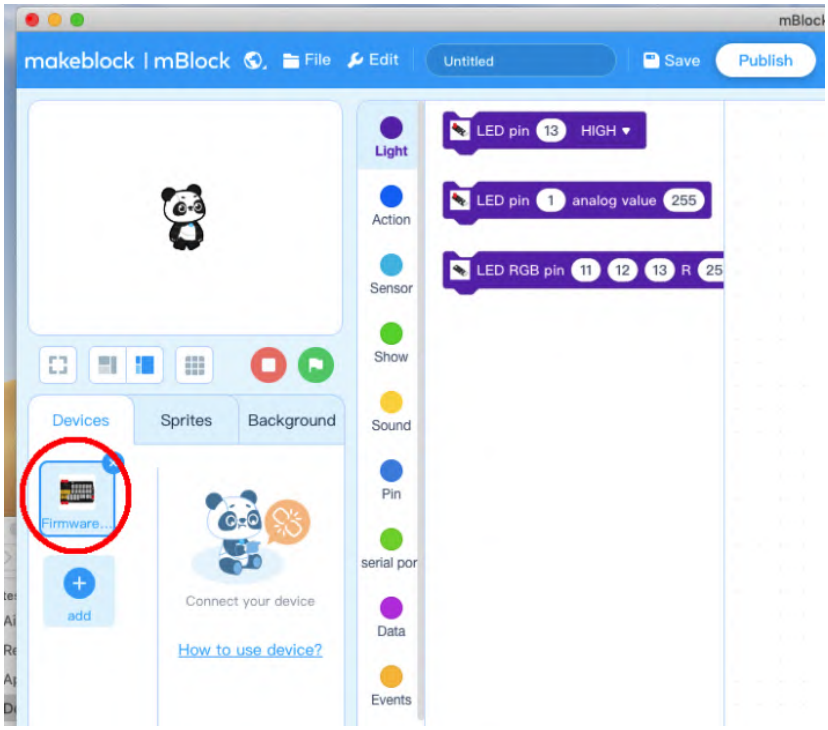


Step 4) Drag and Drop osoyoo_uno_mext file (downloaded in Step 2) to mBlock software as following:

https://osoyoo.com/?p=44354



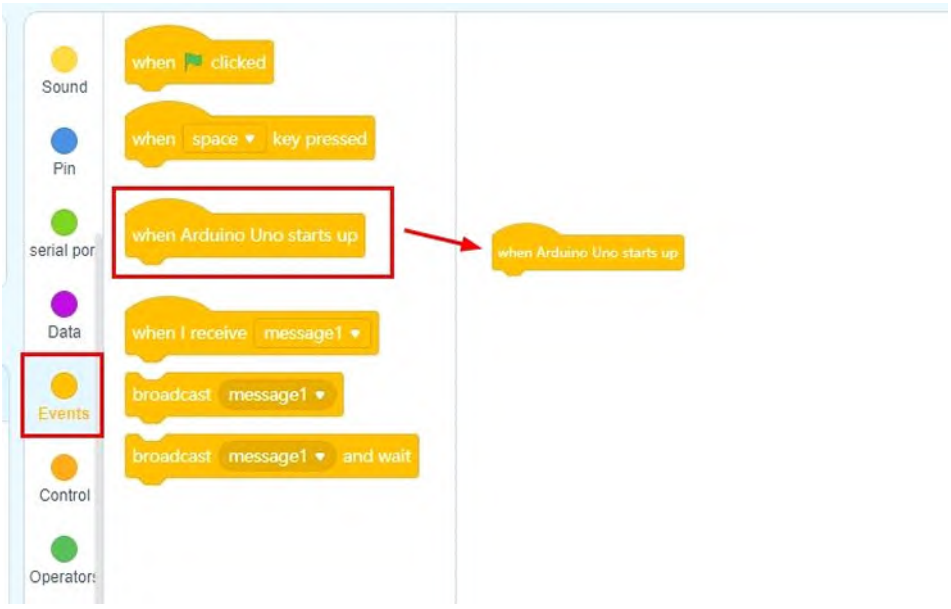
Now you will see a new device firmware in mBlock, see following picture:



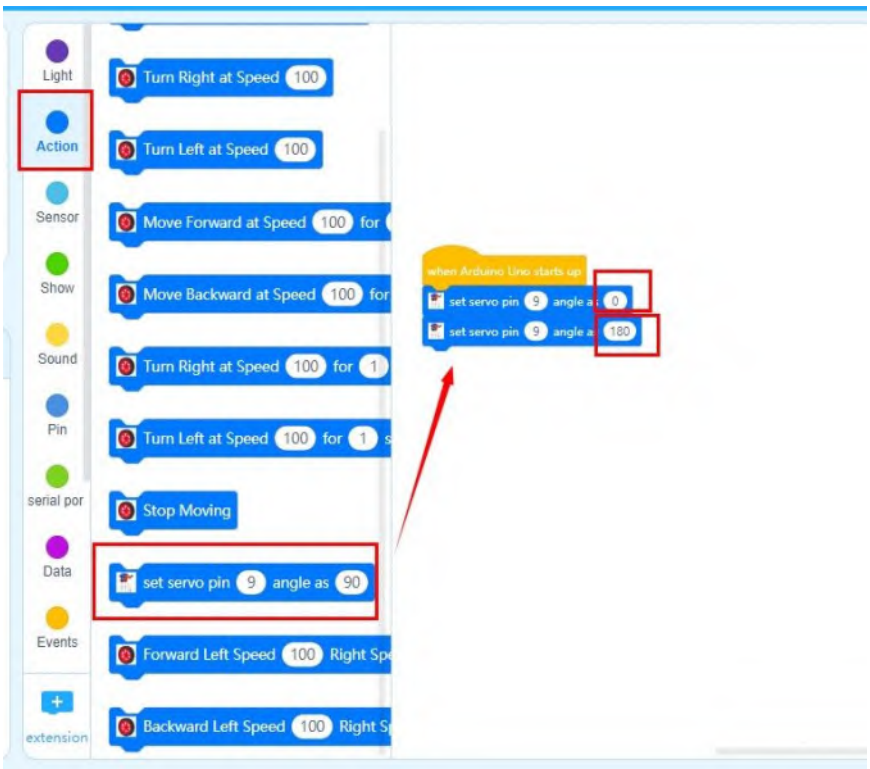
Now mBlock software and OSOYOO_UNO device firmware have been successfully installed in our PC!

Now we will show you how to use blocks to turn above idea into reality.
Step 1: Click **Events**, add **when Arduino Uno starts up** block to programming area.

https://osoyoo.com/?p=44354



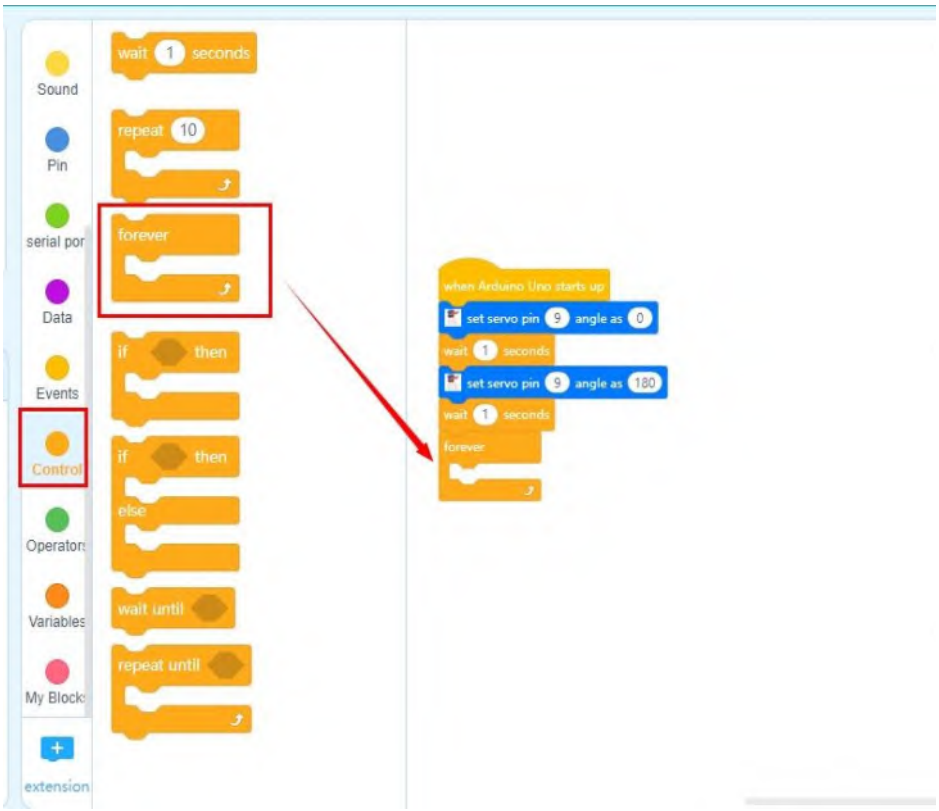
Step 2：Click **Action**, drag **set servo pin 9 Angle as 90** block twice and change angle to **0 and 180** as following:



Step 3： Click Control, drag **wait 1 seconds** block twice under the **set servo pin 9 Angle as 90** block as following:

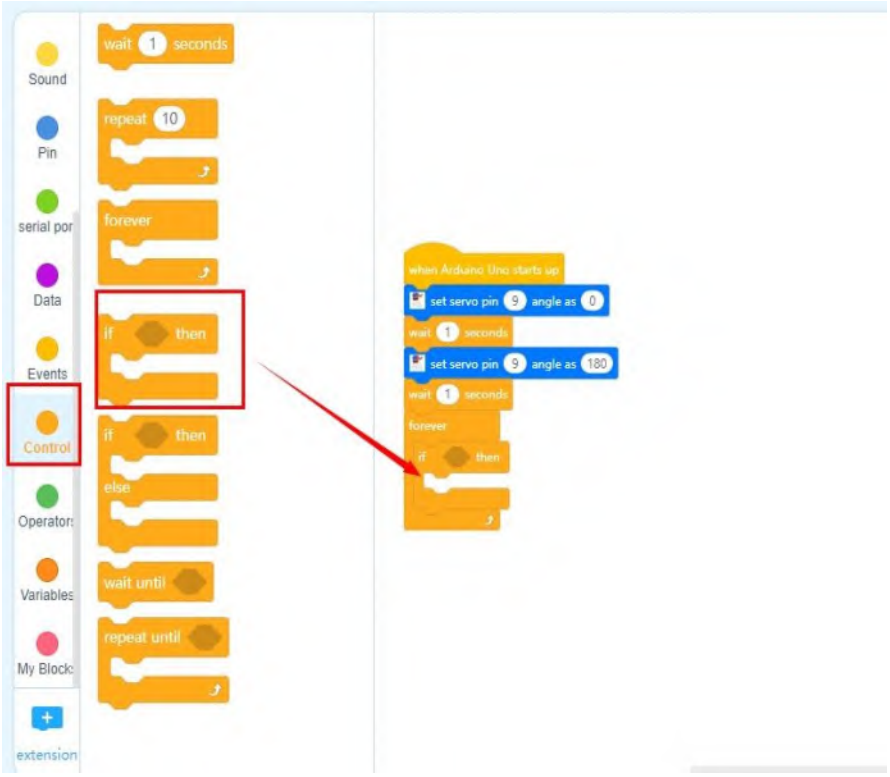
https://osoyoo.com/?p=44354

Step 4： Click **Control**, then Drag and drop **Forever** block under **wait 1 seconds** block as following:

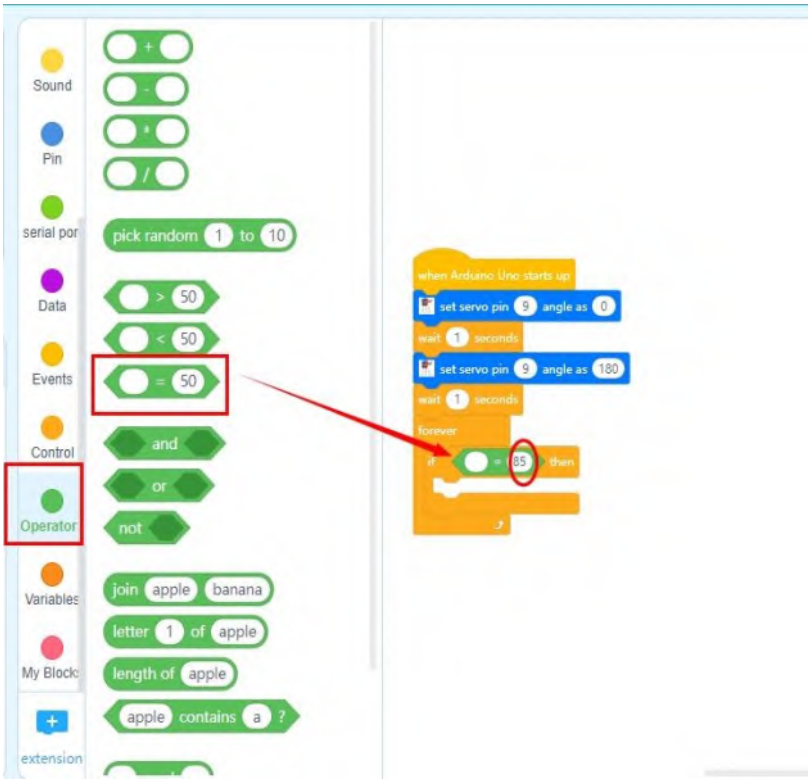


Step 5: Click **Control**, drag if-then block to **forever** loop as following:

https://osoyoo.com/?p=44354

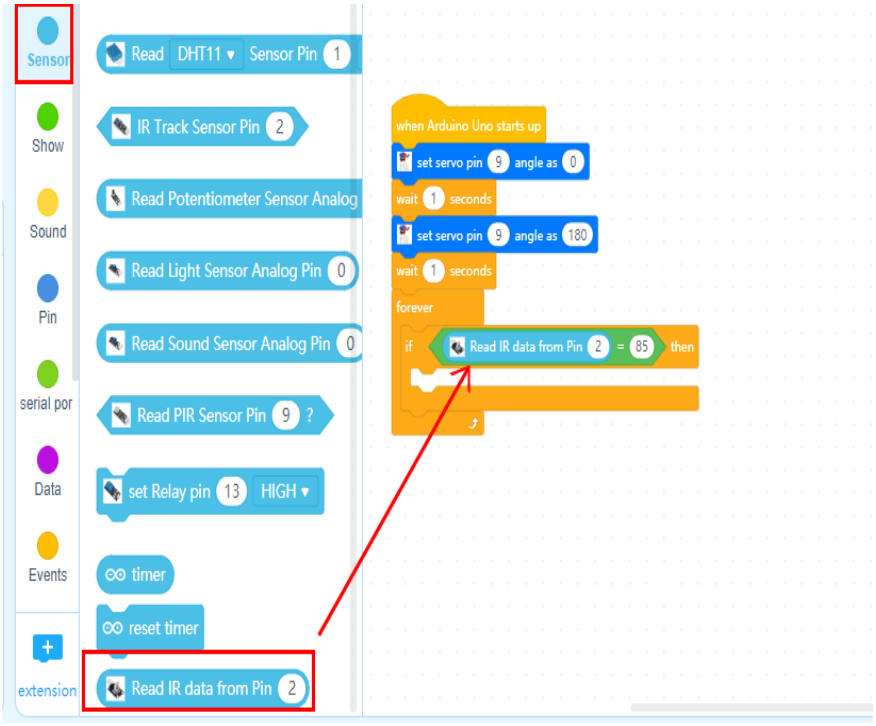


Step 6: Click **Operation**, drag **X =50** block on the placeholder of the if-then block, and change 50 to 85 as following:



https://osoyoo.com/?p=44354

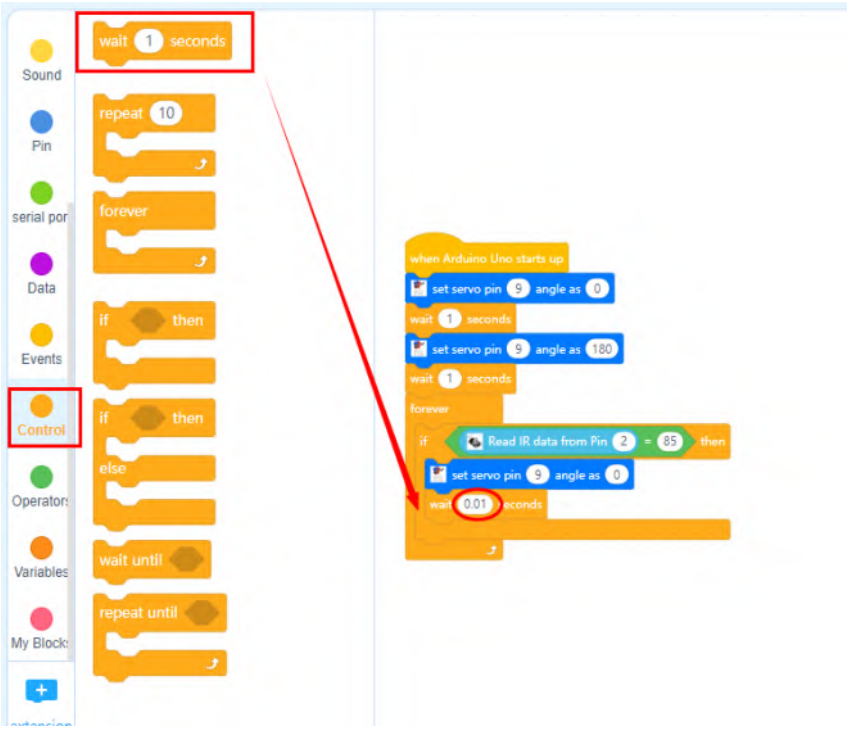
Step 7: Click **Sensor**, drag **Read IR data from Pin 2** block on the first placeholder of the X =85 block as following:



Step 8: Click **Action**, drag *set servo pin 9 Angle as 90* under the **if-then** block, and change **90** to **0** as following:

https://osoyoo.com/?p=44354

Step 9 :Click **Control**, then drag *wait 1 seconds* block, and change **1 to 0.01** as following:

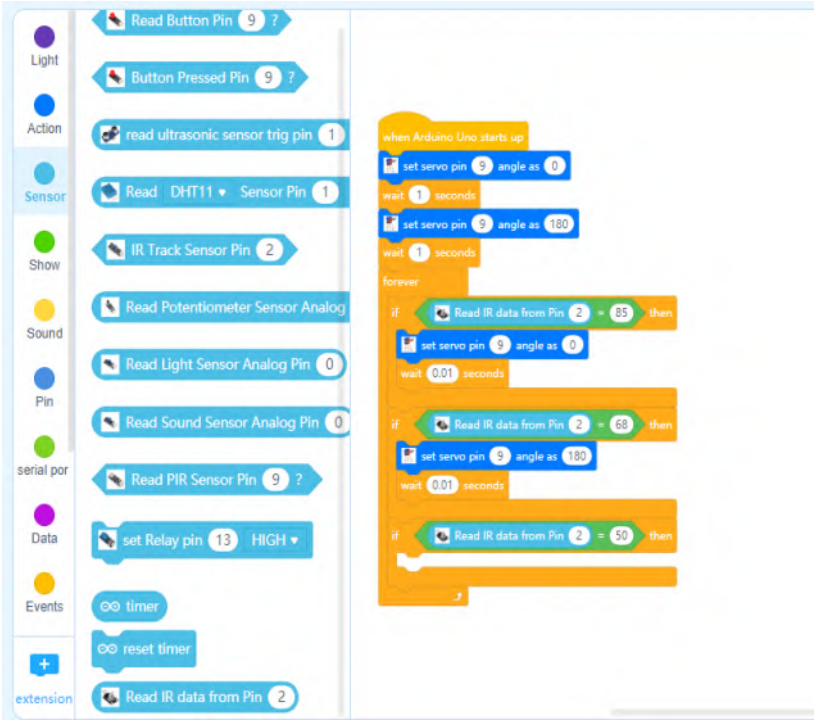


Step 10: Repeat **Step 5** ~ **Step 8** , you will get it as following:

https://osoyoo.com/?p=44354

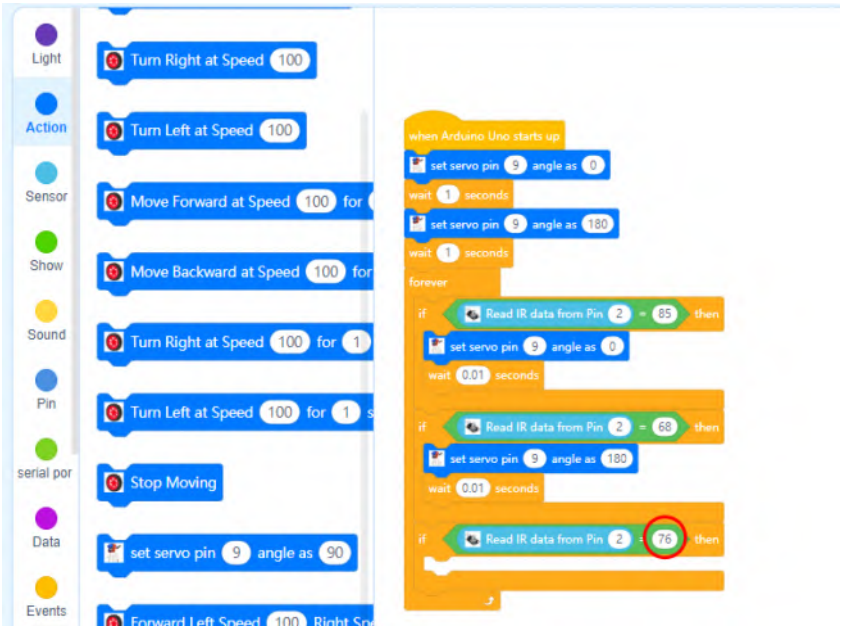
then change the date as following：

Step 11: Click **Control**, drag if-then block; Click **Operation**, drag **X =50** block;Click **Sensor**, drag **Read IR date from Pin 2** block as following:

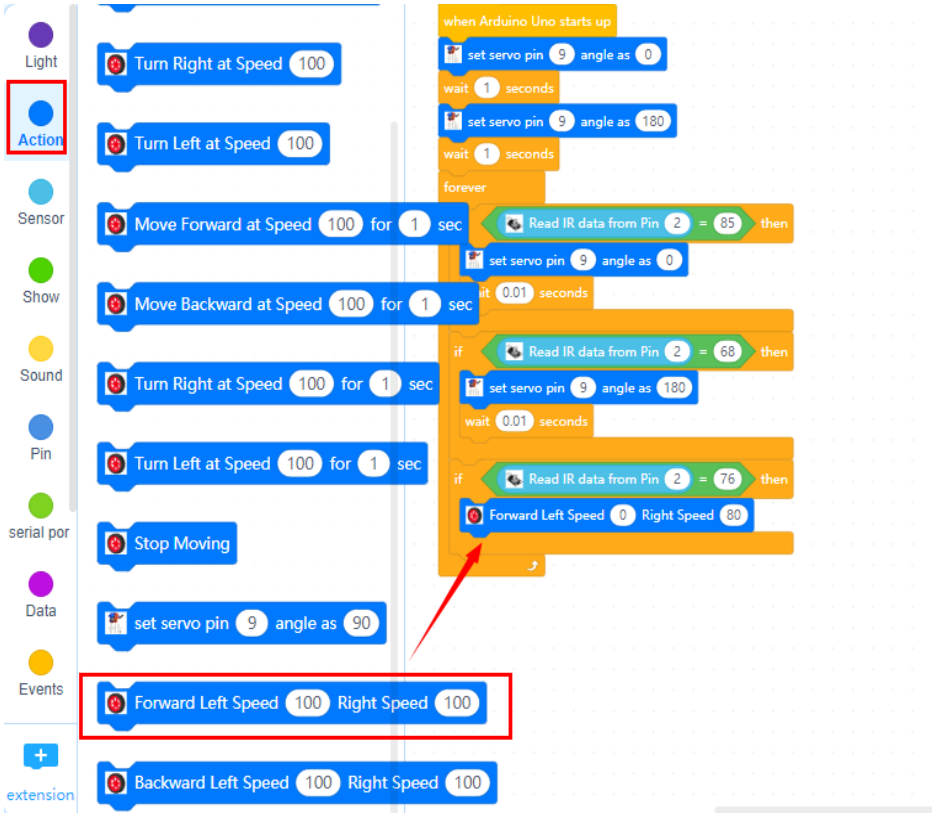


https://osoyoo.com/?p=44354

then change the date as following:

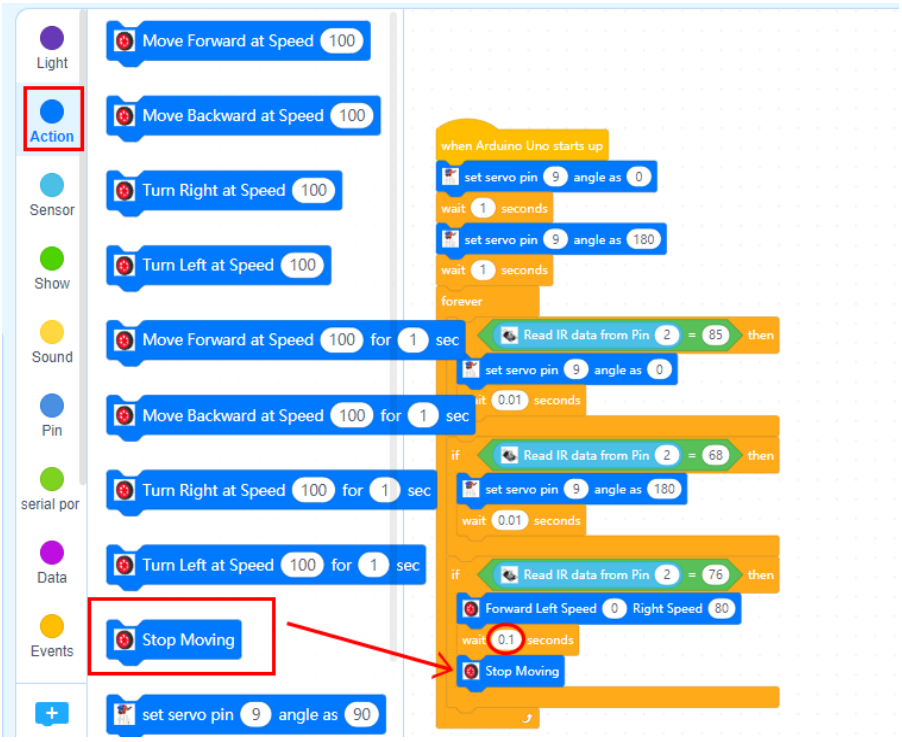


Step12 :Click **Action**, then drag **Forward Left Speed 100 Right Speed 100** block, and change **100 to 0 and 80** as following:

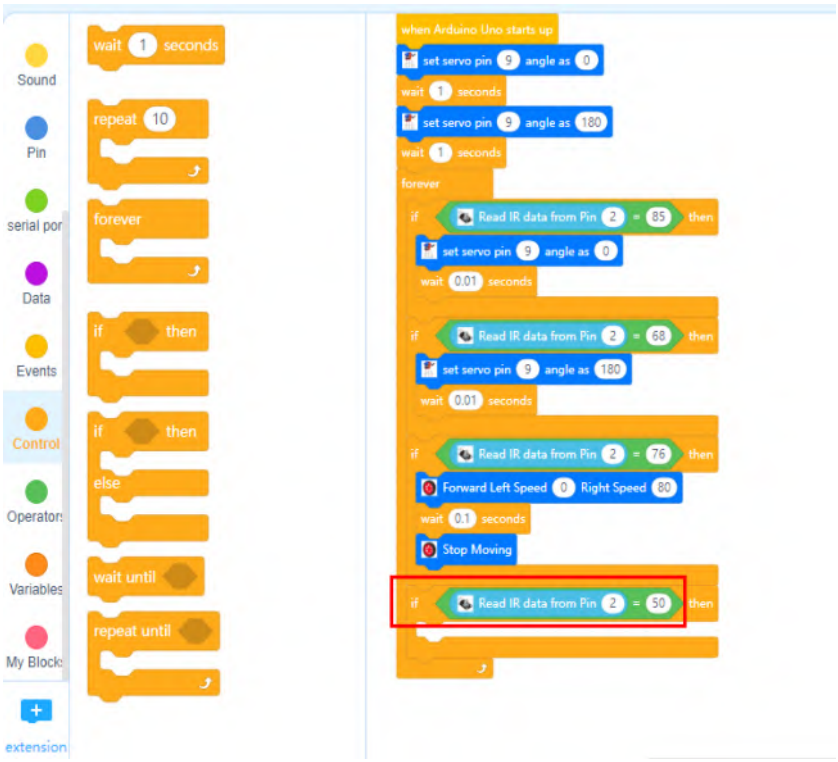


Step13: Click **Control**, drag *wait 1 seconds* block and change **1** to **0.1;** Click **Action,** drag **Stop Moving** as following:

https://osoyoo.com/?p=44354



Step14: Click **Control**, drag if-then block; Click **Operation**, drag **X =50** block;Click **Sensor**, drag **Read IR date from Pin 2** block as following**:**



then change **X =50 to X=82** as following:

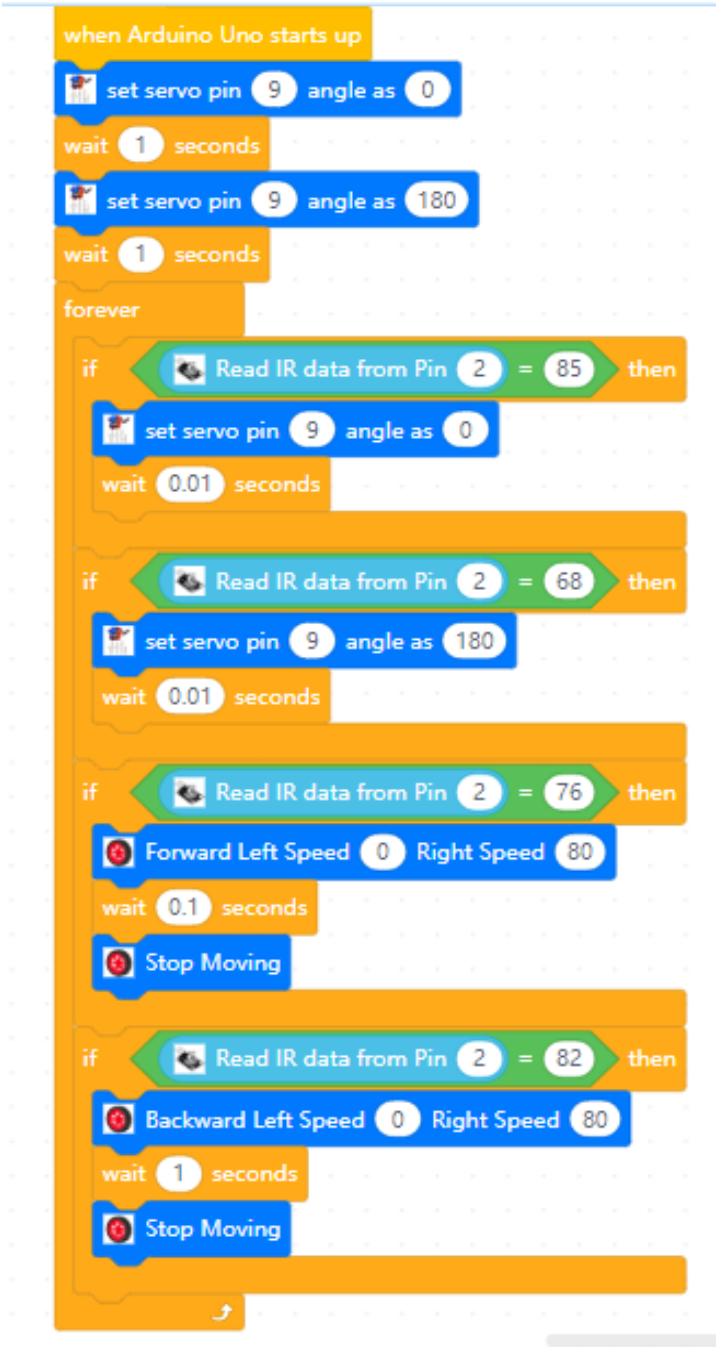
https://osoyoo.com/?p=44354

Step15: Click**Action**, then drag **backward Left Speed 100 Right Speed 100** block, and change **100 to 0 and 80;**

Click **Control**, drag *wait 1 seconds* block and change **1** to **0.1;** Click **Action,** drag **Stop Moving** as following:

https://osoyoo.com/?p=44354

Now we have completed the block programming. The final blocks look like following:

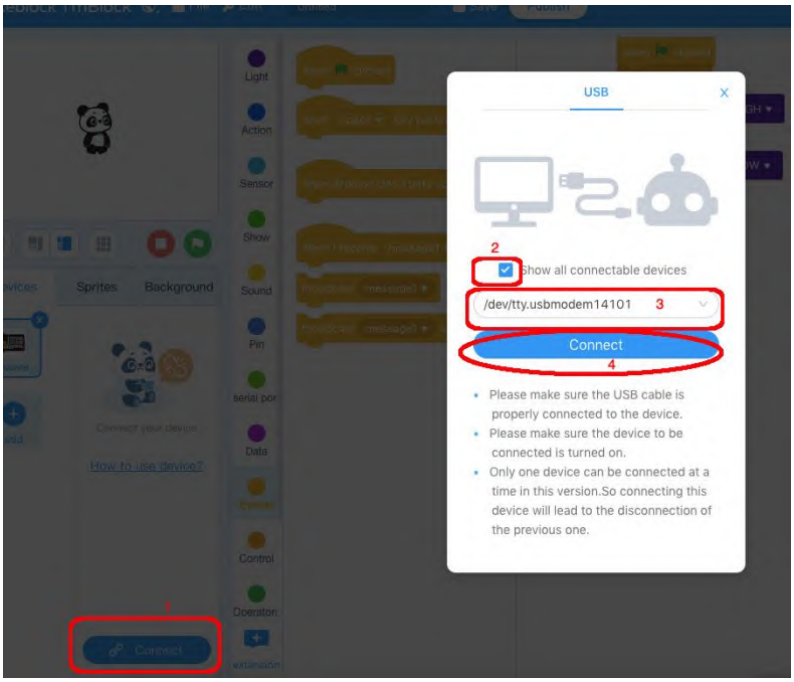


Upload the program to Arduino

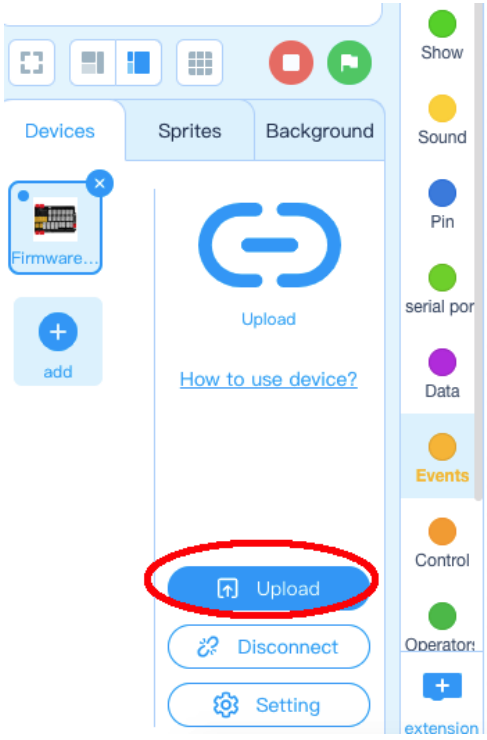
1)you need click the Connect button in the bottom of the mBlock software, you will see a USB window pop up,
2) select **Show all connectable device** check box , then a device drop-down menu will show up,

https://osoyoo.com/?p=44354

3) select your Arduino port from device drop-down menu
4) click **Connect** button to connect your PC to Arduino



5) After you PC is connected to Arduino UNO board, please click Upload button in the bottom of your software, then the code will be uploaded to Arduino UNO board:

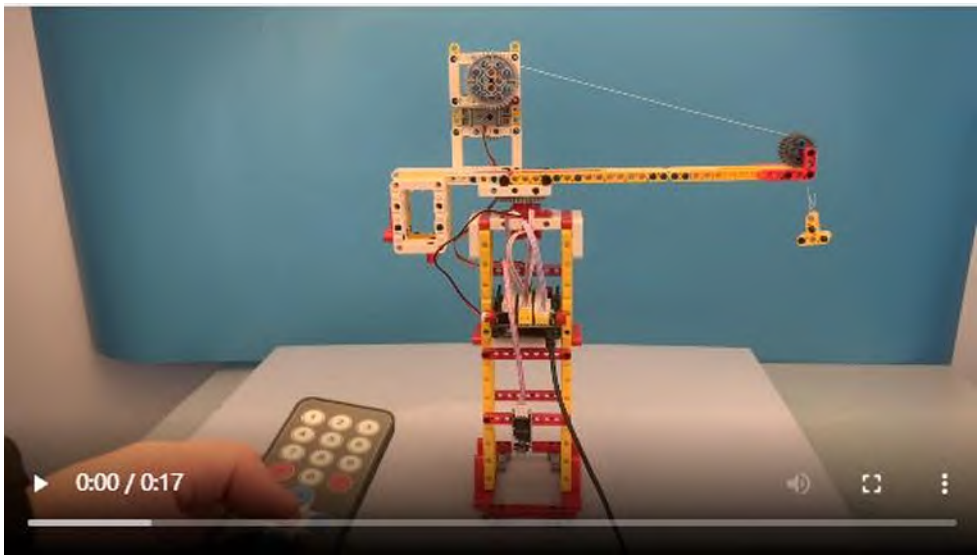


https://osoyoo.com/?p=44354

HOW TO PLAY

1) When you press ◄ key in IR controller, the crane arm will rotate to left (clockwise), when you press ►key, crane arm will rotate to right(counter-clockwise).

2) When you press ▲ key, the cable servo will drive the cable up, if you press ▼key, the cable servo will drop the cable down.



https://osoyoo.com/picture/Block_kit/lesson5/1-5.mp4

https://osoyoo.com/?p=44354

Lesson 6: Robot Crab

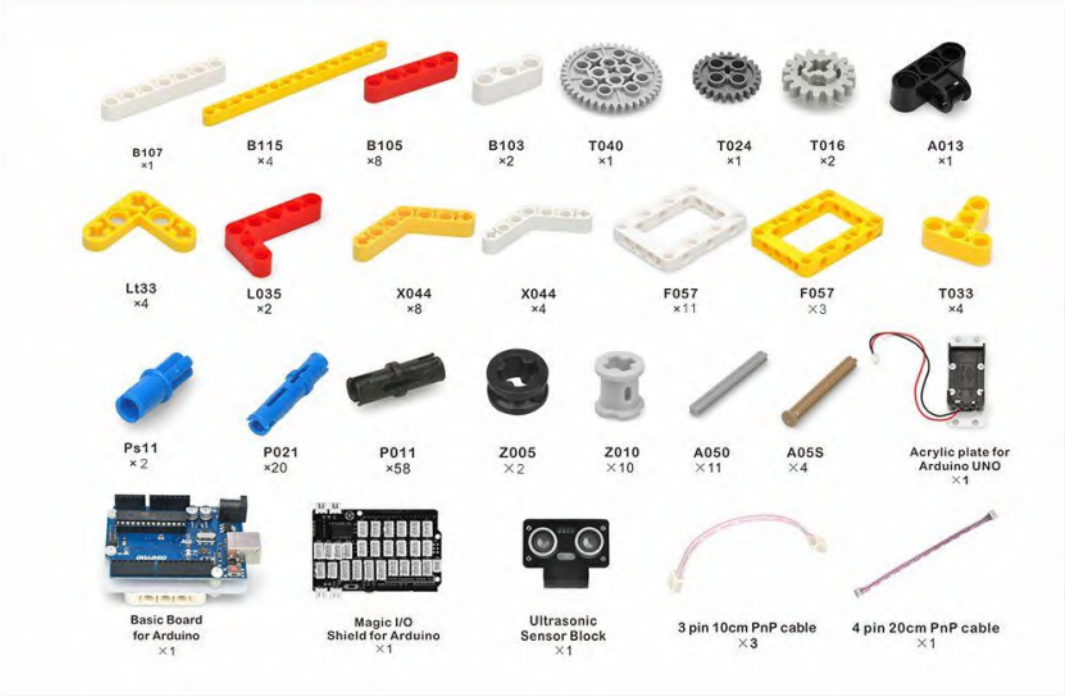
OBJECTIVE

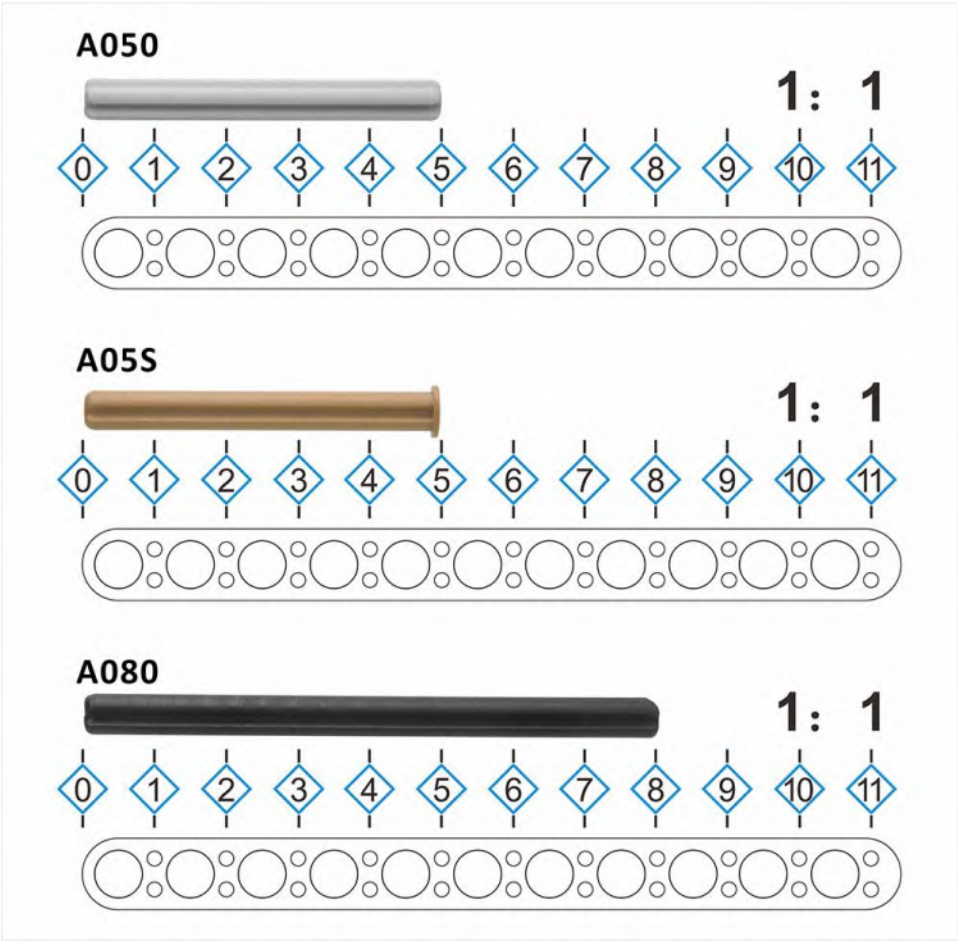
The OSOYOO building bricks is mechanically compatible with leading building bricks. In this lesson, we will use OSOYOO Bricks to build a robot crab which can use its eyes (Ultrasonic Sensor) to detect objects and use pincers (finger servo) to catch object.

PARTS & DEVICES

Please prepare the following parts to complete this project.

https://osoyoo.com/?p=44354

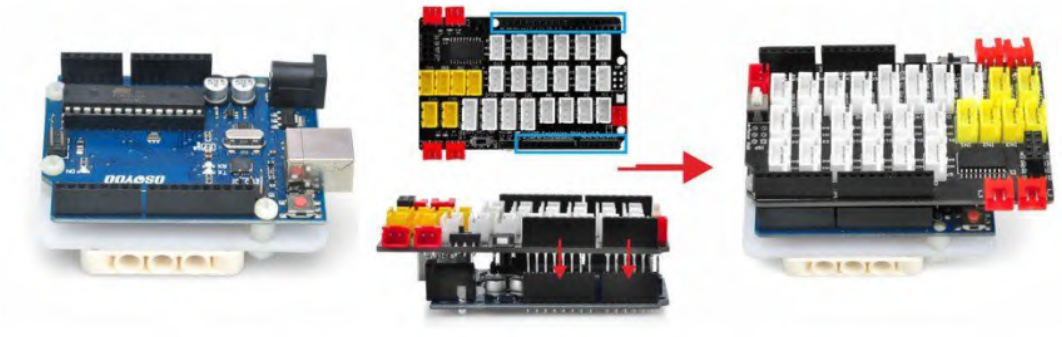




https://osoyoo.com/?p=44354

HOW TO BUILD

Before you build an elevator with blocks, please according to the Preparation before class 3: https://osoyoo.com/2021/12/01/preparation-before-class-3



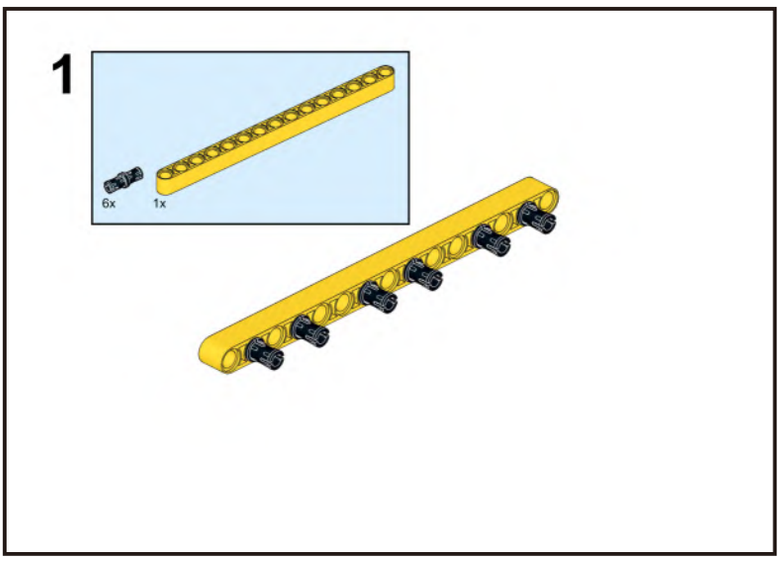
Please visit this link to watch video about Building Blocks: https://youtu.be/v8OrD19aDhE

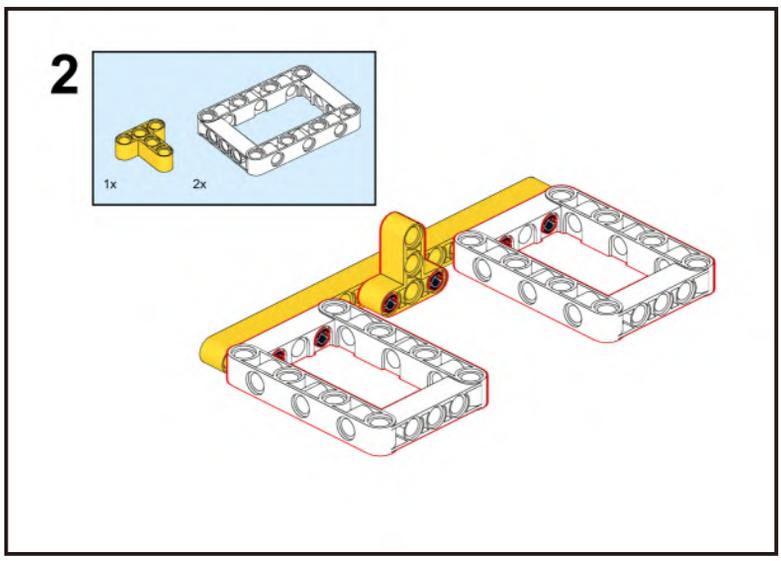
Please follow the instruction to build the blocks (Download link: https://osoyoo.com/picture/Block_kit/lesson6/lesson6.pdf)

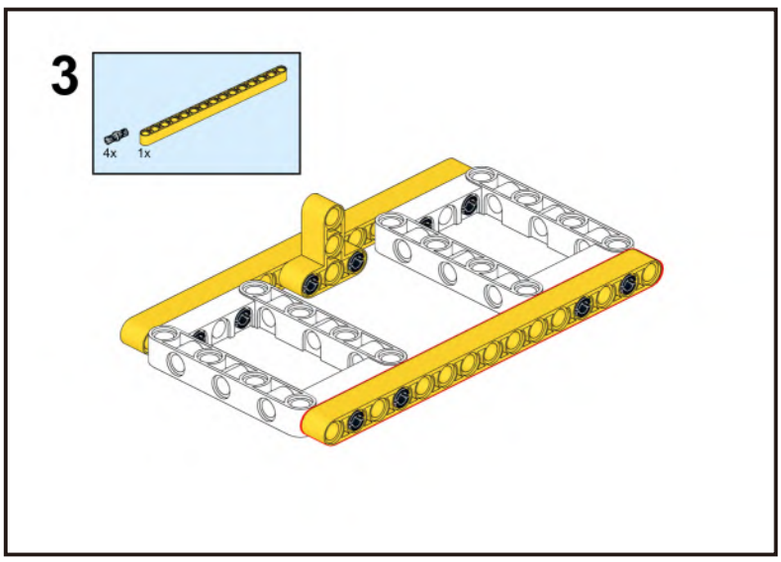
Note：

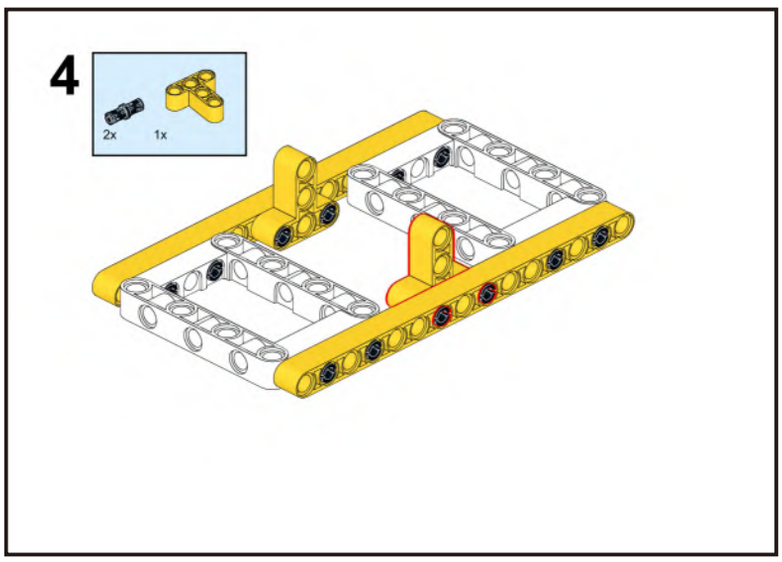
The color of the building block is subject to the actual product, which does not affect the use.

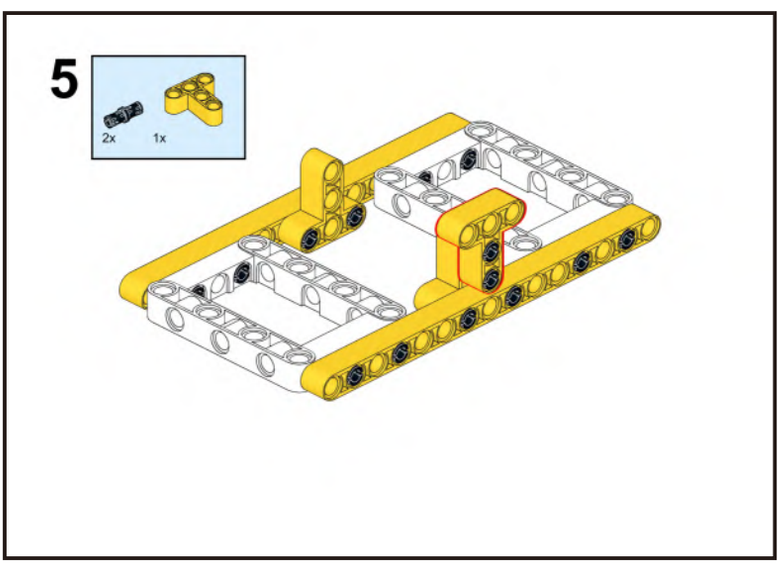
https://osoyoo.com/?p=44354

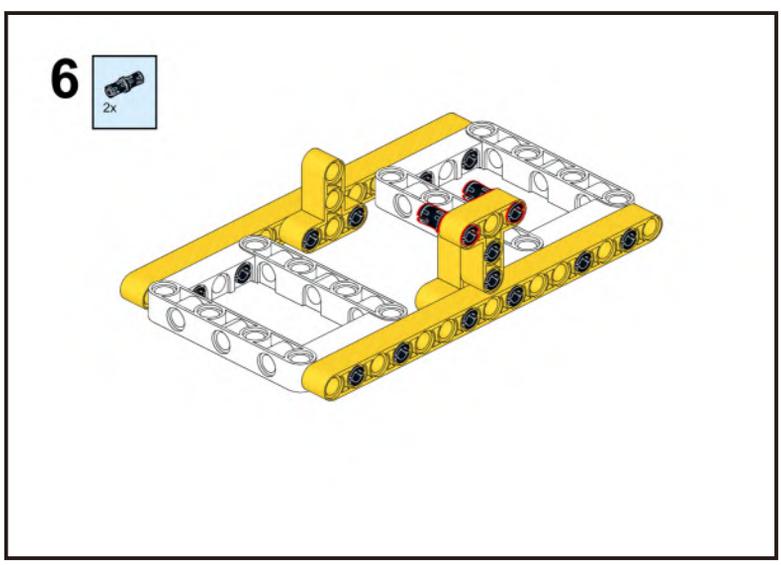




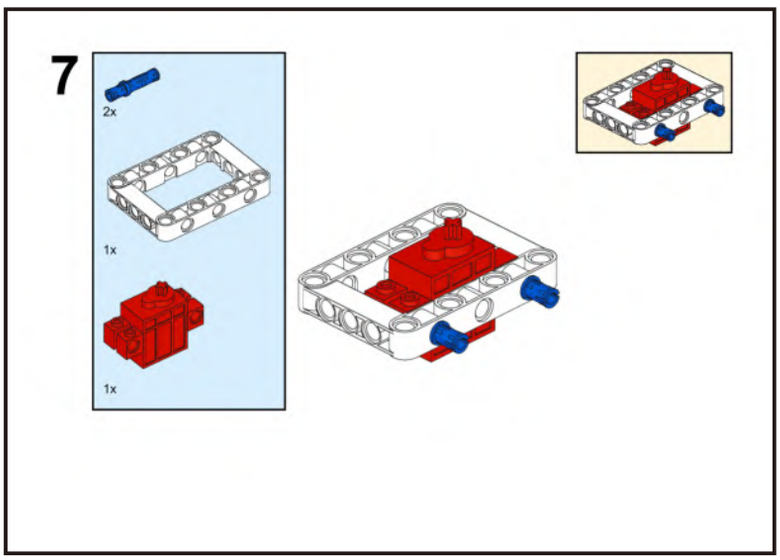


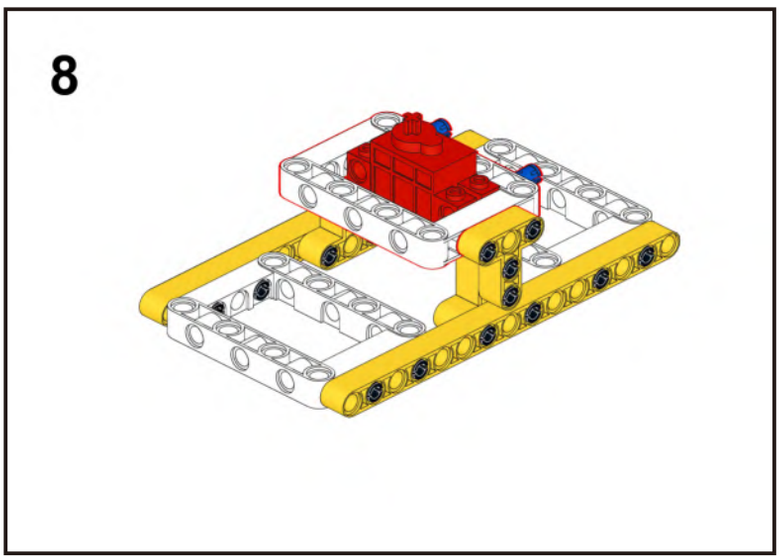


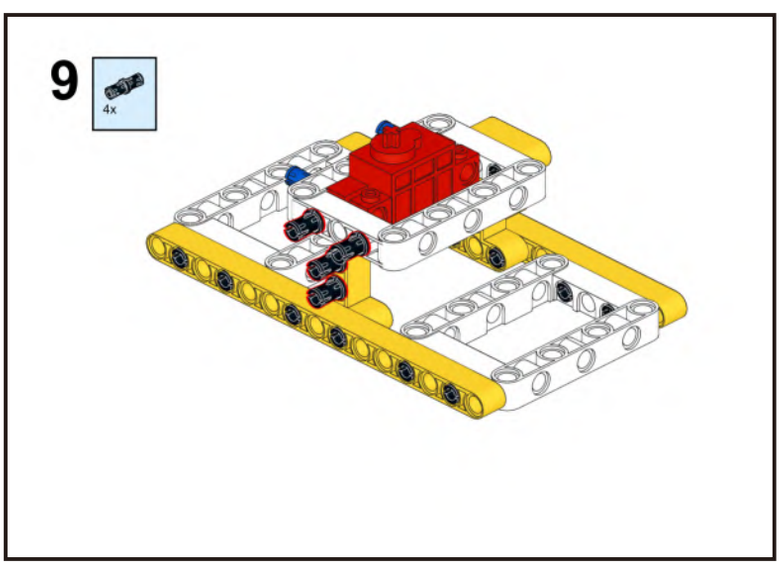


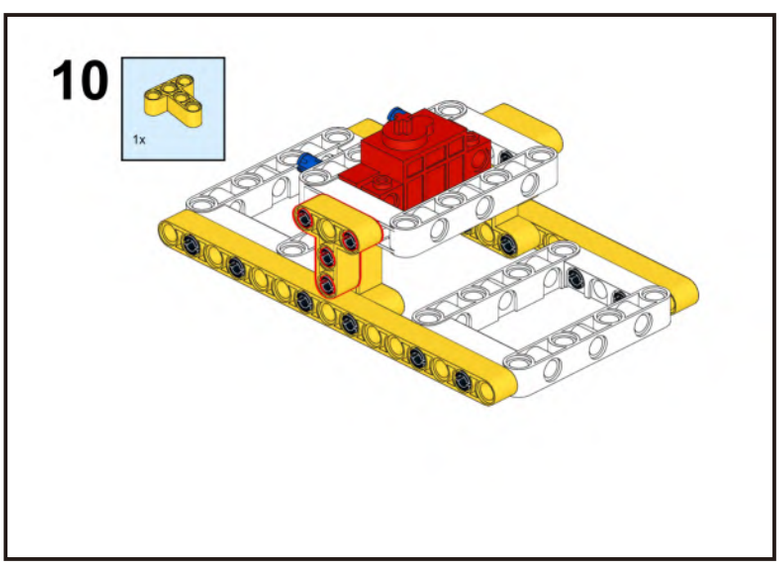


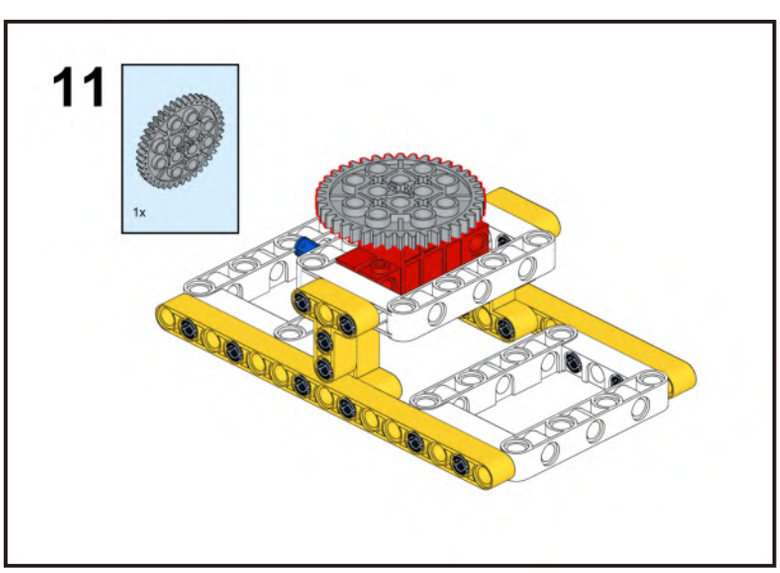
https://osoyoo.com/?p=44354

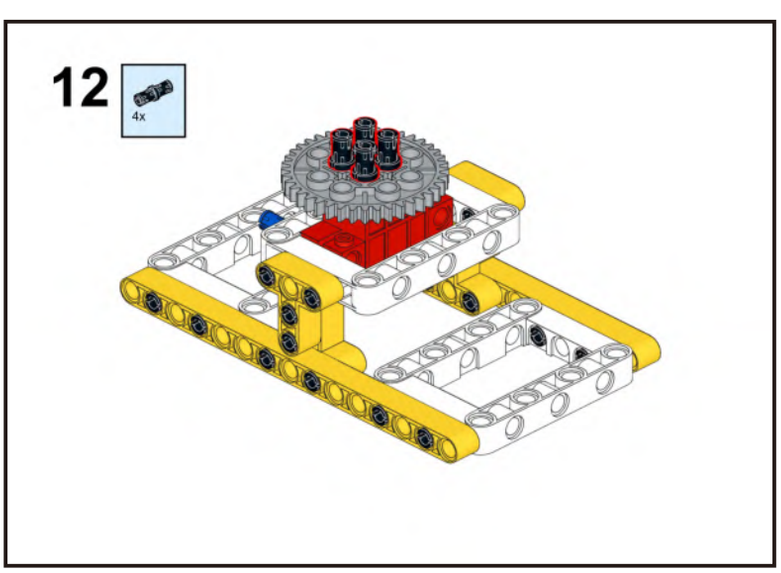






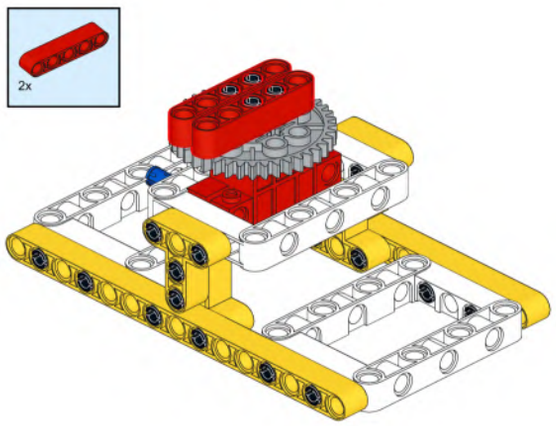




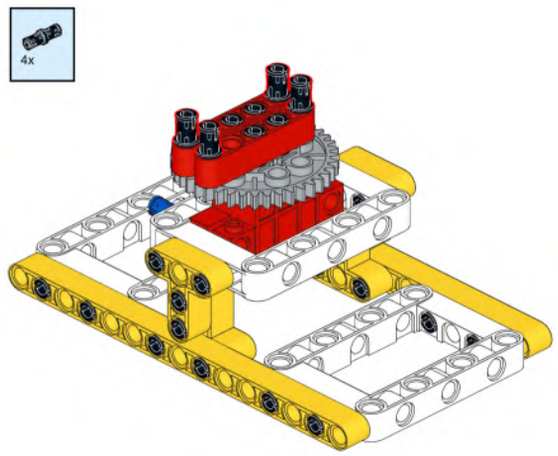


https://osoyoo.com/?p=44354

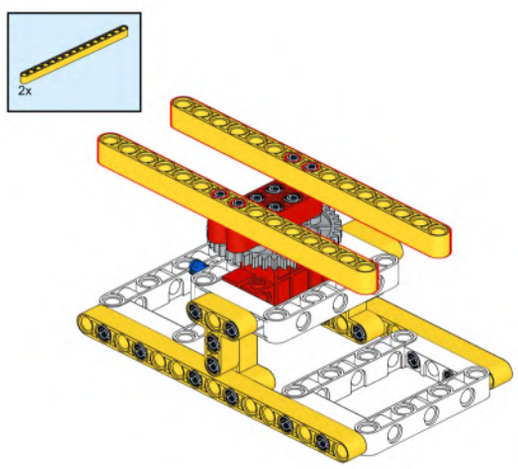
13



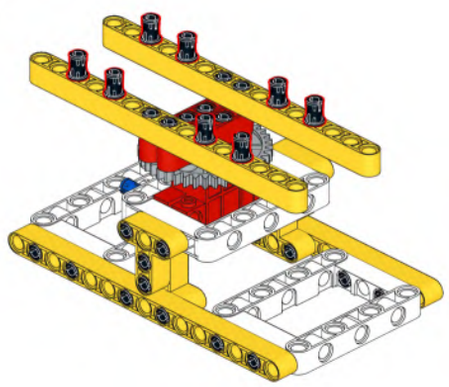
14



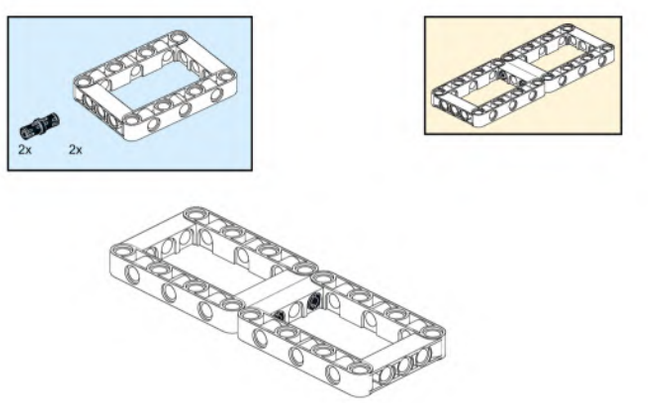
15



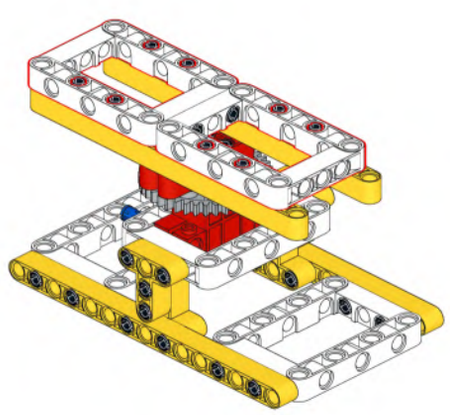
16



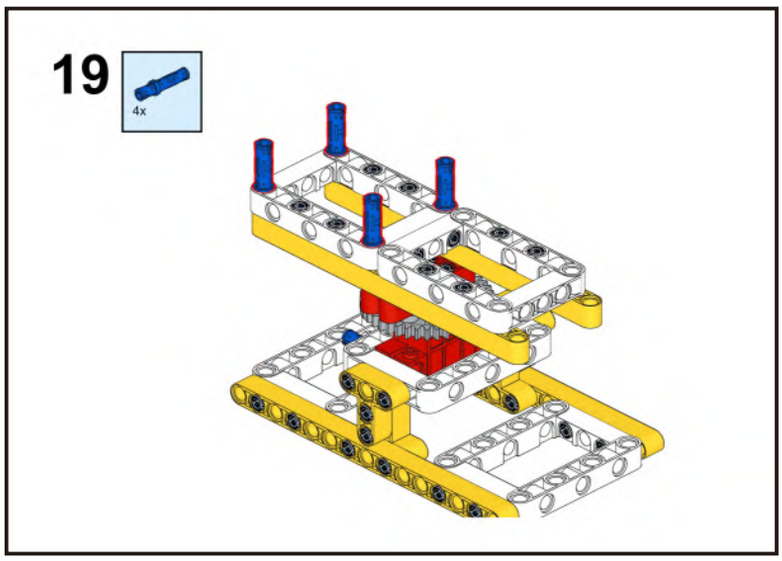
17

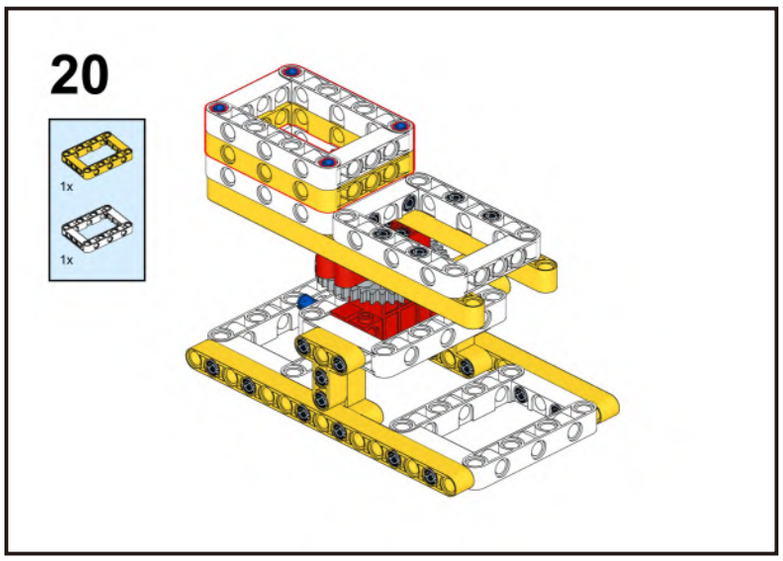


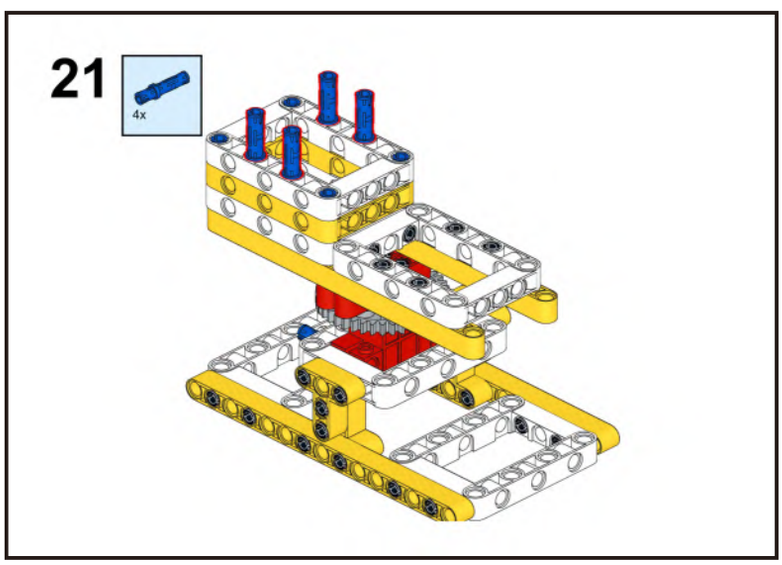
18

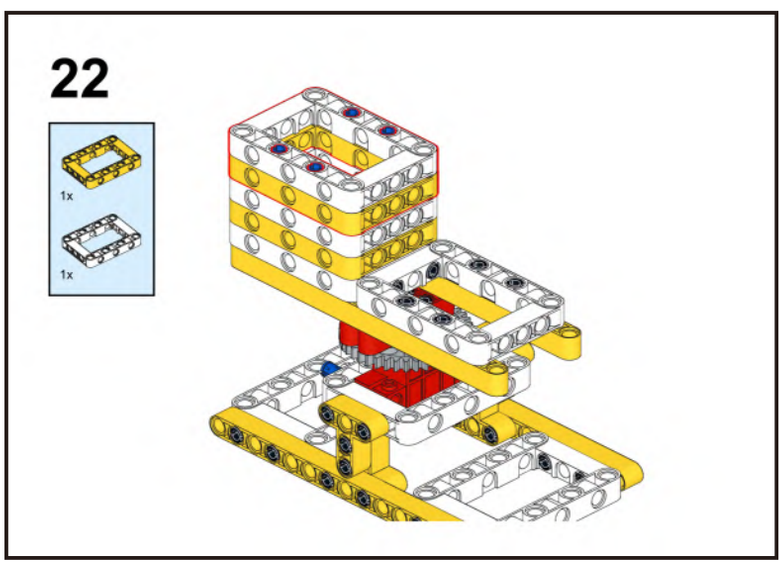


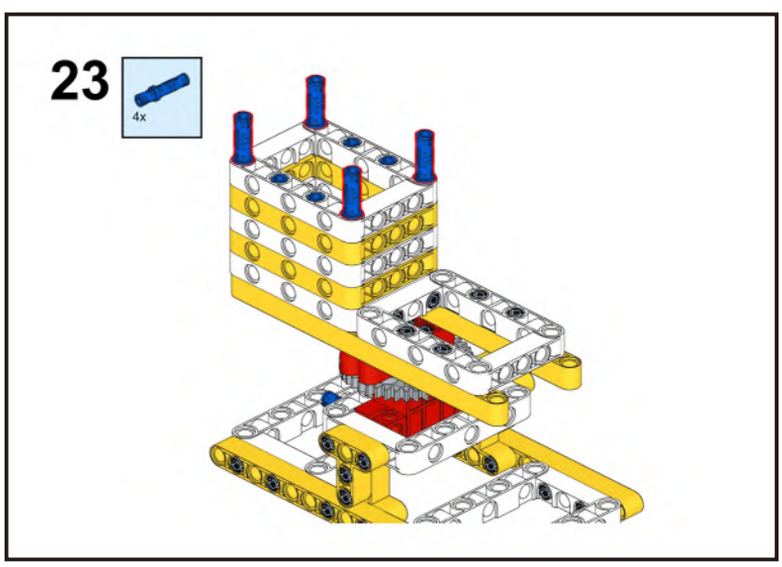
https://osoyoo.com/?p=44354

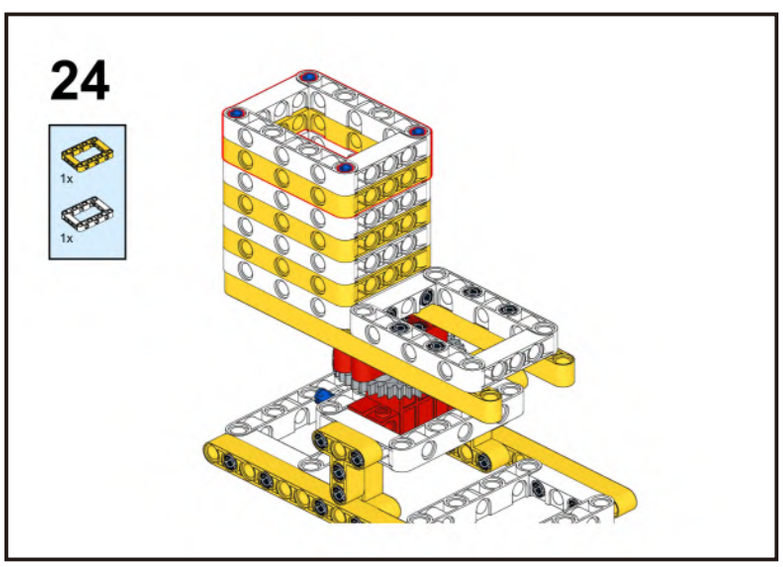




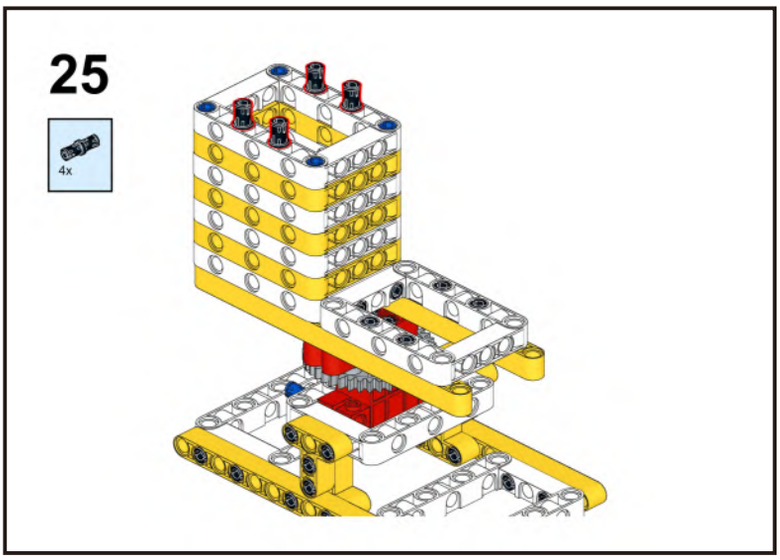


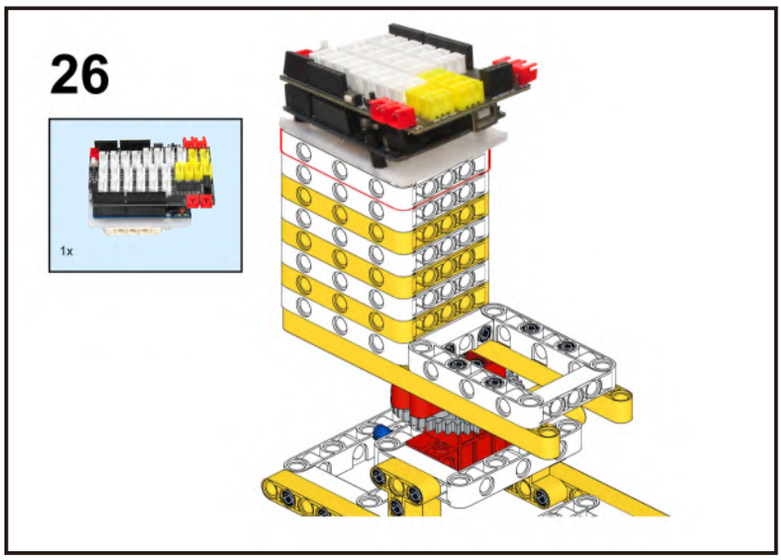


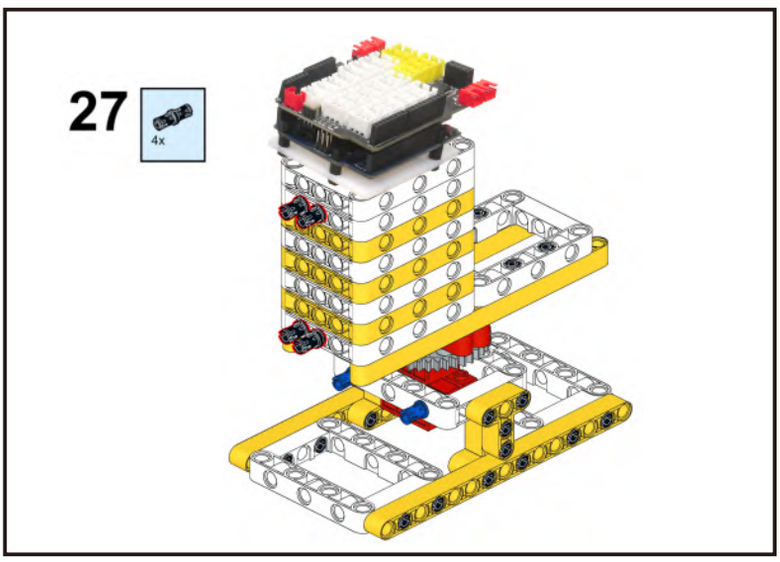


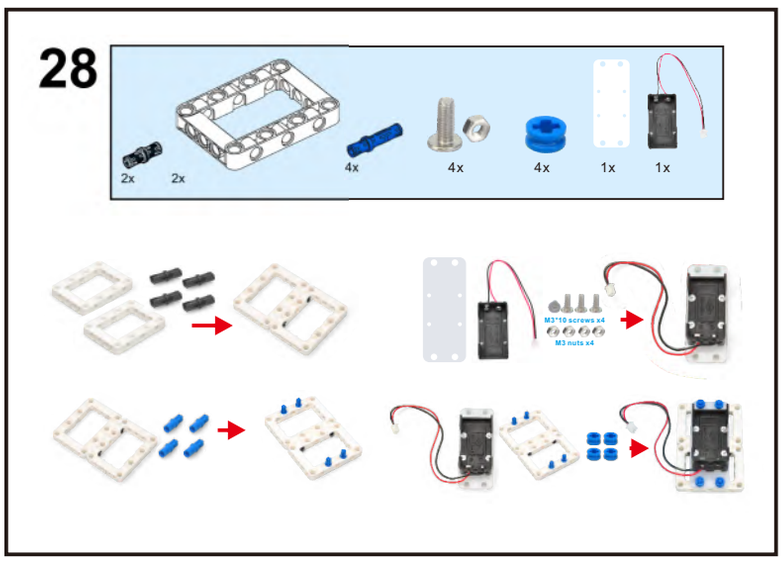


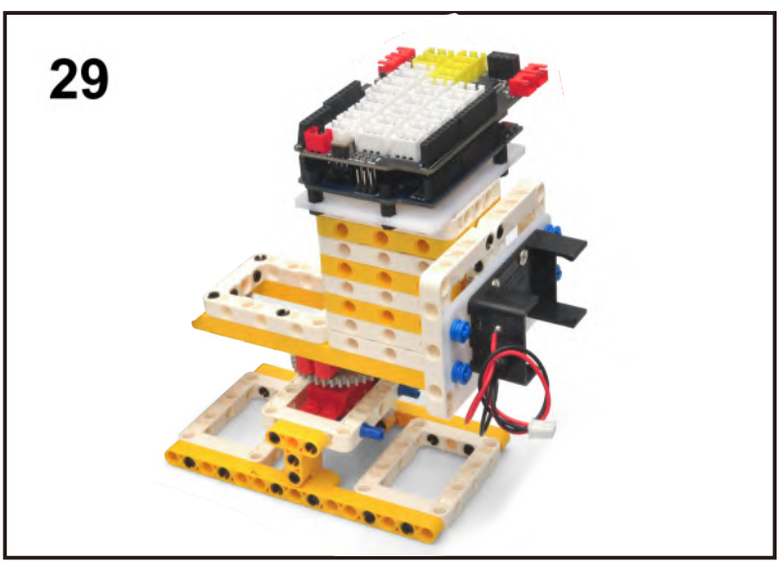
https://osoyoo.com/?p=44354

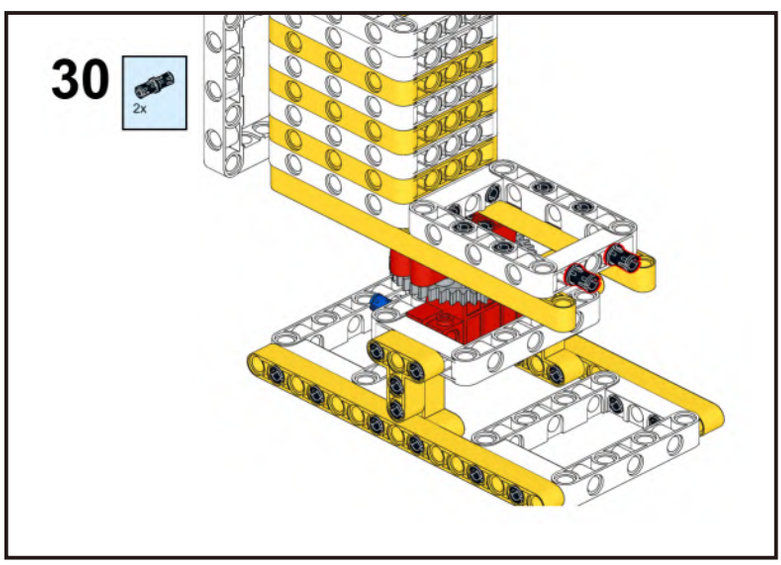




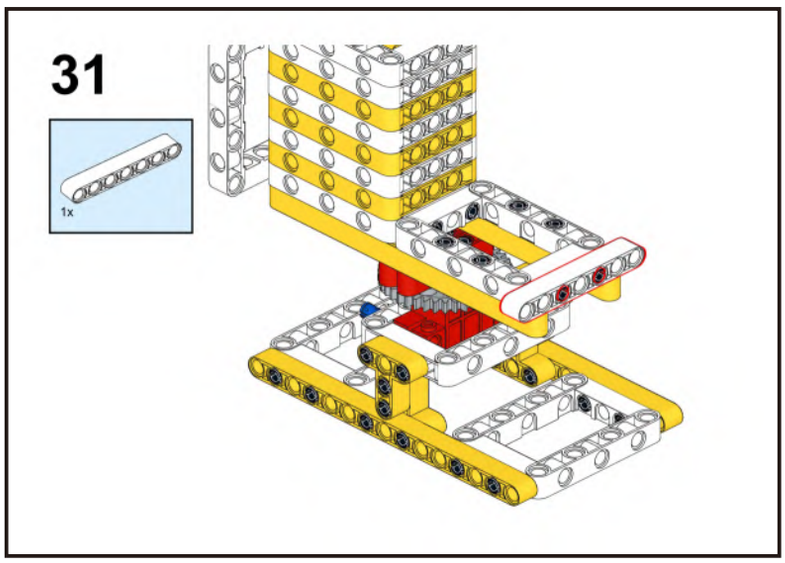


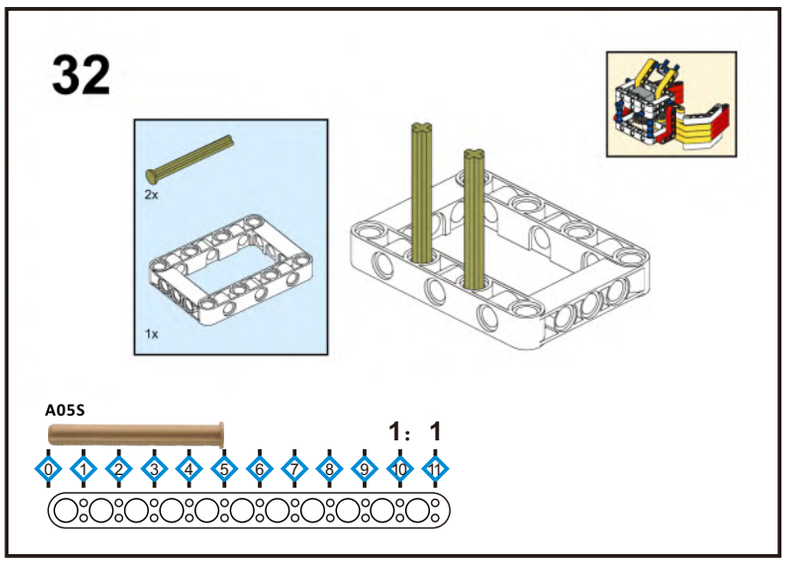


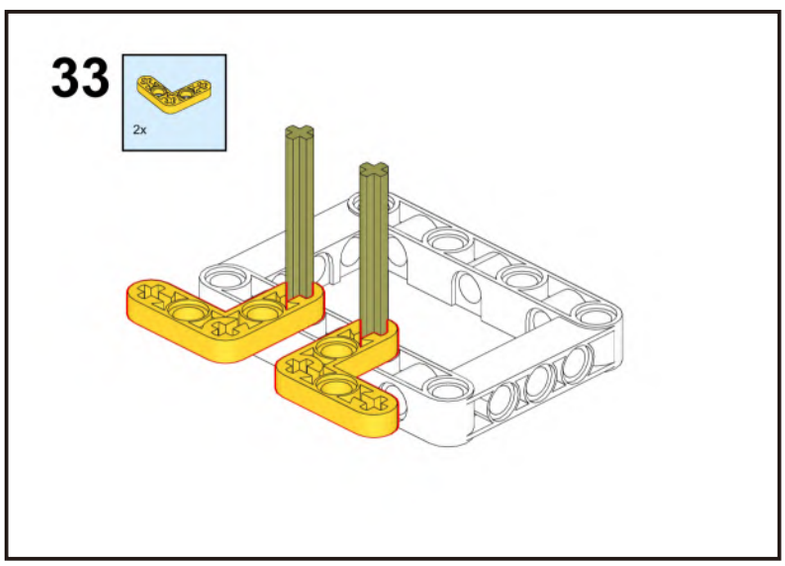


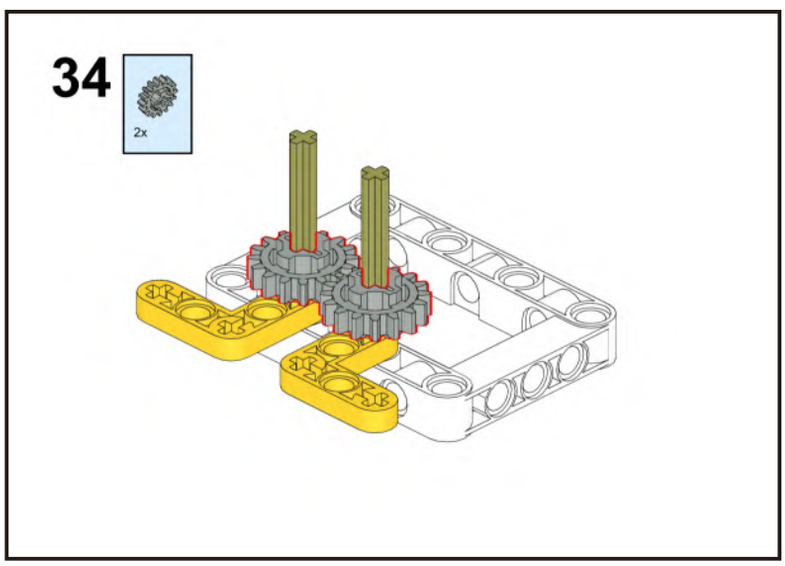


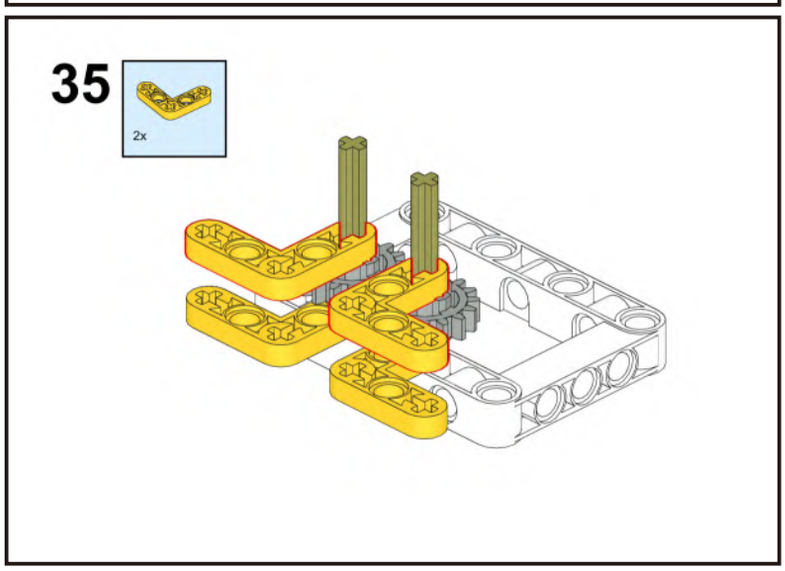
https://osoyoo.com/?p=44354

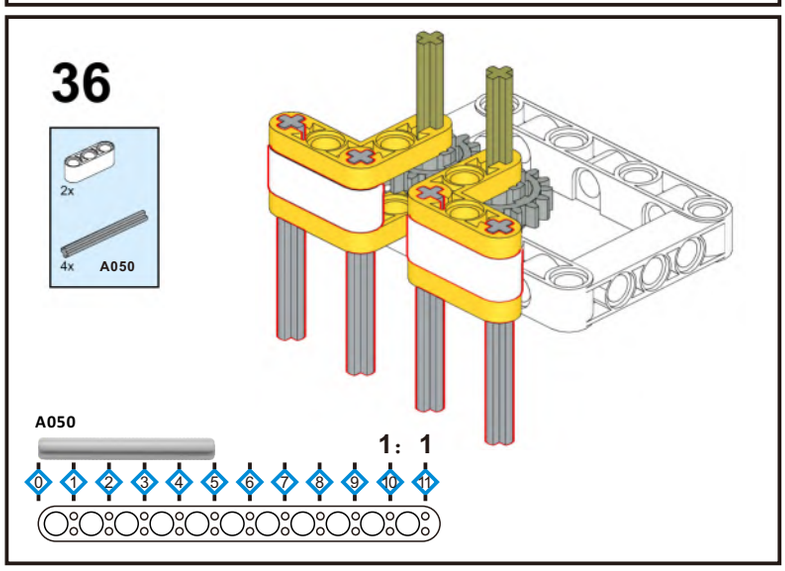




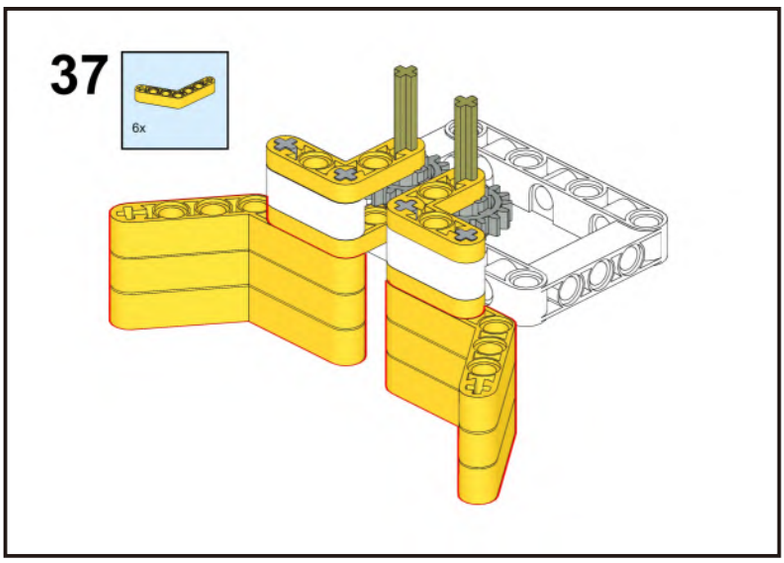


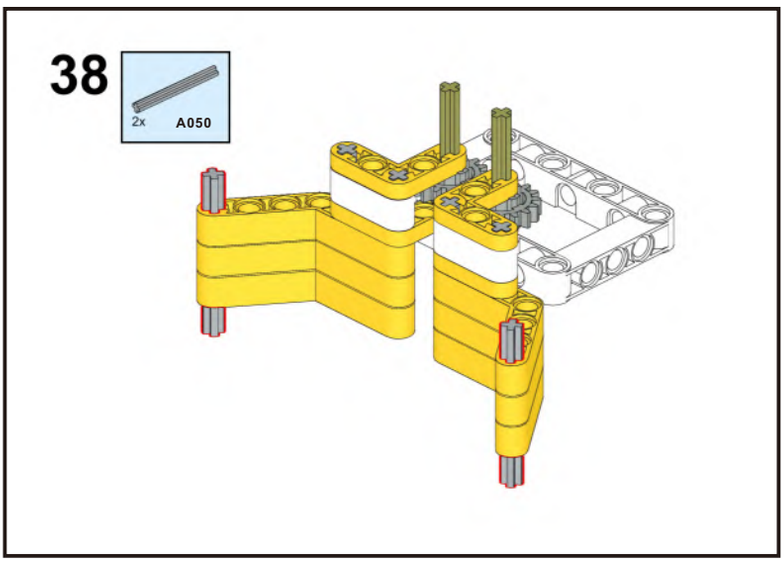


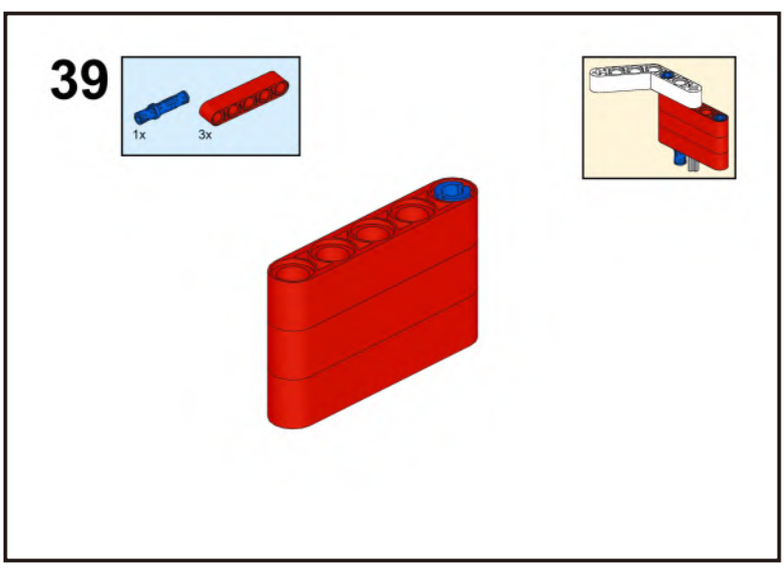


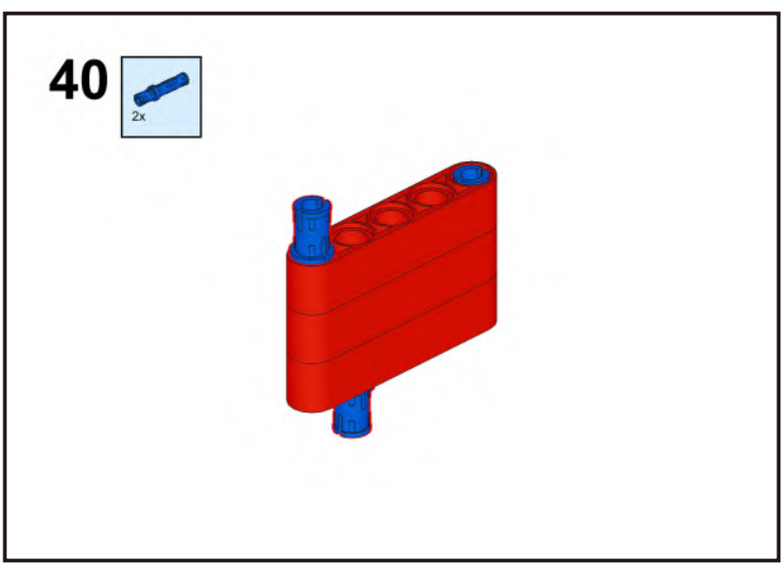


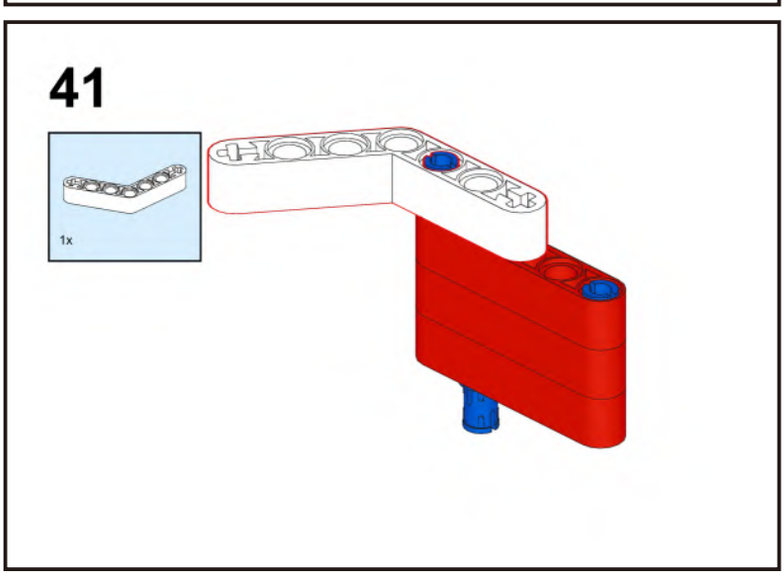
https://osoyoo.com/?p=44354

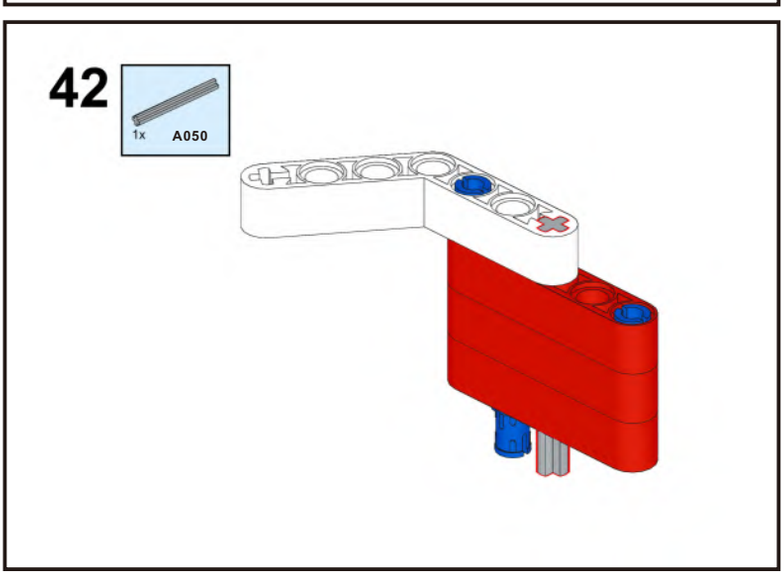






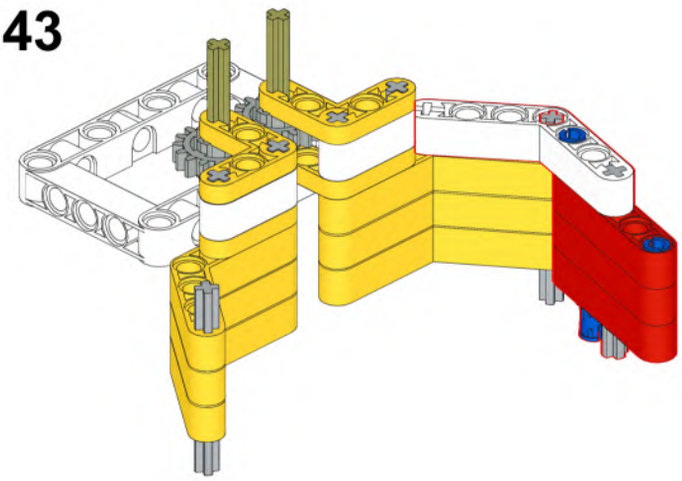




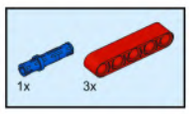


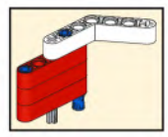
https://osoyoo.com/?p=44354

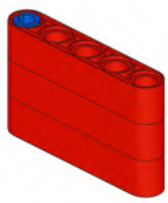
43



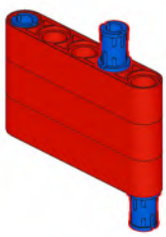
44



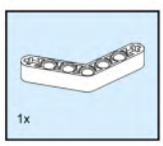


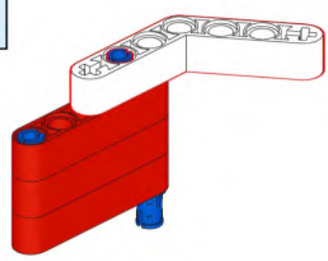


45

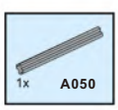


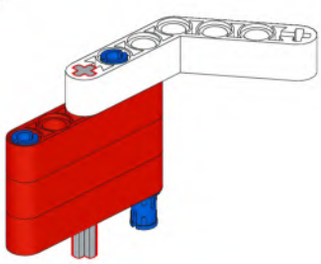
46



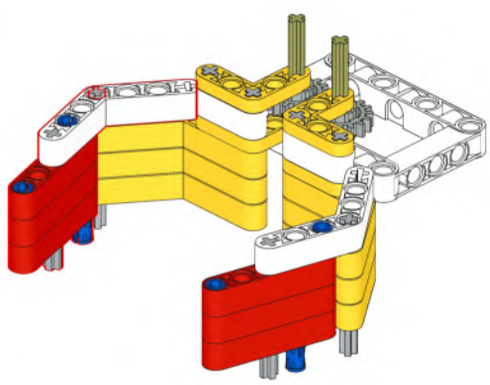


47

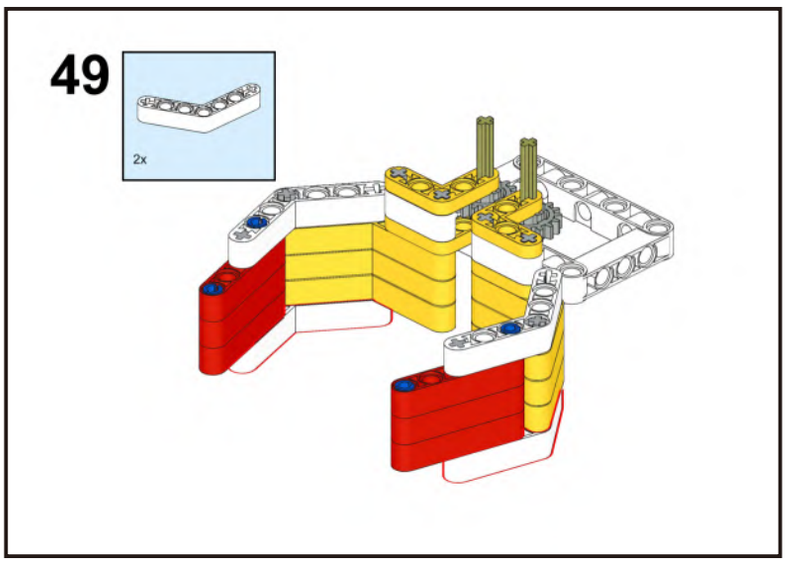


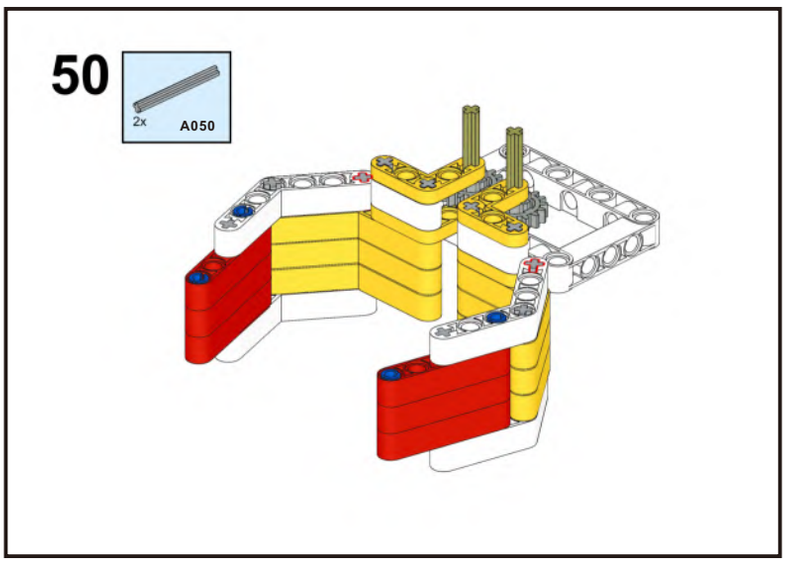


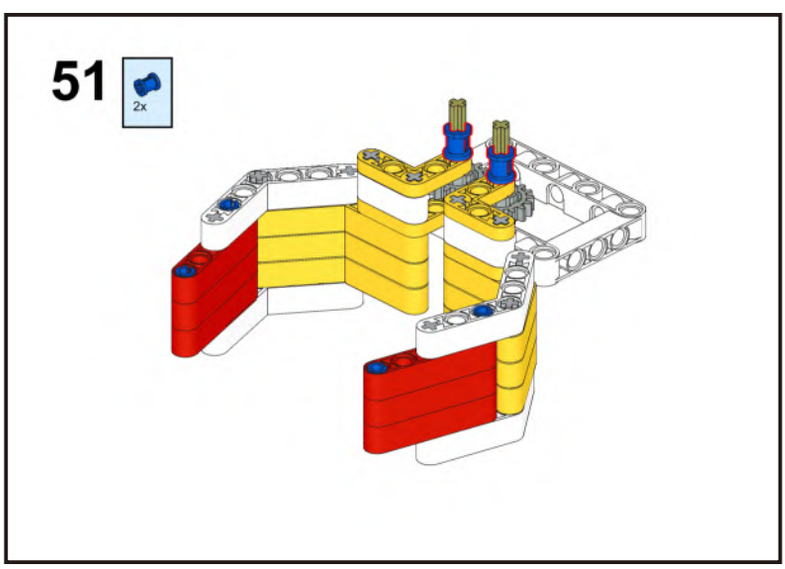
48

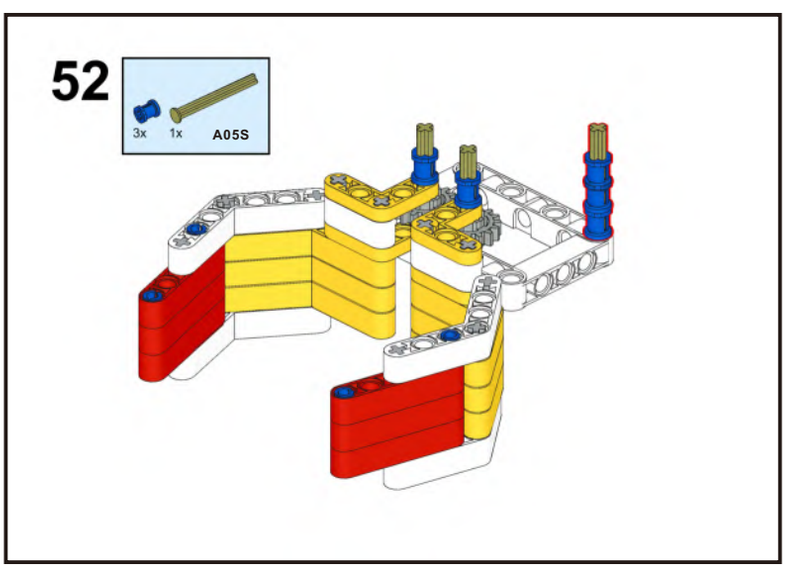


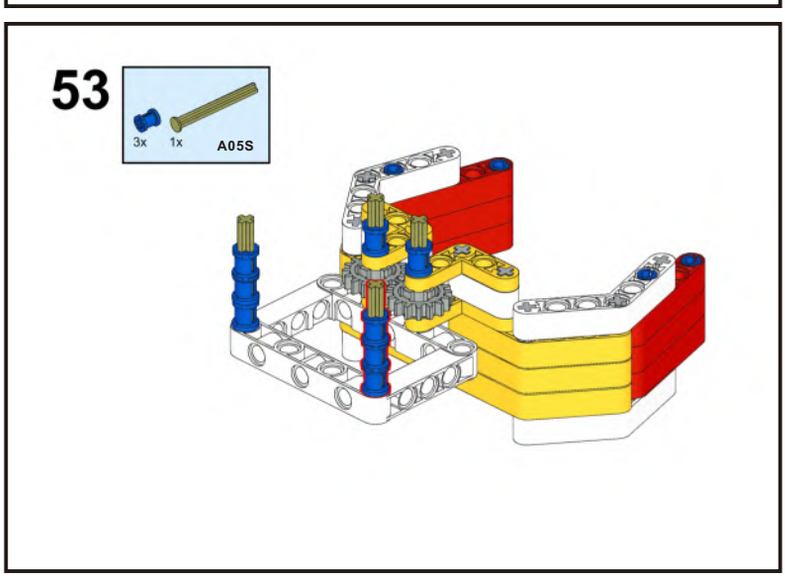
https://osoyoo.com/?p=44354

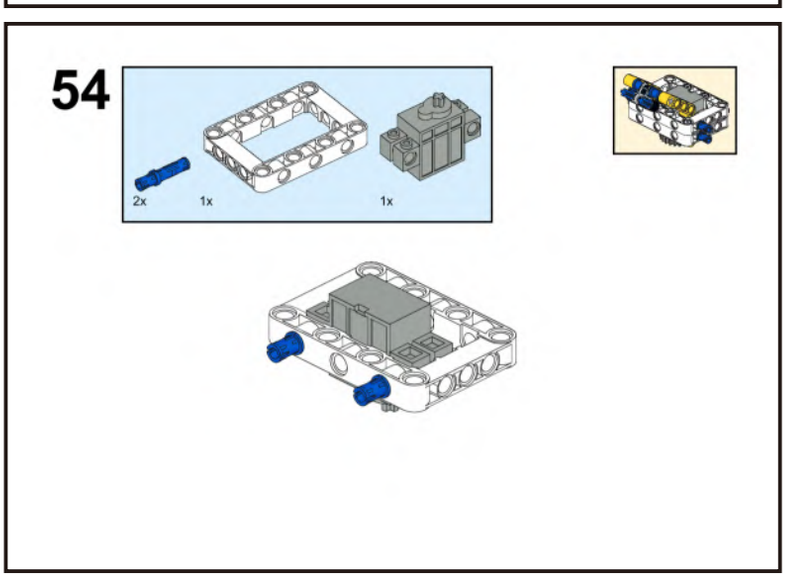




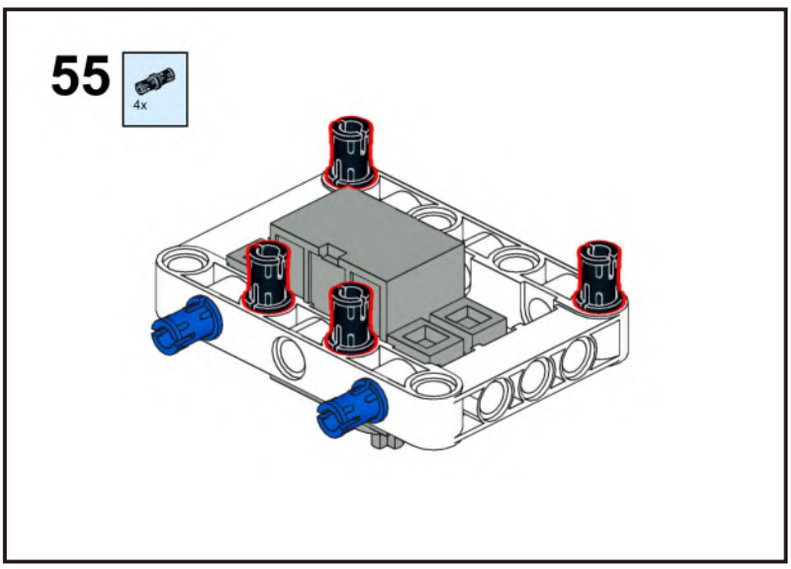


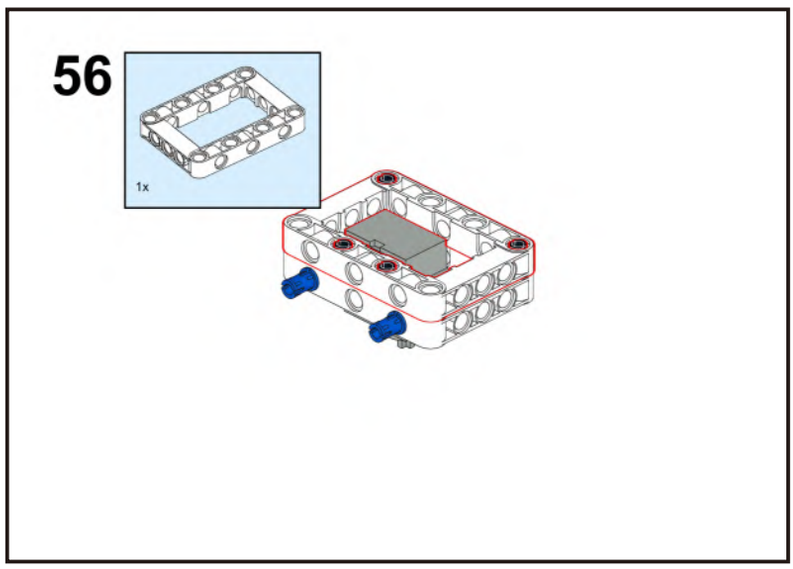


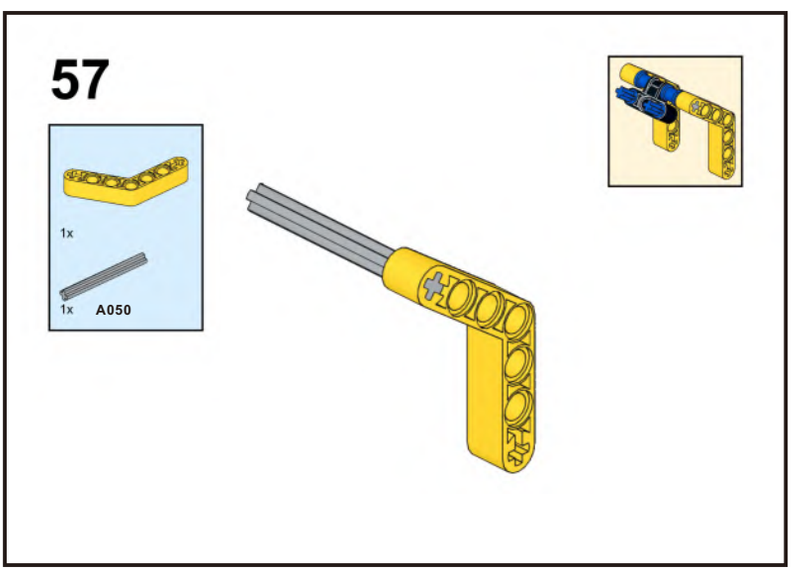


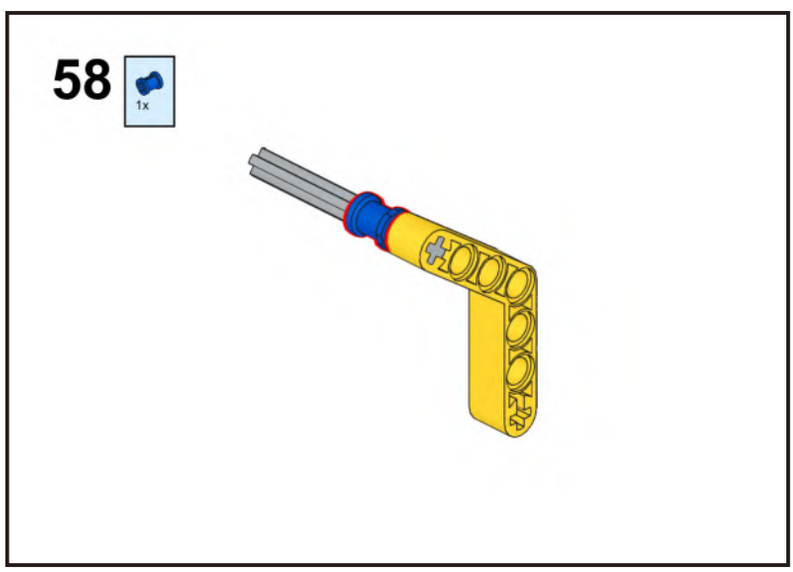


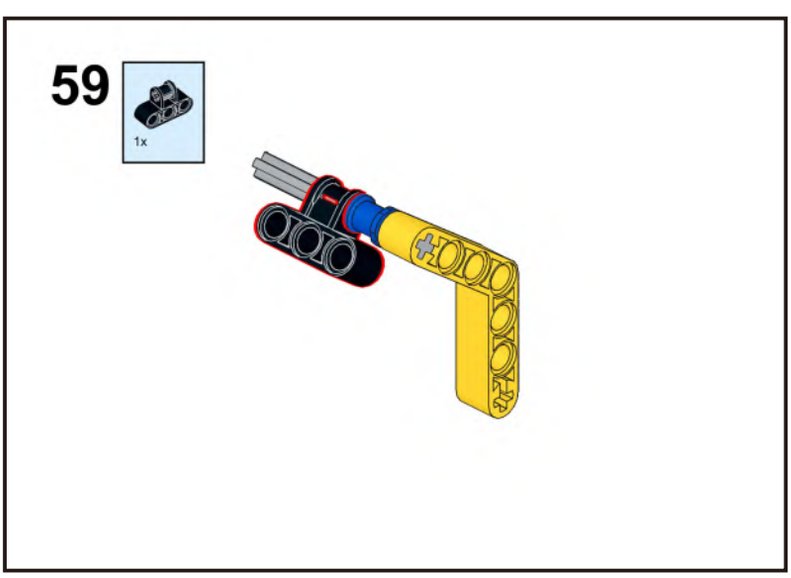
https://osoyoo.com/?p=44354

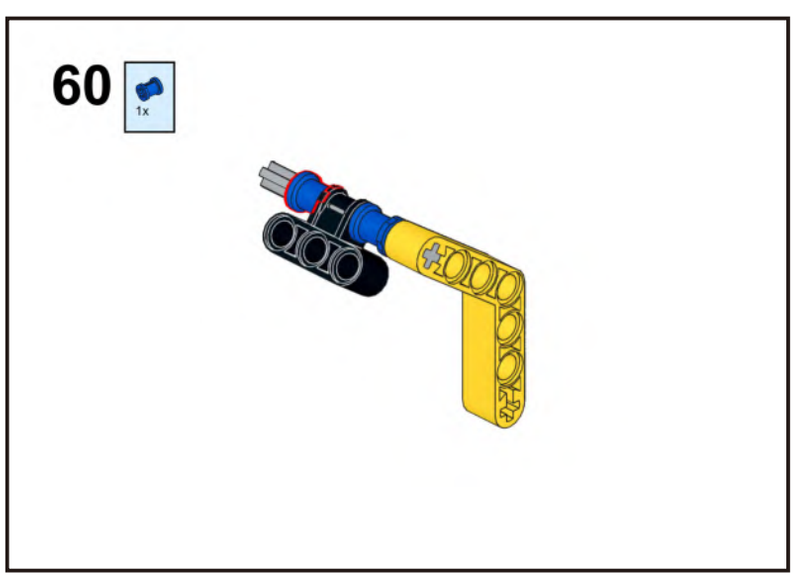








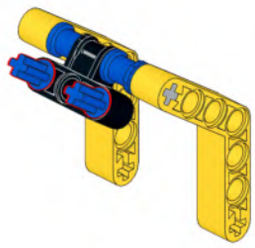




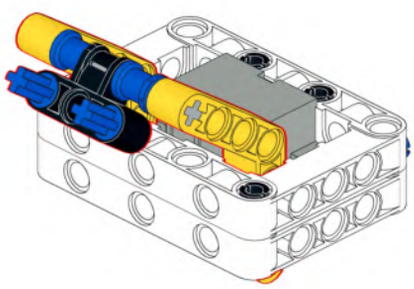
https://osoyoo.com/?p=44354

61

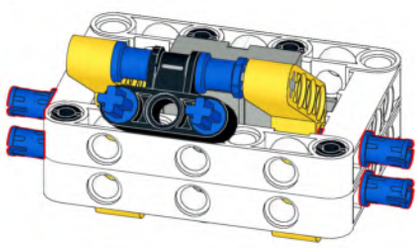
62



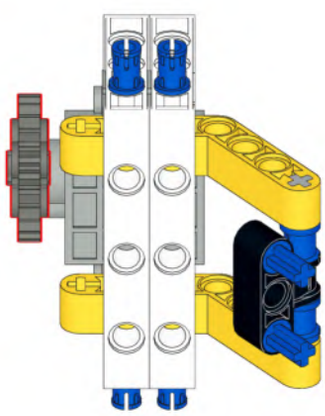
63



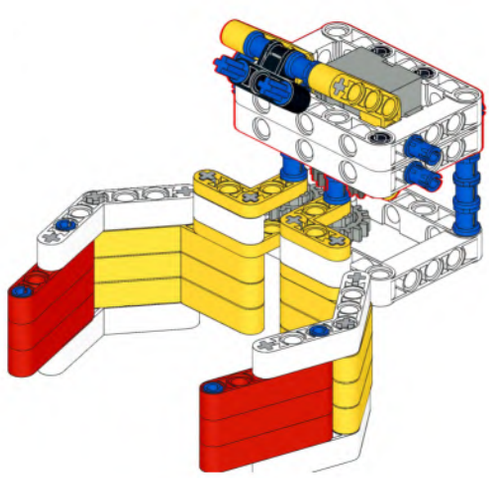
64



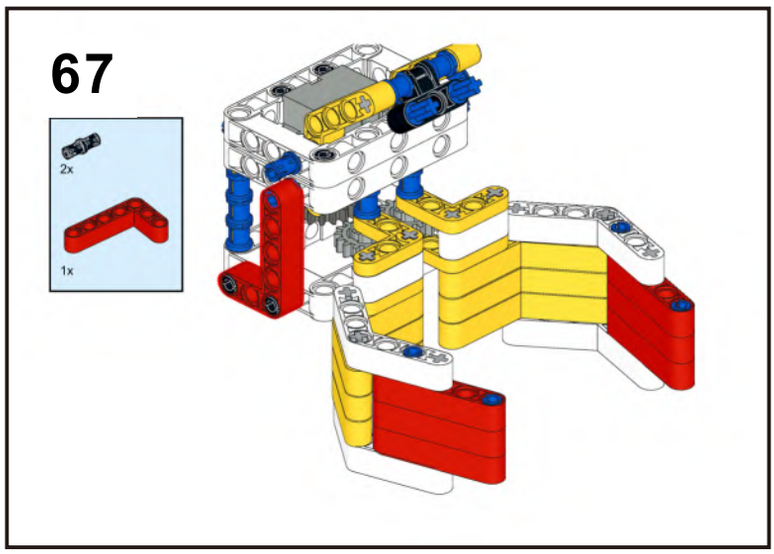
65

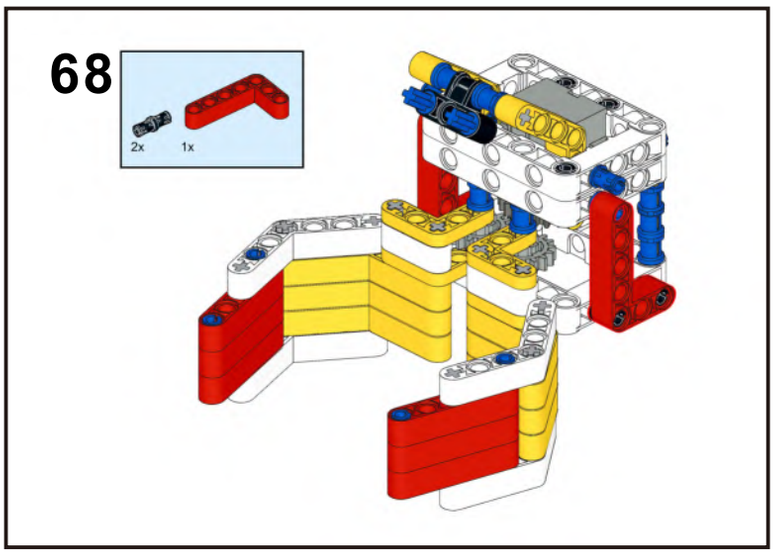


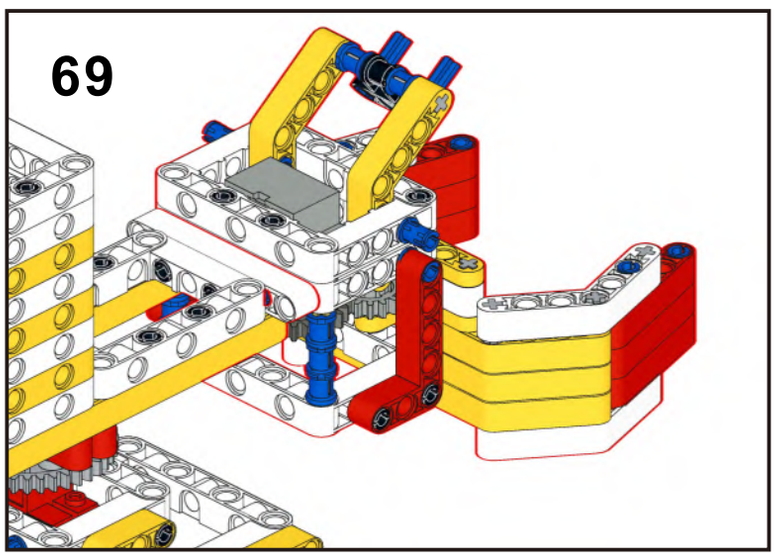
66

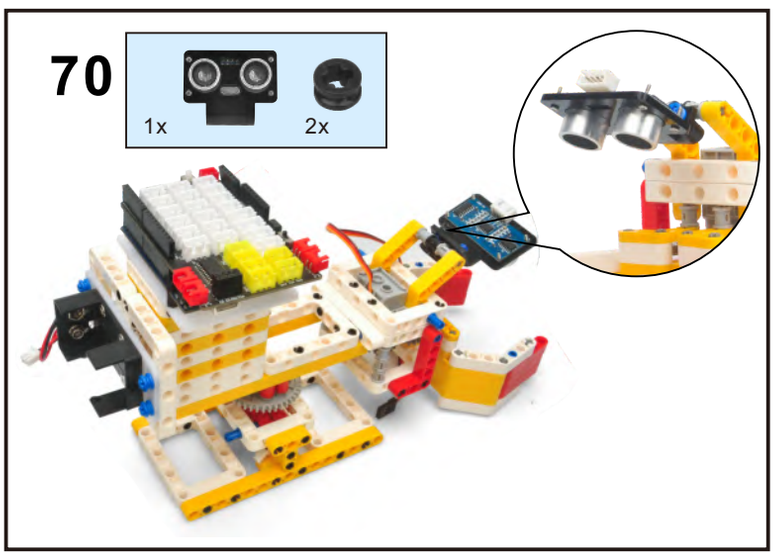


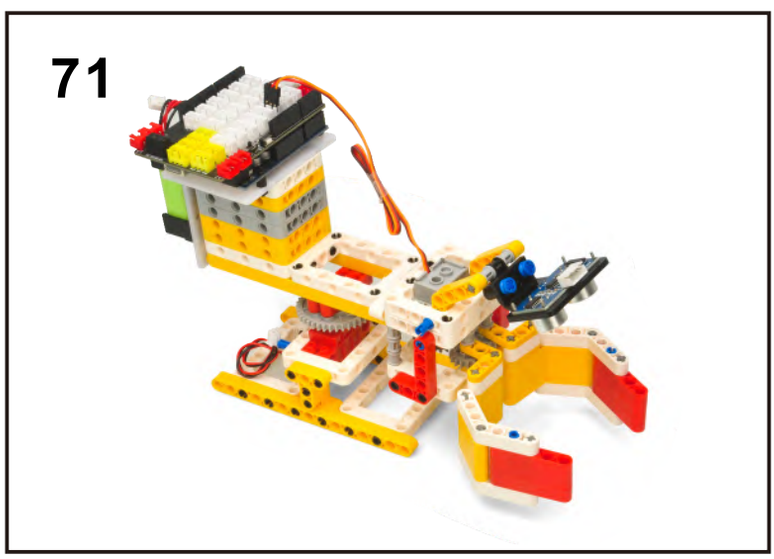
https://osoyoo.com/?p=44354







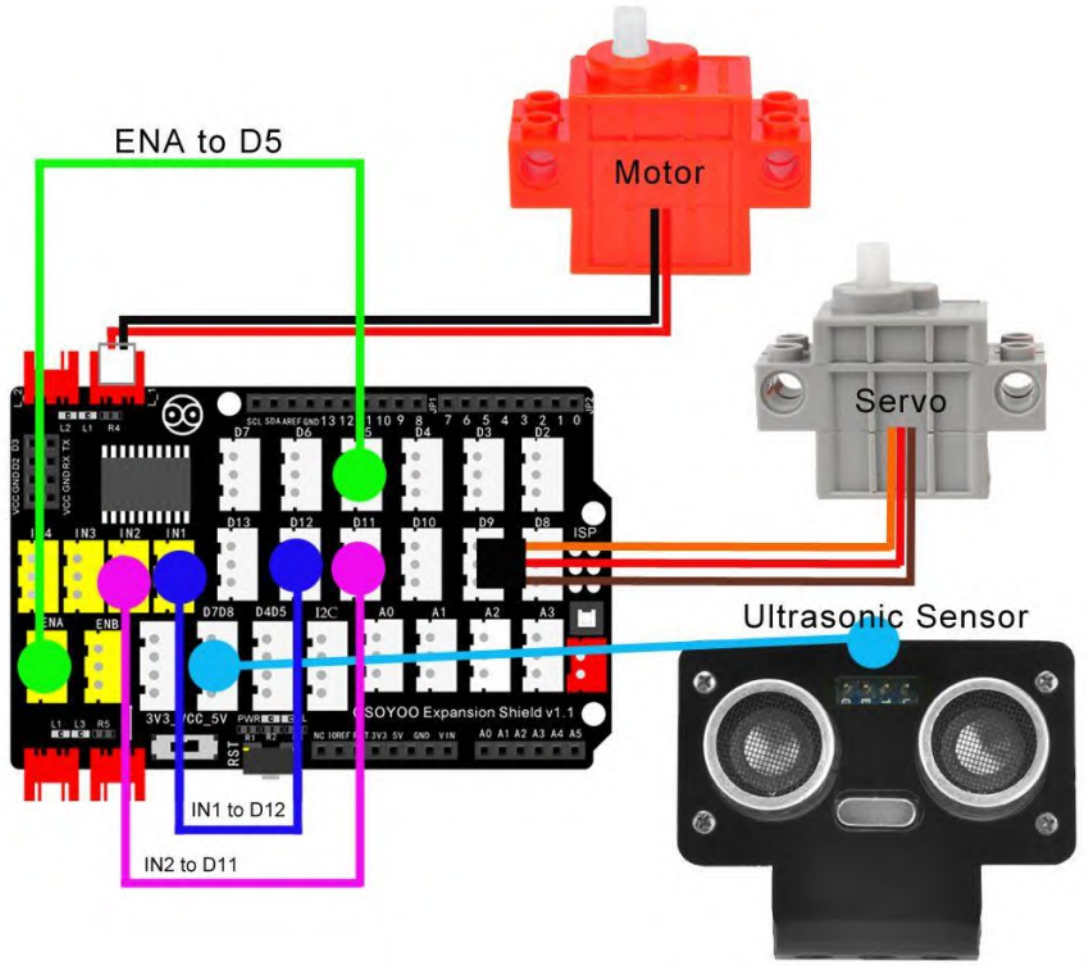




https://osoyoo.com/?p=44354

CIRCUIT CONNECTION

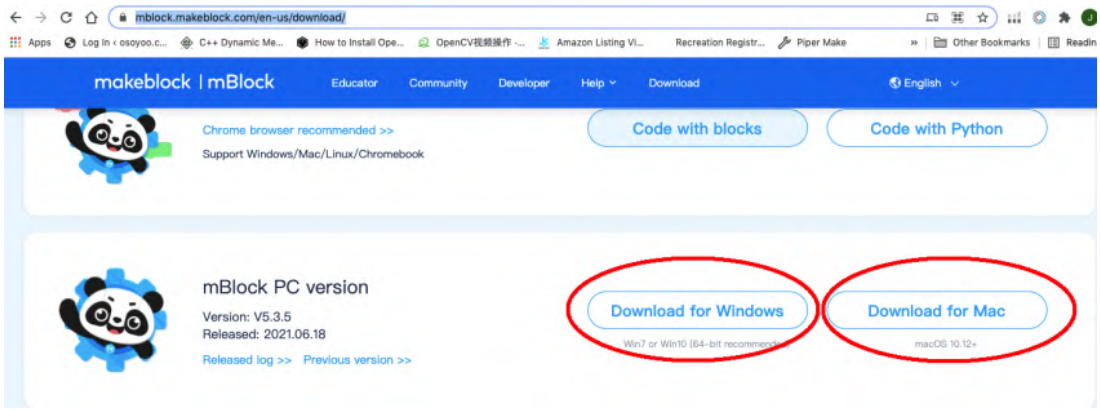
Connect wires as per following picture:
Motor(Red) to L1 or L2
Servo(Grey) to D9 port
IN1 to D12
IN2 to D11
ENA to D5
Ultrasonic Sensor to D7D8 port



HOW TO CODE

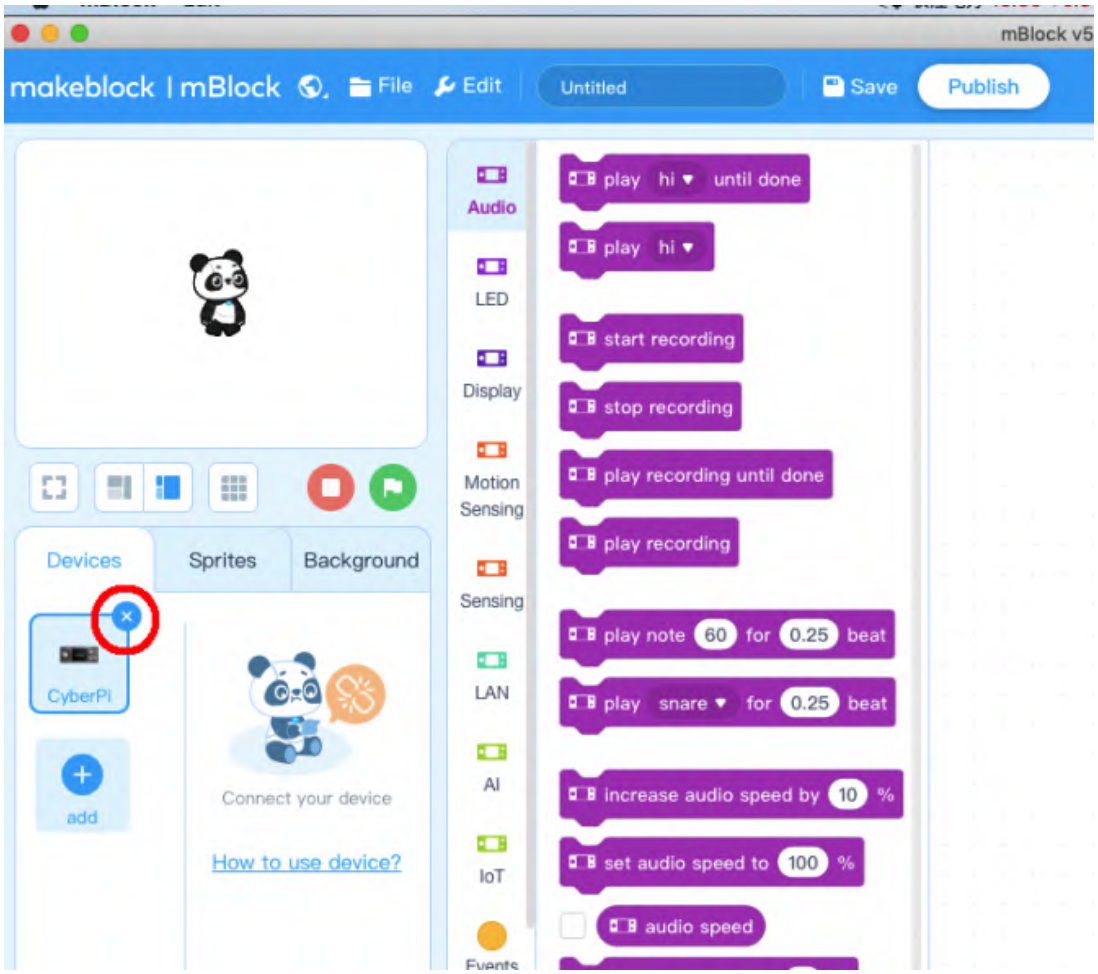
Note: In this kit, we use mblock as programming tool, if you want to learn more about mblock, please visit preparation before class 1:
https://osoyoo.com/2021/12/01/preparation-before-class-1
Step 1) Download mBlock PC from https://mblock.makeblock.com/en-us/download/, select the download file as per your computer OS type:

https://osoyoo.com/?p=44354



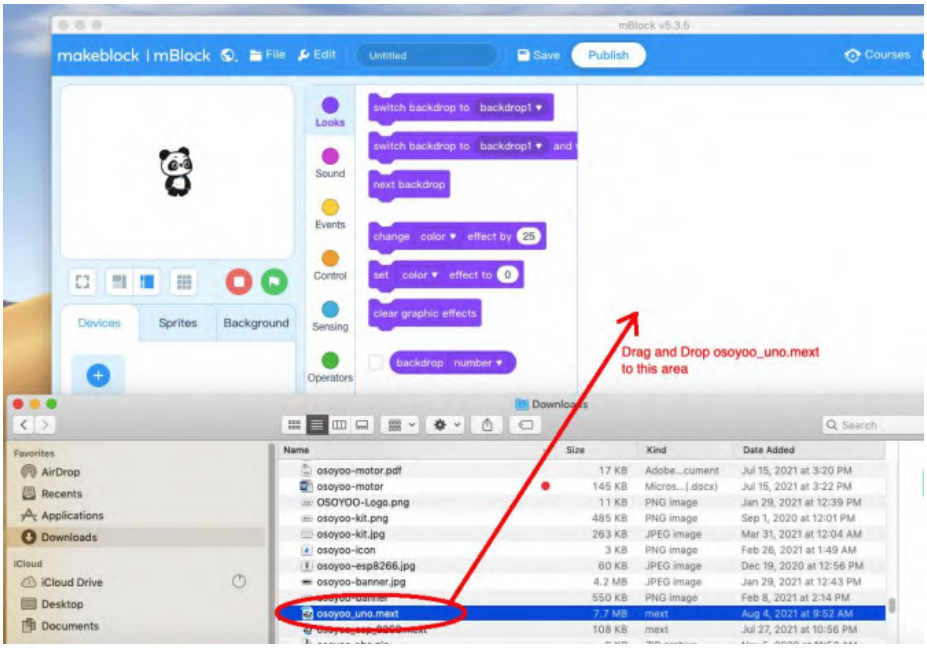
Step 2) Download OSOYOO_UNO.mext device file from https://osoyoo.com/driver/mblock/osoyoo_uno.mext

Step 3) Run the mBlock PC software by double click the lovely Panda icon. you will see mBlock UI as following picture. Please delete the default device **CyberPi** by click the cross in the red circle.

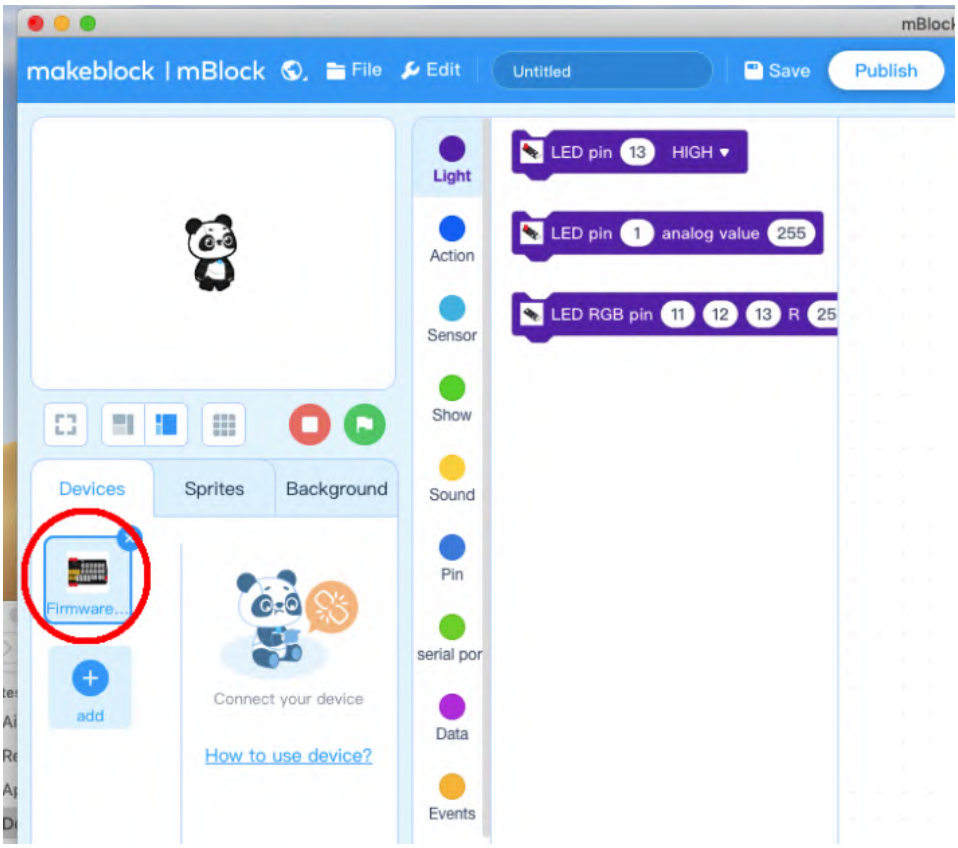


Step 4) Drag and Drop osoyoo_uno_mext file(downloaded in Step 2) to mBlock software as following:

https://osoyoo.com/?p=44354



Now you will see a new device firmware in mBlock, see following picture:



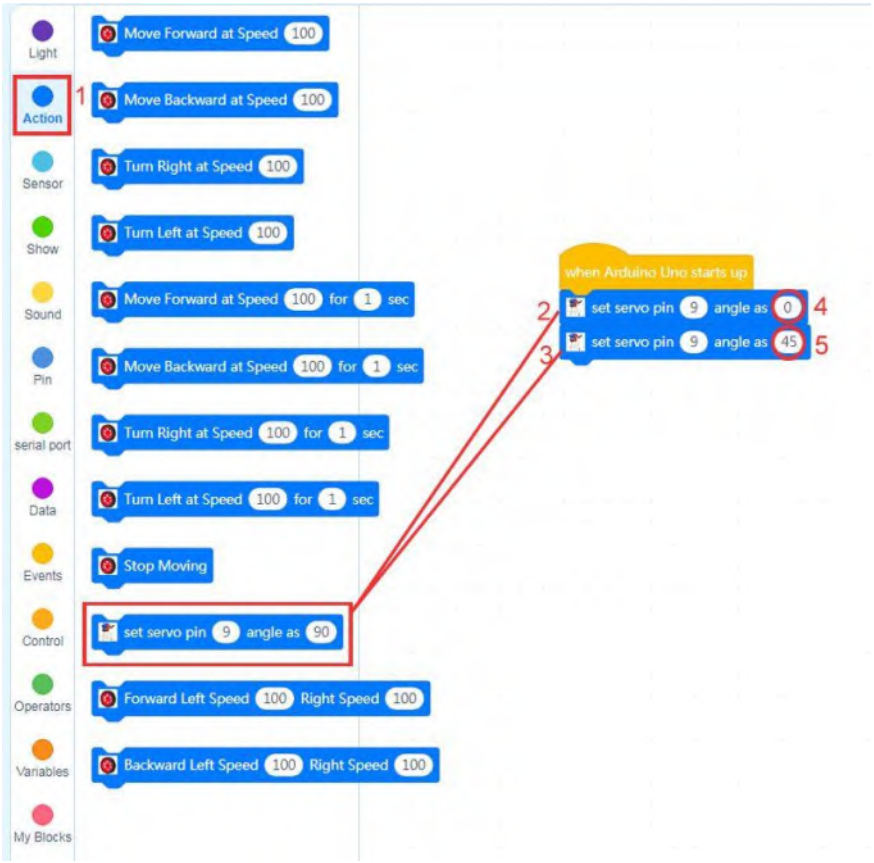
Now mBlock software and OSOYOO_UNO device firmware have been successfully installed in our PC!

https://osoyoo.com/?p=44354

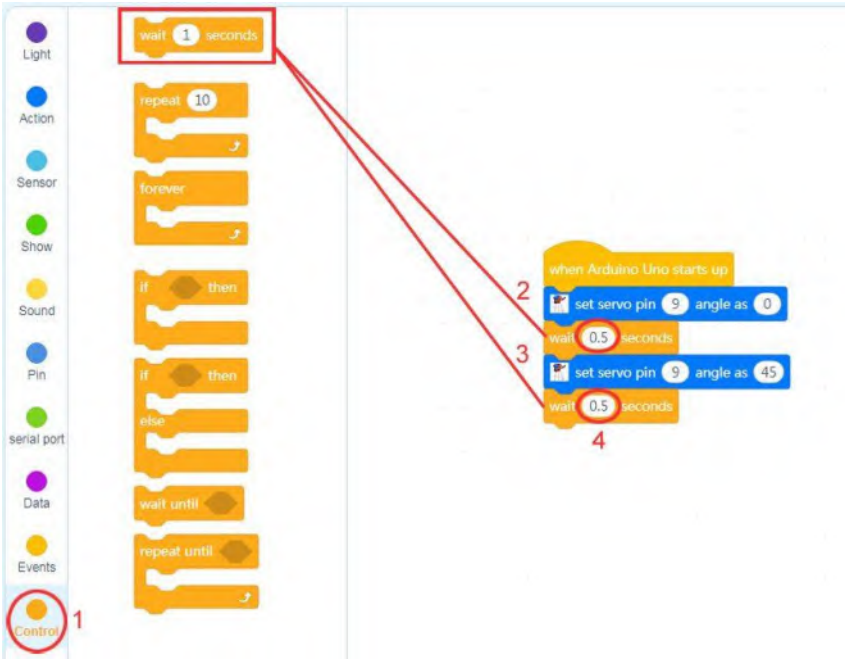
Now we will show you how to use blocks to make our Robot Crab into reality.
Step 1: Click **Events**, add **when Arduino Uno starts up** block to programming area:

Step 2: Click **Action**, drag **set servo pin** *9* **Angle as** *0* block twice and change angle to *0* and *45* as following:

https://osoyoo.com/?p=44354

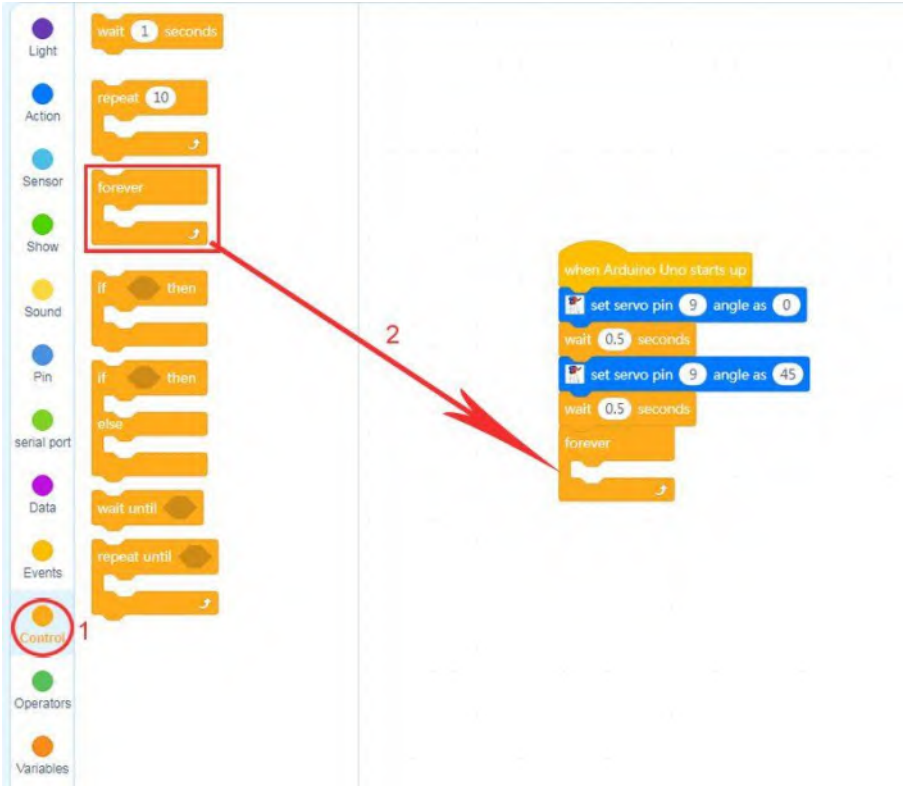


Step 3: Click **Control**, drag **wait 1 seconds** block twice under **set servo pin** *9* **Angle as** *0* block and change 1 to *0.5* as following :



https://osoyoo.com/?p=44354

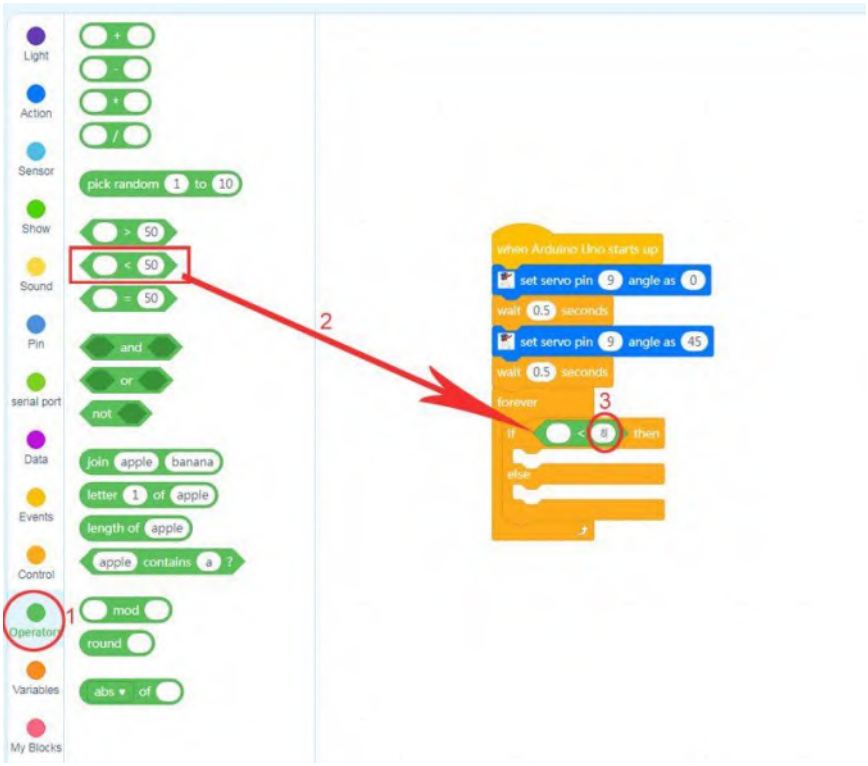
Step 4: Click **Control**, then Drag and drop **Forever** block under **wait x seconds** block as following:



Step 5: Click **Control**, drag if-then-else block to **forever** loop as following:

https://osoyoo.com/?p=44354

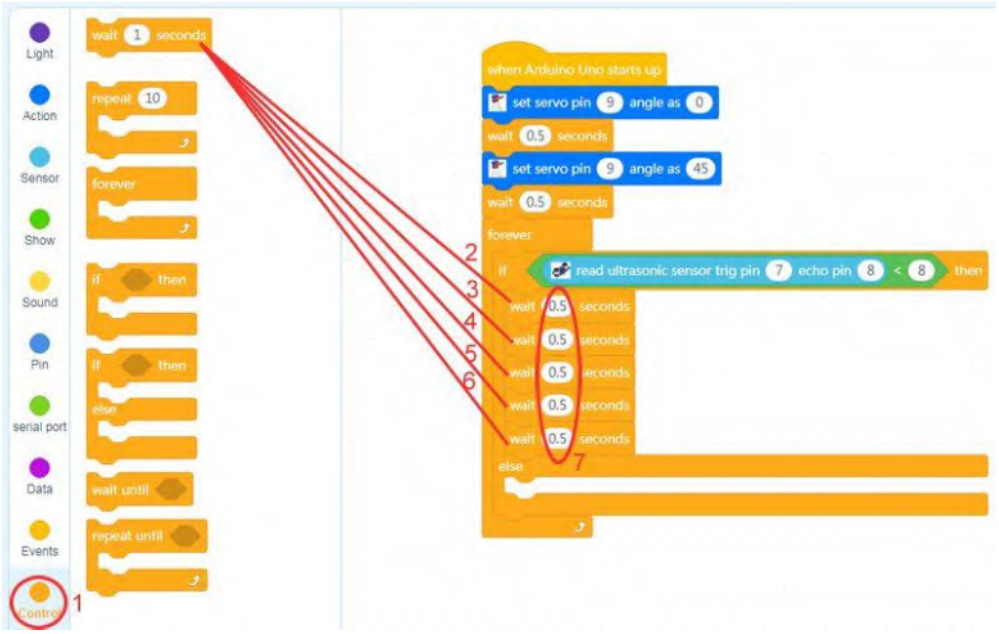
Step 6: Click **Operation**, drag **X < 50** block on the placeholder of the if-then-else block, and change 50 to 8 as following:



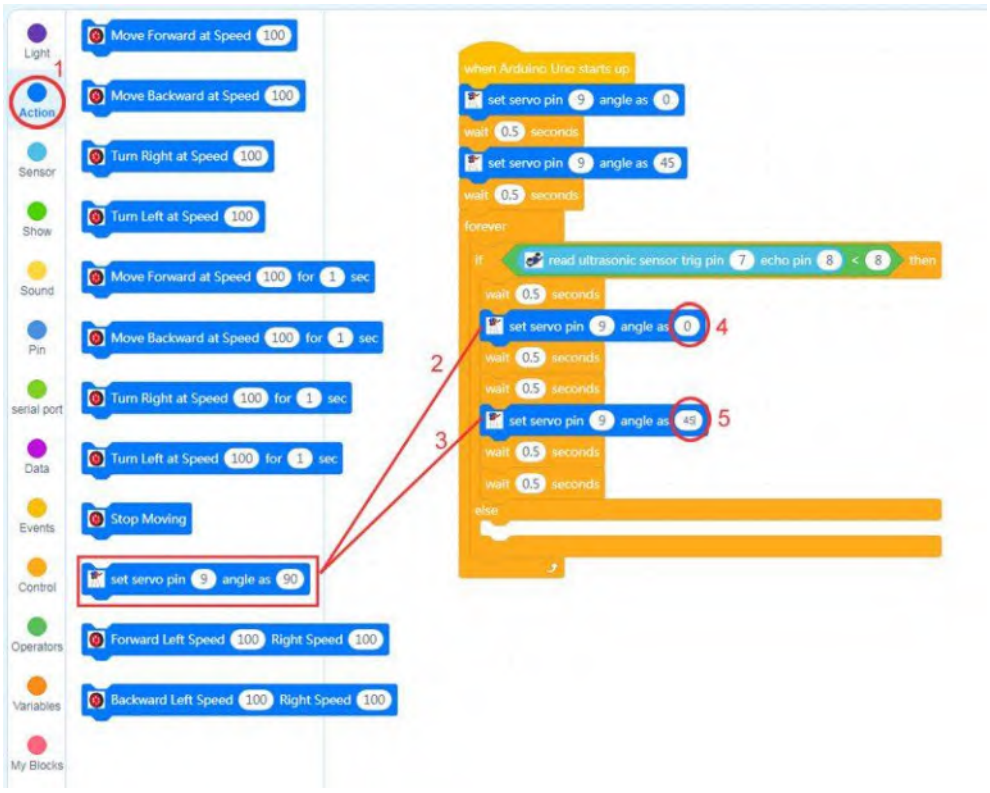
Step 7: Click **Sensor**, drag **read ultrasonic sensor trig pin 1 echo pin 1** block on the first placeholder of the X < 8 block as following:

https://osoyoo.com/?p=44354

Step 8: Click **Control**, drag **Wait 1 seconds** block five times inside the **"then"** section of the if-then-else block as following:



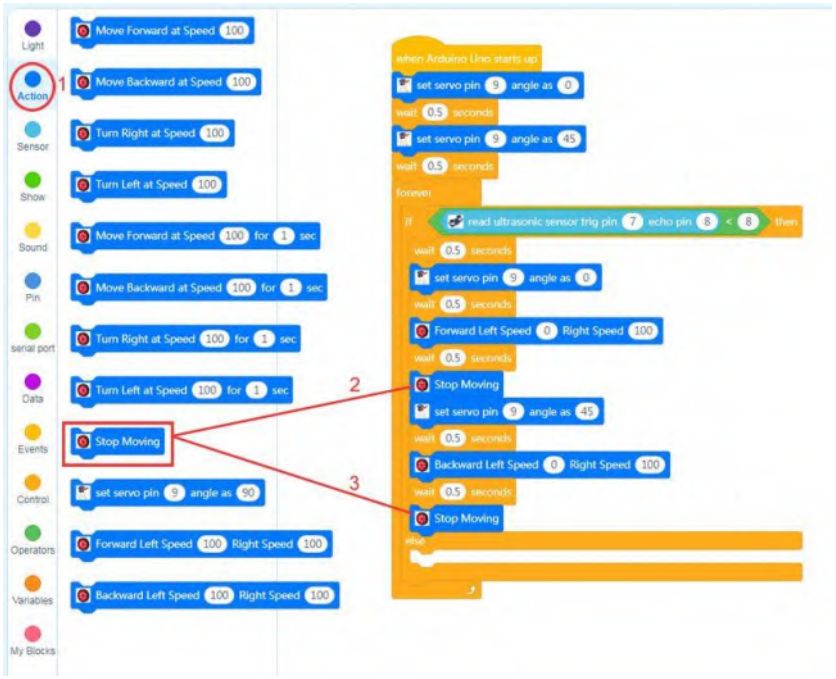
Step 9: Click **Action** , then drag **set Servo Pin** blocks twice to between **wait 1 seconds** blocks and change angles to *0* and **45** as following:



https://osoyoo.com/?p=44354

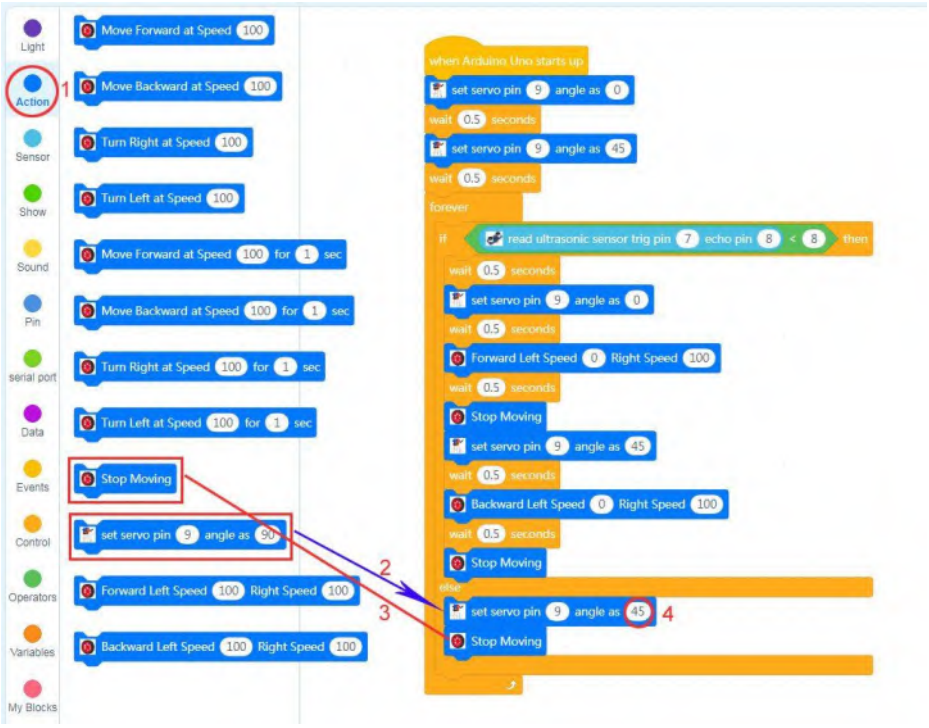
Step 10: Click **Action** , then drag **Forward Left Speed 100 Right Speed 100** block and **Backward Left Speed 100 Right Speed 100** block and change Left Speed to 0 as following:

Step 11: Click **Action** , then drag **Stop Moving** block twice under **wait x seconds** as following:



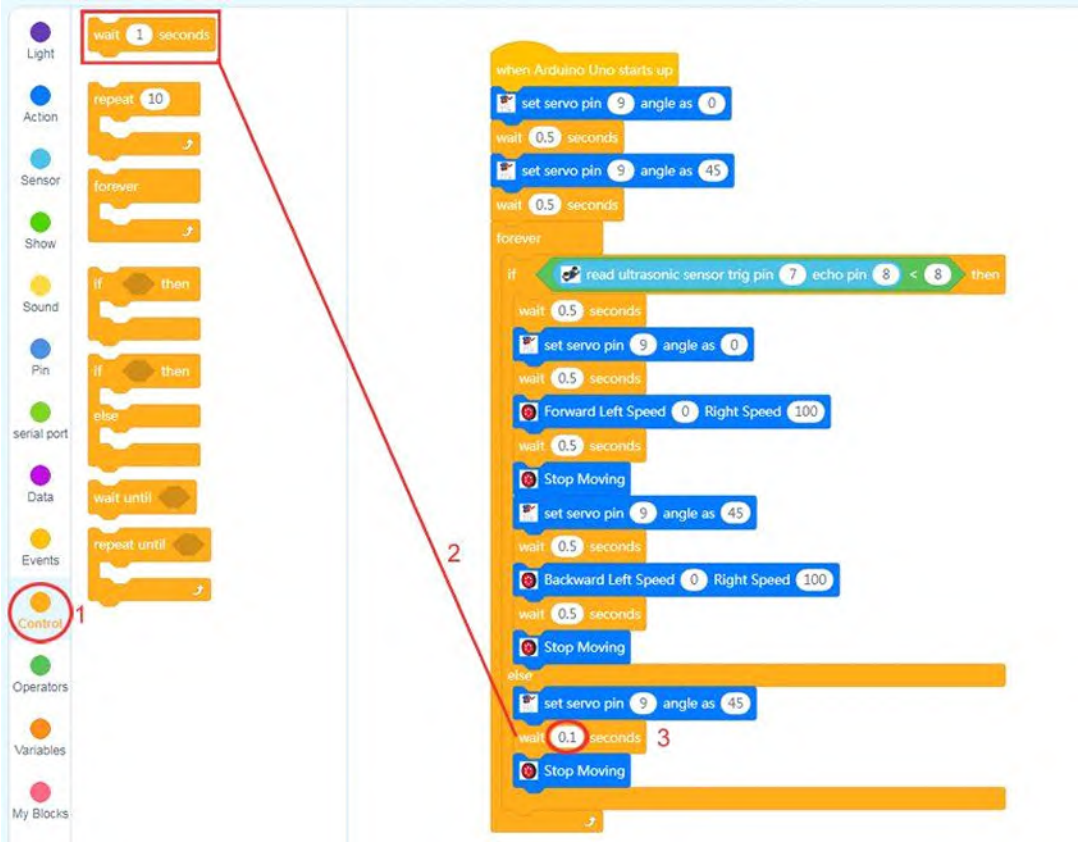
https://osoyoo.com/?p=44354

Step 12: Click **Action** , then drag **Stop Moving** block and **set Servo Pin** block inside the **“else”** section and change the angle to **45** as following:



Step 13: Click **Control** , then drag **wait 1 seconds** block and change time to **0.5 seconds** as following:

https://osoyoo.com/?p=44354



Now all the programming blocks have been completed! From above picture, the logic is pretty straight forward:

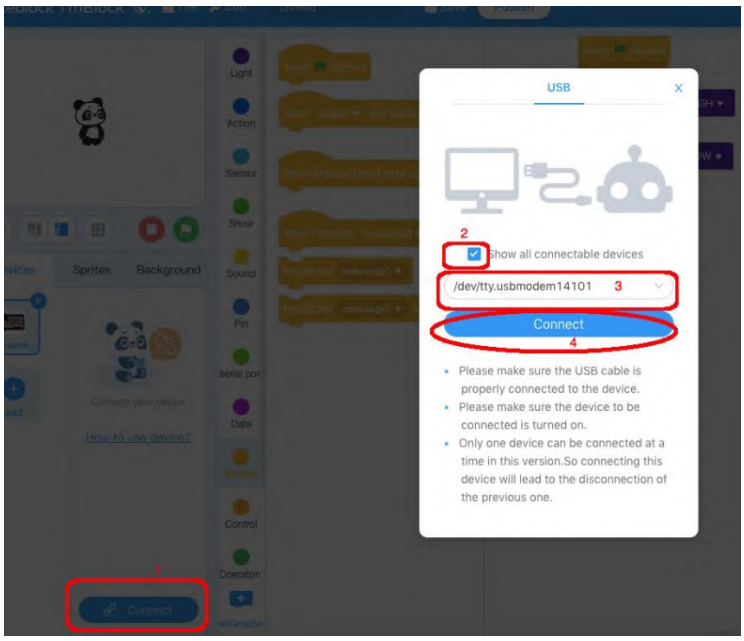
When Arduino is started, the crab will close at the beginning and then open (my servo 0 degree is closed and 45 degree is opened). Computer will enter a dead loop which will check the distance between object and ultrasonic sensor. When the ultrasonic sensor "see" the object under 8cm distance, the crab close to catch the object and the motor move the crab to right, then the crab open to throw the object away, then the motor move the crab back. If the distance is over 8cm, the crab will stay still.

Upload the program to Arduino

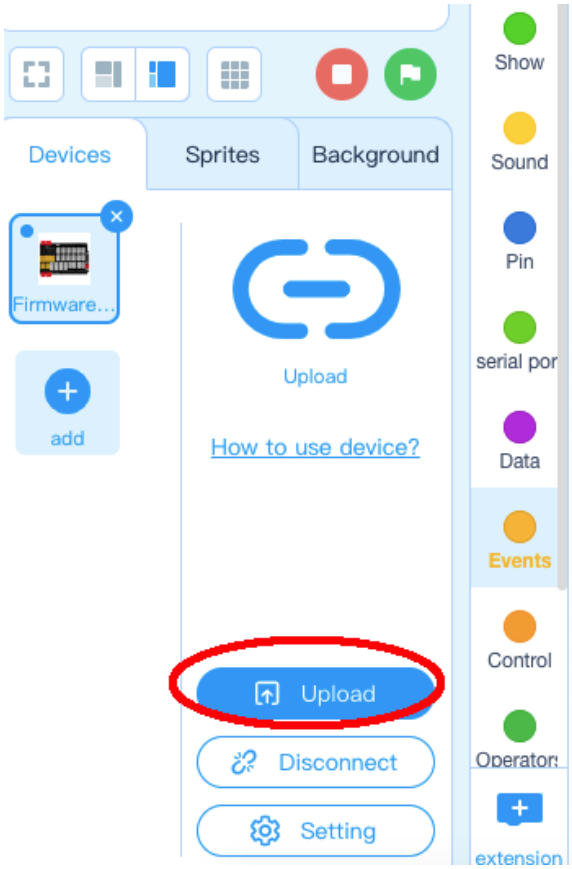
1)you need connect your Arduino board to your PC with a USB cable first. Then click the Connect button in the bottom of the mBlock software, you will see a USB window pop up,
2) select **Show all connectable device** check box , then a device drop-down menu will show up,
3) select your Arduino port from device drop-down menu

https://osoyoo.com/?p=44354

4) click **Connect** button to connect your PC to Arduino



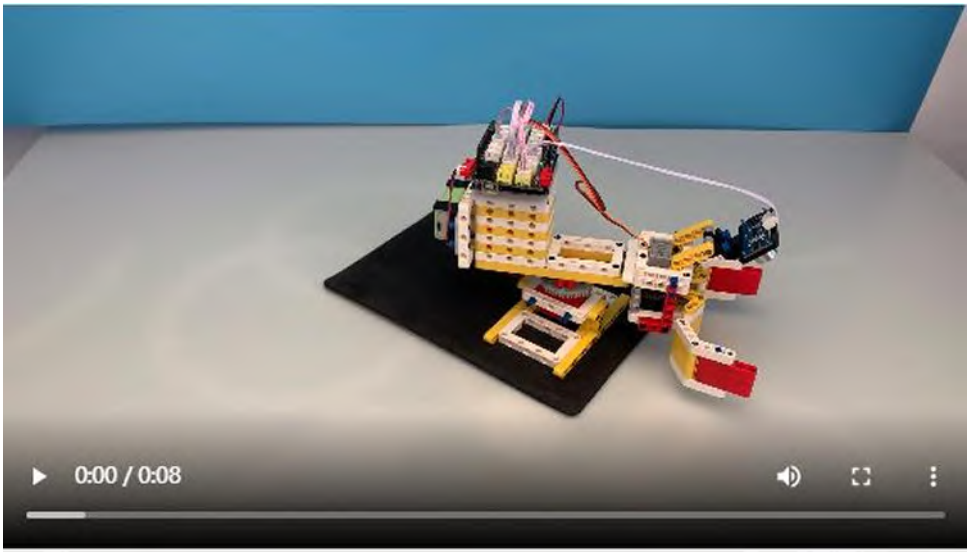
5)After you PC is connected to Arduino UNO board, please click Upload button in the bottom of your software, then the code will be uploaded to Arduino UNO board:



https://osoyoo.com/?p=44354

HOW TO PLAY

Now turn on the power switch in the Magic board, the Arduino will start to work. Press the button on D2, your fan begins to rotate and servo start to oscillate. When you release the button, fan and servo will stop moving.



https://osoyoo.com/picture/Block_kit/lesson6/18.mp4