

# R.O.B.O.T.S

**Robots-Enhanced Operation for Brilliant Opportunity In Teaching Success**



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# **R.O.B.O.T.S**

**Robots-Enhanced Operation for Brilliant Opportunity  
In Teaching Success**



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**R.O.B.O.T.S (Robots-Enhanced Operation for Brilliant Opportunity In Teaching Success)**, IPGM Kampus Sarawak menerbitkan satu modul pembinaan robot dan pengajaran dengan menyepadukan set robotik dan LEGO bagi membantu murid-murid pemulihan sekolah rendah mempelajari kemahiran asas matematik.

***R.O.B.O.T.S (Robots-Enhanced Operation for Brilliant Opportunity In Teaching Success)**, IPGM Kampus Sarawak publishes a robot construction and teaching module by integrating robotics and LEGO sets to help remedial students to learn the foundational mathematical skills in primary school.*

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## 1.0 PERATURAN PERMAINAN *R.O.B.O.T.S GAME RULES*

### 1.1 Terma Dalam Permainan R.O.B.O.T.S *Terms In The R.O.B.O.T.S Game*

Berikut merupakan beberapa terma penting yang digunakan dalam permainan R.O.B.O.T.S beserta dengan penerangannya:

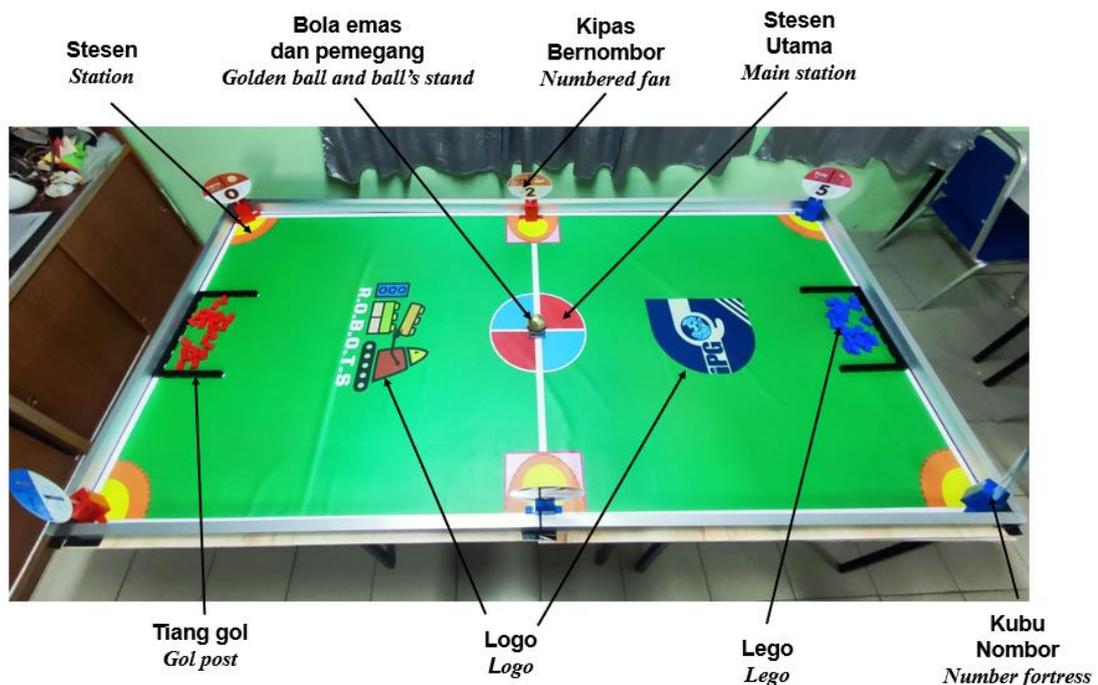
*Below are some important terms used in the R.O.B.O.T.S game along with their explanations:*

- Padang - Merujuk kepada gelanggang R.O.B.O.T.S  
*Field - Refers to the R.O.B.O.T.S playing field*
- Logo - Merujuk kepada logo R.O.B.O.T.S dan logo institusi IPGMKS  
*Logo - Refers to the R.O.B.O.T.S logo and the IPGMKS institution logo*
- Lego - Merujuk kepada blok Lego putih, merah dan biru  
*Lego - Refers to the white, red, and blue Lego blocks*
- Stesen - Merujuk kepada tempat untuk meletakkan Lego pada padang  
*Station - Refers to the place to put the Lego blocks on the field*
- Stesen utama - Merujuk kepada tempat untuk meletakkan bola emas atau bulatan yang berada di tengah padang  
*Main station - Refers to the place to put the golden ball or circle located at the center of the field*

### 1.2 Penerangan Padang R.O.B.O.T.S *Description Of R.O.B.O.T.S Field*

Gambar berikut menunjukkan padang R.O.B.O.T.S yang dilengkapi dengan item permainan. Padang dalam permainan R.O.B.O.T.S berukuran 243cm x 120.5cm. Padang ini juga dikelilingi dengan bingkai aluminium.

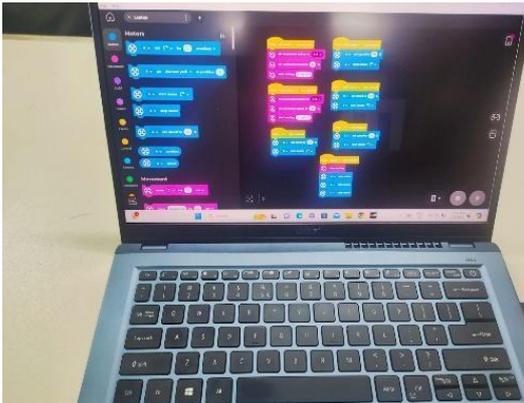
*The following graphic shows the game field with the R.O.B.O.T.S game items. The dimensions of a R.O.B.O.T.S playing field are 243cm x 120.5cm. The field also surrounded by an aluminium frame.*



### 1.3 Jenis Kawalan R.O.B.O.T.S

#### *Types Of R.O.B.O.T.S Controls*

Terdapat pelbagai jenis kawalan yang boleh digunakan dalam permainan R.O.B.O.T.S.  
*There are various types of controls that can be used in the R.O.B.O.T.S game.*

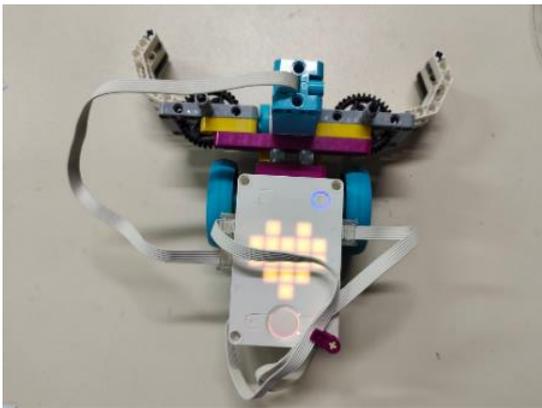
	
<p>Alat kawalan <i>Controller</i></p>	<p>Telefon pintar <i>Smartphone</i></p>
	
<p>Tablet <i>Tablet</i></p>	<p>Komputer riba <i>Laptop</i></p>

### 1.4 Item Permainan R.O.B.O.T.S

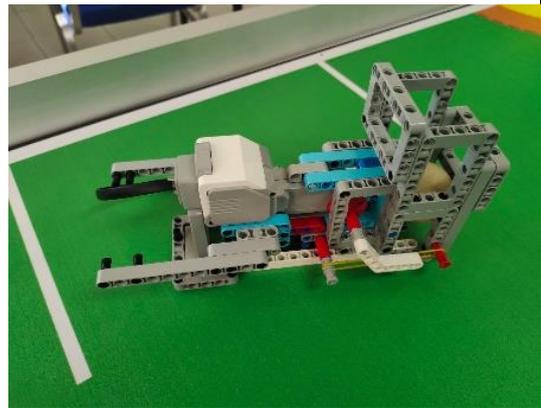
#### *R.O.B.O.T.S Game Items*

Berikut merupakan 9 jenis item permainan yang digunakan dalam permainan R.O.B.O.T.S.

*Below shown 9 types of game items used in the R.O.B.O.T.S game.*



R.O.B.O.T.S  
*R.O.B.O.T.S*



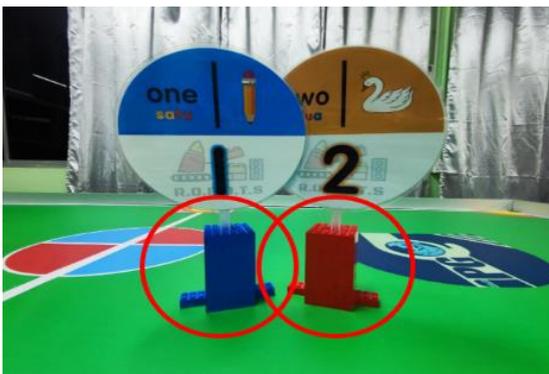
Penembak Lego  
*Lego shooter*



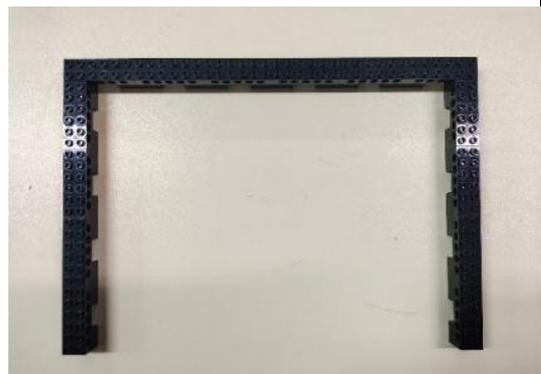
Teacher spin master  
*Teacher spin master*



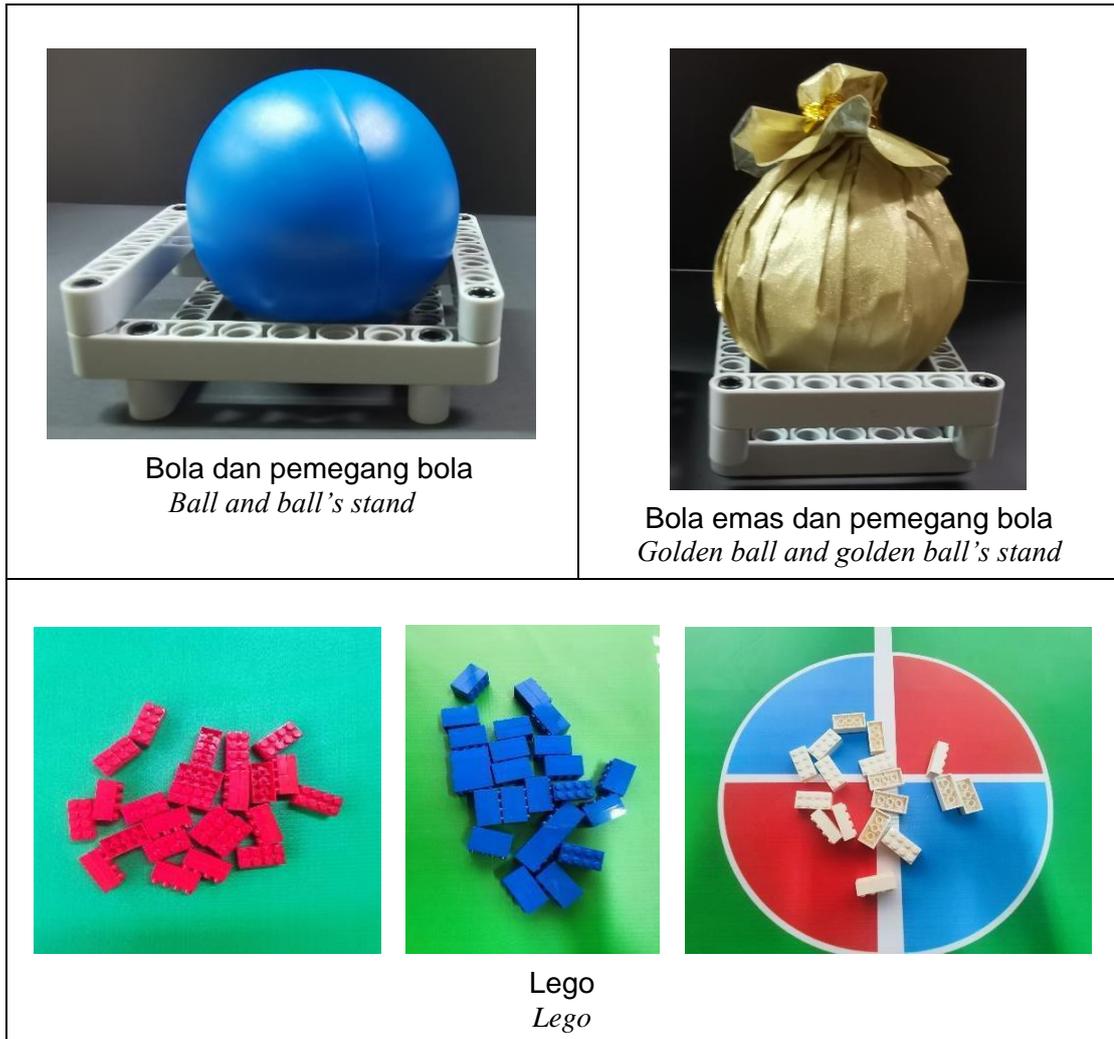
Kipas bernombor  
*Numbered fan*



Kubu nombor  
*Number fortress*



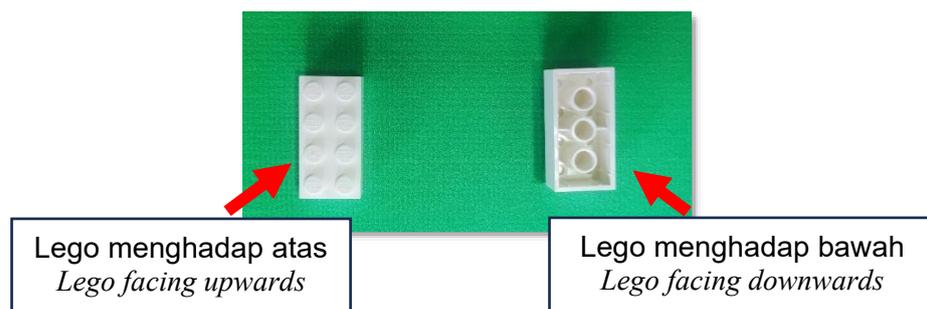
Tiang gol  
*Gol post*



### 1.5 Cara Memulakan Pertandingan *Competition Commencement Procedure*

1. Setiap pusingan akan dimainkan oleh dua peserta.  
*Each round will be played by two participants.*
2. Guru akan menggunakan kaedah pelontaran Lego untuk menentukan giliran peserta memilih nombor (Rajah 1).  
*The teacher will throw the Lego to determine the turn of the participants to choose the number (Figure 1).*

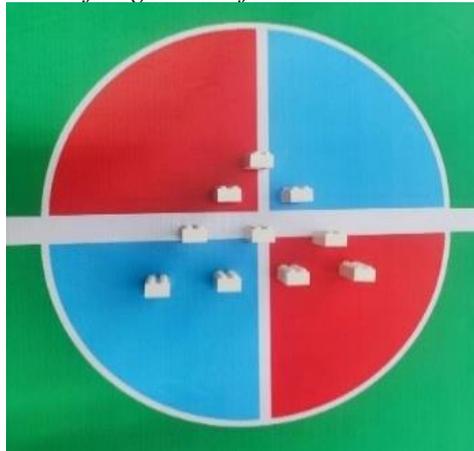
**Rajah 1: Kaedah lontaran Lego**  
*Figure 1: Lego throwing method*



3. Guru perlu menentukan peserta 1 dan peserta 2 terlebih dahulu. Jika Lego menghadap ke atas, peserta 1 akan memiliki keutamaan dalam pemilihan nombor. Sebaliknya, jika Lego menghadap ke bawah maka peserta 2 akan memiliki keutamaan dalam pemilihan nombor. Sekiranya Lego tidak menghadap ke mana-mana arah maka guru berhak untuk melontar semula atau menentukan peserta yang memulakan pemilihan nombor.  
*The teacher needs to determine Participant 1 and 2 before throwing the Lego. If the Lego faces upwards, Participant 1 will have priority in number selection. Conversely, if the Lego faces downwards, Participant 2 will have priority in number selection. If the Lego does not face any direction, the teacher has the right to rethrow or decide which participants will start the number selection.*
4. Nombor pertama dan kedua akan dipilih dengan kaedah melastik Lego putih dan nombor ketiga akan dipilih oleh guru dengan kaedah *Teacher Spin Master*.  
*The first and second numbers will be chosen using the white Lego slingshot method, while the third number will be selected by the teacher using the Teacher Spin Master method.*
5. Lego putih akan disusun di tengah padang sebelum dilastik (Rajah 2).  
*The white Lego will be arranged in the center of the field before being slingshotted by the participants (Figure 2).*

**Rajah 2: Susunan Lego di padang**

*Figure 2: Arrangement of Lego in the field*



6. Peserta harus memastikan bahawa kedudukan R.O.B.O.T.S berada di tengah logo semasa melastik. Namun begitu, peserta bebas untuk menentukan arah R.O.B.O.T.S menghadap semasa melastik.  
*During the slingshot action, participants must ensure that the R.O.B.O.T.S position is at the center of the logo. However, participants are free to determine the facing direction of the R.O.B.O.T.S.*
7. Bilangan Lego putih yang berjaya dilastik merupakan nombor yang akan dipilih.  
*The amount of white Lego that are hit successfully will be the chosen number.*

8. Lego putih di stesen utama akan disusun semula selepas dilastik oleh peserta pertama.  
*The white Lego at the main station will be rearranged after being slingshotted by the participants.*
9. Sekiranya bilangan Lego putih yang berjaya dilastik adalah sama maka guru berhak untuk menambah atau menolak 1 terhadap bilangan Lego yang dilastik (Rujuk Jadual 1).  
*If the amount of the slingshotted white Lego is the same, the teacher has the right to add or subtract 1 from the amount of the slingshotted Lego. (Refer to Table 1).*
10. Sekiranya bilangan Lego putih yang berjaya dilastik melebihi daripada julat nombor 0 - 9 maka nombor 9 akan dipilih.  
*If the amount of the slingshotted Lego exceeds the range numbers from 0 to 9, the number 9 will be selected.*
11. Lego putih akan dikemaskan selepas kedua-dua peserta telah habis melastik. Seterusnya, guru akan memilih nombor yang terakhir menerusi *Teacher Spin Master*.  
*The white Lego will be tidied up after both of the participants have finished slingshotting. Subsequently, the teacher will choose the final number using the Teacher Spin Master.*
12. Setelah semua nombor siap dipilih, peserta mempunyai kebebasan untuk menyusun kedudukan kipas bernombor berdasarkan kreativiti masing-masing.  
*After all the numbers are chosen, participants are free to arrange the position of the numbered fans based on their creativity.*

**Jadual 1: Cara menentukan nombor**

*Table 1: Number determination method*

<b>Bilangan Lego yang dilastik</b> <i>Number of slingshotted Lego</i>	<b>Nombor yang dipilih</b> <i>Selected number</i>
<b>Situasi 1</b> <i>Situation 1</i>	
Peserta 1 <i>Participant 1</i>  Tiada Lego putih yang berjaya dilastik <i>No Lego successfully hit by the slingshot</i>	0
Peserta 2 <i>Participant 2</i>  Tiada Lego putih yang berjaya dilastik <i>No Lego successfully hit by the slingshot</i>	Guru akan menambah 1. Maka kipas bernombor yang dipilih adalah 1 <i>The teacher will add 1. Therefore, the selected numbered fan is 1.</i>  $0 + 1 = 1$

<b>Situasi 2</b> <i>Situation 2</i>	
<p>Peserta 1 <i>Participant 1</i></p> <p>10 Lego putih berjaya dilastik <i>10 Lego are successfully hit by the slingshot</i></p>	<p>Guru akan menolak 1 untuk memastikan nombor yang dipilih berada dalam julat 1 - 9 <i>The teacher will subtract 1 to ensure that the selected number remains within the range of 1 - 9.</i></p> <p><math>10 - 1 = 9</math></p>
<p>Peserta 2 <i>Participant 2</i></p> <p>9 Lego putih berjaya dilastik <i>9 Lego are successfully hit by the slingshot</i></p>	<p>Guru boleh menolak 1 pada nombor yang dipilih. <i>The teacher may subtract 1 from the selected number.</i></p> <p><math>9 - 1 = 8</math></p>

### 1.6 Cara Permainan R.O.B.O.T.S *R.O.B.O.T.S Game Procedure*

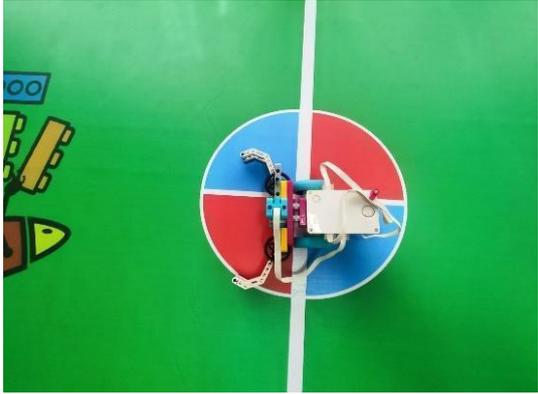
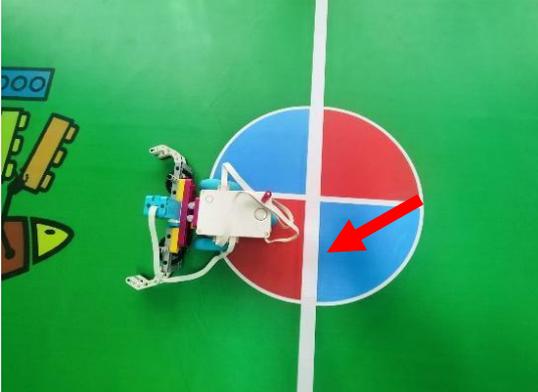
1. Peserta perlu menggunakan telefon pintar untuk mengawal pergerakan R.O.B.O.T.S.  
*Participants are required to use the smartphones to control the movement of R.O.B.O.T.S.*
2. Peserta hanya boleh melakukan permainan di dalam kawasan sendiri (Rajah 3).  
*Participants can only play within their designated area (Figure 3).*

**Rajah 3:** Kawasan permainan kedua-dua peserta  
*Figure 3: Game areas for both participants*



3. Sekiranya seluruh R.O.B.O.T.S peserta melewati kawasan pertandingan masing-masing, maka peserta akan dikira telah melanggar peraturan dan kalah dalam pusingan tersebut (Rujuk Jadual 2)  
*If the entire R.O.B.O.T.S of the participant crossed their designated area, the participant will be considered as violated the rules and will lose the round (Refer to Table 2).*

**Jadual 2: Kawasan permainan peserta**  
*Table 2: Participant's game area*

	<p>Peserta tidak melepasi kawasan pertandingan. <i>The participant did not exceed the designated area.</i></p>
	<p>Peserta telah melepasi kawasan pertandingan (garisan merah dalam gambar di atas) <i>The participant exceeded the designated area (red line in the above image).</i></p>

4. Sebelum pertandingan dimulakan, kedudukan kedua-dua R.O.B.O.T.S mesti saling menghadap antara satu sama lain dan tangan R.O.B.O.T.S mesti dalam keadaan tertutup.  
*Before the competition begins, both R.O.B.O.T.S must facing towards each other with their arms closed tightly.*
5. Peserta perlu mengambil dan memasukkan bilangan Lego yang tepat ke dalam stesen mengikut nombor yang dipaparkan pada kipas bernombor.  
*Participants must collect and put the correct amount of Lego in the station according to the number displayed on the numbered fan.*
6. Stesen akan dikira lengkap dengan syarat bilangan Lego mesti betul berdasarkan nombor yang tertera pada kipas bernombor. (Sila rujuk contoh rajah di dalam Jadual 3).  
*A station will be considered complete if the amount of Lego competitiones correctly with the number on the numbered fan (Refer examples in Table 3).*

**Jadual 3: Contoh stesen yang dikira lengkap**

*Table 3: Example of complete stations*

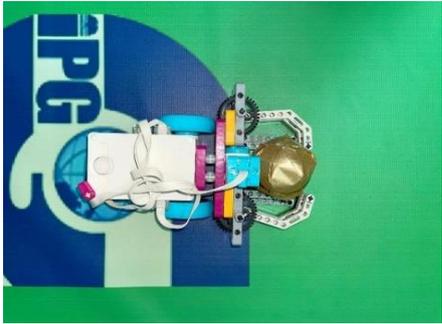
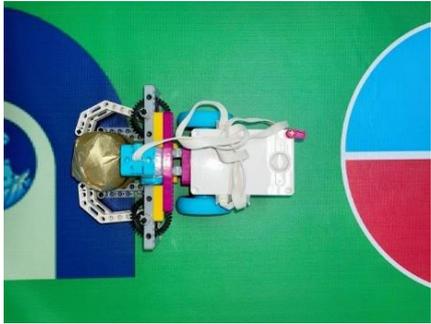
		
<p><b>Lengkap</b> - Semua Lego telah dimasukkan ke dalam stesen  <i>Complete</i> - All Lego has been placed into the station.</p>	<p><b>Lengkap</b> - Peserta dibenarkan untuk memasukkan sebahagian sahaja daripada Lego ke dalam stesen  <i>Complete</i> - Participants are allowed to place only a portion of the Lego into the station</p>	<p><b>Tidak lengkap</b> - Lego tidak dimasukkan ke dalam stesen  <i>Incomplete</i> - Lego are not placed into the station.</p>

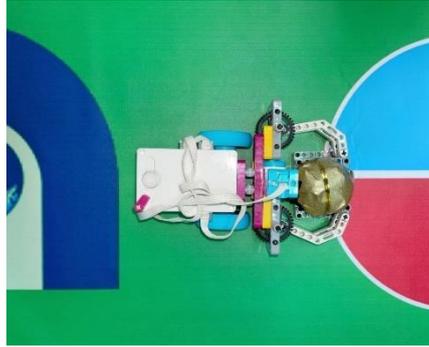
7. Selepas ketiga-tiga stesen telah dilengkapkan, peserta dikehendaki untuk mengambil bola emas di stesen utama ke bahagian logo kawasan sendiri. (Rujuk Jadual 4).

*After all three stations have been completed, participants are required to take the golden ball from the main station to their own designated logo area (Refer to Table 4).*

**Jadual 4: Contoh status kelengkapan**

*Table 4: Example of completion status*

	
<p><b>Lengkap / Complete</b>  R.O.B.O.T.S telah masuk kawasan logo.  <i>R.O.B.O.T.S has entered the logo area.</i></p>	<p><b>Lengkap / Complete</b>  Sebahagian R.O.B.O.T.S telah masuk kawasan logo.  <i>Part of the R.O.B.O.T.S has entered the logo area.</i></p>



**Tidak lengkap / Incomplete**

R.O.B.O.T.S atau bola emas tidak menyentuh sebahagian logo  
*R.O.B.O.T.S or the golden ball does not touch any part of the logo.*

8. Kipas bernombor yang dipilih pada permulaan pertandingan akan digunakan bagi pusingan pertama dan kedua. Sekiranya terdapat pusingan ketiga maka murid dan guru akan memilih nombor semula dengan *Teacher Spin Master*.  
*The numbered fans selected at the beginning of the competition will be used for the first and second rounds. If there is a third round, the students and the teacher will reselect the numbers using the Teacher Spin Master.*
9. Peserta dikehendaki untuk bertukar kawasan pertandingan bagi setiap pusingan. Namun begitu, peserta masih dibenarkan untuk menggunakan alat kawalan R.O.B.O.T.S yang sama.  
*Participants are required to switch the competition areas for each round. However, they are still allowed to use the same R.O.B.O.T.S controller.*
10. Peserta berpeluang untuk menukar kedudukan kipas bernombor bagi setiap pusingan.  
*Participants have the opportunity to change the position of the numbered fans for each round.*

**1.7 Cara Penentuan Pemenang**  
**Winner Determination Method**

1. Pemenang akan ditentukan dengan kaedah "*Best of 3*" dan setiap pusingan diberikan masa maksimum 4 minit.  
*The winner will be determined by the "Best of 3" method, and each round is given a maximum time of 4 minutes.*
2. Peserta yang berjaya melengkapkan lebih banyak stesen dalam masa 4 minit akan dikira sebagai pemenang pusingan berkenaan.  
*The participants who completes the most stations within 4 minutes will be considered the winner of that round.*
3. Sekiranya terdapat peserta yang berjaya menyelesaikan semua stesen dan lebih awal dari 4 minit, maka peserta tersebut merupakan pemenang bagi pusingan berkenaan.  
*If the participant completes all stations in less than 4 minutes, that participant will be the winner of the round.*

4. Sekiranya kedua-dua peserta tidak berjaya melengkapkan 3 stesen dan bilangan stesen yang dilengkapkan adalah sama maka tiada pemenang akan diwujudkan (Sila rujuk Jadual 5).

*If neither participants complete all three stations and the number of stations completed is the same, then no winner will be declared (Refer to Table 5).*

**Jadual 5: Contoh situasi dan cara pemarkahan**

*Table 5: Example situation and scoring method*

<b>Contoh Situasi</b> <i>Example Situations</i>	<b>Cara Pemarkahan</b> <i>Scoring Method</i>
<b>Pusingan 1 / Round 1</b>	
<b>Sebelum 4 minit tamat</b> <i>Before 4 minutes end:</i> <ul style="list-style-type: none"> <li>• Peserta A menyiapkan 3 stesen dalam masa 2 minit 30 saat. <i>Participant A completes 3 stations in 2 minutes 30 seconds</i></li> <li>• Peserta B menyiapkan 3 stesen dalam masa 1 minit 50 saat. <i>Participant B completes 3 stations in 1 minute 50 seconds.</i></li> </ul>	Peserta B adalah pemenang. <i>Participant B is the winner.</i>
<b>Pusingan 2 / Round 2</b>	
<b>Tamat 4 minit / End of 4 minutes:</b> <ul style="list-style-type: none"> <li>• Peserta A dan Peserta B masing-masing melengkapkan 2 stesen dalam masa 3 minit. <i>Participant A and Participant B each complete 2 stations in 3 minutes.</i></li> </ul>	Pusingan ini adalah seri <i>This round is a tie.</i>
<b>Pusingan 3 / Round 3</b>	
<b>Tamat 4 minit / End of 4 minutes:</b> <ul style="list-style-type: none"> <li>• Peserta A menyiapkan 2 stesen dalam masa 3 minit. <i>Participant A completes 2 stations in 3 minutes.</i></li> <li>• Peserta B menyiapkan 1 stesen dalam masa 3 minit. <i>Participant B completes 1 station in 3 minutes.</i></li> </ul>	Peserta A adalah pemenang. <i>Participant A is the winner.</i>
<b>Pusingan 4 / Round 4</b>	
Pusingan ke-4 dimainkan sekiranya keputusan pertandingan dalam 3 pusingan sebelum ini adalah seri. <i>Round 4 is played if the results of 3 rounds before are tied.</i>	
<b>Dalam masa 4 minit / Within 4 minutes:</b> <ul style="list-style-type: none"> <li>• Peserta A berjaya meletakkan bola di stesen yang kipas bernombor paling besar dalam masa 2 minit. <i>Participant A places the ball at the station with the largest numbered fan in 2 minutes.</i></li> <li>• Peserta B berjaya meletakkan bola di stesen yang kipas bernombor paling besar dalam masa 3 minit.</li> </ul>	Peserta A adalah pemenang untuk keseluruhan pertandingan ini. <i>Participant A is the winner of the entire competition.</i>

<i>Participant B places the ball at the station with the largest numbered fan in 3 minutes.</i>	
---	--

5. Sekiranya terdapat peserta yang telah melengkapkan pusingan maka pertandingan akan dihentikan. Guru akan menyemak semula semua stesen untuk memastikan bahawa semua stesen telah disiapkan. Sekiranya peserta didapati tidak melengkapkan stesen maka kemenangan akan ditentukan dengan bilangan stesen yang disiapkan.

*If the participant completes the round, the competition will be stopped. The teacher will review all stations to ensure that they have been completed. If a participant is found to have not completed a stations, the winner will be determined by the number of stations completed.*

6. Sekiranya keputusan akhir permainan adalah seri maka kedua-dua peserta akan diberikan tugas tambahan.

*If the final result of the game is a tie, both participants will be given an additional task.*

7. Tugas tambahan tersebut memerlukan peserta untuk mengambil bola berserta pemegang bola yang diletakkan di tiang gol kawasan masing-masing. Kemudian, peserta perlu meletakkan bola tersebut ke kipas bernombor yang mempunyai nombor terbesar. Sebagai contoh, nombor 3, 5 dan 1 adalah tiga nombor pada kipas bernombor, maka bola perlu diletakkan pada stesen yang mempunyai kipas bernombor 5 dengan tepat seperti yang ditunjukkan dalam Jadual 6.

*The additional task requires participants to take the ball with its holder placed at the goalpost in their area. Then, the participants need to place the ball on the numbered fan with the largest number. For example, if 3, 5, and 1 are the three numbers on the numbered fan, the ball must be placed at the station with the numbered fan 5, as shown in Table 6.*

**Jadual 6: Contoh situasi bola dalam stesen**

*Table 6: Example of Ball Status in a Station*

	
<p><b>Lengkap</b> - Sebahagian daripada bola telah dimasukkan ke dalam kawasan stesen</p> <p><i>Complete</i> - Part of the ball has been placed in the station area.</p>	<p><b>Tidak lengkap</b> - Bola tidak dimasukkan ke dalam kawasan stesen</p> <p><i>Incomplete</i> - The ball is not placed in the station area.</p>

8. Sebelum pusingan ini bermula, peserta perlu memulakan tugas tambahan dengan meletakkan R.O.B.O.T.S masing-masing di tengah logo *dan tangan R.O.B.O.T.S ditutup rapat.*  
*Before this round begins, participants must start the additional task by placing their R.O.B.O.T.S in the center of the logo with the R.O.B.O.T.S' hands closed tightly.*
9. Peserta dikehendaki untuk mengambil bola emas dan membawa balik ke logo kawasan sendiri sebagai tanda tugas tambahan disiapkan.  
*Participants are required to take the golden ball and bring it back to their own logo area to signify the completion of the additional task.*
10. Peserta yang berjaya melengkapkan tugas tambahan ini dalam masa tersingkat dikira sebagai pemenang.  
*The participant who completes this additional task in the shortest time is considered as the winner.*

## **1.8 Penyelesaian Masalah Teknikal**

### ***Technical Problem Resolution***

1. Sekiranya Lego termasuk ke dalam bahagian bawah R.O.B.O.T.S, maka guru atau hakim perlu angkat dan meletakkan semula R.O.B.O.T.S di tempat permulaan (dalam kawasan logo). Pertandingan tidak akan dihentikan dalam situasi ini iaitu pertandingan masih diteruskan.  
*If the Lego gets under the R.O.B.O.T.S, the teacher or referee must lift and place the R.O.B.O.T.S back at the starting point (within the logo area). The competition will not be stopped in this situation; it will continue.*
2. Sekiranya R.O.B.O.T.S bermasalah, guru akan menghentikan pusingan pertandingan berkenaan dan peserta dikehendaki untuk memulakan semula pusingan ini.  
*If the R.O.B.O.T.S encounters a problem, the teacher will stop the current round, and the participants will be required to restart the round.*

## 2.0 PENGAWALAN R.O.B.O.T.S *R.O.B.O.T.S CONTROL*

Pengawalan robot merujuk kepada cara pemain mengendalikan pergerakan R.O.B.O.T.S, Teacher Spin Master dan Penembak Lego. R.O.B.O.T.S boleh dikawal dengan menggunakan peranti seperti komputer riba, telefon dan tablet.

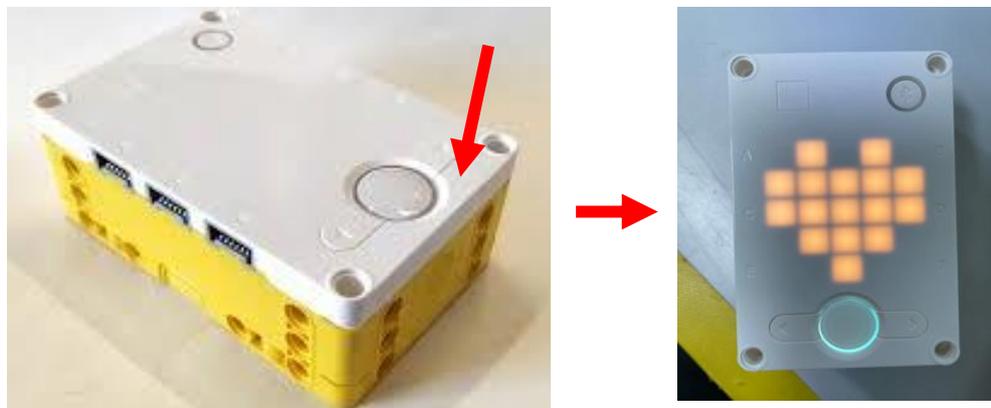
*Robot control refers to the way players control the movements of R.O.B.O.T.S, Teacher Spin Master, and Lego Shooter. R.O.B.O.T.S can be controlled using multiple devices such as laptops, phones, and tablets.*

### 2.1 Panduan Menyambung *Bluetooth SPIKE* Ke Peranti *Guide To Connect Bluetooth SPIKE To The Devices*

Berikut merupakan cara untuk menyambungkan *SPIKE Brick* dengan peranti.

*Here are the steps to connect the SPIKE Brick with a device.*

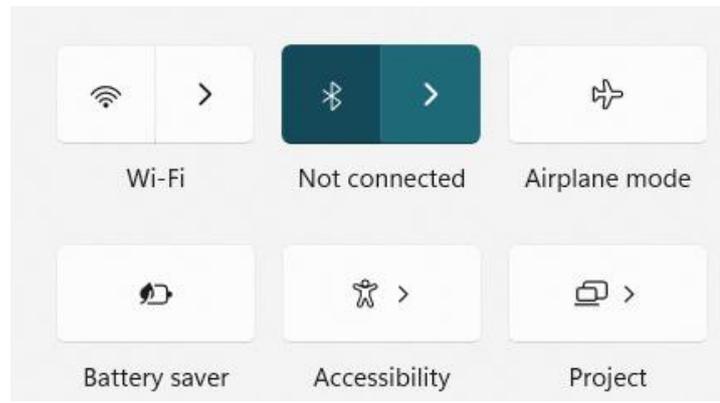
1. Menghidupkan *SPIKE Brick*  
*Switch on the SPIKE Brick*



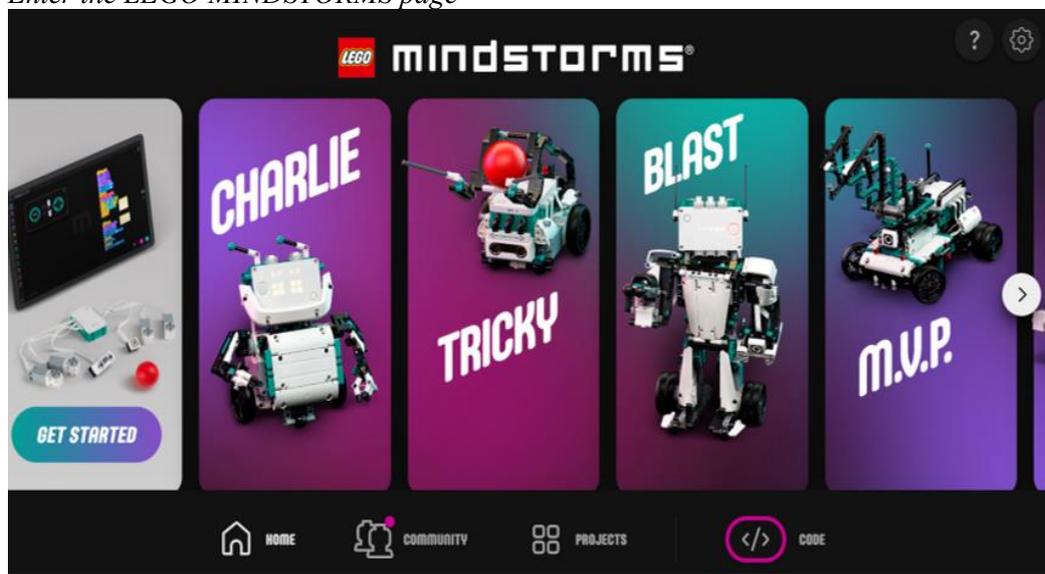
2. Tekan butang *Bluetooth* di *SPIKE Brick*  
*Press the Bluetooth button on the SPIKE Brick*



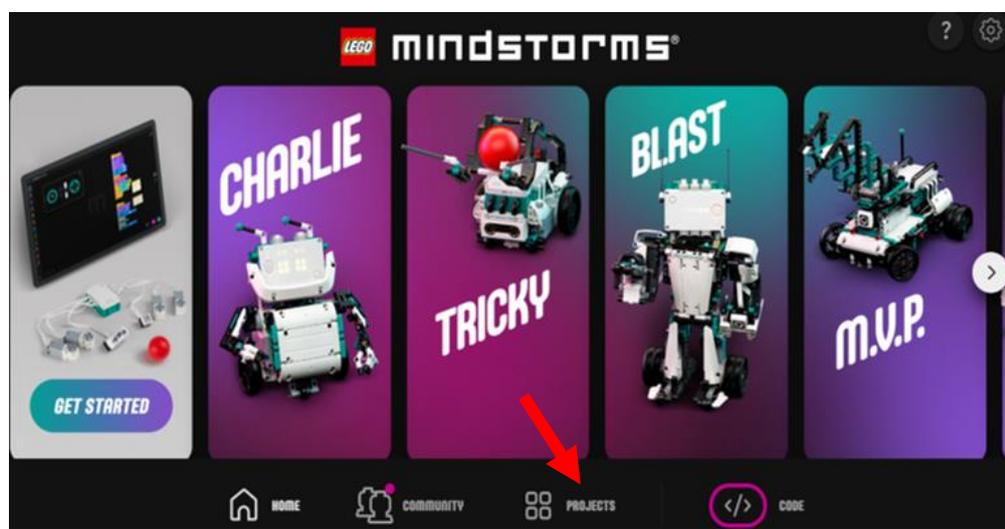
3. Mengaktifkan *Bluetooth* di komputer / telepon / tablet  
*Enable Bluetooth on the laptop / phone / tablet*

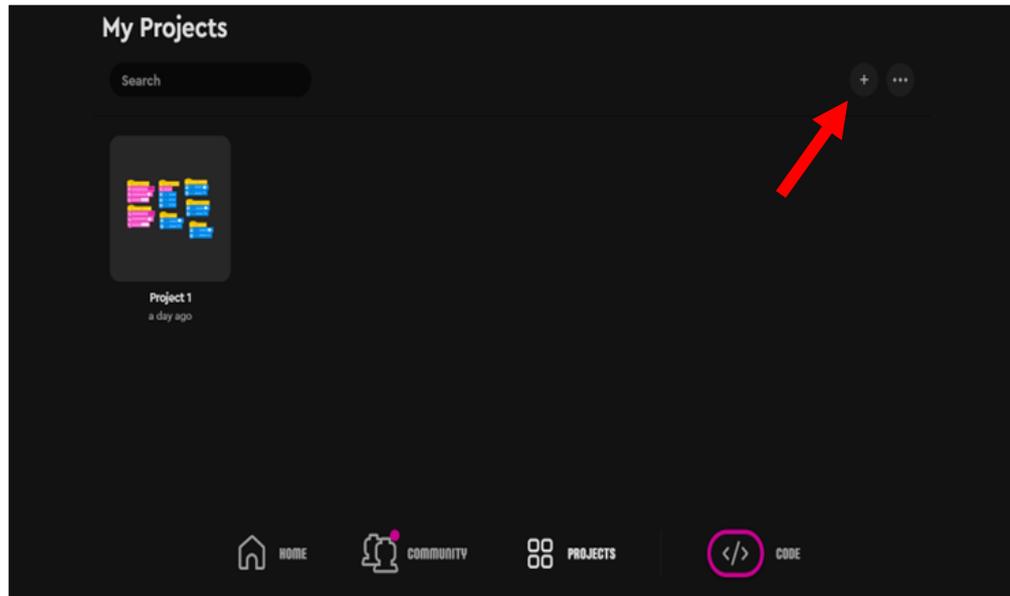


4. Masuk ke dalam aplikasi LEGO MINDSTORMS  
*Enter the LEGO MINDSTORMS page*

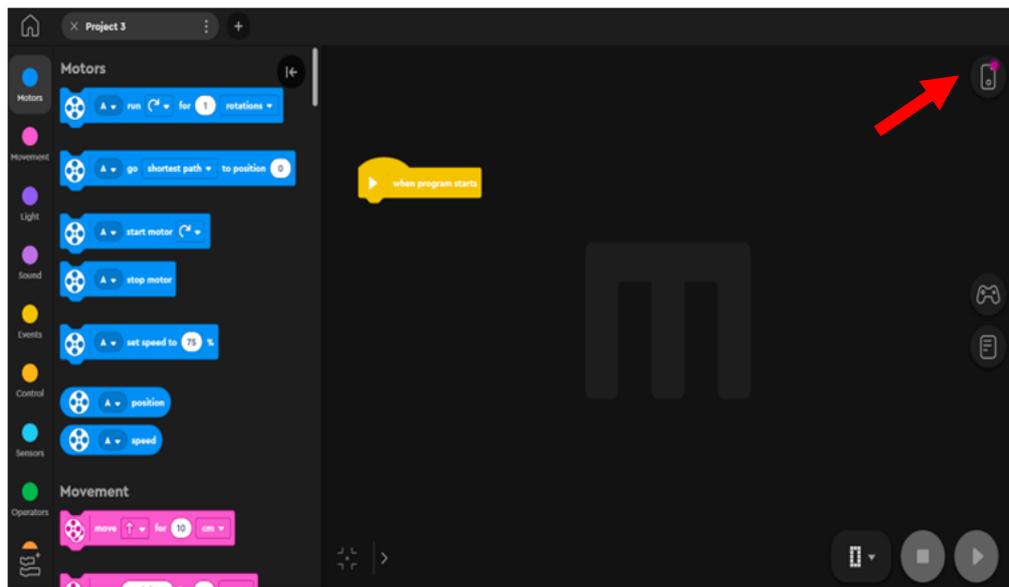


5. Buka satu projek baharu  
*Open a new project*

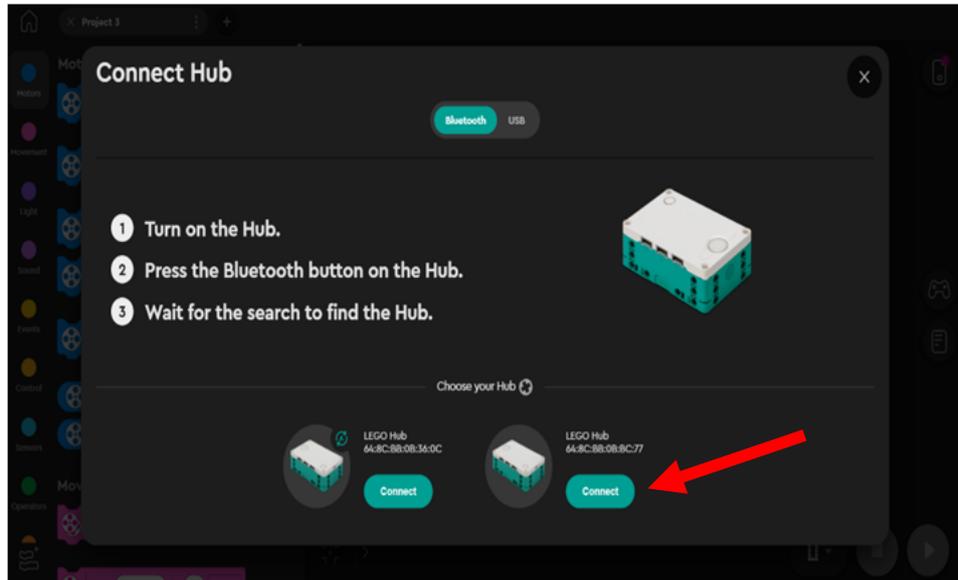




6. Sambungkan *Bluetooth* SPIKE dengan *Bluetooth* aplikasi Komputer Riba /  
 Telefon / Tablet  
*Connect Bluetooth SPIKE with Bluetooth application laptop / phone / tablet*



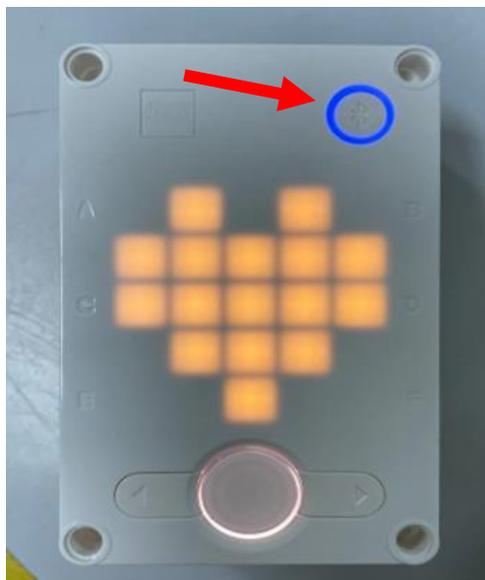
Logo Hub yang berwarna merah bermaksud peranti  
 belum disambungkan ke SPIKE  
*The red Hub Logo indicates that devices is not connected to the SPIKE*



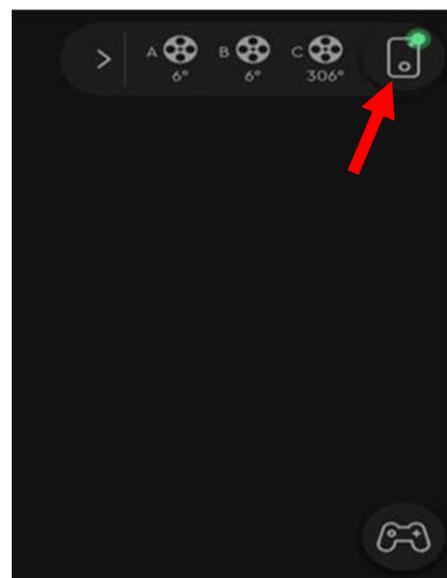
Pilih Hub yang sesuai  
*Select the appropriate Hub*

7. Butang *Bluetooth SPIKE* yang berkelipan menunjukkan *SPIKE* sedang menyambung ke aplikasi. Setelah Logo Hub berubah menjadi hijau maka *SPIKE* telah berjaya disambungkan ke peranti.

*The blinking SPIKE Bluetooth button indicates that SPIKE is in the process of connecting to the application. Once the Hub Logo turns green, SPIKE has successfully connected to the device.*



Butang Bluetooth SPIKE yang berkelipan  
*The blinking SPIKE Bluetooth button*



Logo Hub yang menjadi hijau  
*Hub Logo turns green*

## 2.2 Panduan Penulisan Program Melalui Pelbagai Peranti *Guide To Write Programs Across Multiple Devices*

Berikut merupakan cara untuk memprogramkan SPIKE dengan menggunakan peranti yang berbeza.

*Here are the ways to program SPIKE using different devices.*

### A. Komputer Riba *Laptop*

- A1. Tuliskan program seperti yang ditunjukkan di bawah.  
*Write the program as shown below.*

The screenshot displays the SPIKE-EDU programming environment with several key-based programs:

- Ke hadapan (Move forward):** Triggered by the up arrow key. It sets motors A+B, sets speed to 40%, and starts moving straight.
- Ke kiri (Turn left):** Triggered by the left arrow key. It sets motor A speed to 30% and starts motor A.
- Ke kanan (Turn right):** Triggered by the right arrow key. It sets motor B speed to 30% and starts motor B.
- Ke belakang (Move backward):** Triggered by the down arrow key. It sets motors A+B, sets speed to -40%, and starts moving straight.
- Membuka tangan (Open the hand):** Triggered by the 'c' key. It sets motor C speed to 30% and starts motor C.
- Menutup tangan (Close the hand):** Triggered by the 'z' key. It sets motor C speed to 30% and starts motor C.
- Menghentikan segala pergerakan (Stop all the movement):** Triggered by the space key. It stops moving and stops motors A, B, and C.

- A2. Mencuba program dengan butang papan kekunci di bawah.  
*Try the program with the keyboard buttons below.*

The image shows a close-up of the following keyboard keys with their corresponding program names:

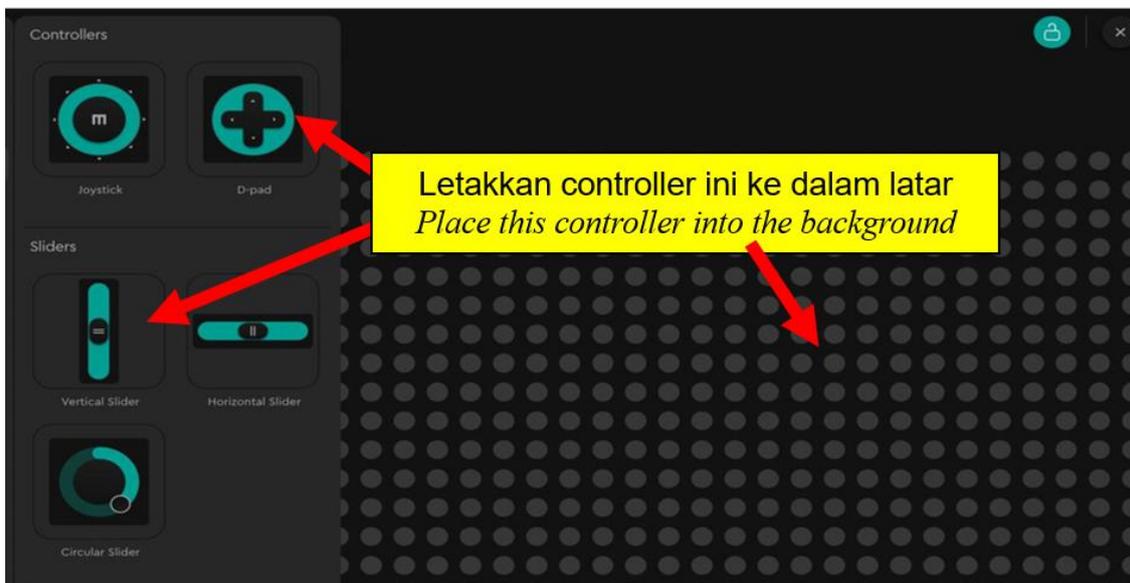
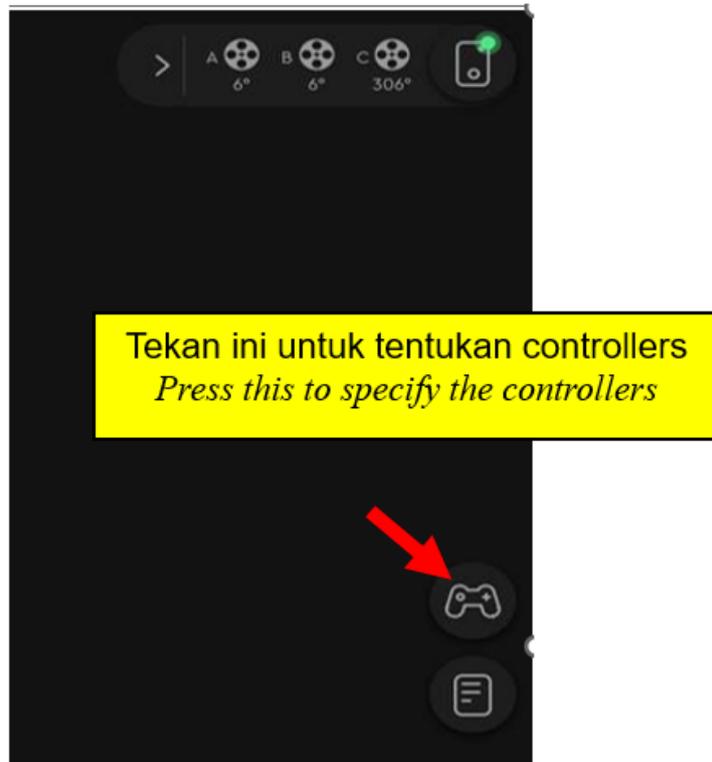
- Ke hadapan (Move forward):** Up arrow key.
- Ke kiri (Move to left):** Left arrow key.
- Ke bawah (Move downward):** Down arrow key.
- Ke kanan (Move to right):** Right arrow key.

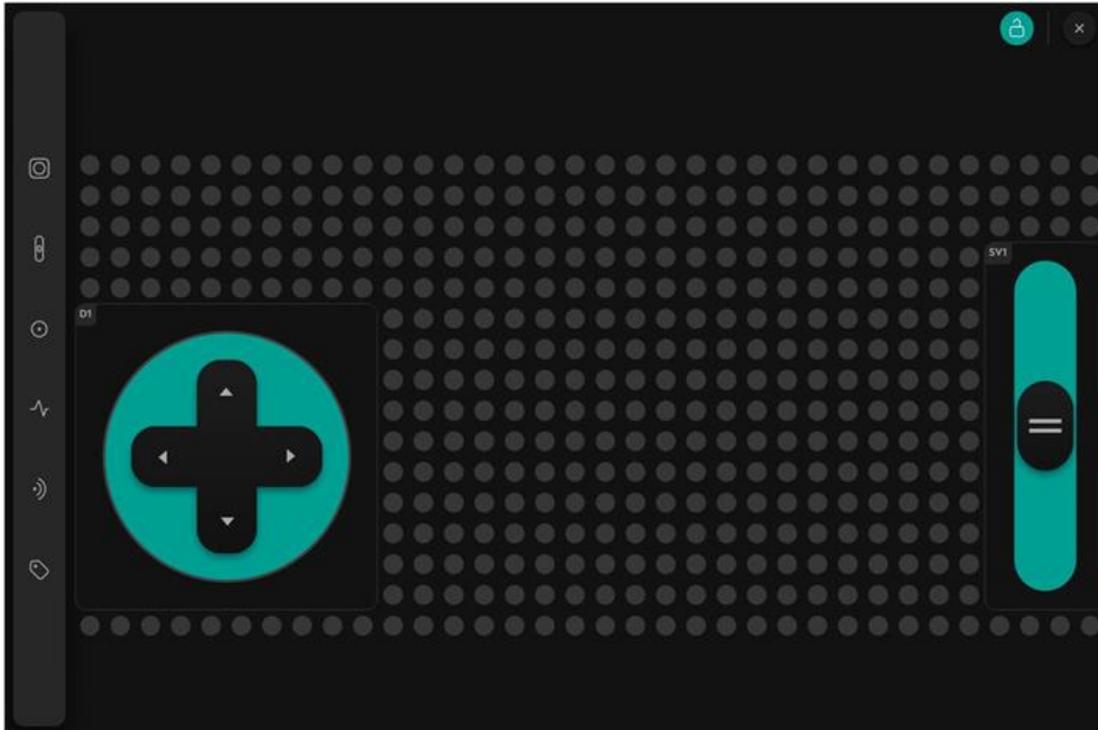


**B** **Telefon Pintar Dan Tablet**  
*Handphone And Tablet*

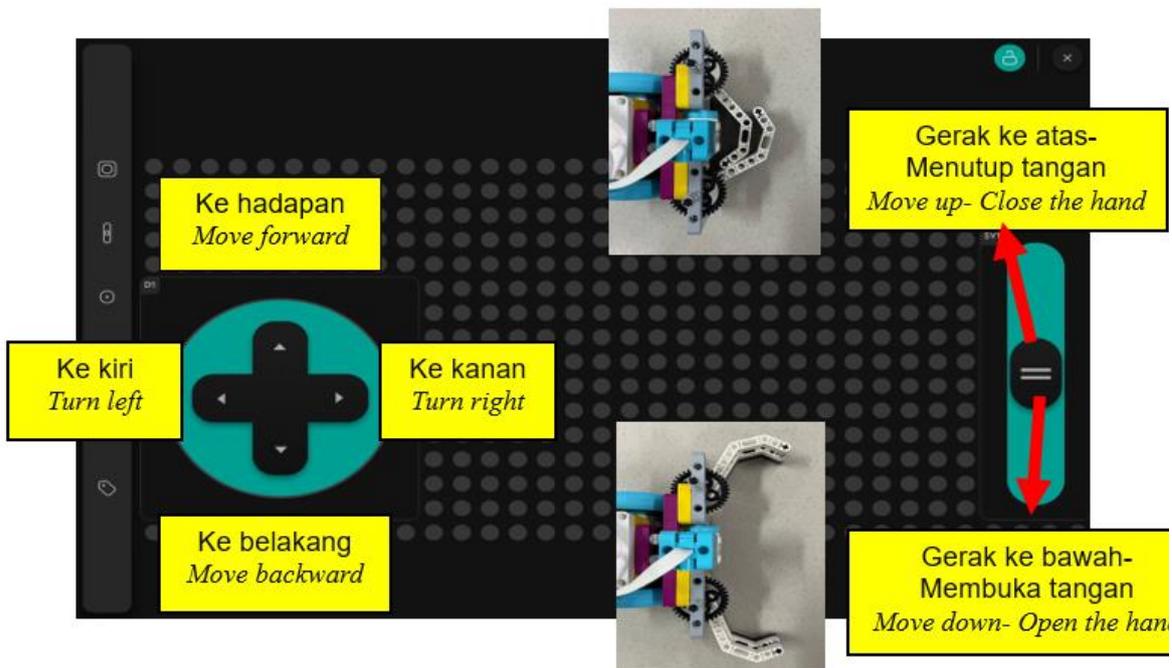
B1. Tuliskan program seperti yang ditunjukkan di bawah.  
*Write the program as shown below.*

- B2. Menyediakan paparan kawalan berdasarkan langkah di bawah.  
*The control display can be set up based on the steps below.*





Controller tersebut boleh disusun berdasarkan susunan seperti ini.  
*The controller can be arranged in a layout like this.*



Grafik di atas menunjukkan penerangan terhadap cara pengawalan R.O.B.O.T.S berdasarkan controller.  
*The diagram above illustrates the ways to control the R.O.B.O.T.S based on the controller.*

### 3.0 PENGAWALAN PENEMBAK LEGO *LEGO SHOOTER CONTROL*

Penembak Lego boleh dikawal dengan menggunakan *EV3 Brick*.  
*The Lego Shooter can be controlled using the EV3 Brick.*

### 3.1 Panduan Menyambung *Bluetooth EV3* dengan Komputer Riba *Guide to Connect Bluetooth EV3 to Laptop*

*EV3 Brick* boleh disambungkan ke komputer riba menerusi *Bluetooth*. Penyambungan ini memudahkan program untuk dimuat turun tanpa memerlukan penyambungan wayar. Berikut merupakan langkah-langkah untuk menyambungkan *Bluetooth EV3* dengan *Bluetooth* komputer riba:

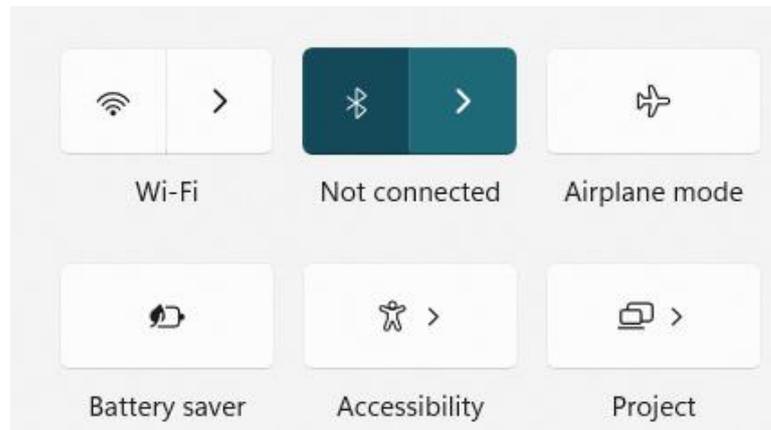
*The EV3 Brick can be connected to a laptop via Bluetooth. This connection facilitates program downloads without the need for any wired connections. Here are the steps to connect the EV3 Brick Bluetooth with the Bluetooth of a laptop:*

1. Hidupkan *EV3 Brick*  
*Switch on the EV3 Brick*



Tekan butang yang ditunjukkan selama beberapa saat.  
*Press the indicated button for a few seconds.*

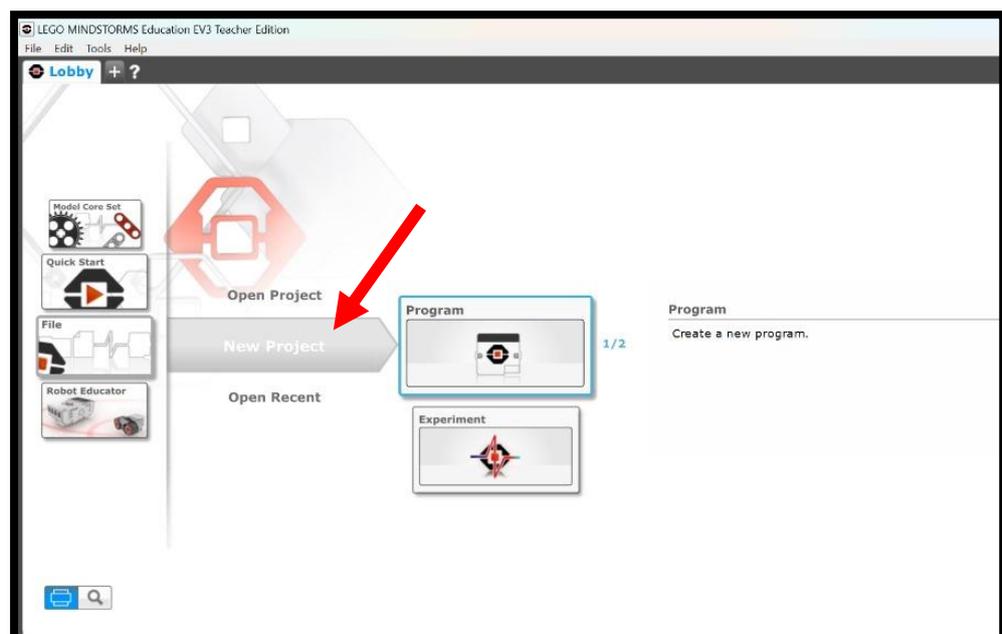
2. Mengaktifkan *Bluetooth* di komputer riba  
*Enable bluetooth on the laptop*



3. Buka aplikasi LEGO MINDSTORMS EDUCATION EV3  
*Open the LEGO MINDSTORMS EDUCATION EV3*



4. Tekan Projek Baharu  
*Click on the new project*

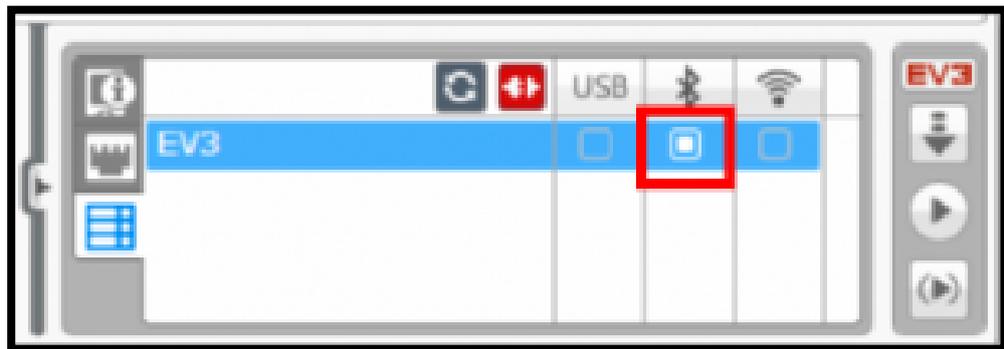


5. Sambungkan “bluetooth” EV3 dengan “bluetooth” komputer riba  
*Connect the EV3 Bluetooth with the laptop Bluetooth*



Sila memastikan bahawa *Bluetooth* telah diaktifkan dalam *EV3 Brick*.  
*Please ensure that Bluetooth is enabled on the EV3 Brick.*

6. Butang Bluetooth EV3 yang diisi warna bermaksud EV3 Brick telah berjaya disambungkan dengan aplikasi LEGO MINDSTORMS EDUCATION.  
*The illuminated Bluetooth button on the EV3 Brick indicates that the EV3 Brick has successfully connected to the LEGO MINDSTORMS EDUCATION.*



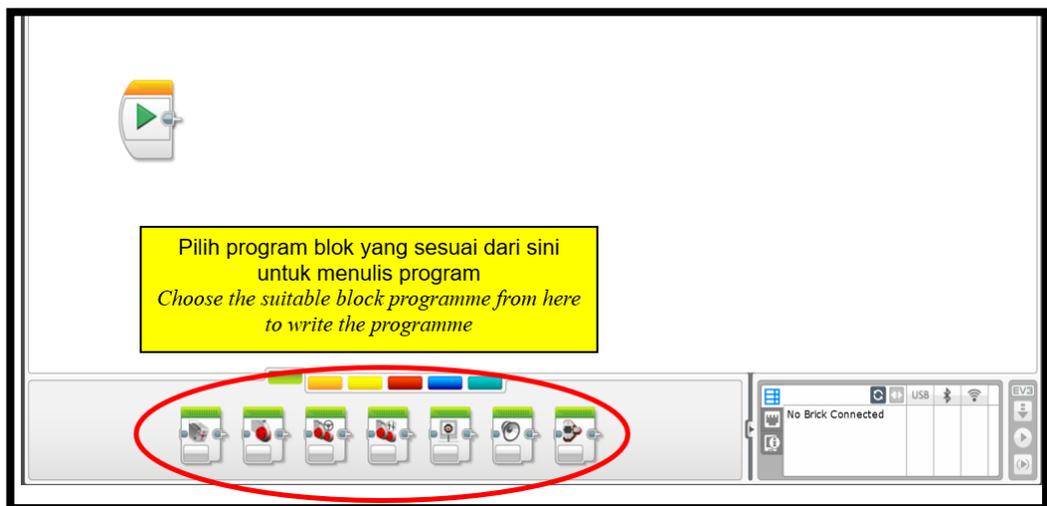
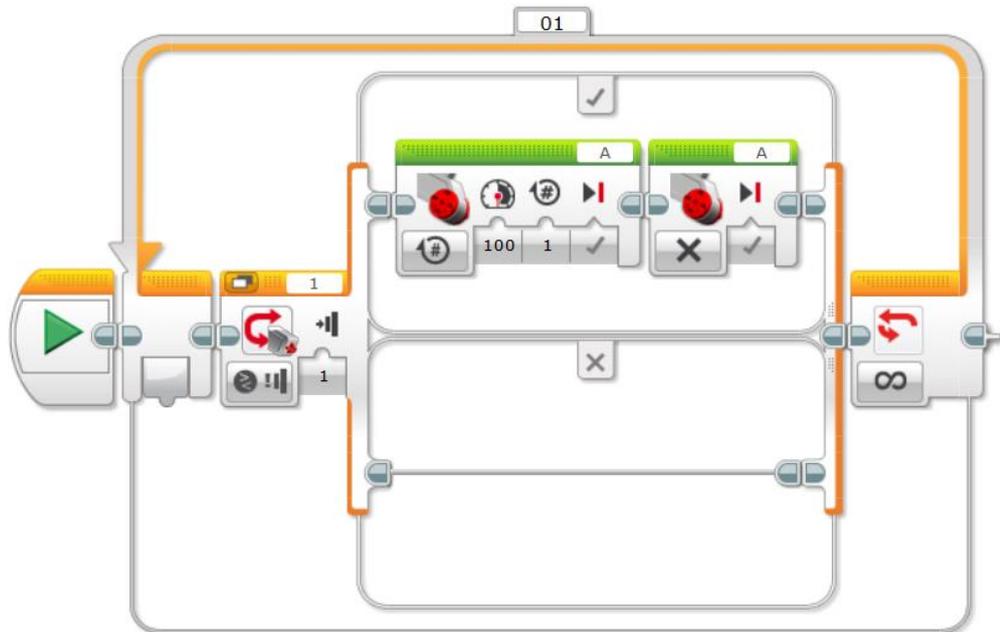
*EV3 Brick* telah berjaya disambungkan dengan  
LEGO MINDSTORMS EDUCATION.  
*EV3 Brick has successfully connected to the LEGO MINDSTORMS EDUCATION.*

### 3.2 Panduan Penulisan Program Penembak Lego *Guide To Write Lego Shooters' Program*

Program Penembak Lego boleh dituliskan menerusi LEGO MINDSTORMS EDUCATION EV3.

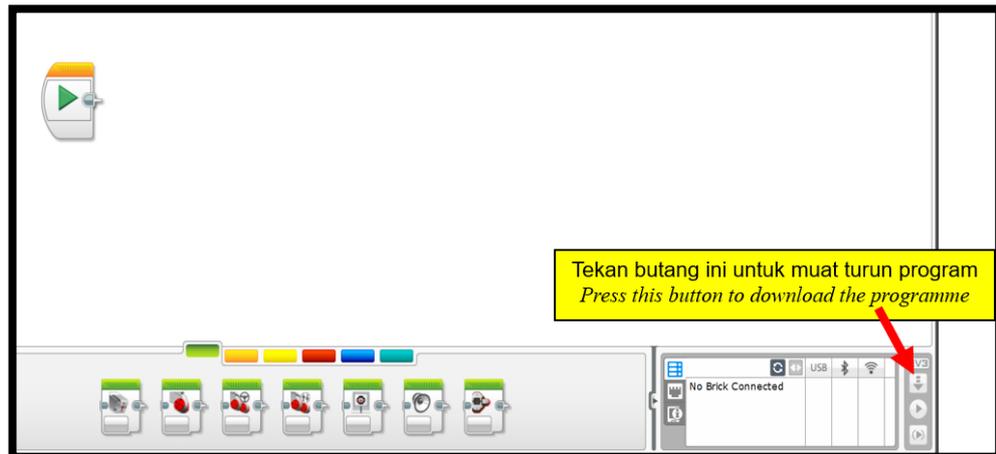
*The Lego Shooter program can be written using LEGO MINDSTORMS EDUCATION EV3.*

1. Tuliskan program seperti yang ditunjukkan di bawah.  
*Write the program as shown below.*



Gambar di atas menunjukkan cara untuk mendapatkan blok program.  
*The image above shows the way to obtain the program blocks.*

2. Memuat turun program yang ditulis ke EV3 Brick.  
*Download the program to the EV3 Brick.*



#### 4.0 **PENGAWALAN TEACHER SPIN MASTER** *TEACHER SPIN MASTER CONTROL*

*Teacher Spin Master boleh dikawal dengan menggunakan EV3 Brick.  
Teacher Spin Master can be controlled using the EV3 Brick.*

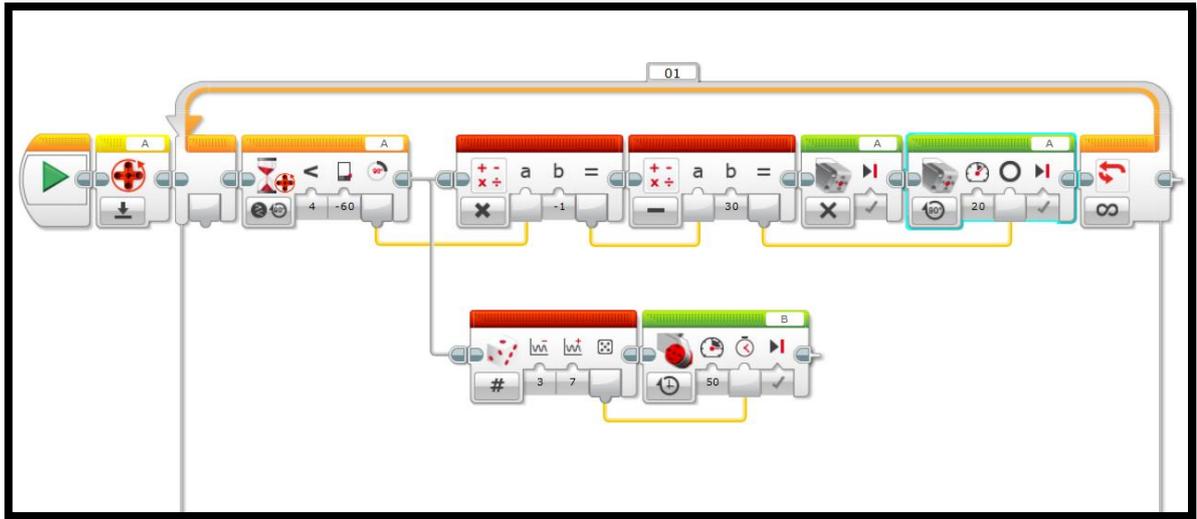
#### 4.1 **Panduan Menyambung Bluetooth EV3 dengan Komputer Riba** *Guide to Connect Bluetooth EV3 to Laptop*

*EV3 Brick boleh disambungkan ke komputer riba menerusi Bluetooth. Penyambungan ini memudahkan program untuk dimuat turun tanpa memerlukan penyambungan wayar. Langkah-langkah untuk menyambungkan Bluetooth EV3 dengan Bluetooth komputer riba adalah sama yang dinyatakan di bahagian 3.1.*

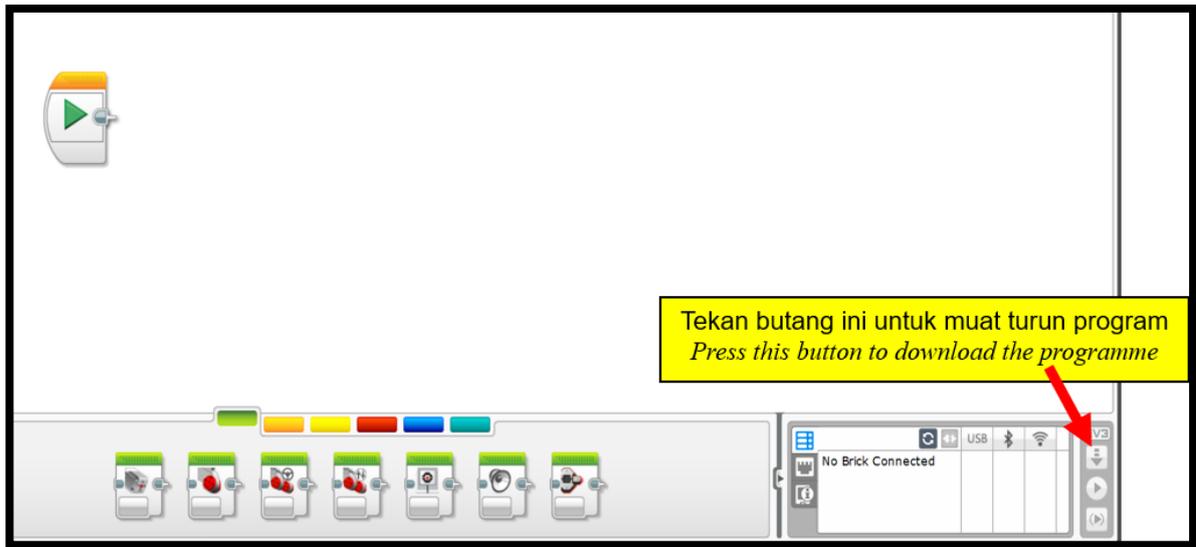
*The EV3 Brick can be connected to a laptop via Bluetooth. This connection facilitates program downloads without the need for any wired connections. The steps to connect the EV3 Brick Bluetooth with the Bluetooth of a laptop is same as stated in 3.1.*

#### 4.2 **Panduan Penulisan Program Teacher Spin Master** *Guide to Write Teacher Spin Master's Program*

1. Tuliskan program seperti yang ditunjukkan di bawah.  
*Write the program as shown below.*



2. Memuat turun program yang ditulis ke EV3 Brick.  
*Download the program to the EV3 Brick.*

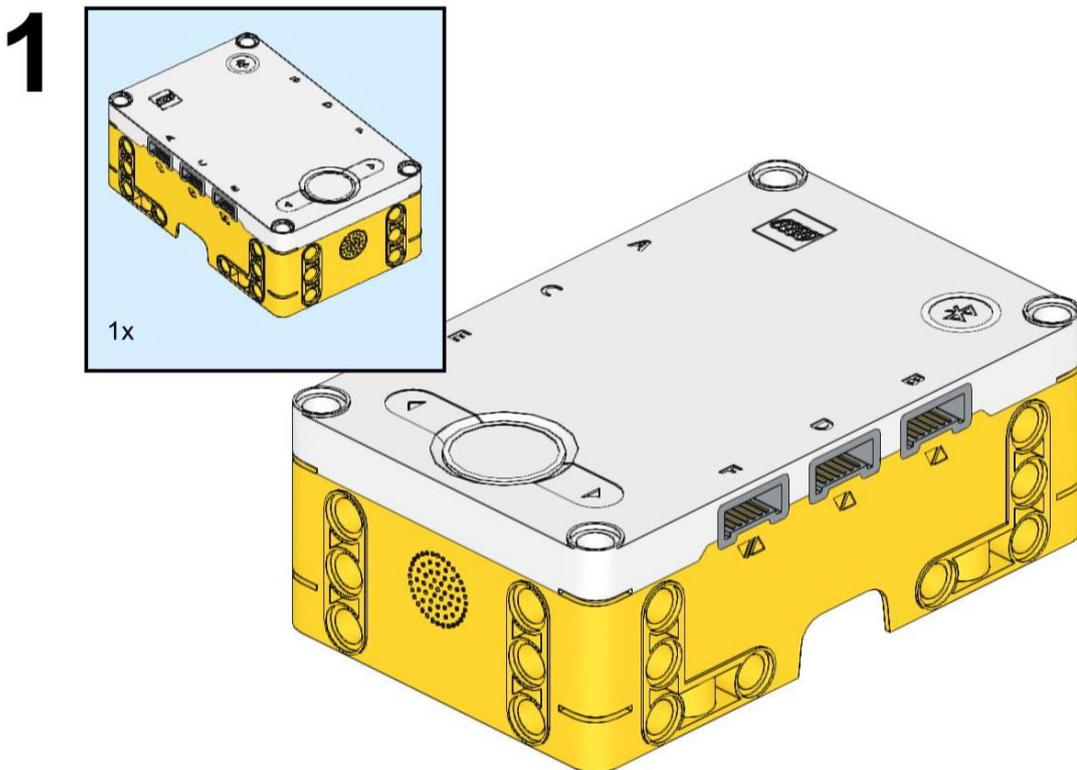


## 5.0 PEMASANGAN ROBOT *BUILDING INSTRUCTION OF ROBOT*

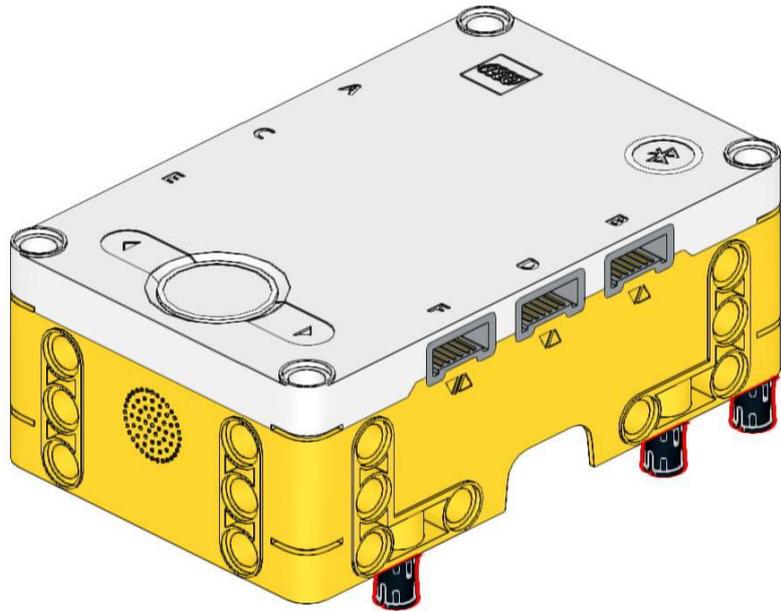
Bahagian ini akan menunjukkan urutan gambar-gambar pemasangan R.O.B.O.T.S, Teacher Spin Master dan Penembak Lego. Pemasangan ini menggunakan Lego Education SPIKE Prime Set, Lego Education SPIKE Prime Expansion Set, Lego Mindstorms EV3 Educaiton Core Set dan Mindstorms EV3 Educaiton Expansion Set. *This section will show a sequence of pictures for building instruction of R.O.B.O.T.S, Teacher Spin Master and Lego Shooter. This robots uses Lego Education SPIKE Prime Set, Lego Education SPIKE Prime Expansion Set, Lego Mindstorms EV3 Educaiton Core Set and Mindstorms EV3 Educaiton Expansion Set.*

### 5.1 R.O.B.O.T.S *R.O.B.O.T.S*

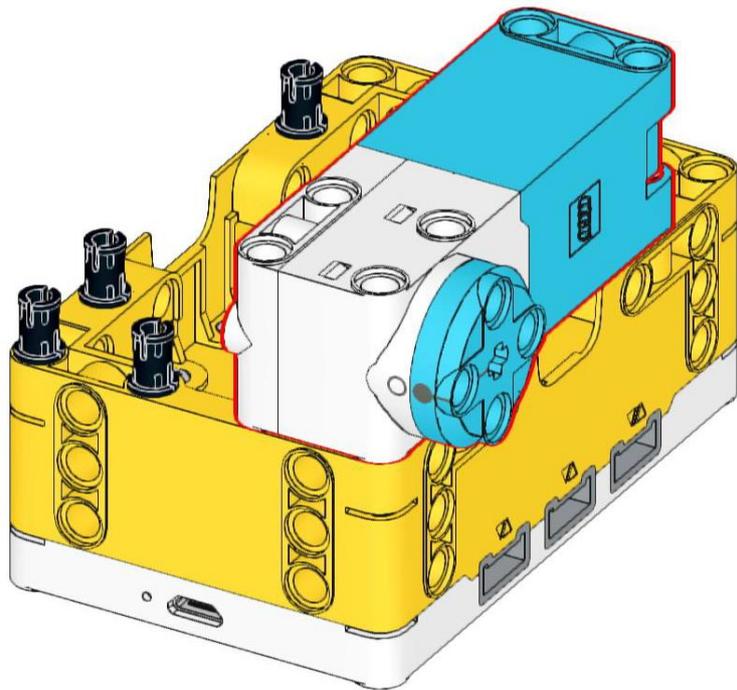
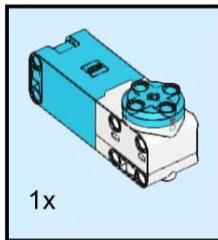
Pembinaan R.O.B.O.T.S adalah menggunakan Lego Education SPIKE Prime Set dan Lego Education SPIKE Prime Expansion Set  
*The construction of R.O.B.O.T.S is using Lego Education SPIKE Prime Set and Lego Education SPIKE Prime Expansion Set*



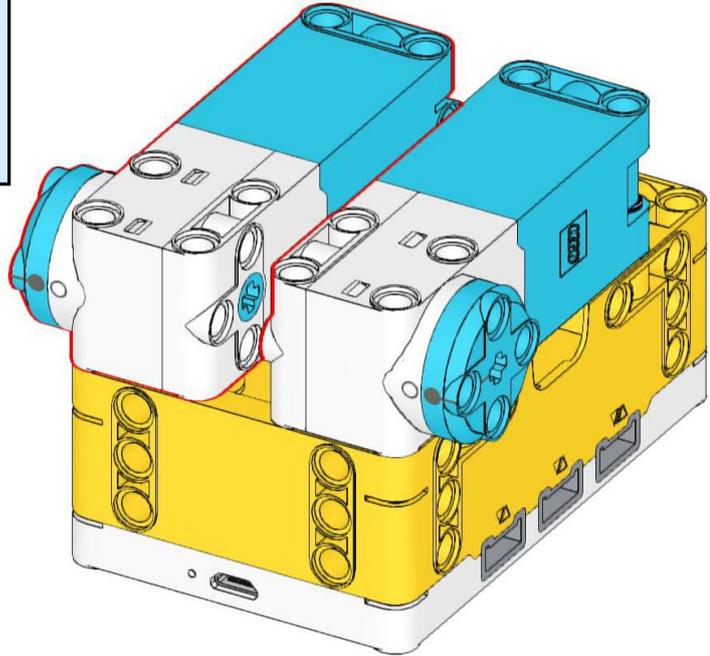
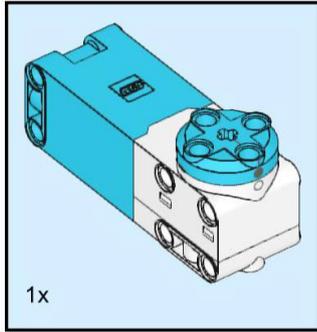
2



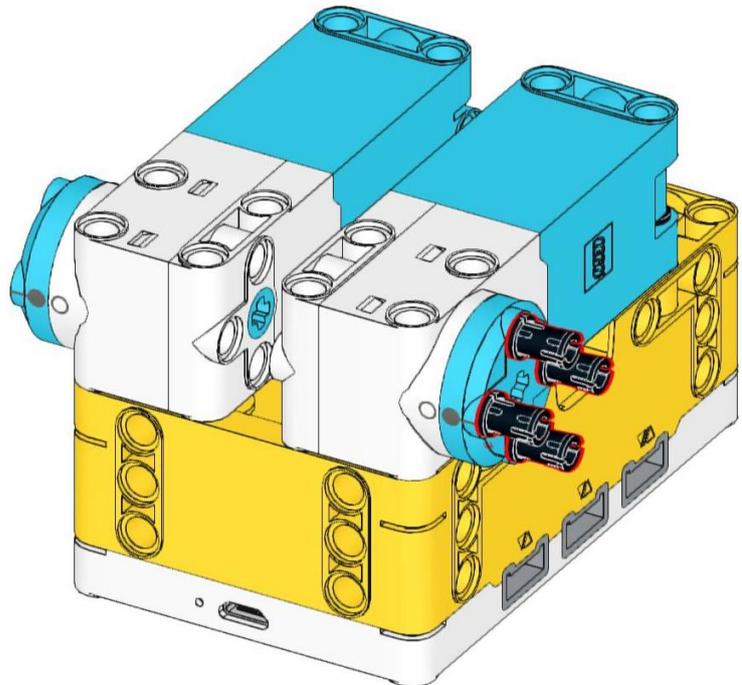
3



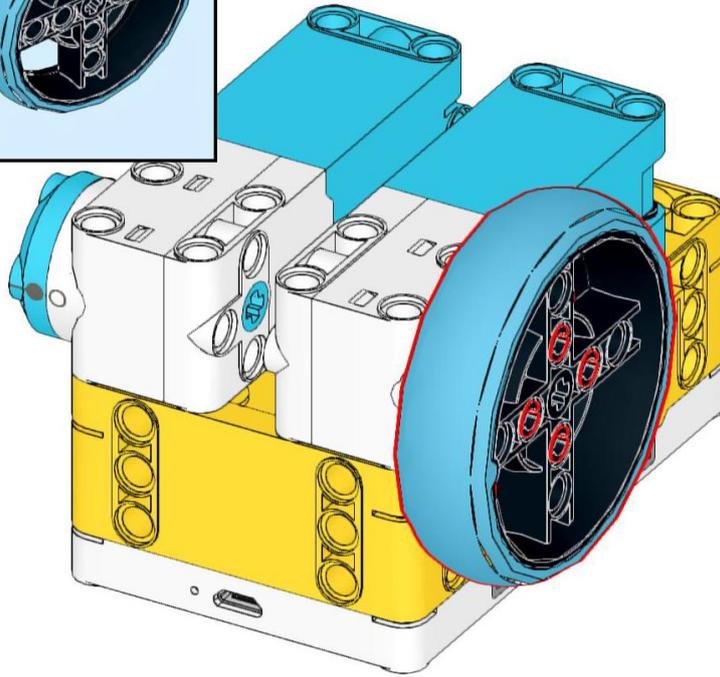
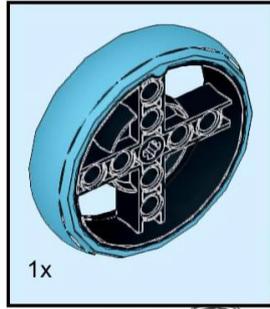
4



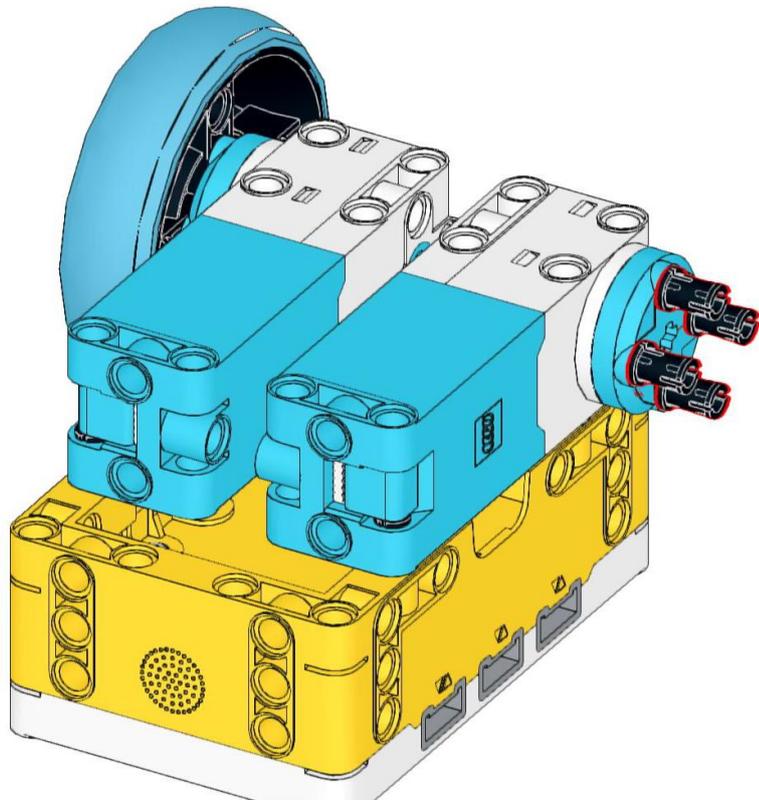
5



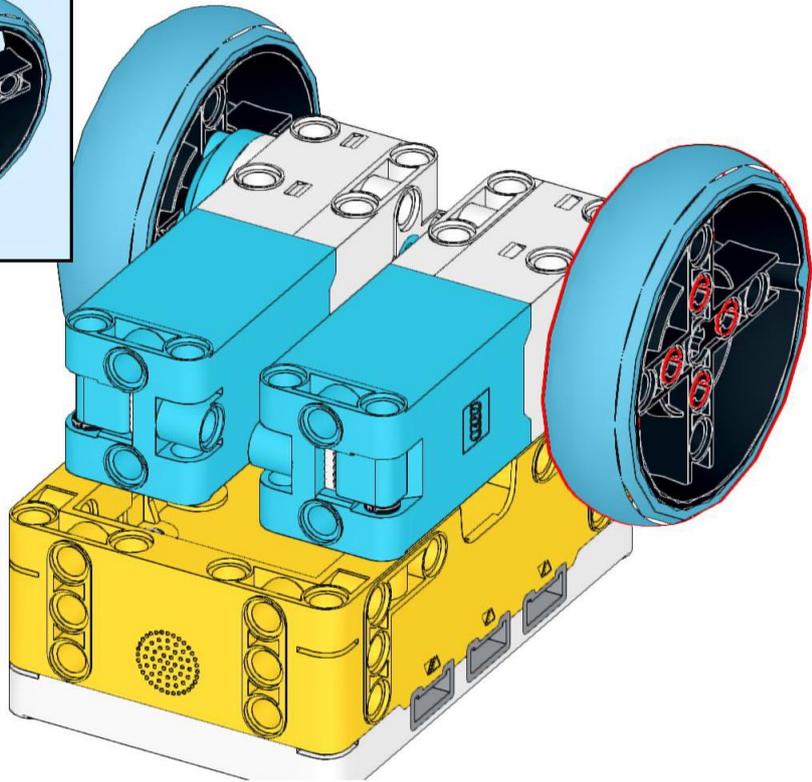
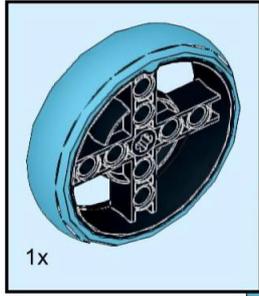
6



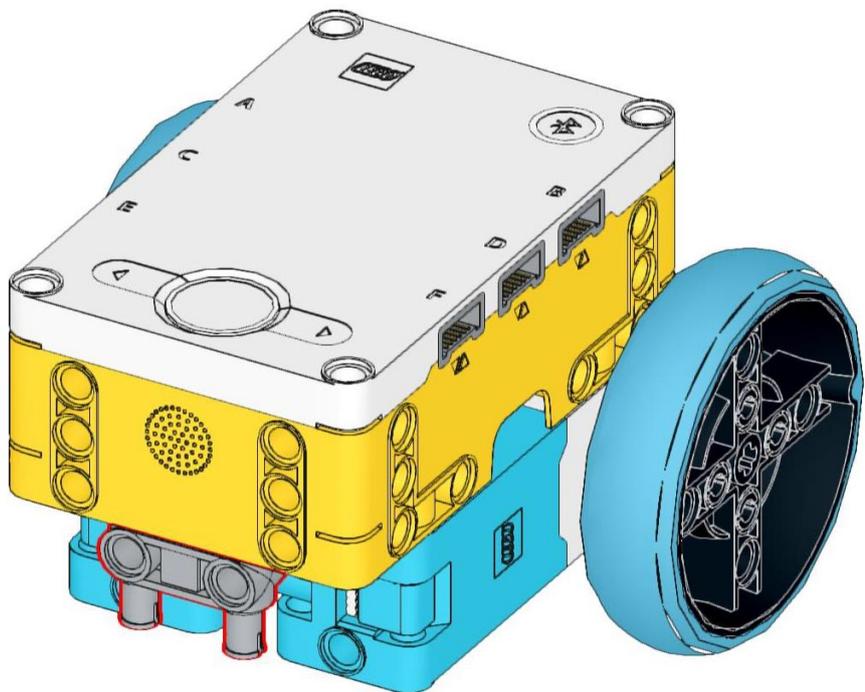
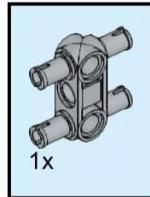
7



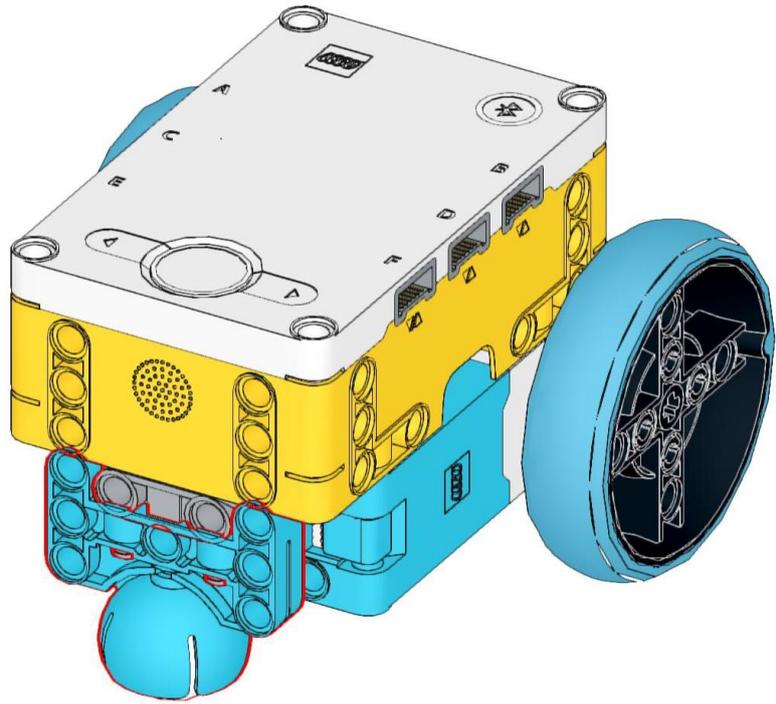
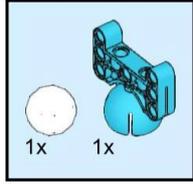
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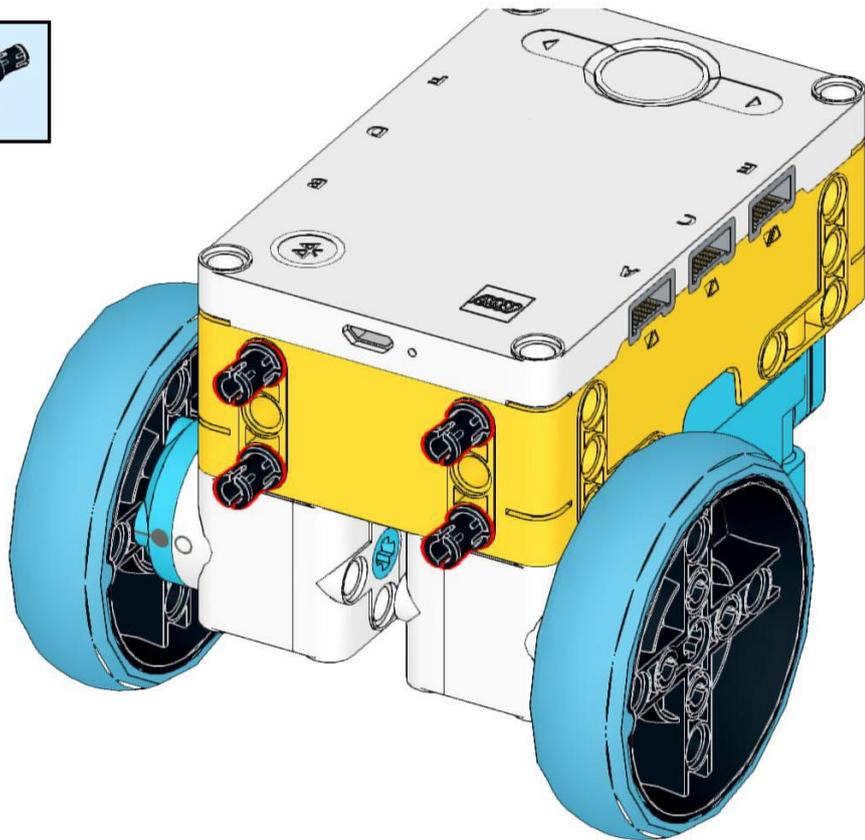
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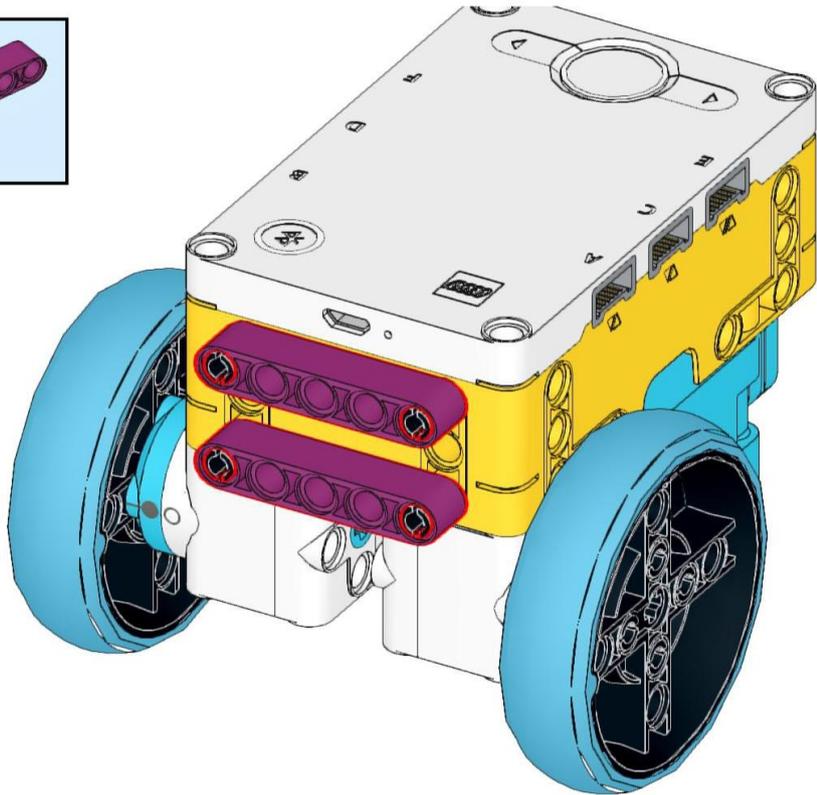
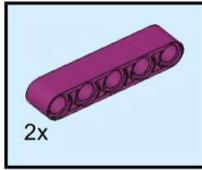
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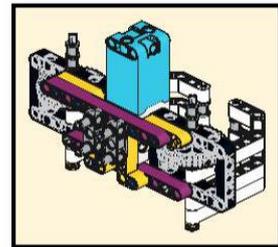
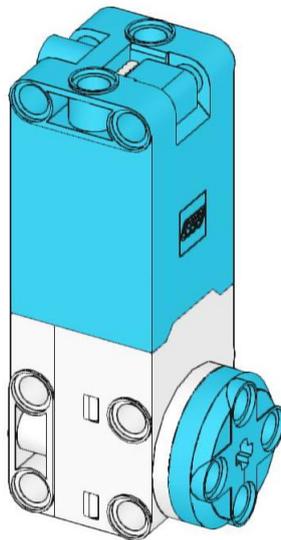
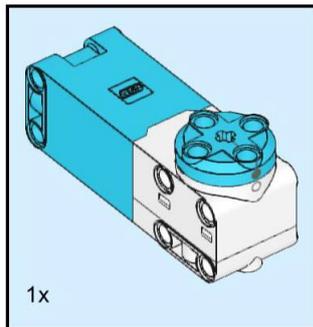
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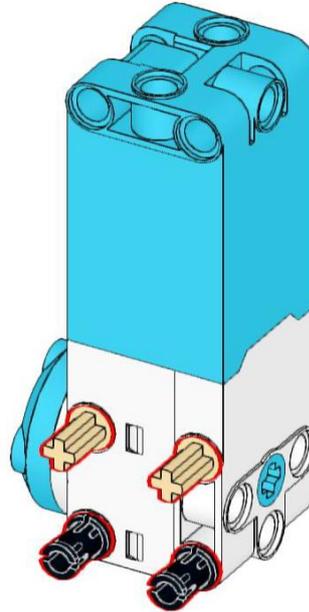
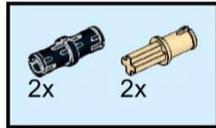
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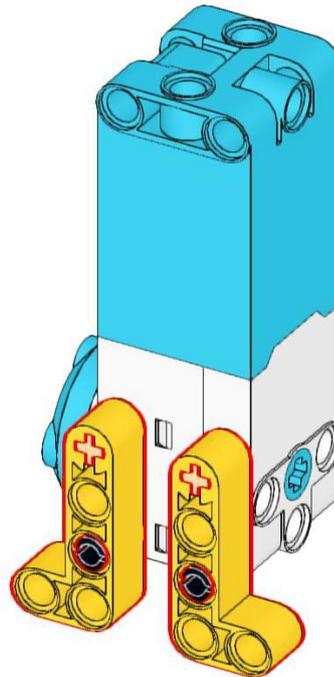
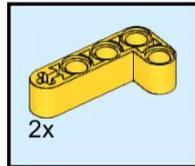
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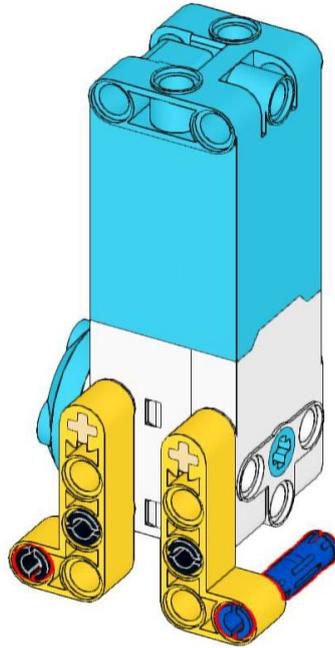
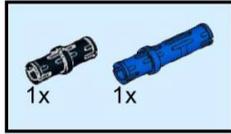
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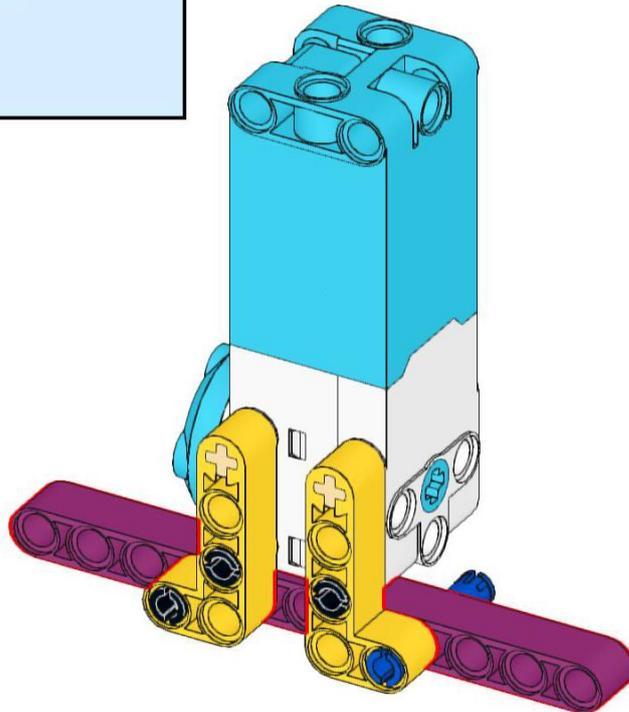
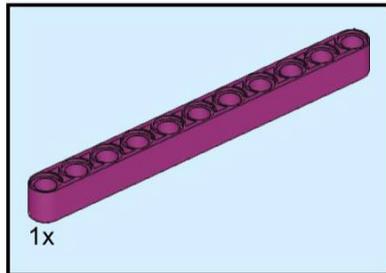
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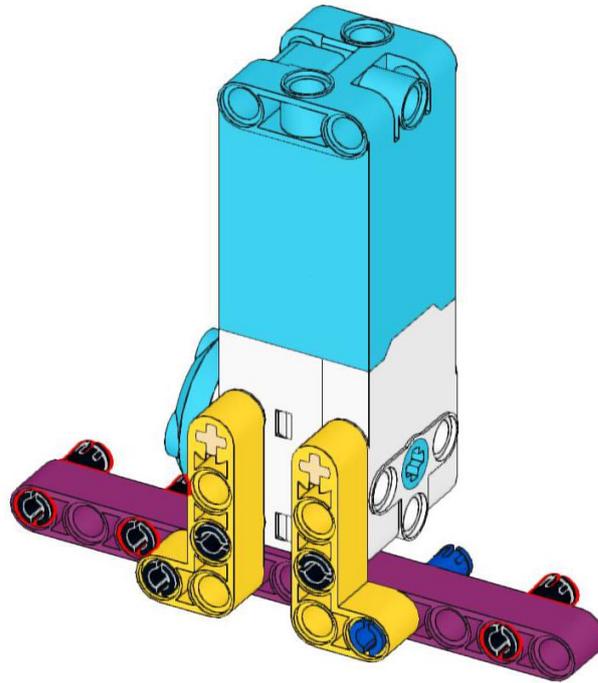
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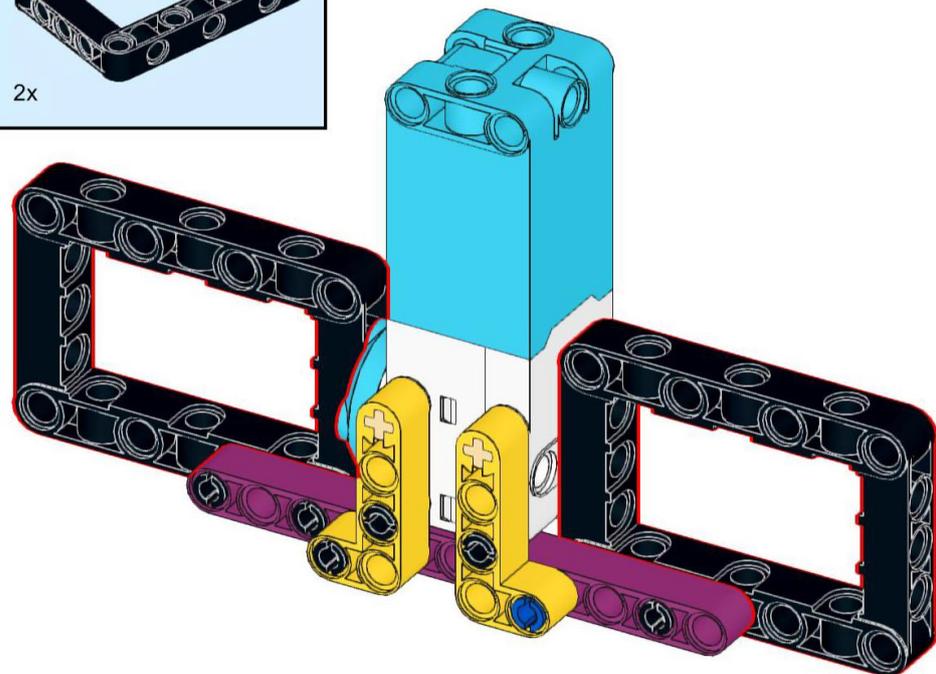
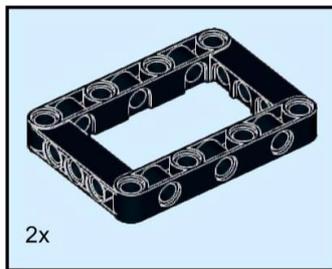
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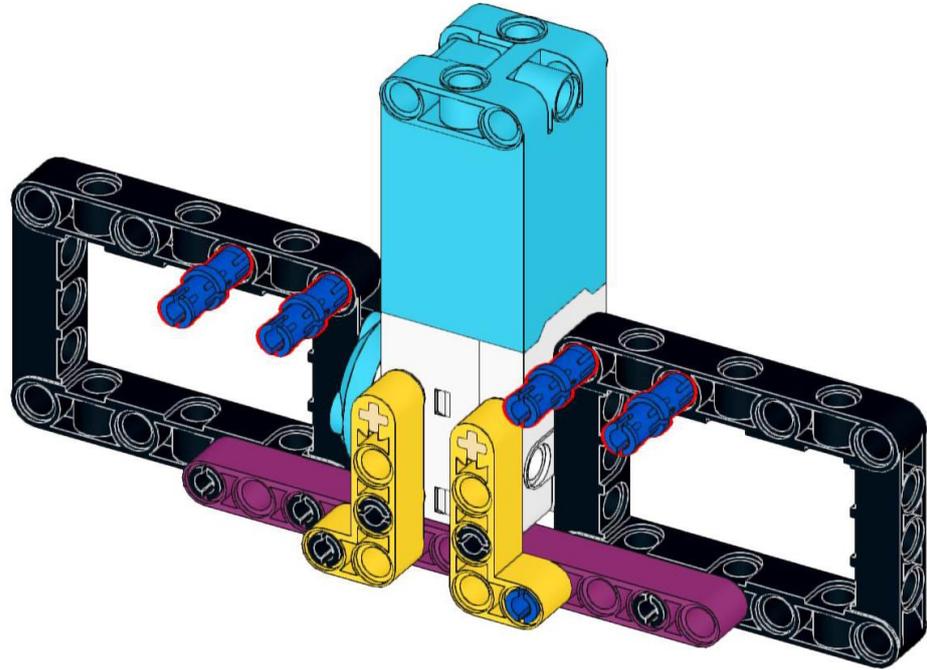
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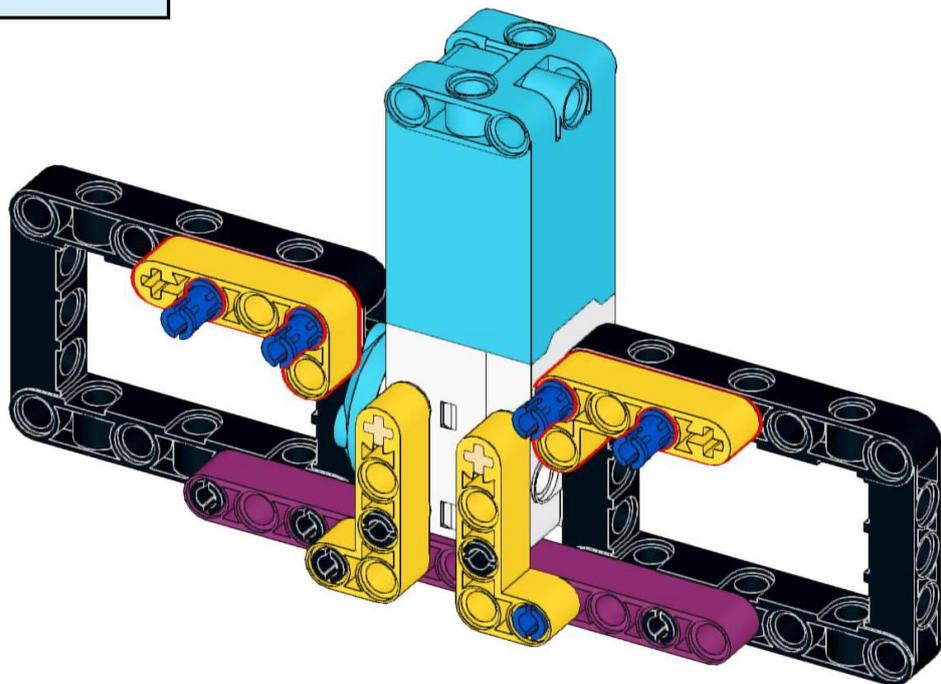
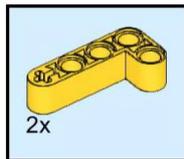
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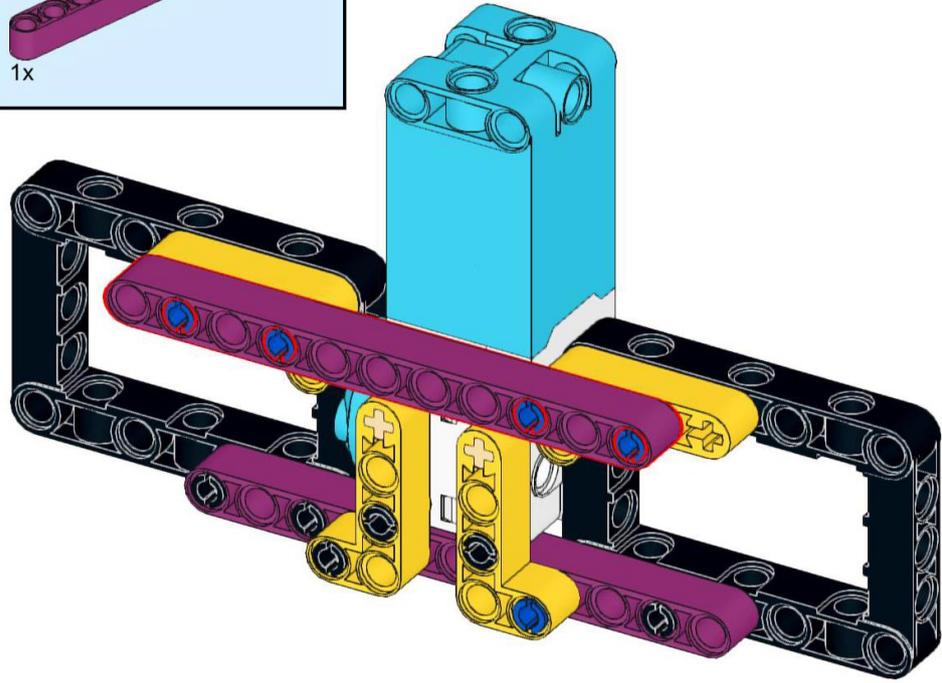
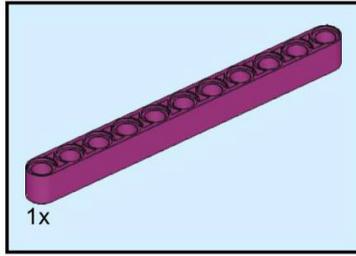
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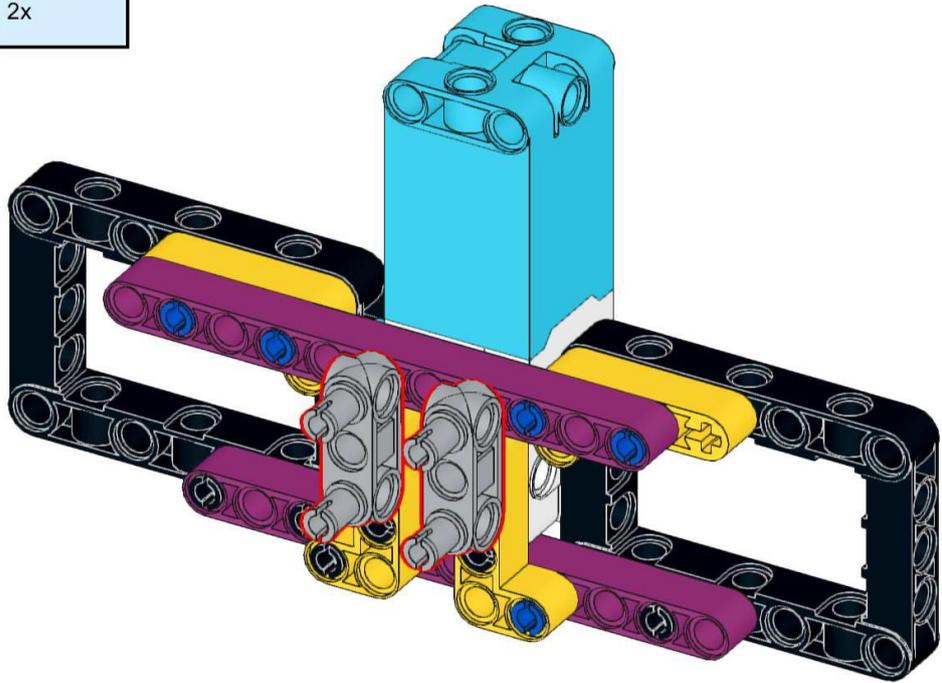
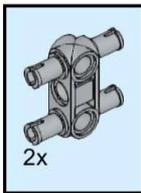
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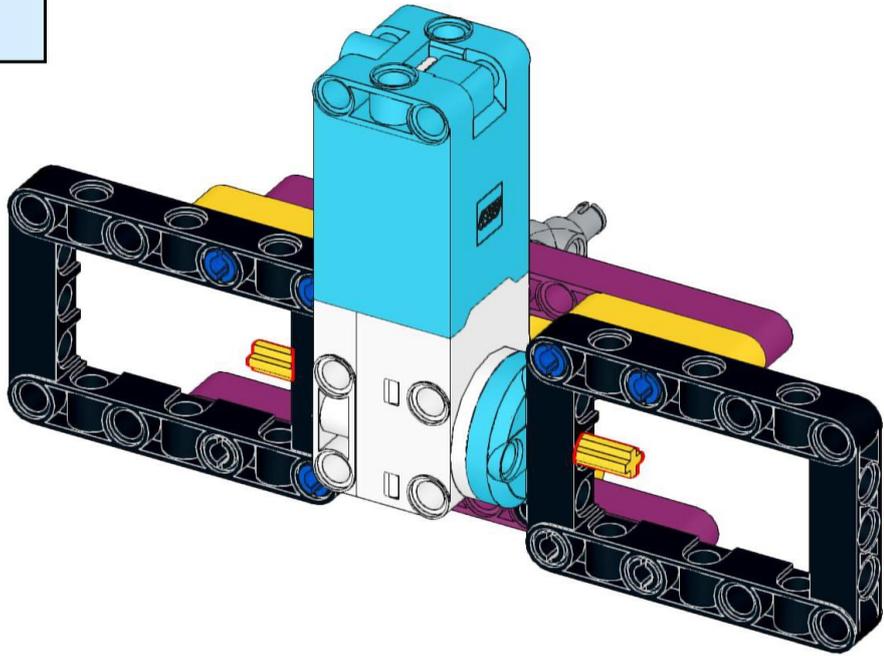
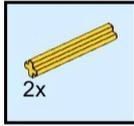
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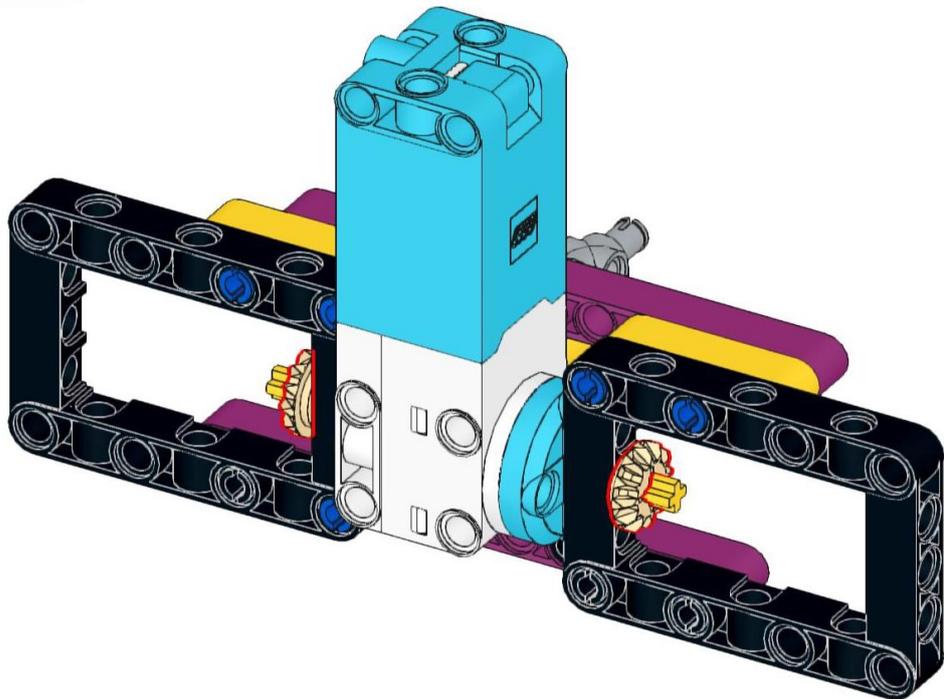
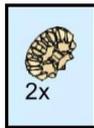
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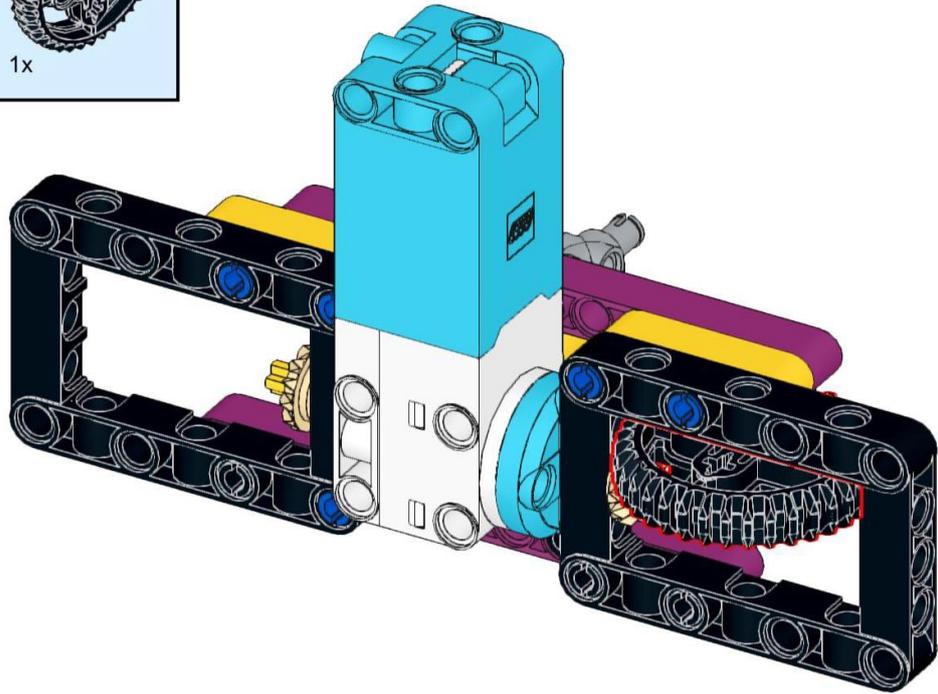
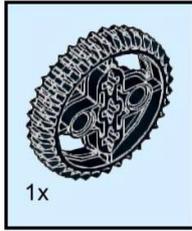
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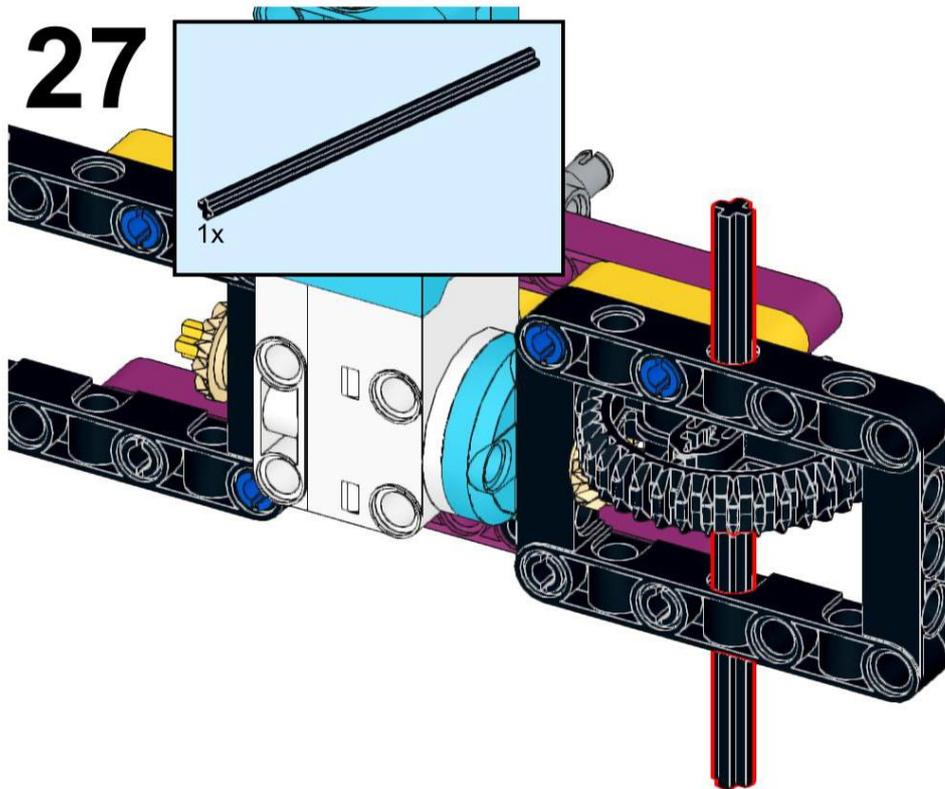
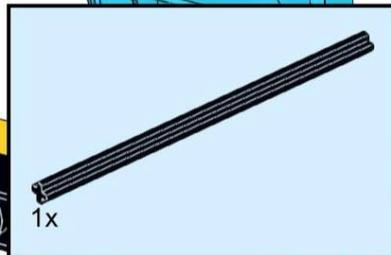
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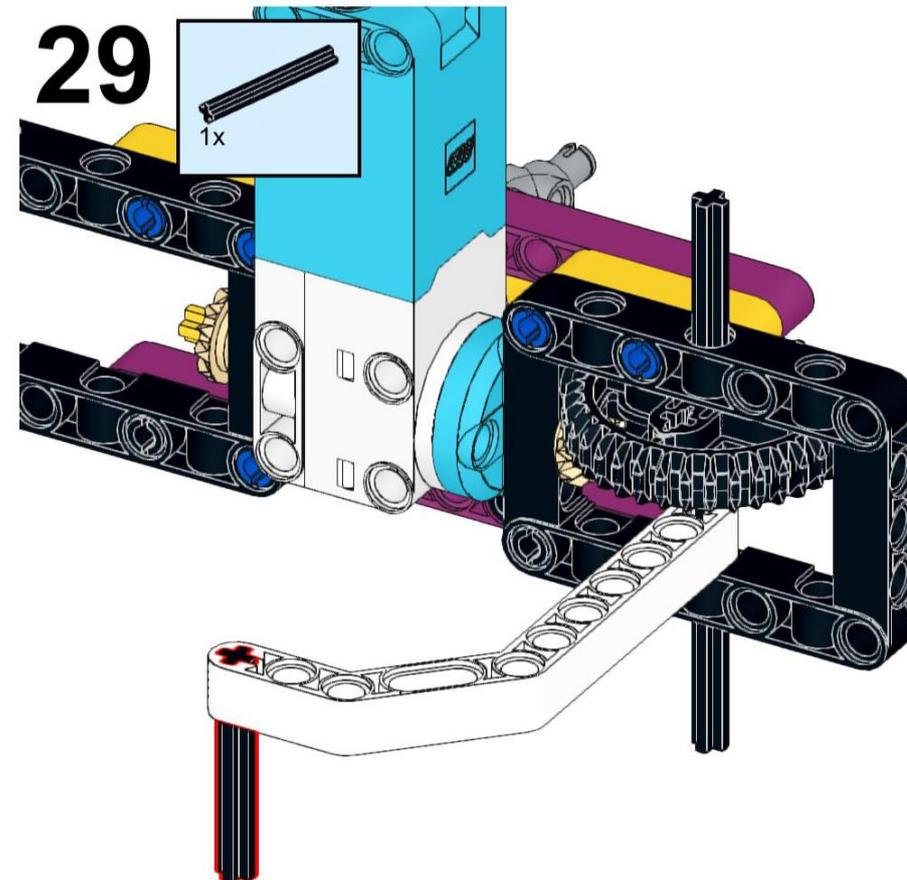
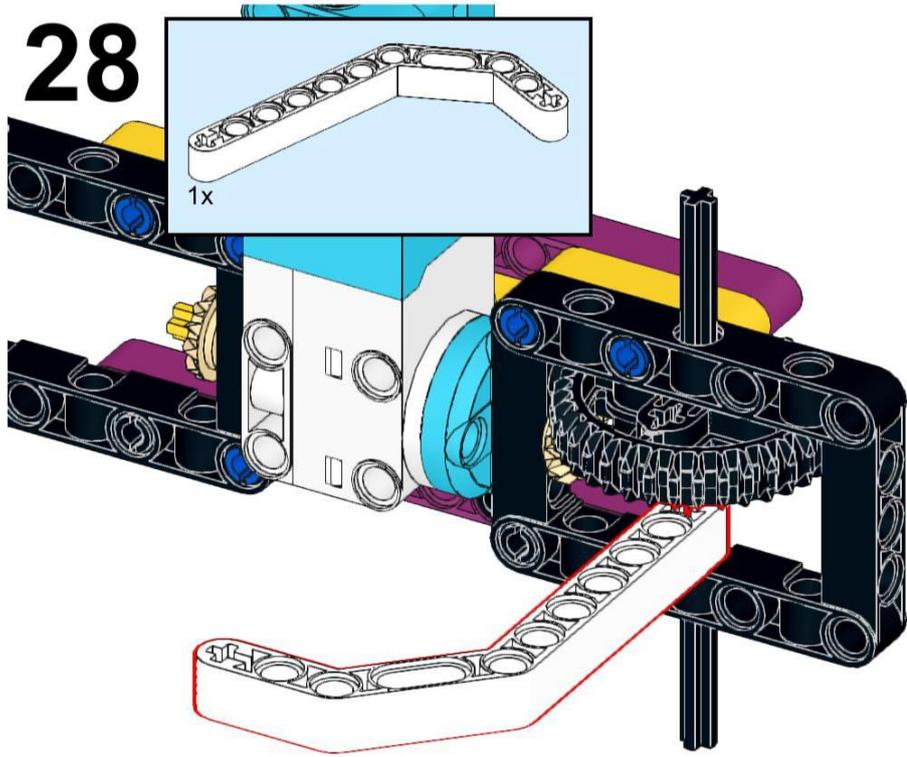


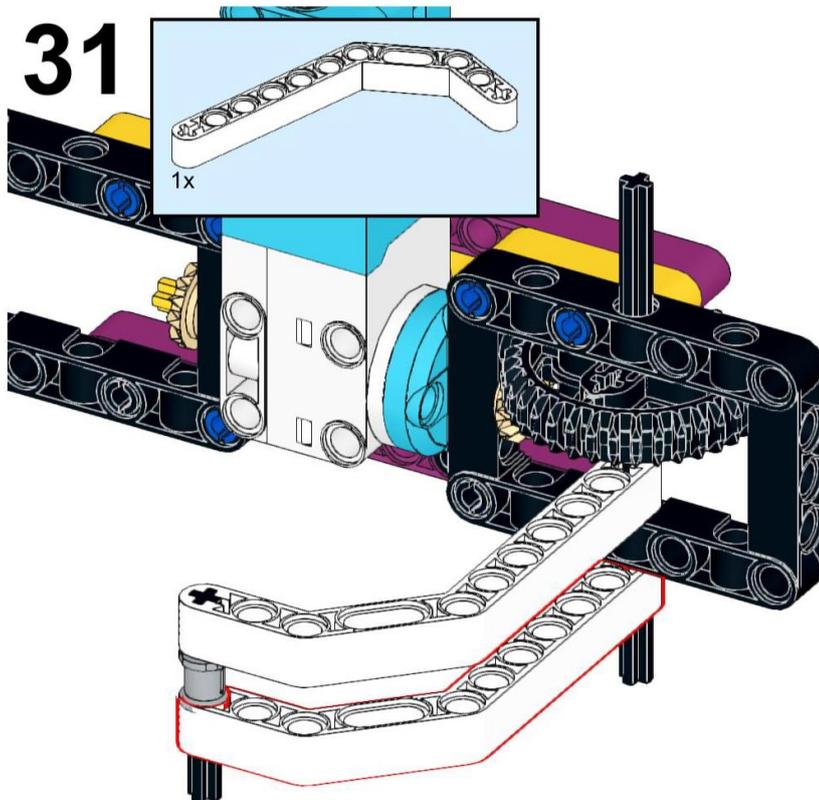
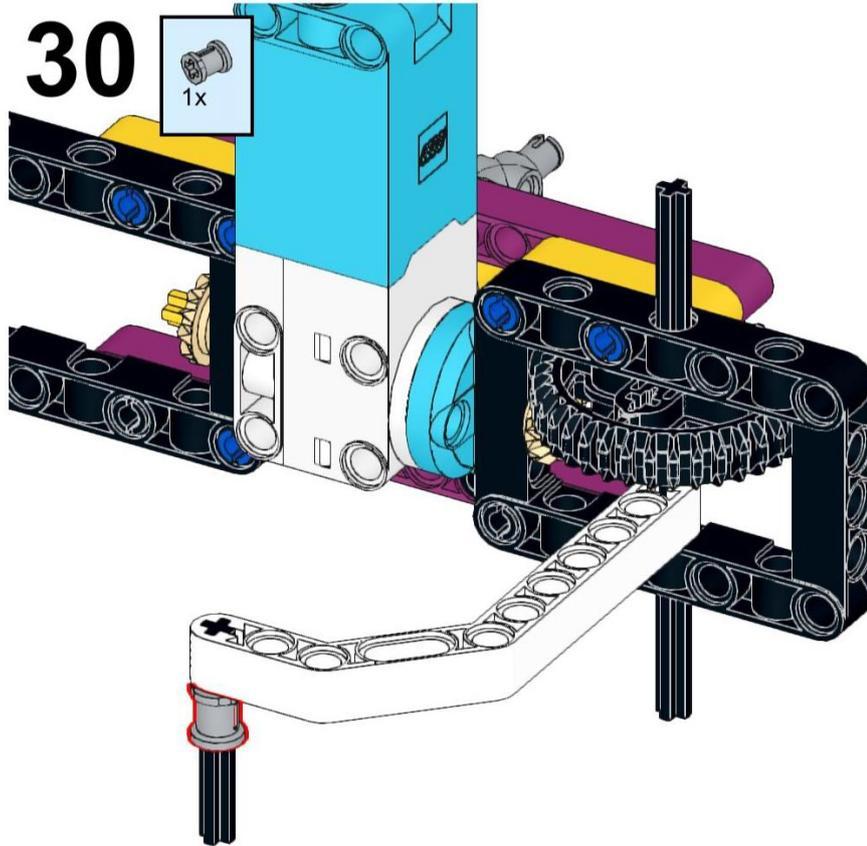
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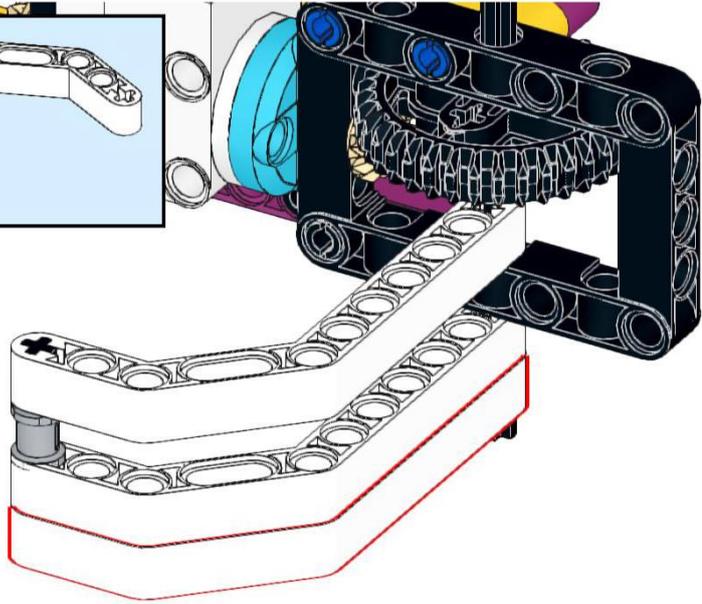
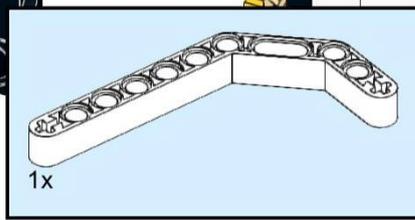
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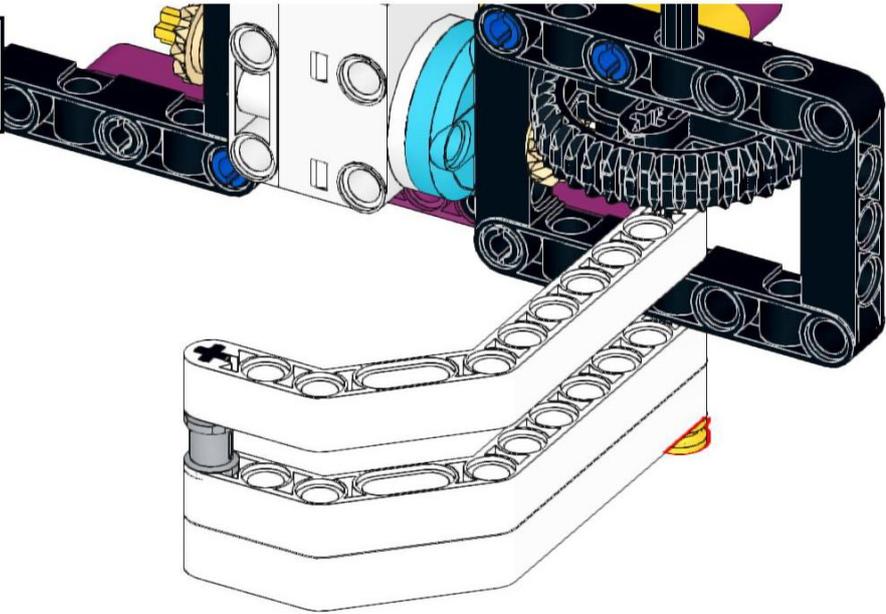




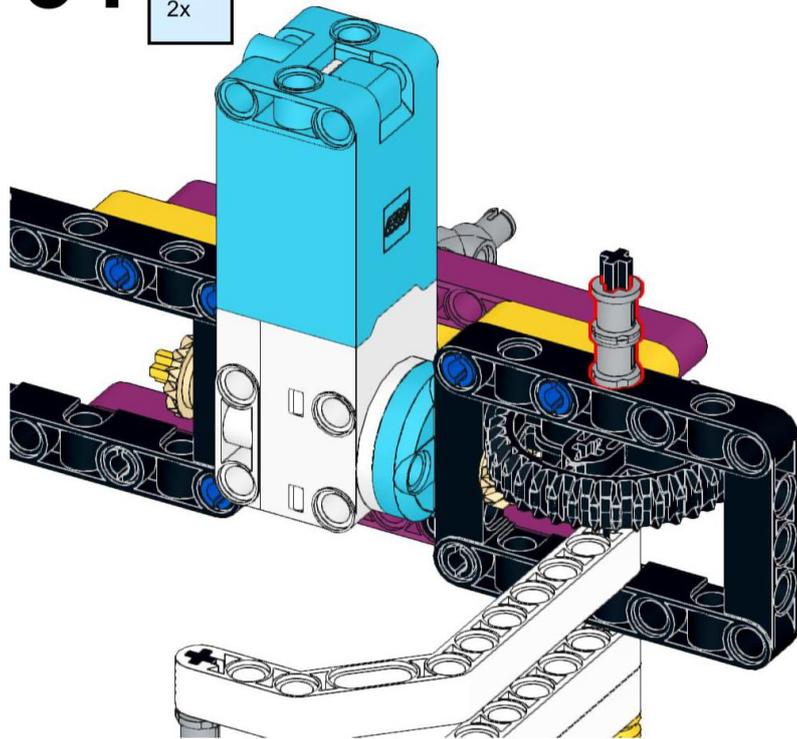
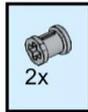
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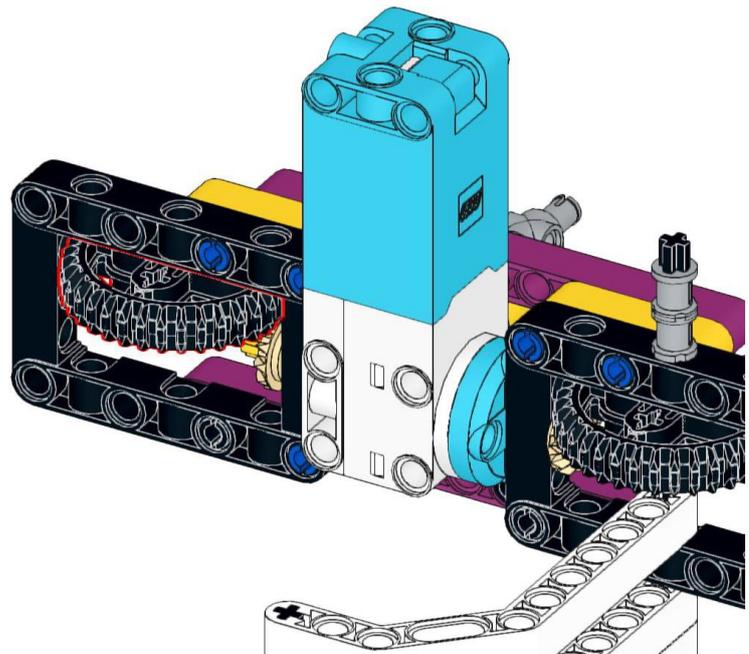
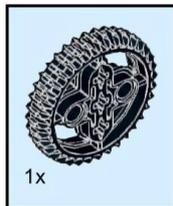
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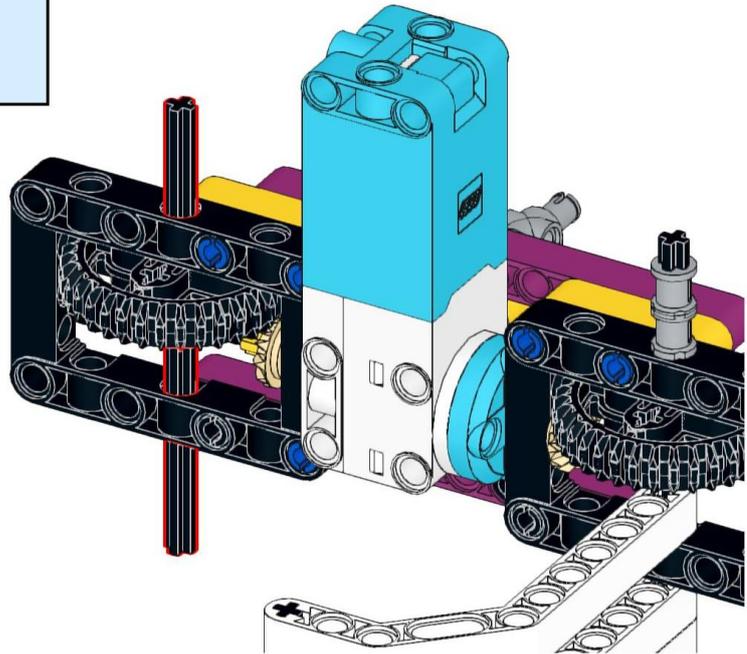
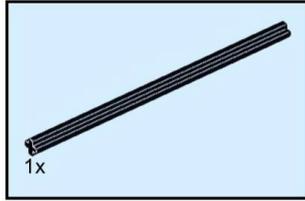
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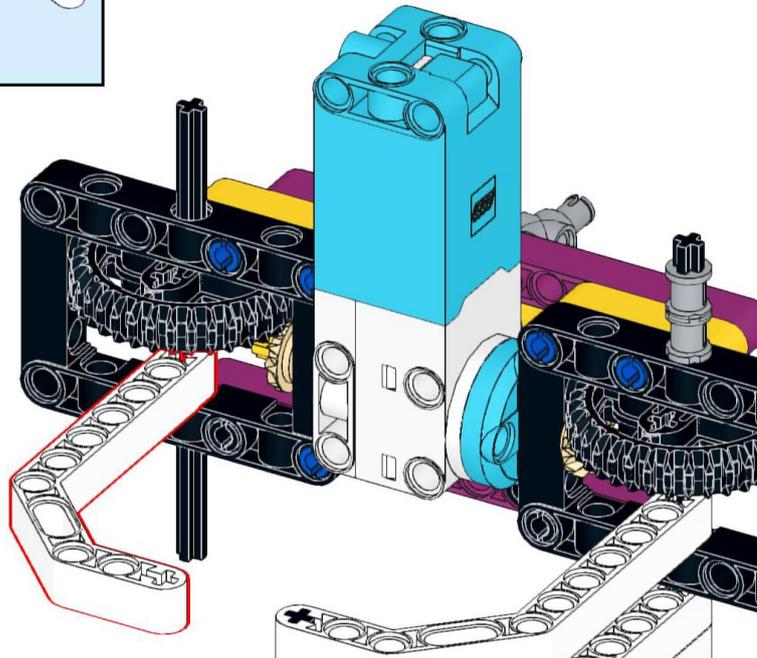
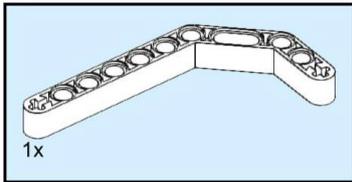
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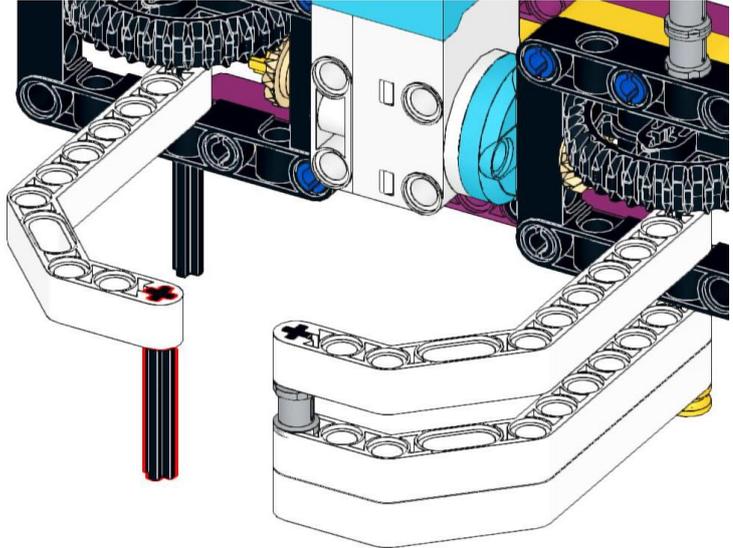
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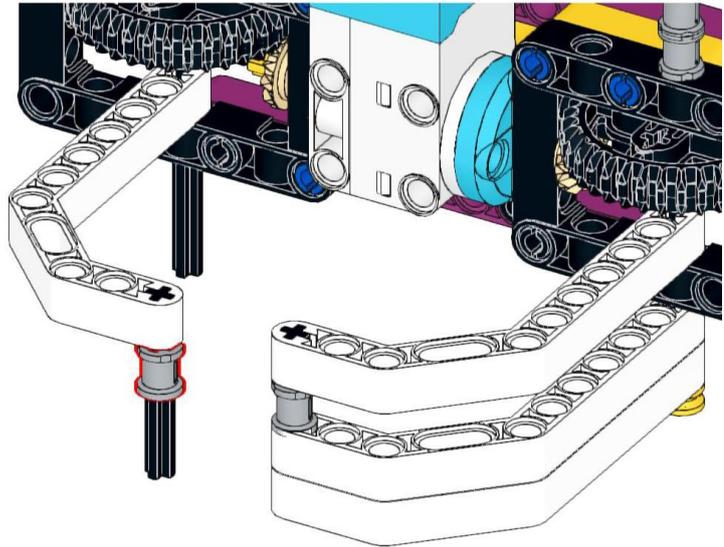
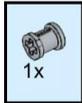
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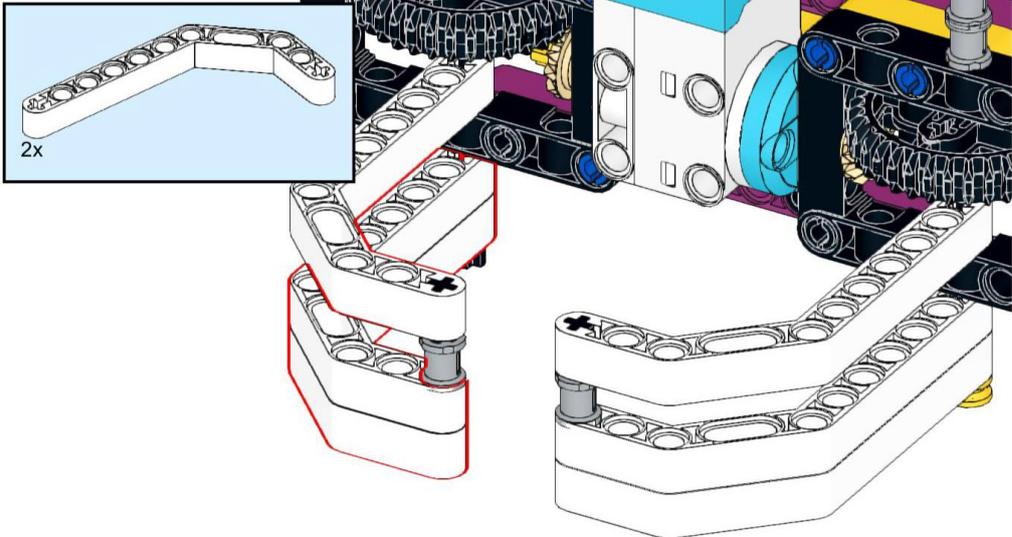
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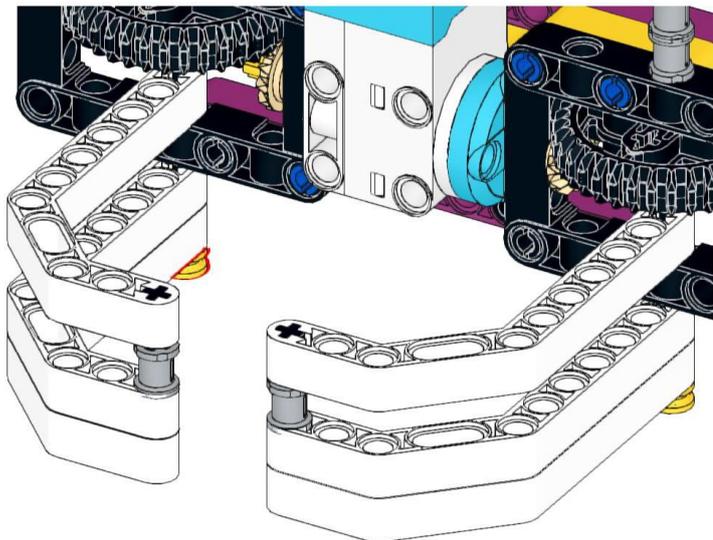
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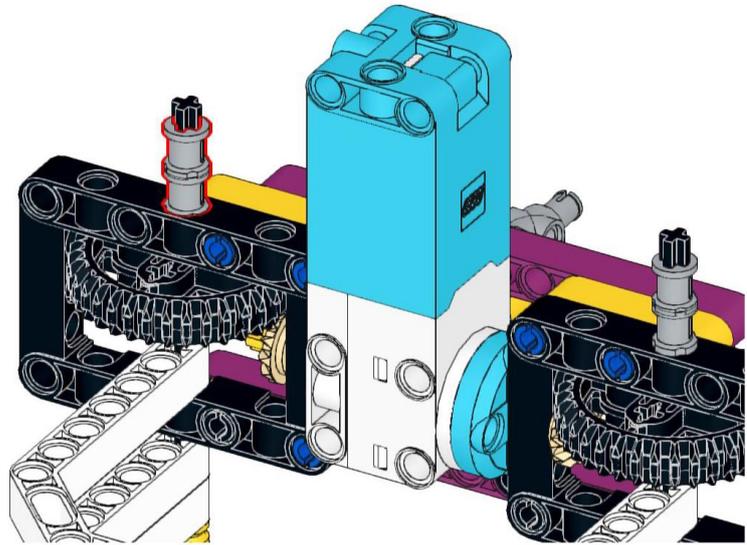
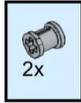
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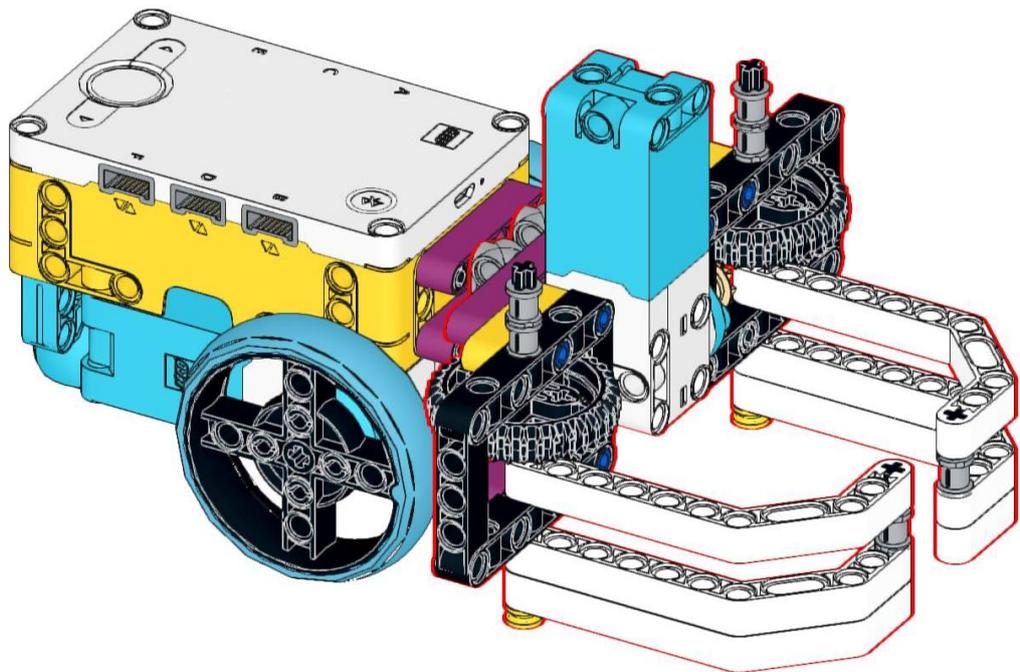
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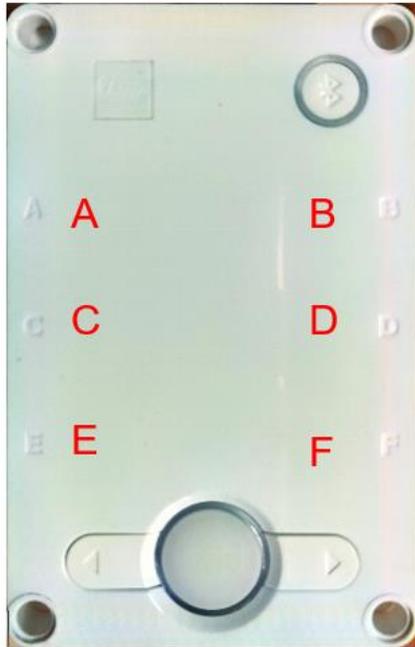


## Penyambungan wayar ke *Spike Prime Hub*

*Connection of wire towards Spike Prime Hub*

Berikut menunjukkan bahagian penyambung yang terdapat pada *Spike Prime Hub R.O.B.O.T.S* serta jenis wayar yang diperlukan.

*Below shows the wires that need to connect to the ports R.O.B.O.T.S Spike Prime Hub.*



*Spike Prime Hub*



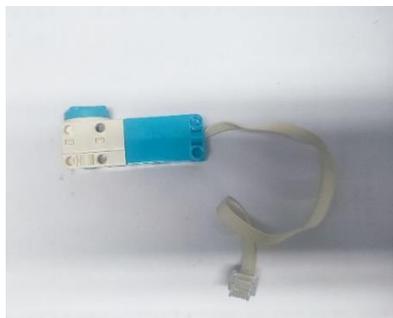
Pandangan sisi kiri  
*Left side view*



Pandangan sisi kanan  
*Right side view*

Port A hingga Port F boleh menyambungkan *Spike Prime Hub R.O.B.O.T.S* dengan *motor* dan *sensor*.

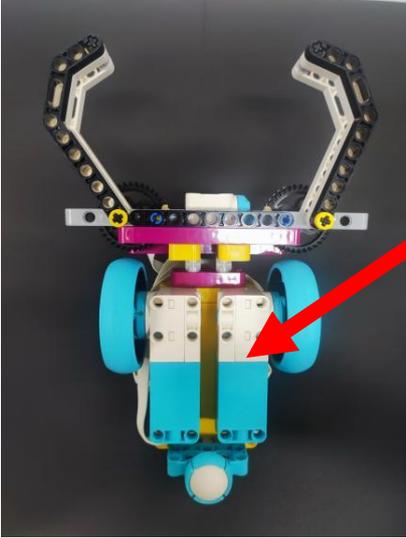
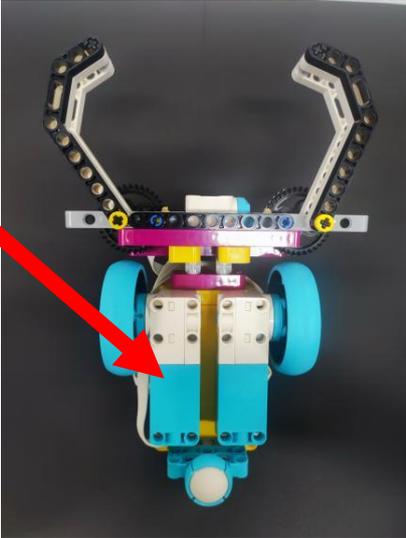
*Port A to port F connect R.O.B.O.T.S Spike Prime Hub to the motors and sensors.*



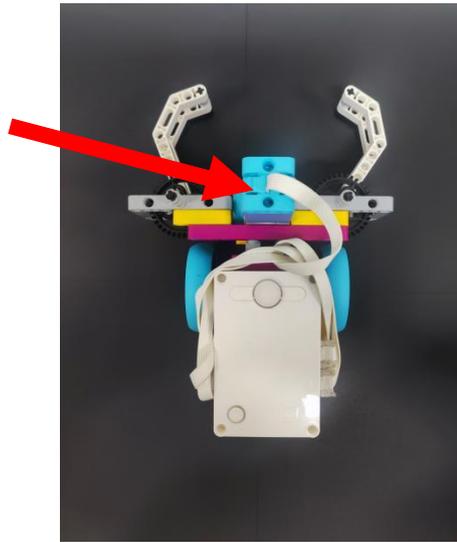
Tiga *medium motor* akan digunakan dan disambungkan ke *Spike Prime Hub R.O.B.O.T.S*.

*Three medium motors will be used and connect to the R.O.B.O.T.S Spike Prime Hub.*

Jadual di bawah menunjukkan jenis motor yang disambungkan pada bahagian penyambung *Spike Prime Hub R.O.B.O.T.S.*  
*The table below shows the types of motors connected to the ports of the R.O.B.O.T.S Spike Prime Hub.*

Bahagian penyambung <i>Port</i>	Sambungan <i>Connection</i>
A	 <p>Medium motor sebelah kanan (Mengawal tayar kanan)  <i>Right side medium motor (Controls the right tire)</i></p>
B	 <p>Medium motor sebelah kiri (Mengawal tayar kiri)  <i>Left side medium motor (Controls the left tire)</i></p>

C

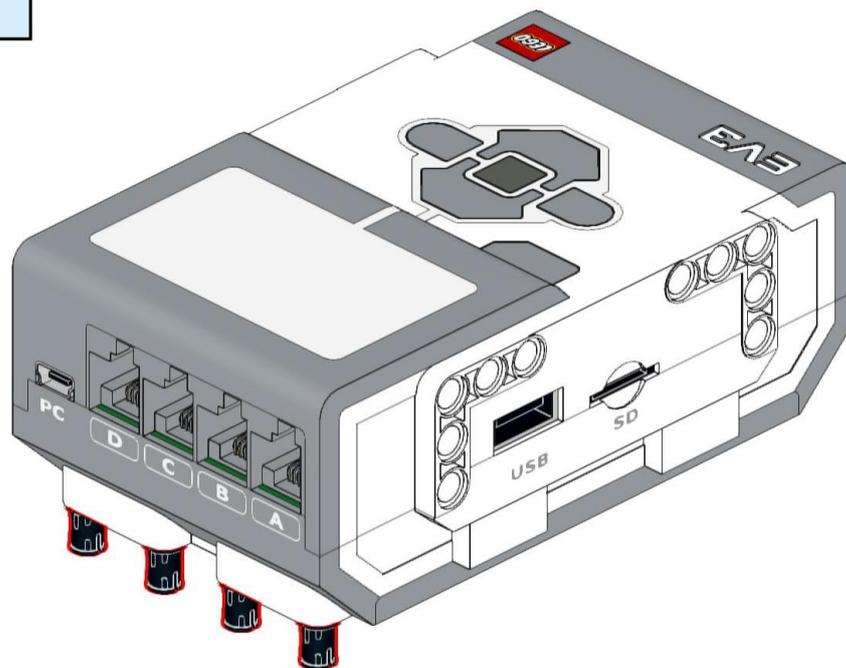
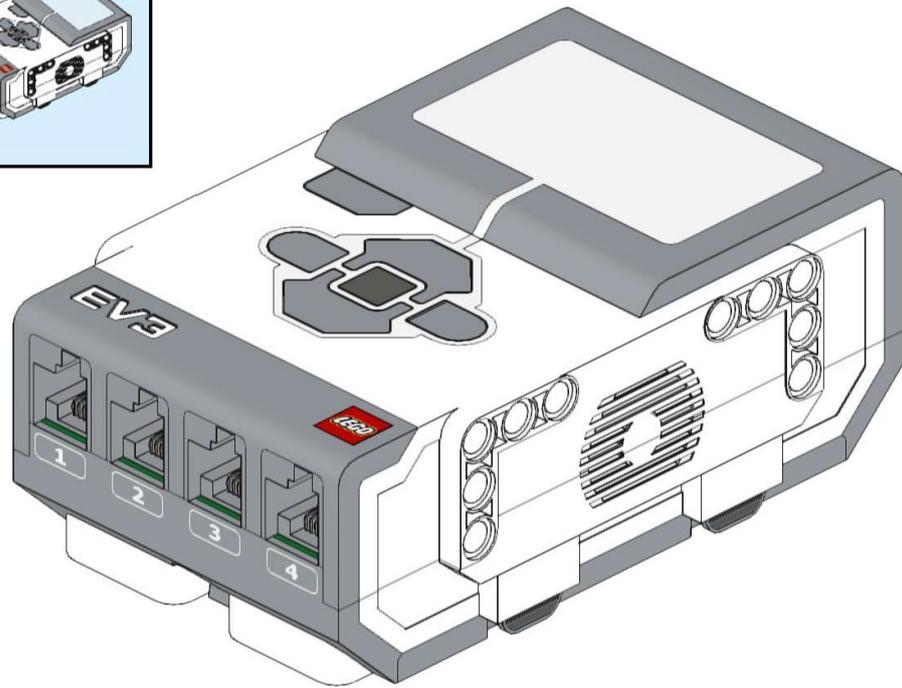
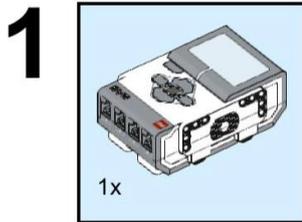


Medium motor di tengah (Mengawal tangan R.O.B.O.T.S )  
*Medium motor in the middle (Controlling the R.O.B.O.T.S hand*

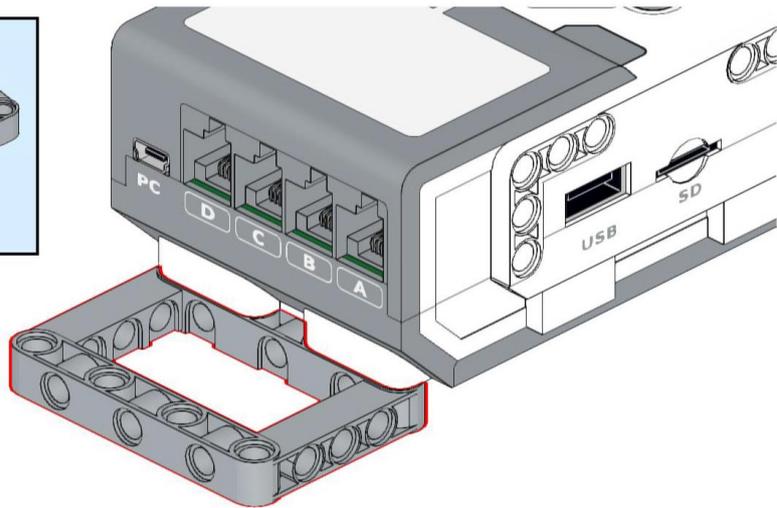
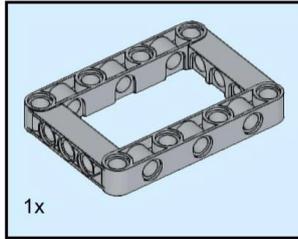
## 5.2 Penembak Lego *Lego Shooter*

Pembinaan Penembak Lego adalah menggunakan Lego Mindstorms EV3 Educaiton Core Set dan Mindstorms EV3 Educaiton Expansion Set.

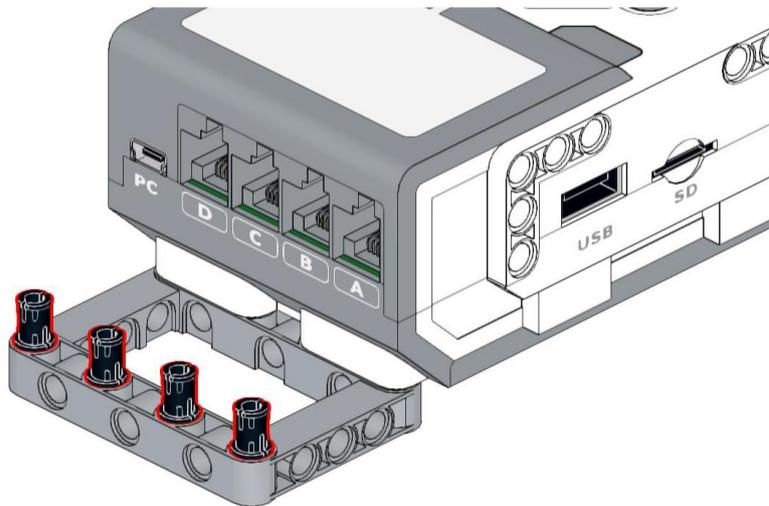
*The construction of Lego Shooter is using Lego Mindstorms EV3 Educaiton Core Set and Mindstorms EV3 Educaiton Expansion Set.*



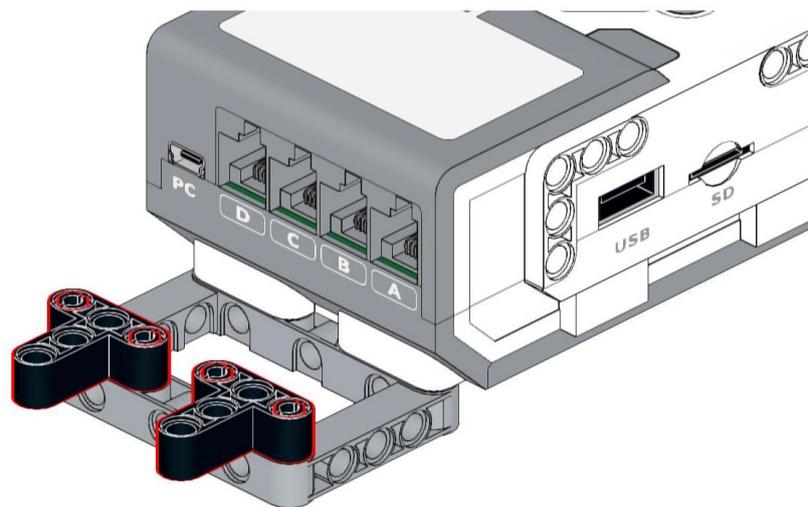
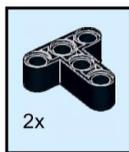
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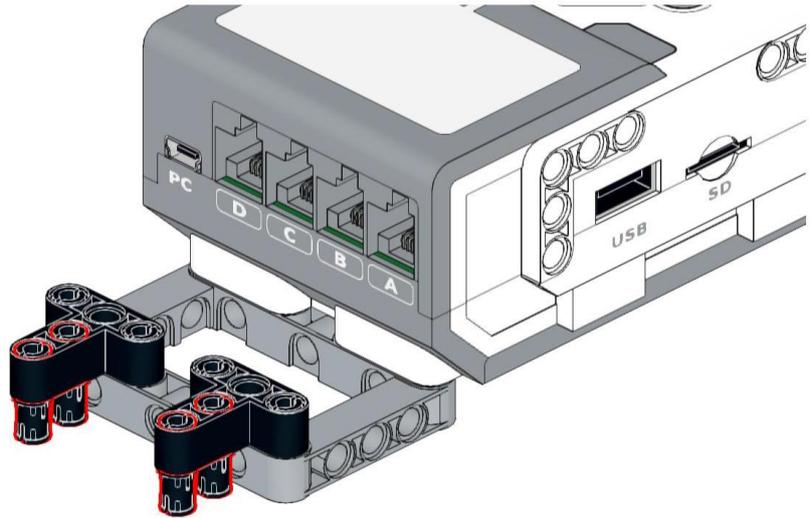
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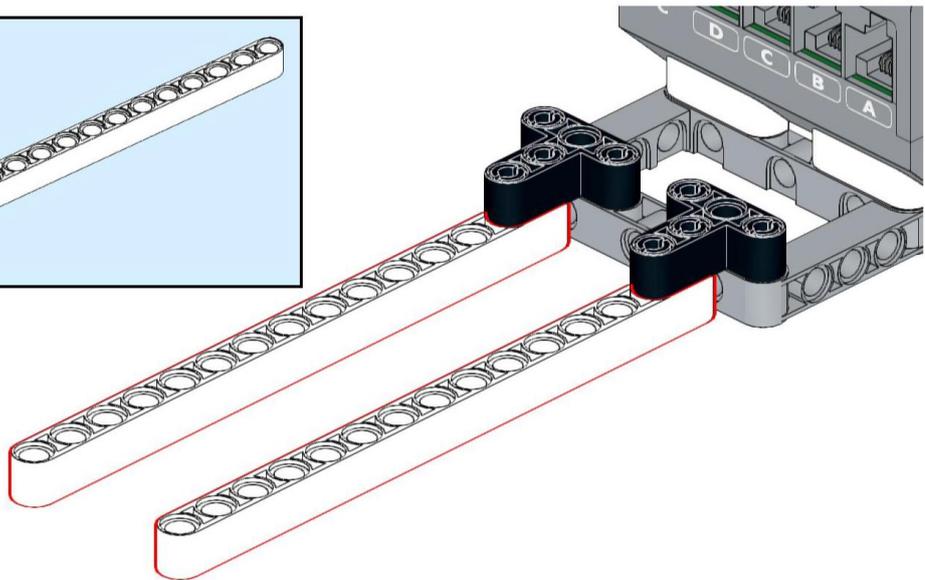
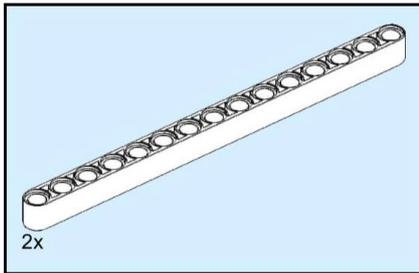
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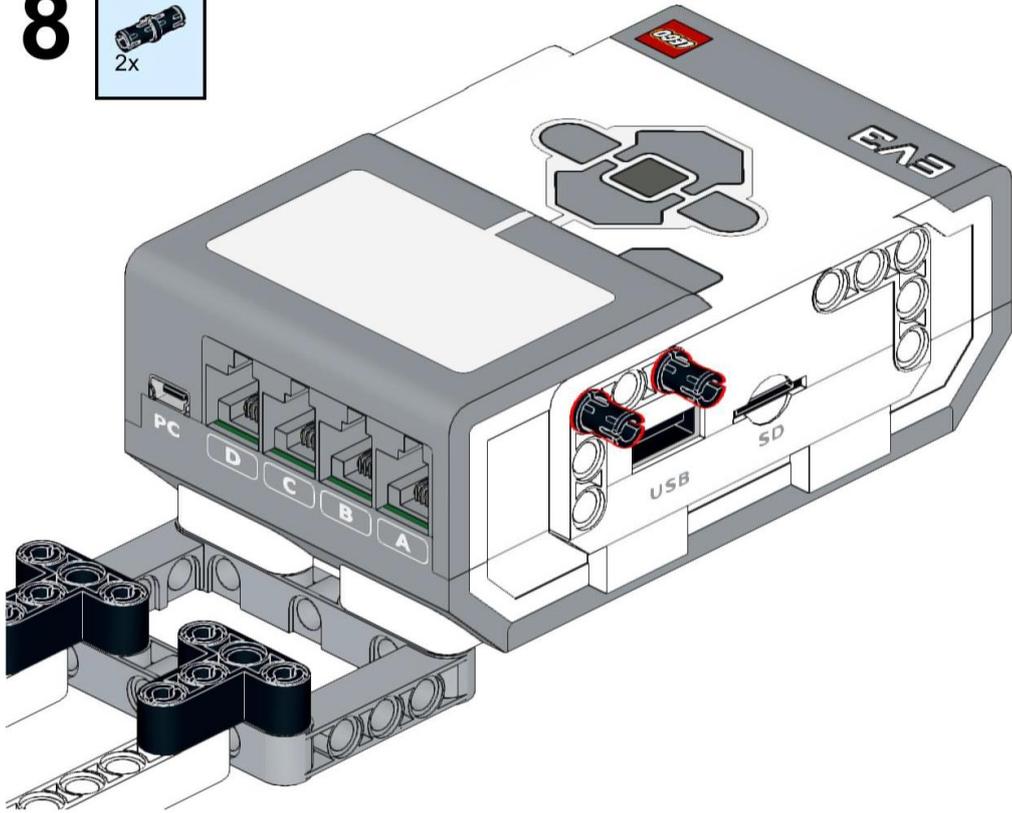
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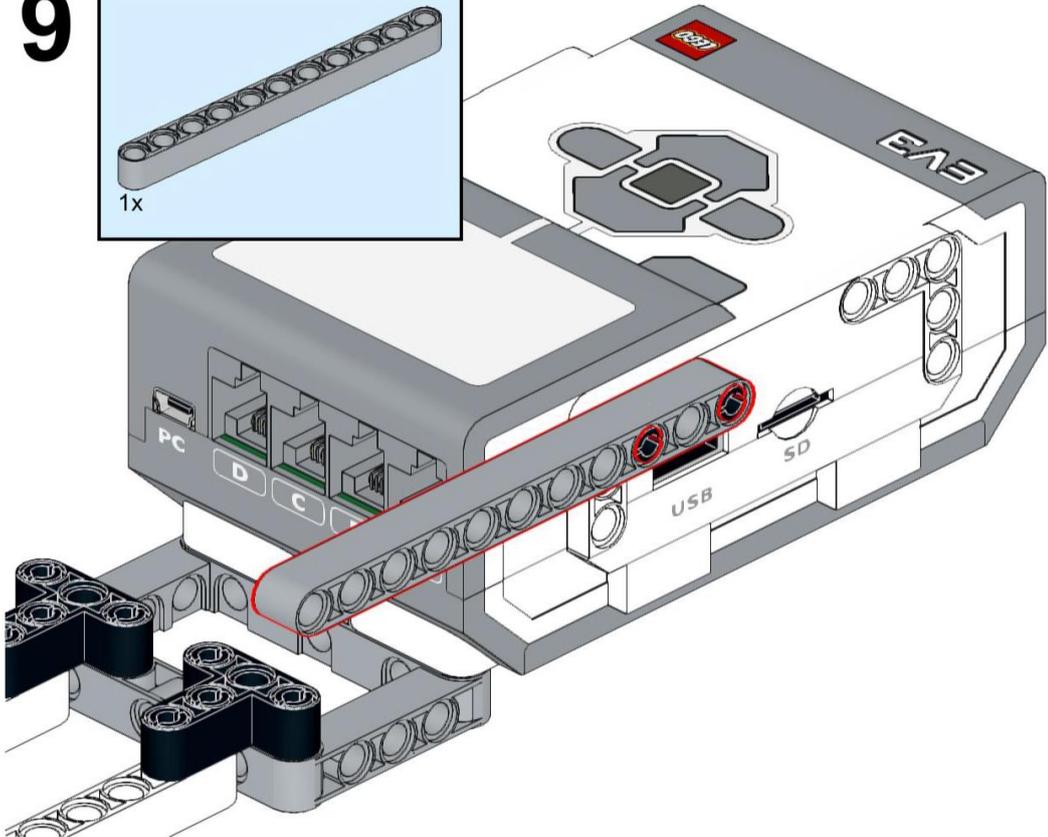
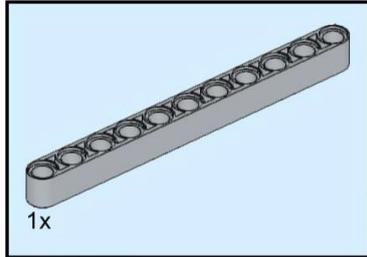
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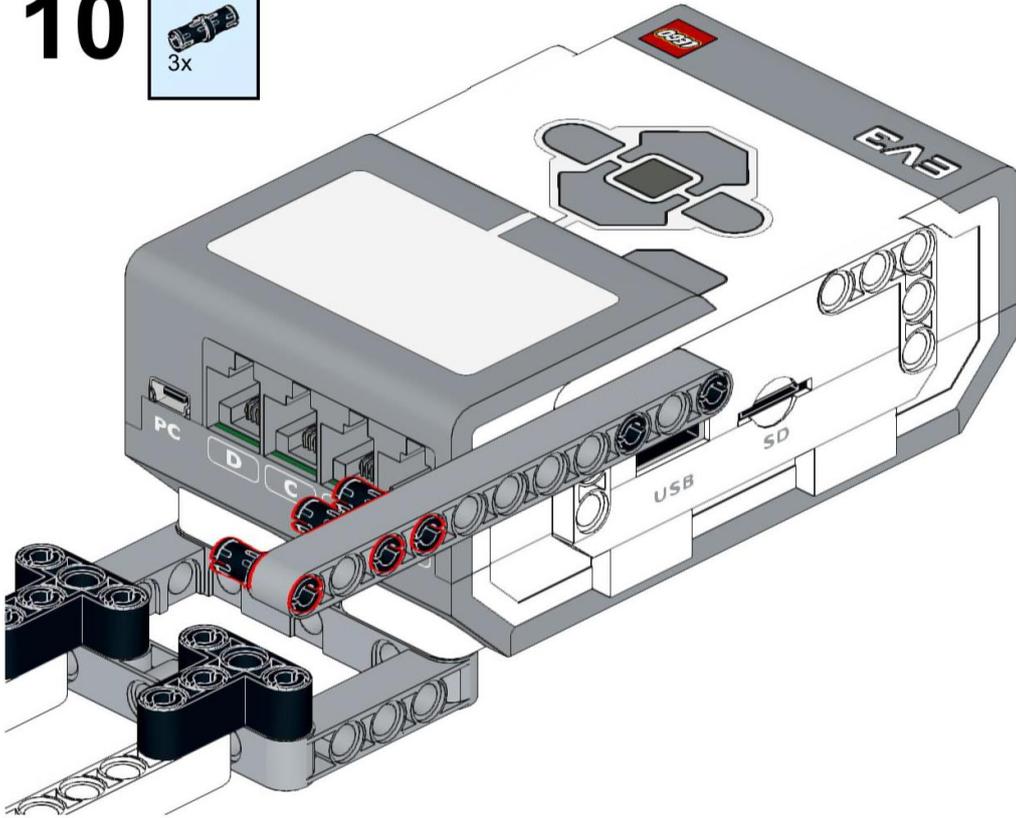
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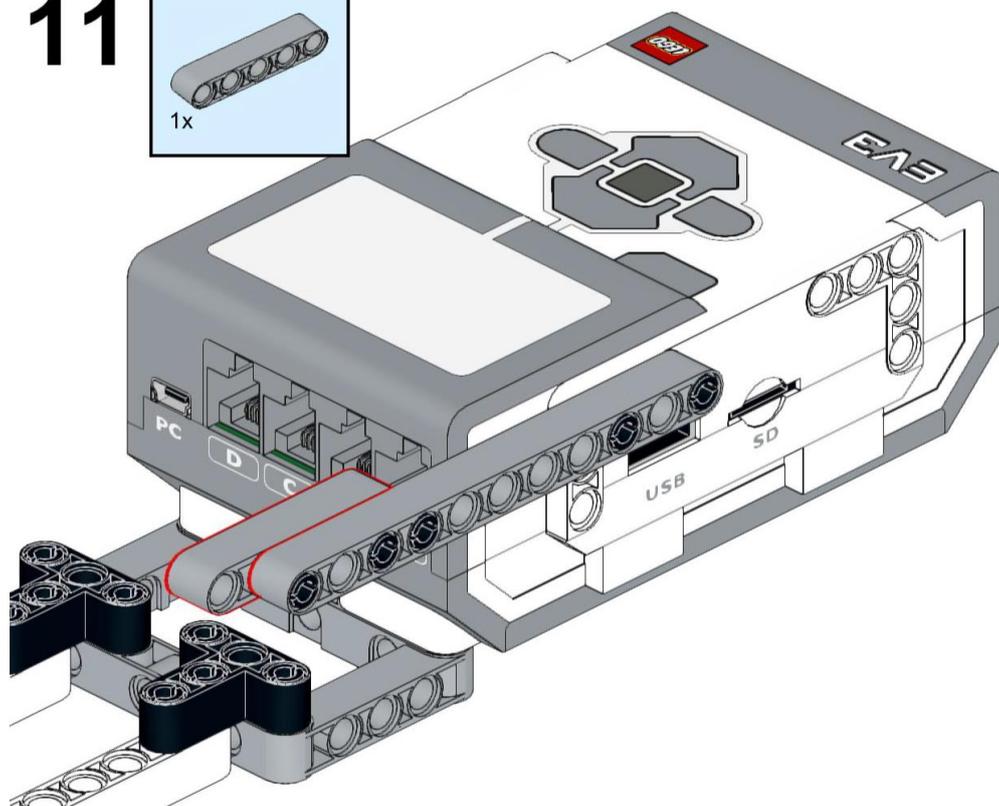
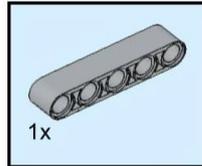
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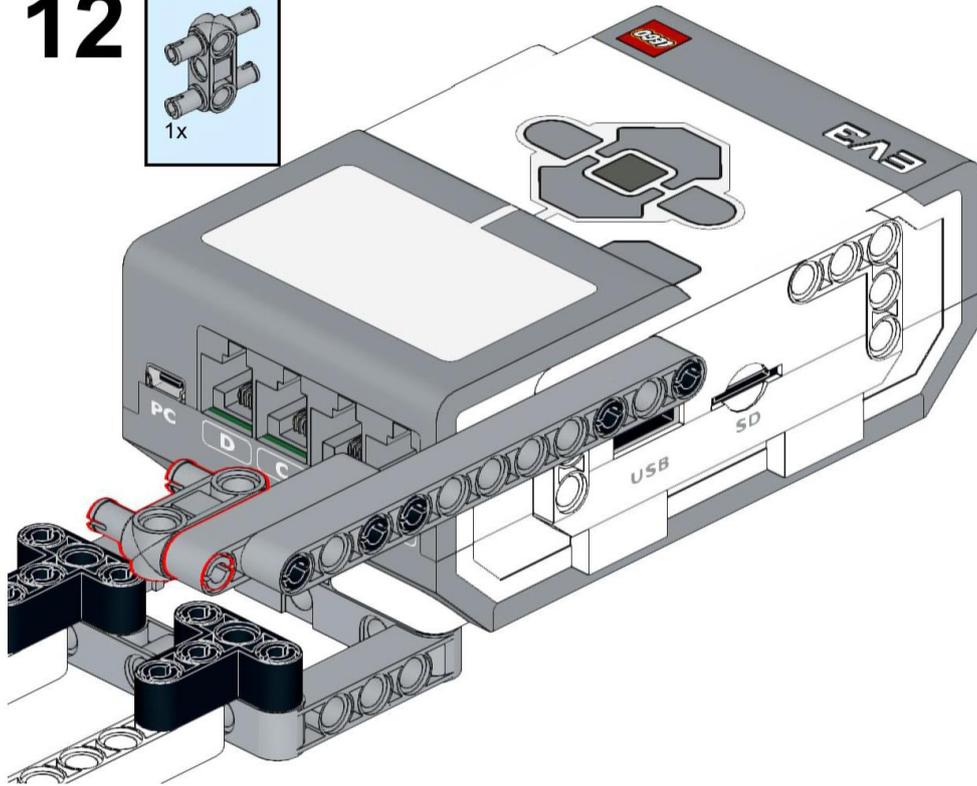
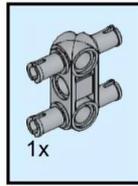
# 10



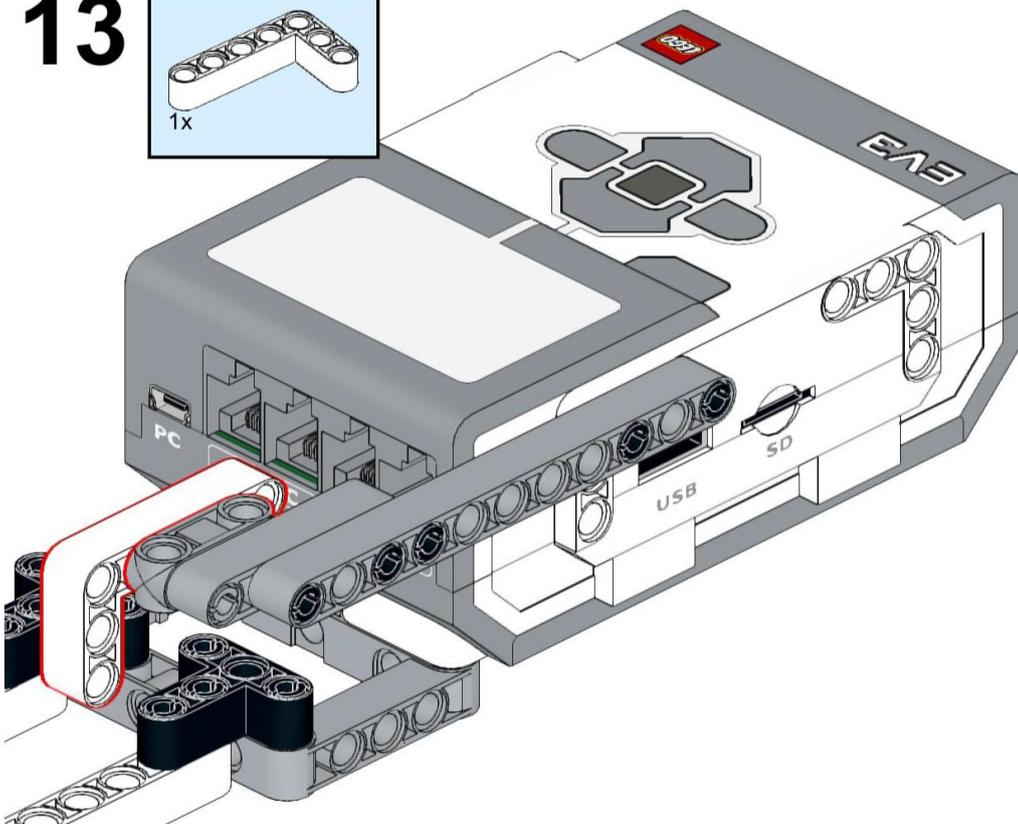
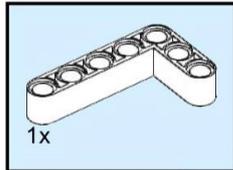
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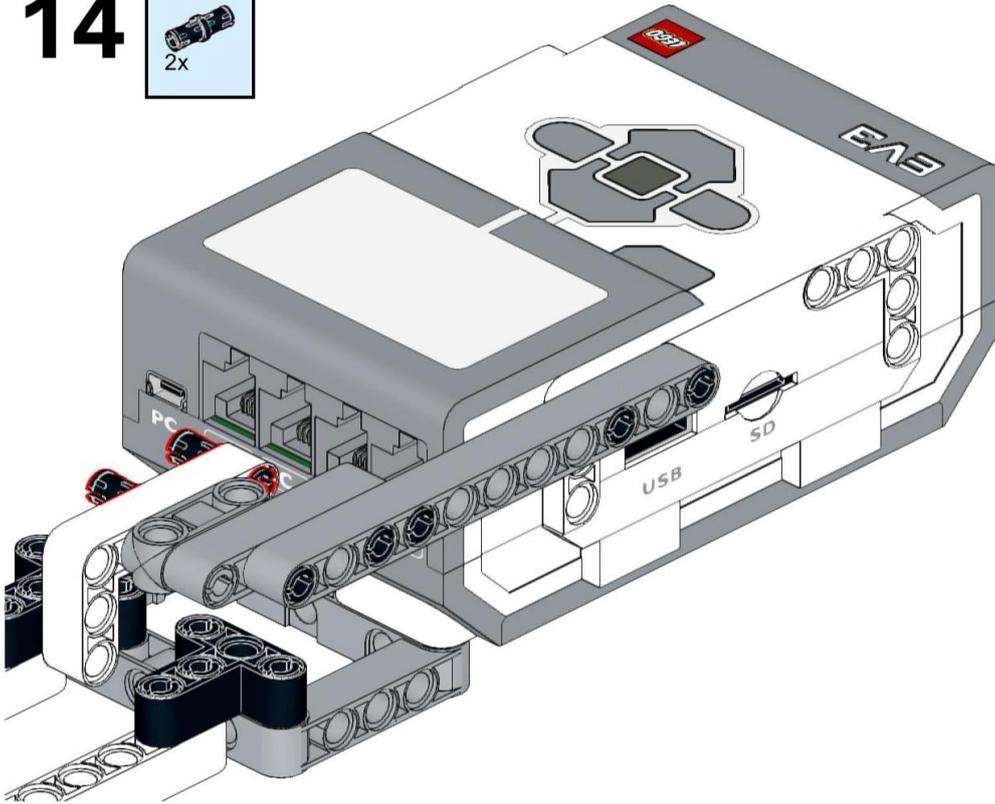
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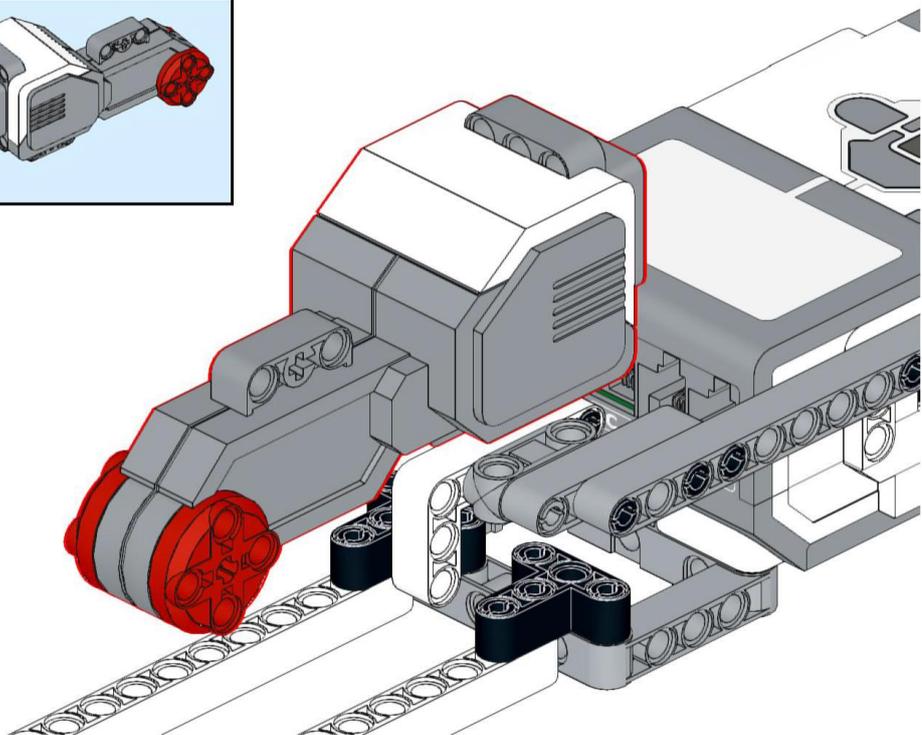
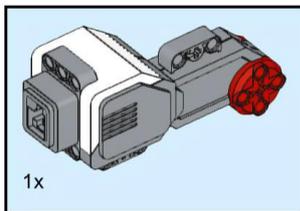
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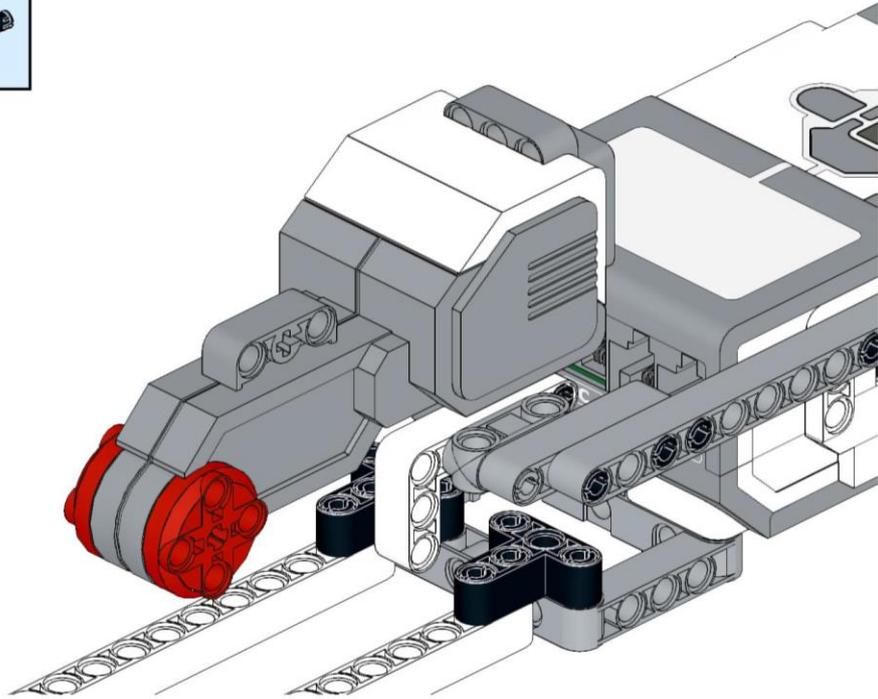
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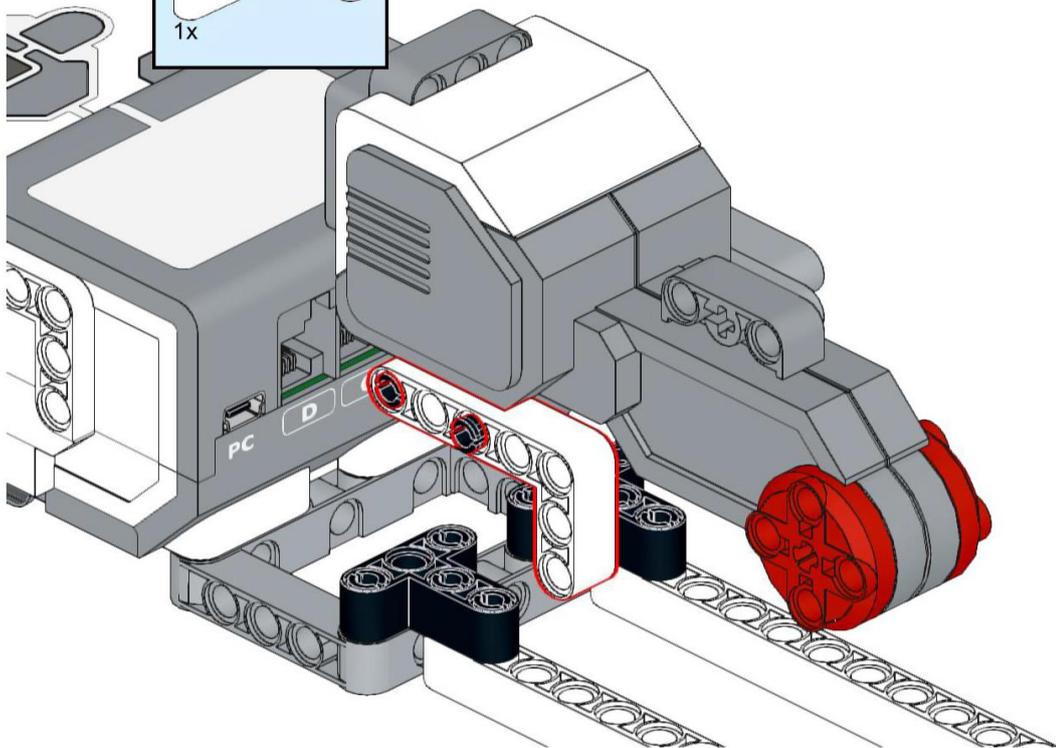
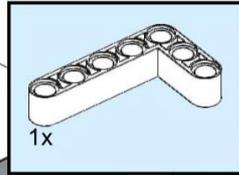
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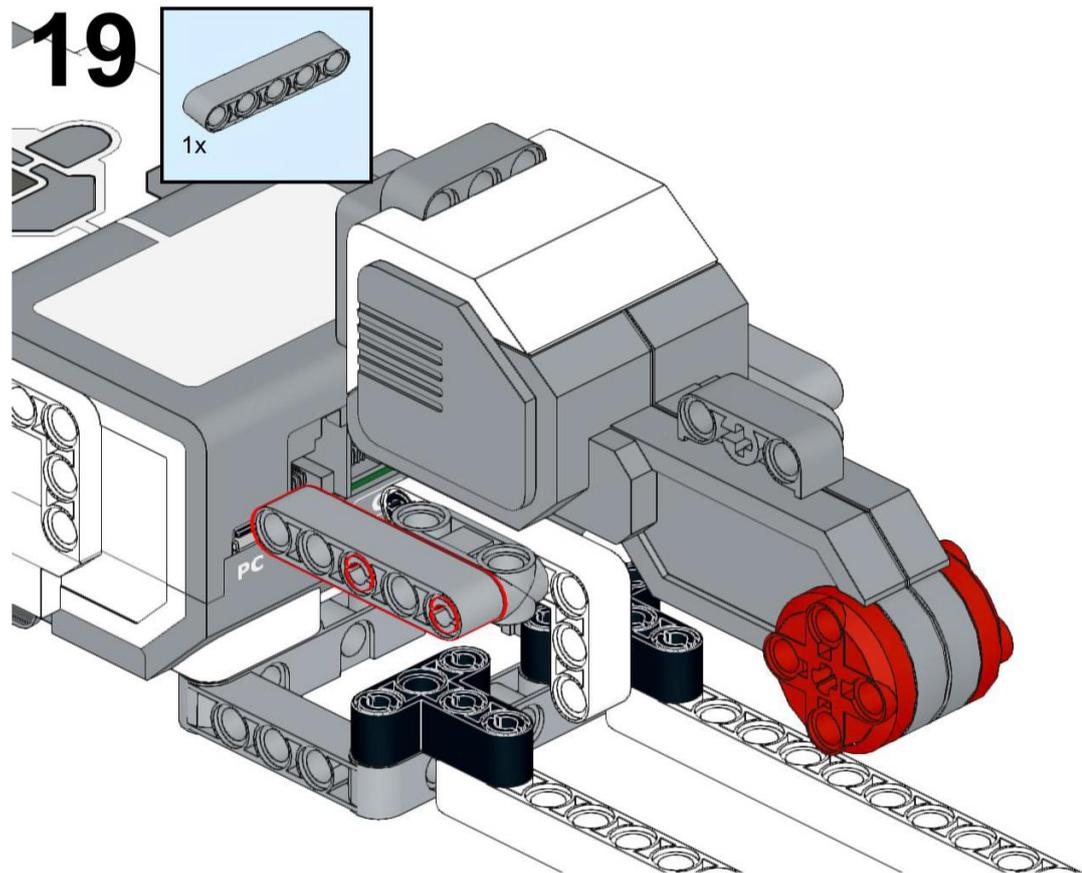
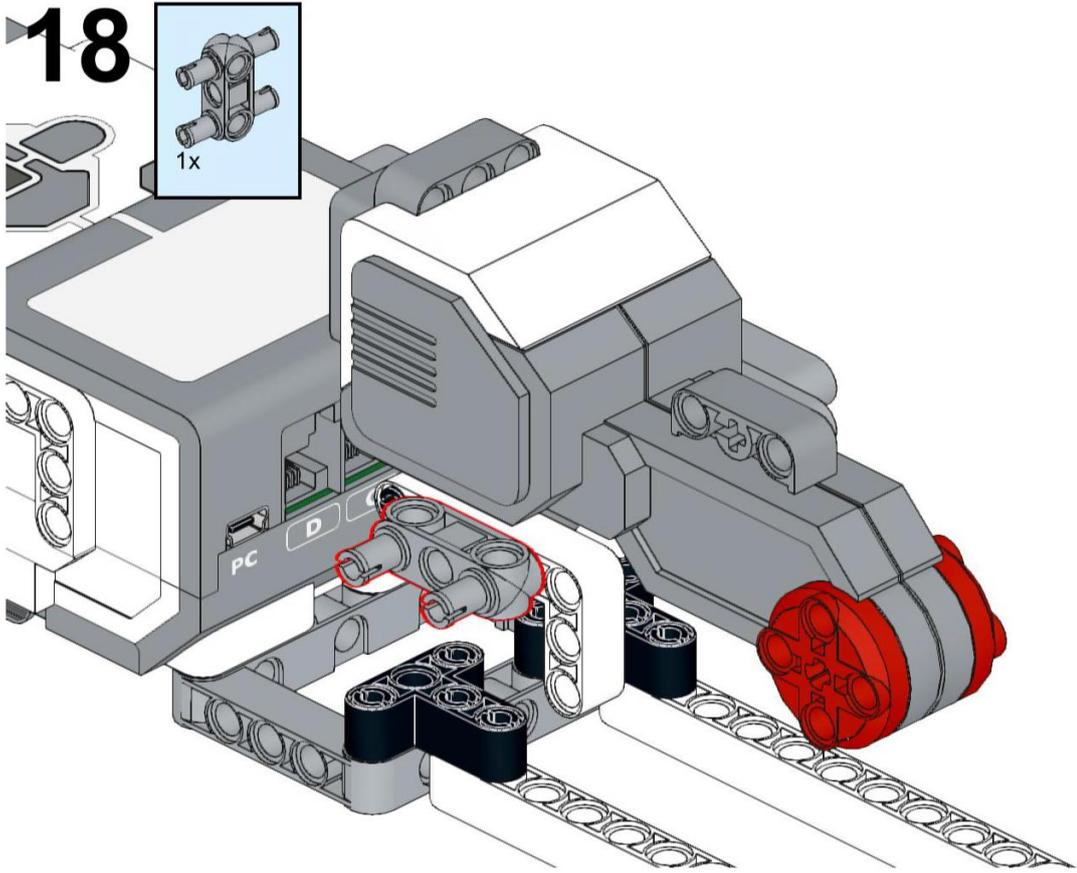


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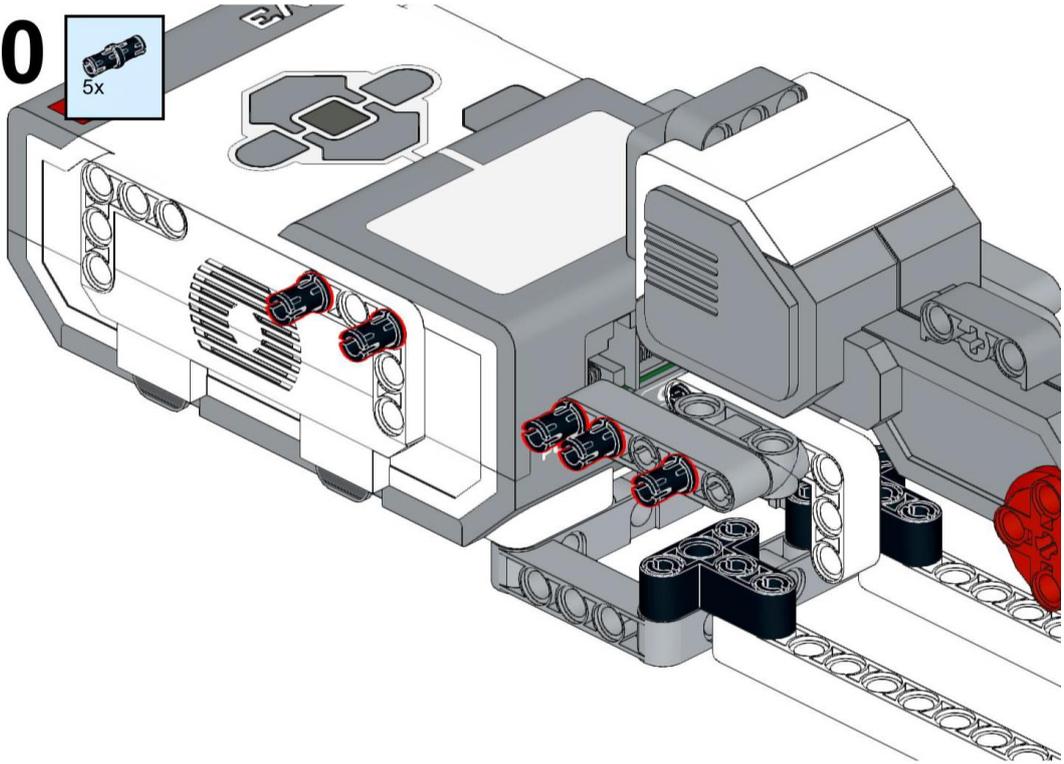


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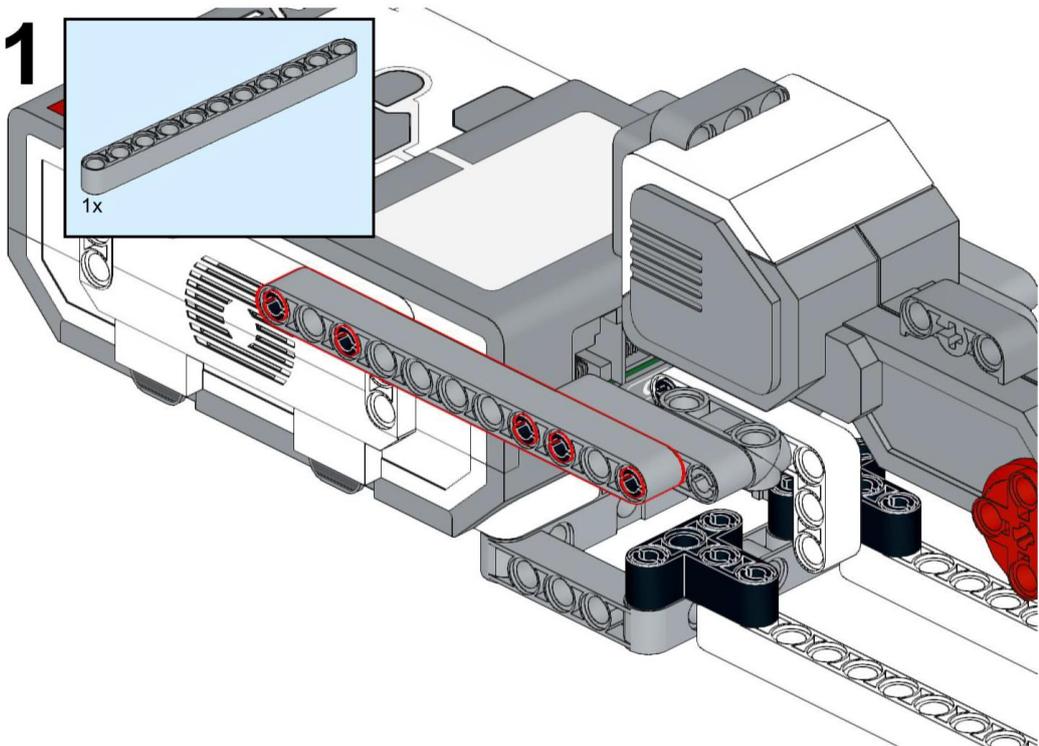
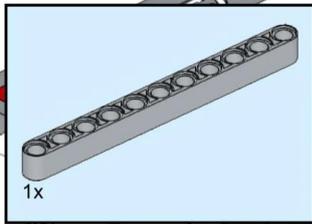




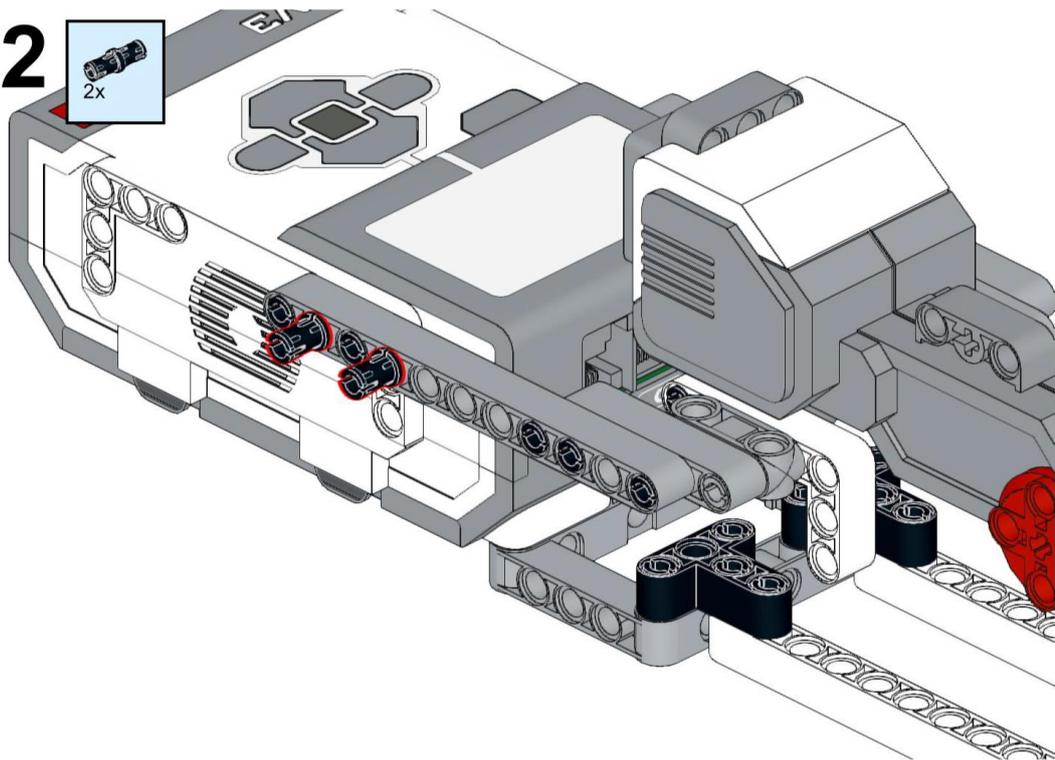
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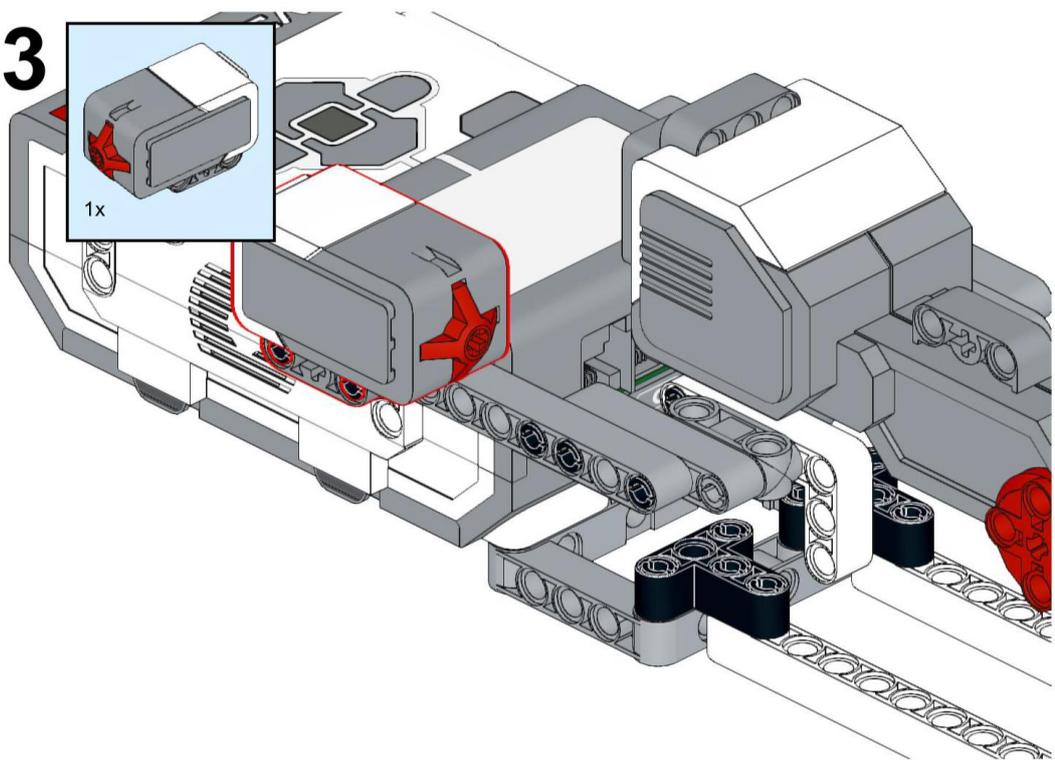
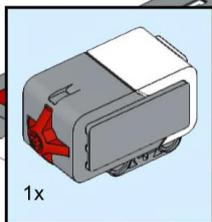
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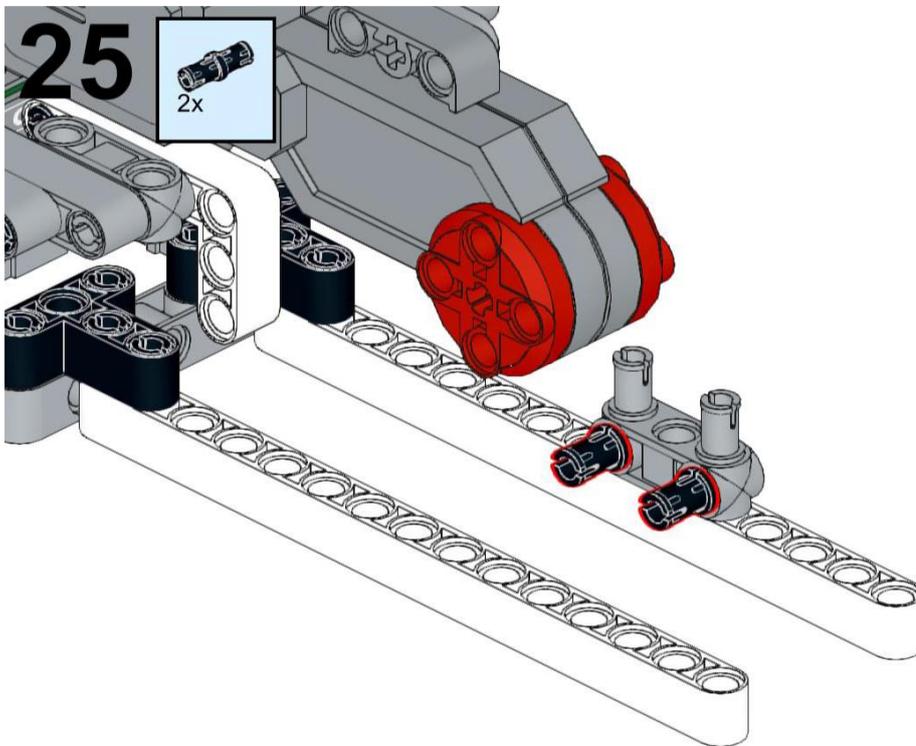
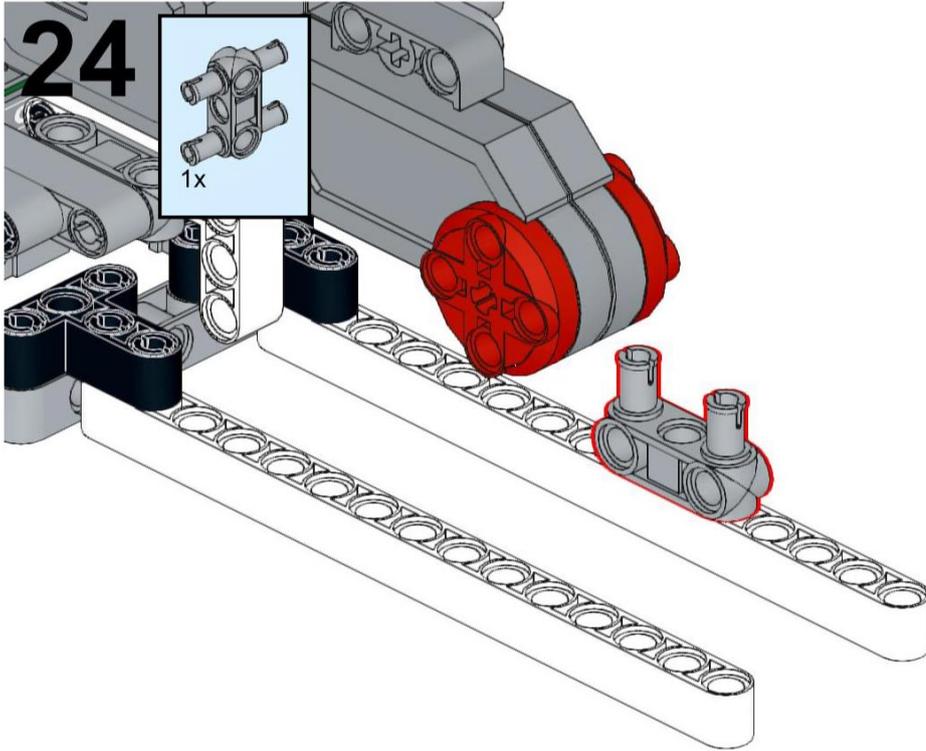


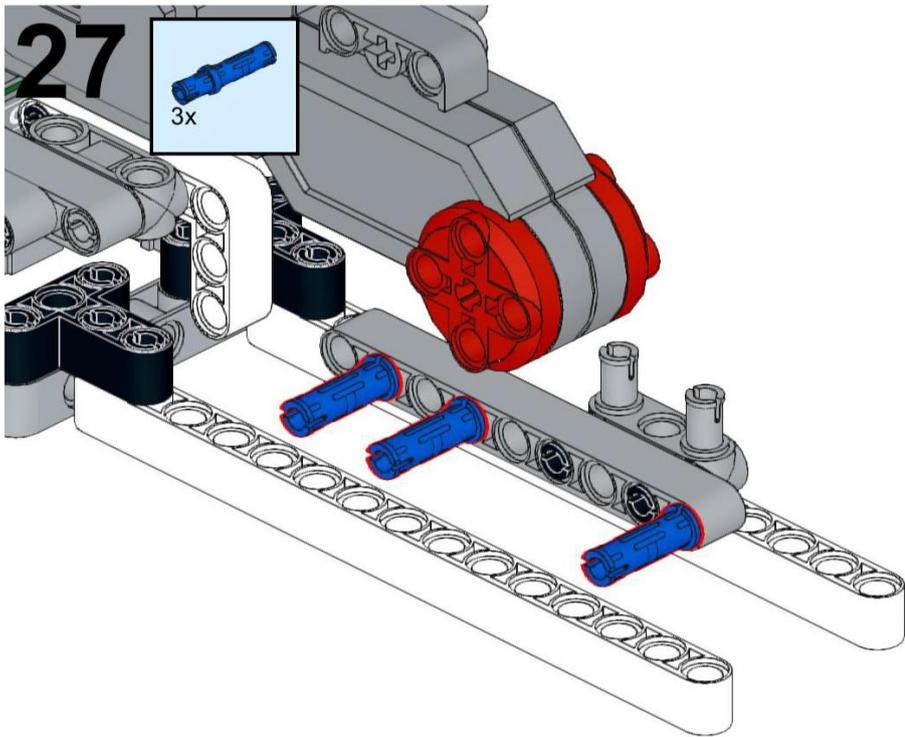
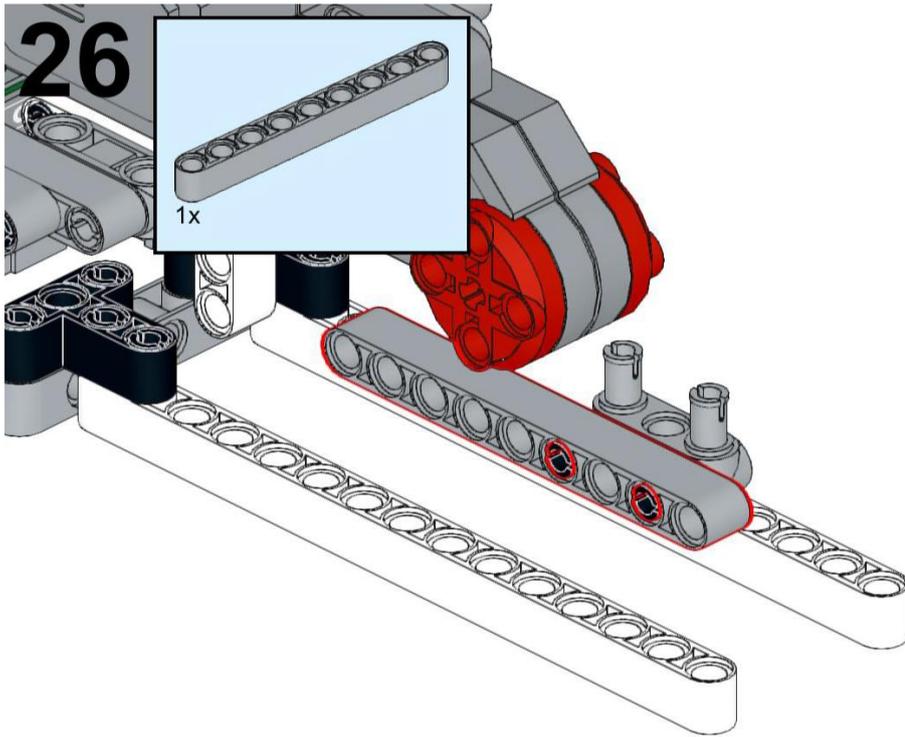
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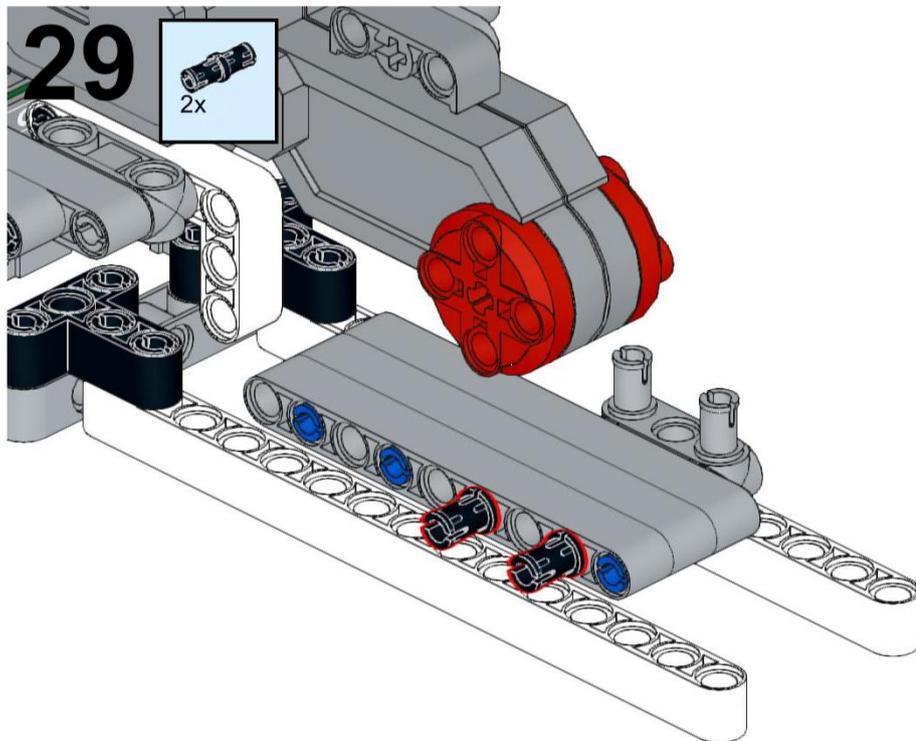
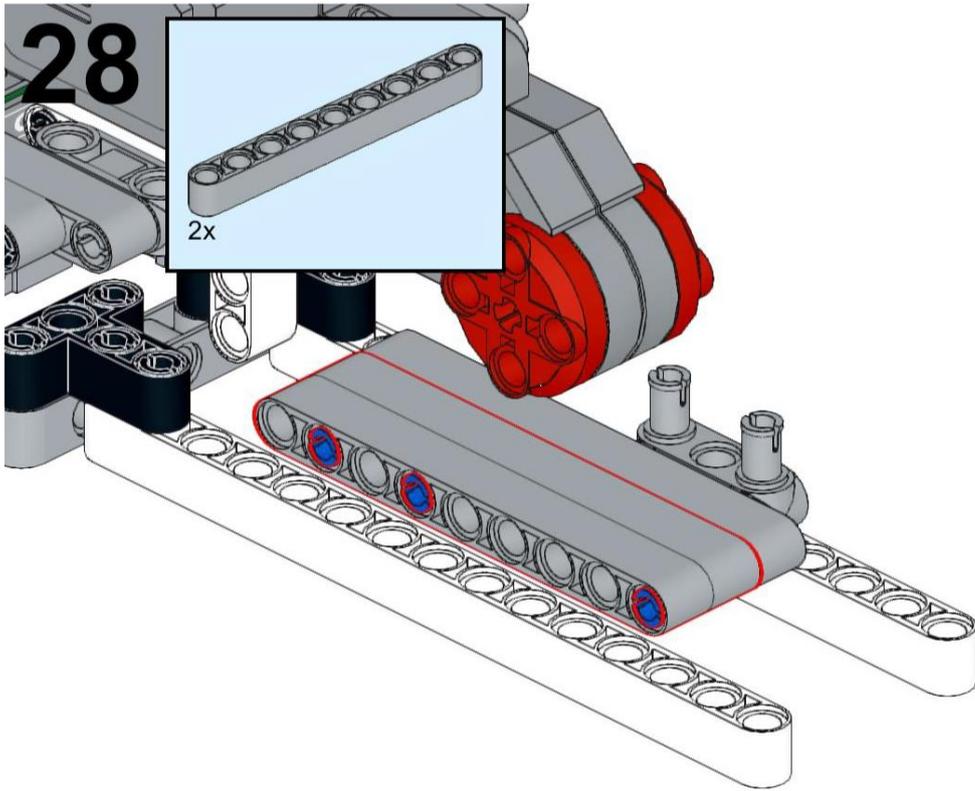


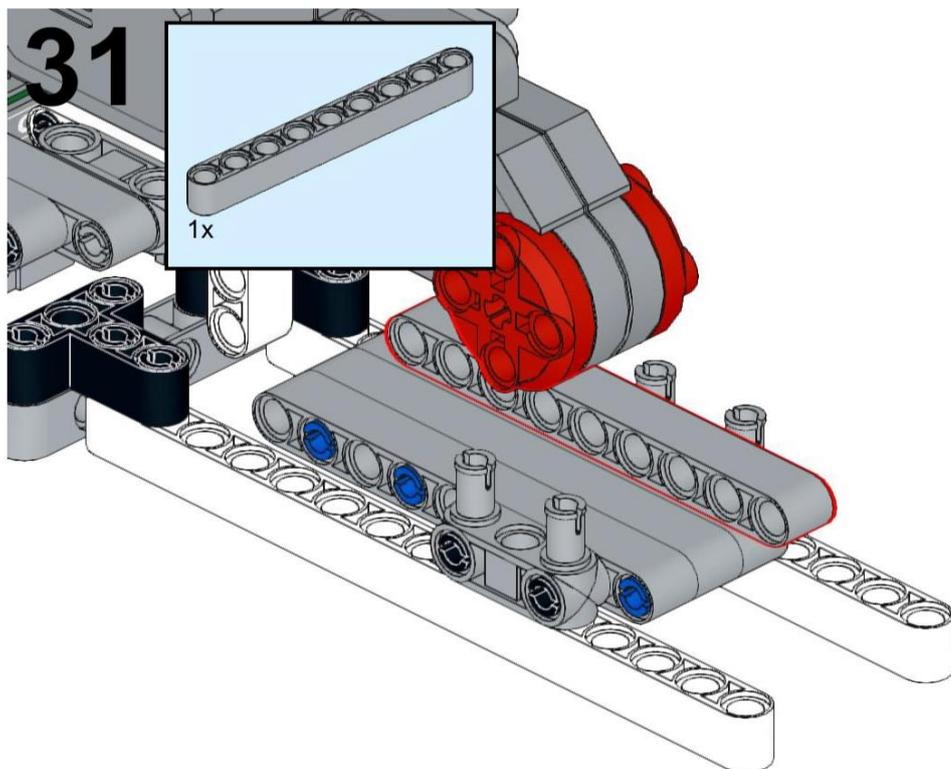
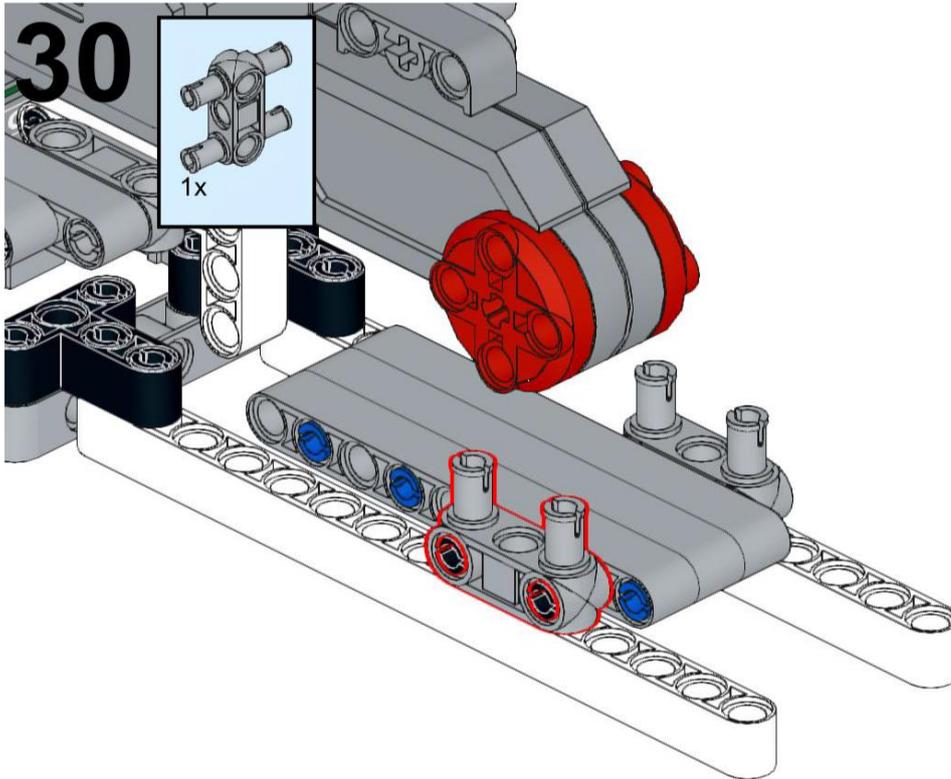
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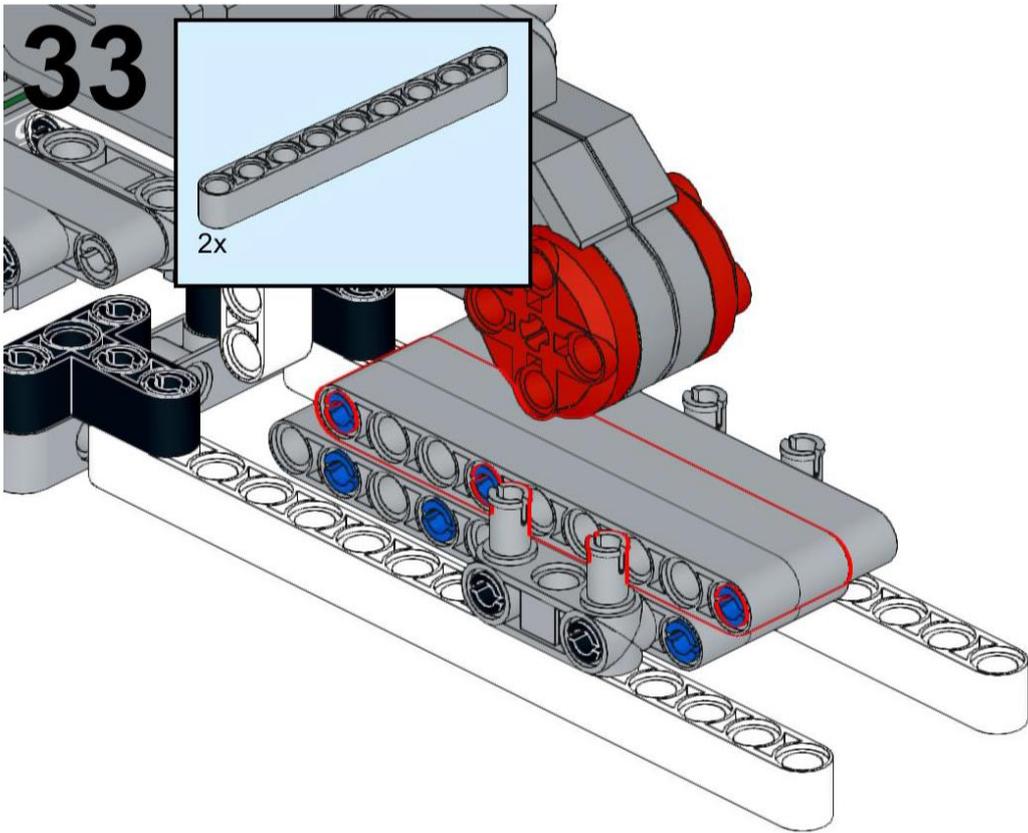
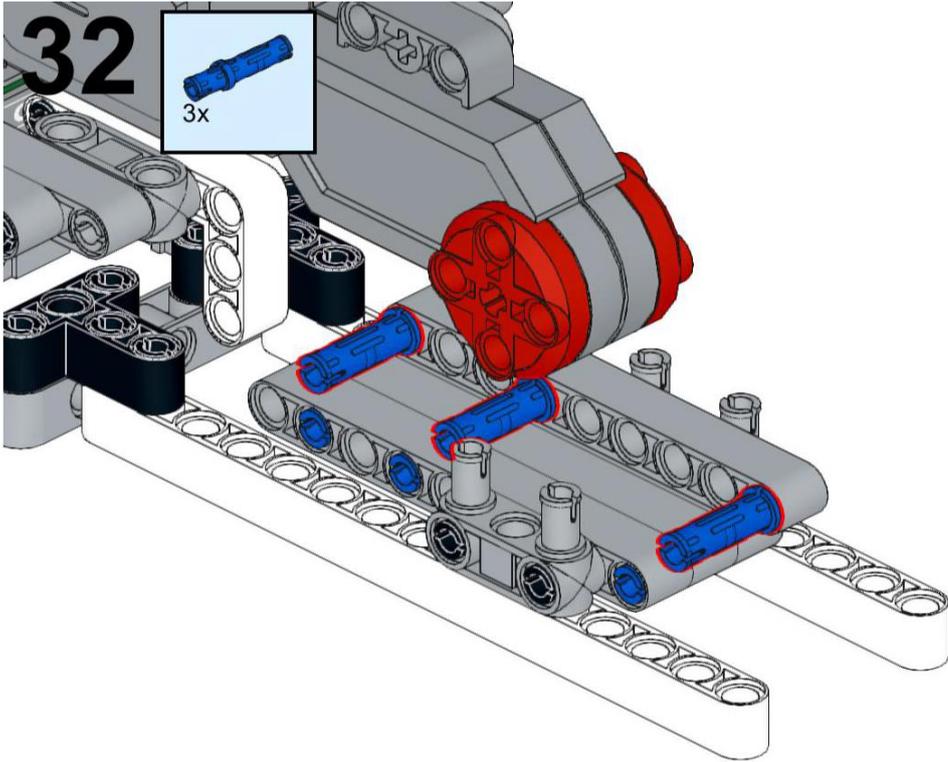


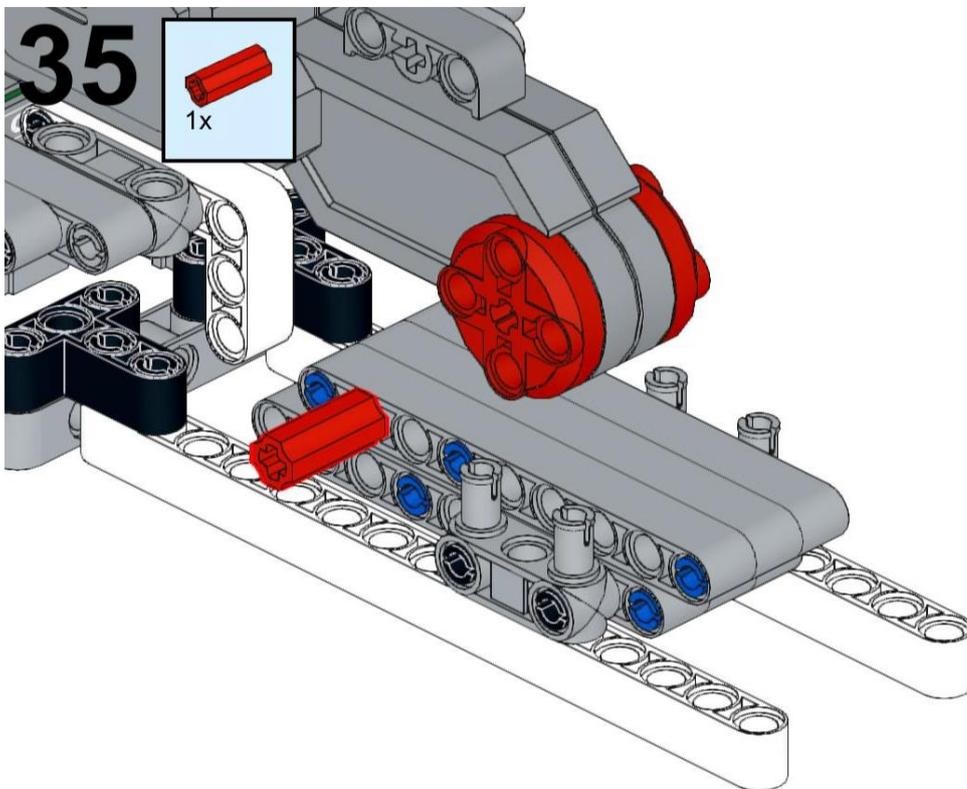
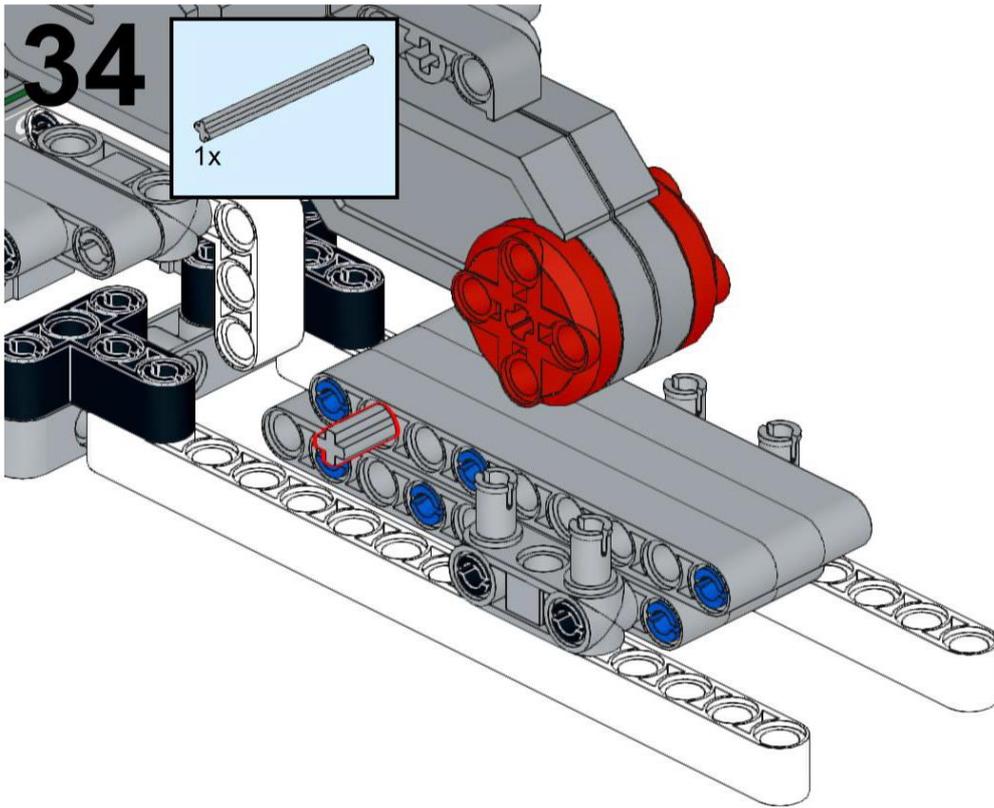


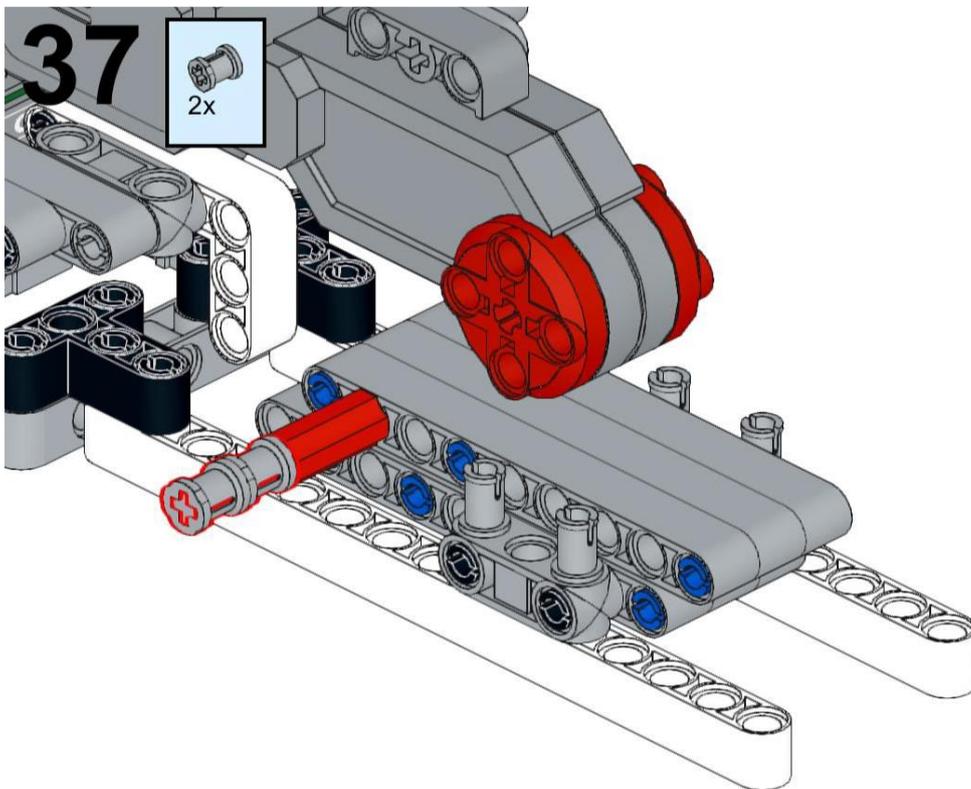
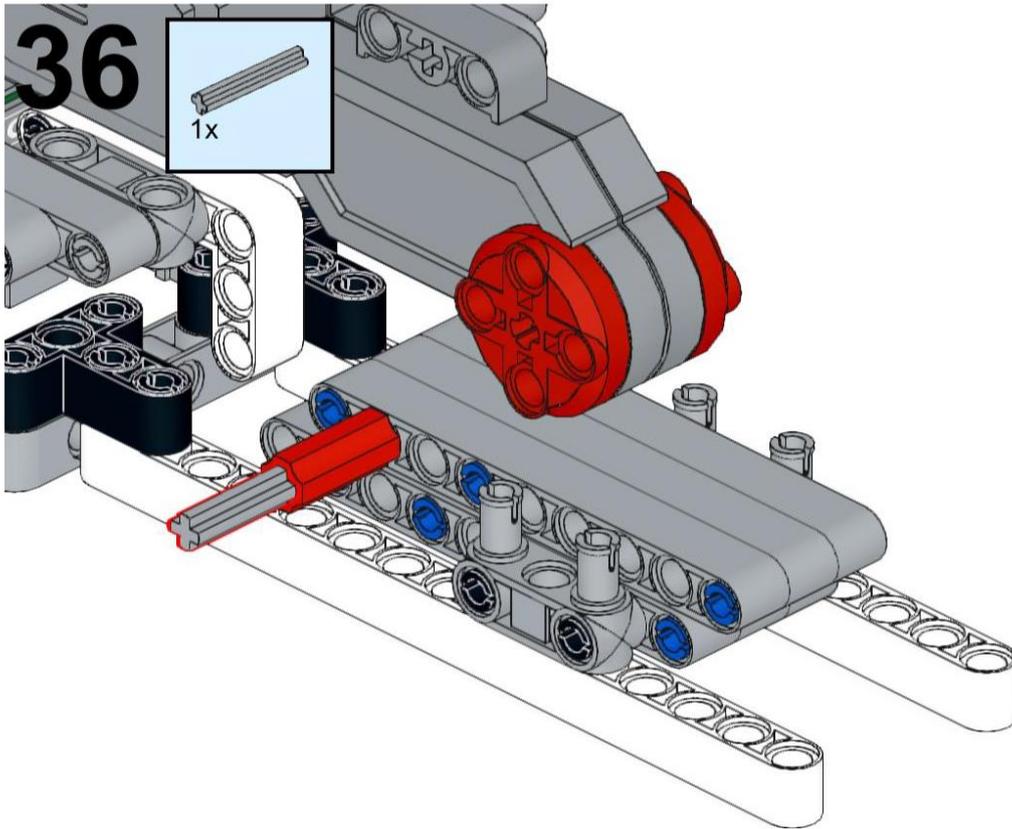




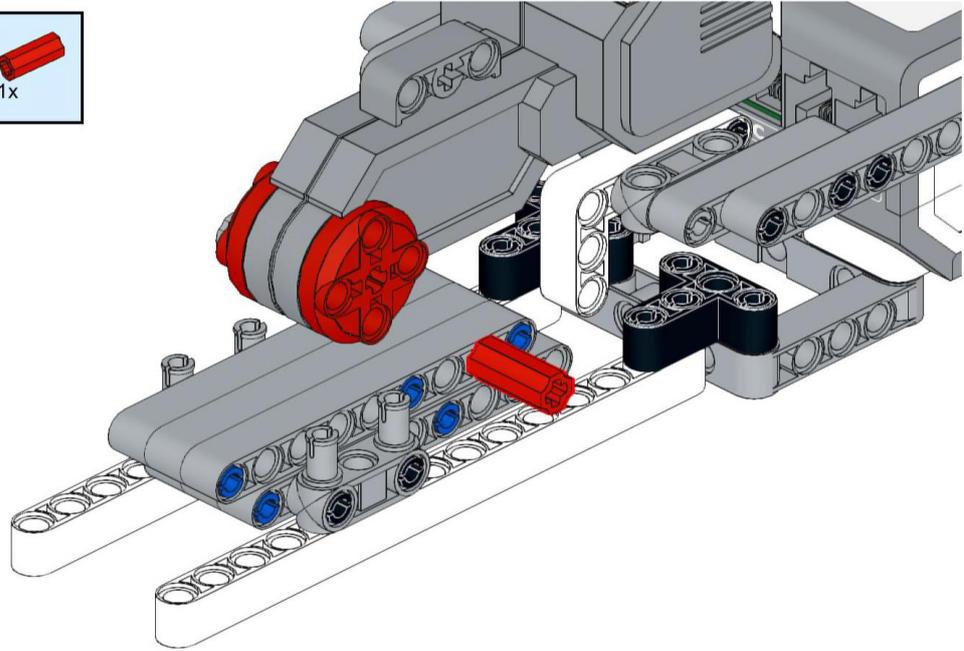
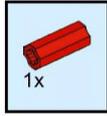




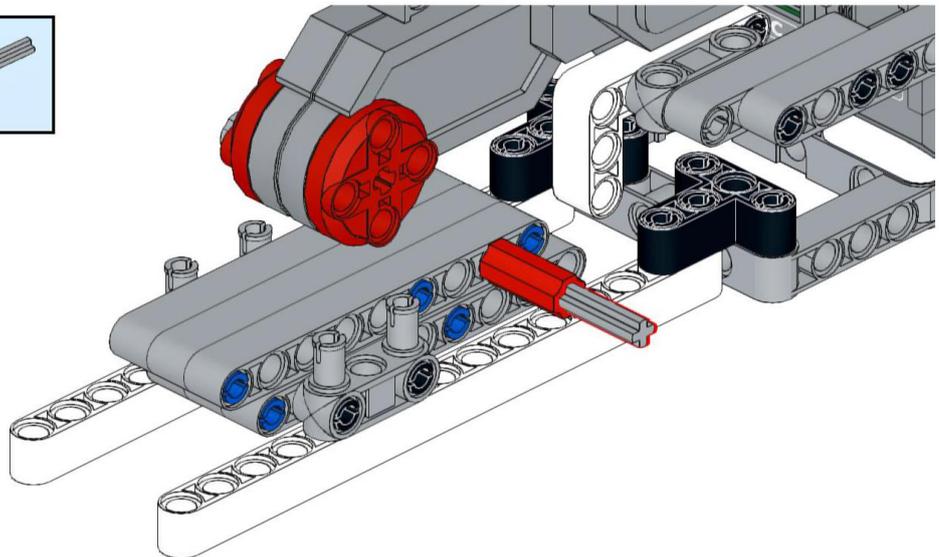
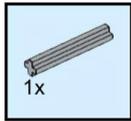




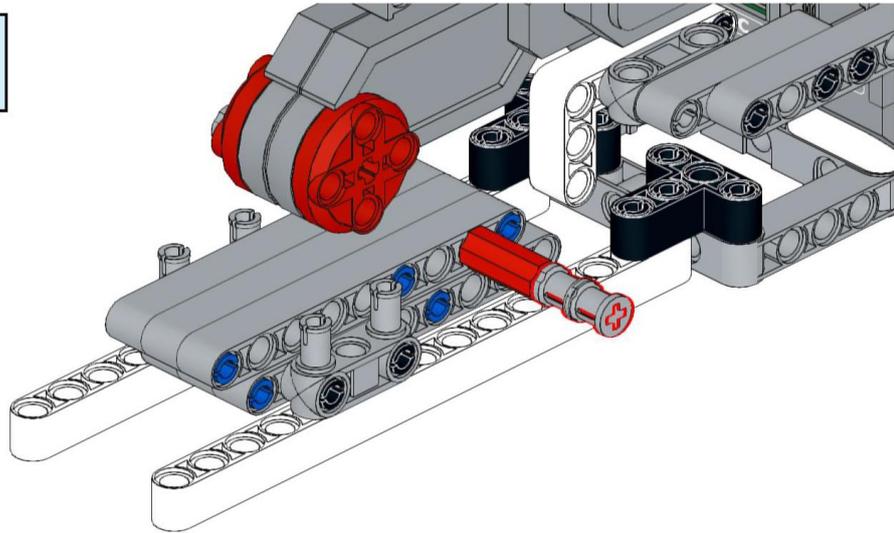
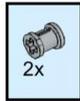
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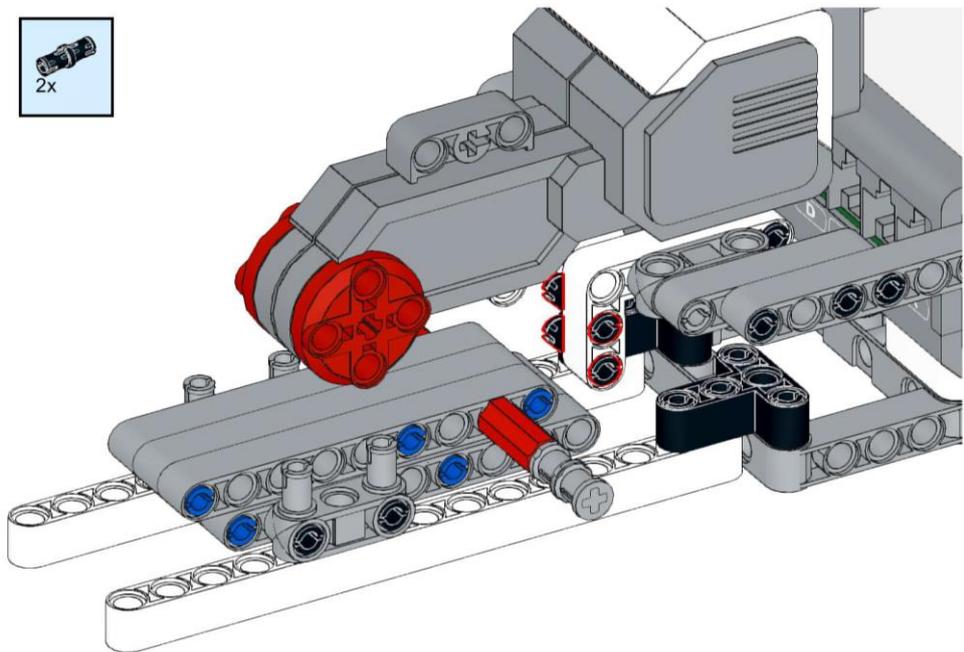
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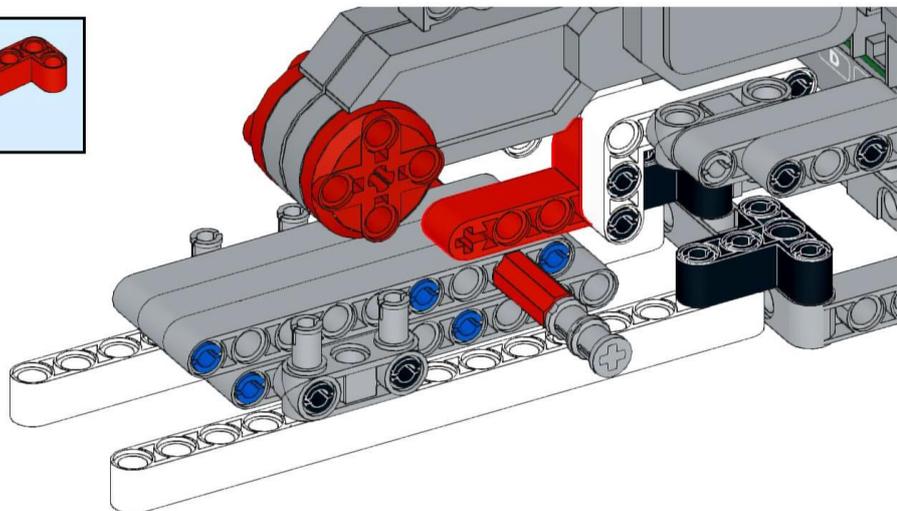
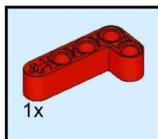
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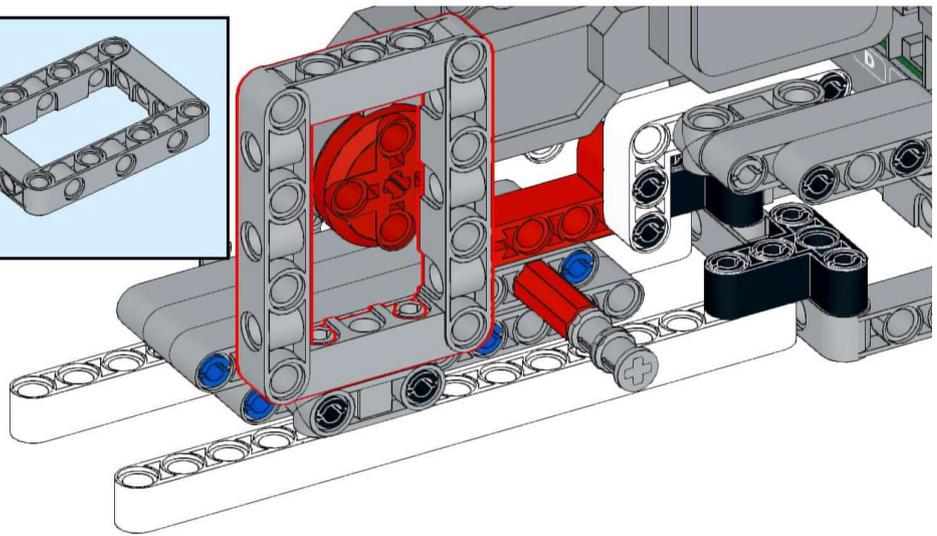
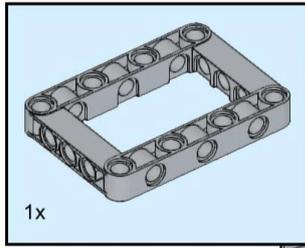
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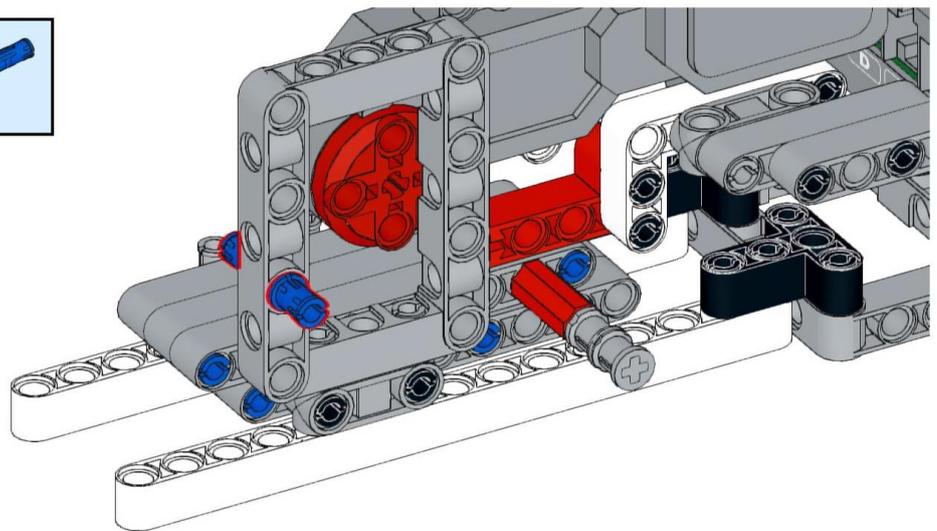
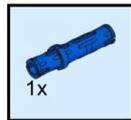
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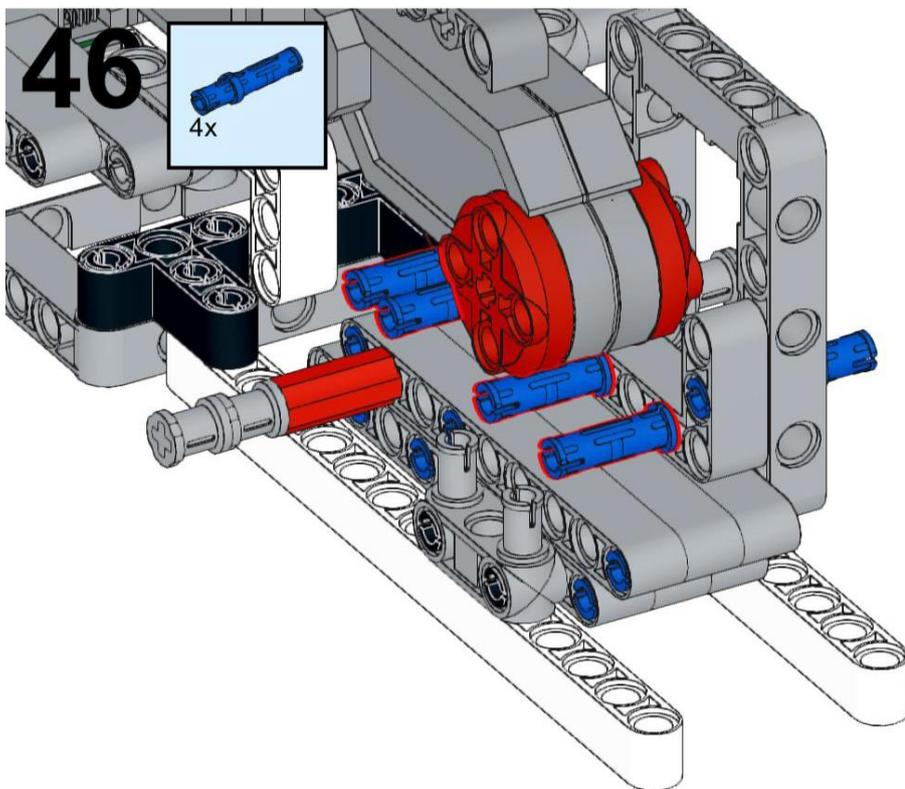
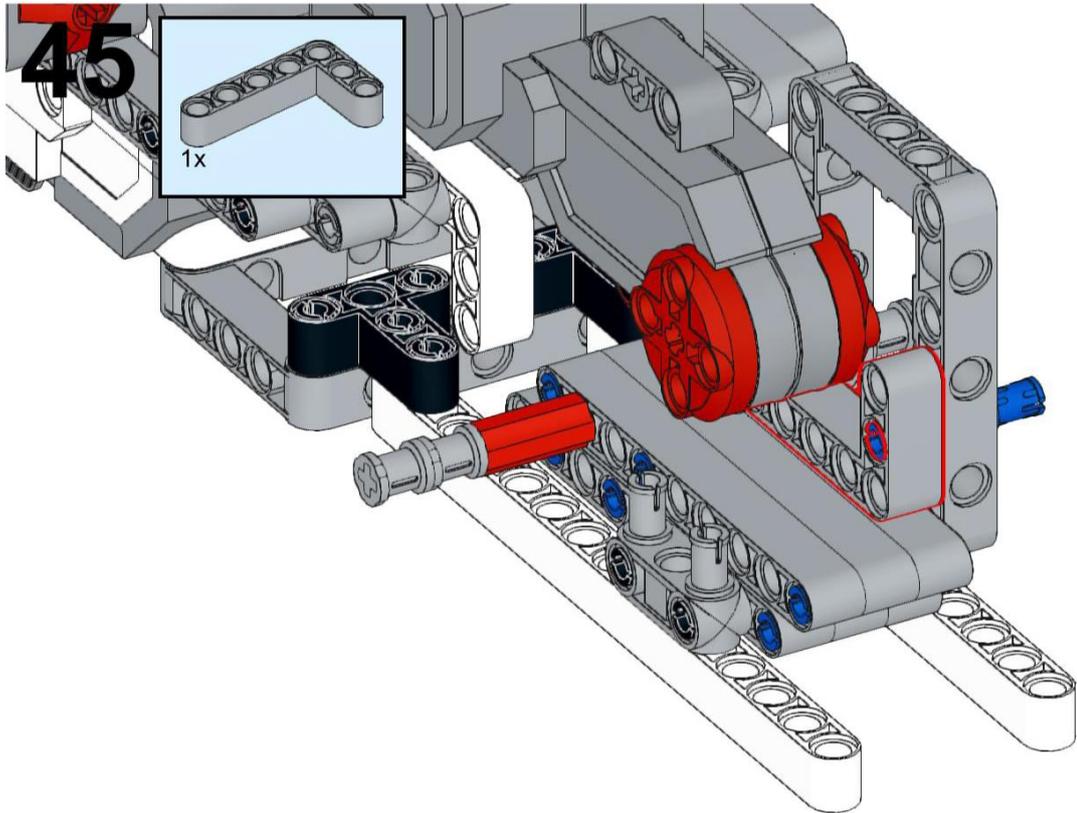


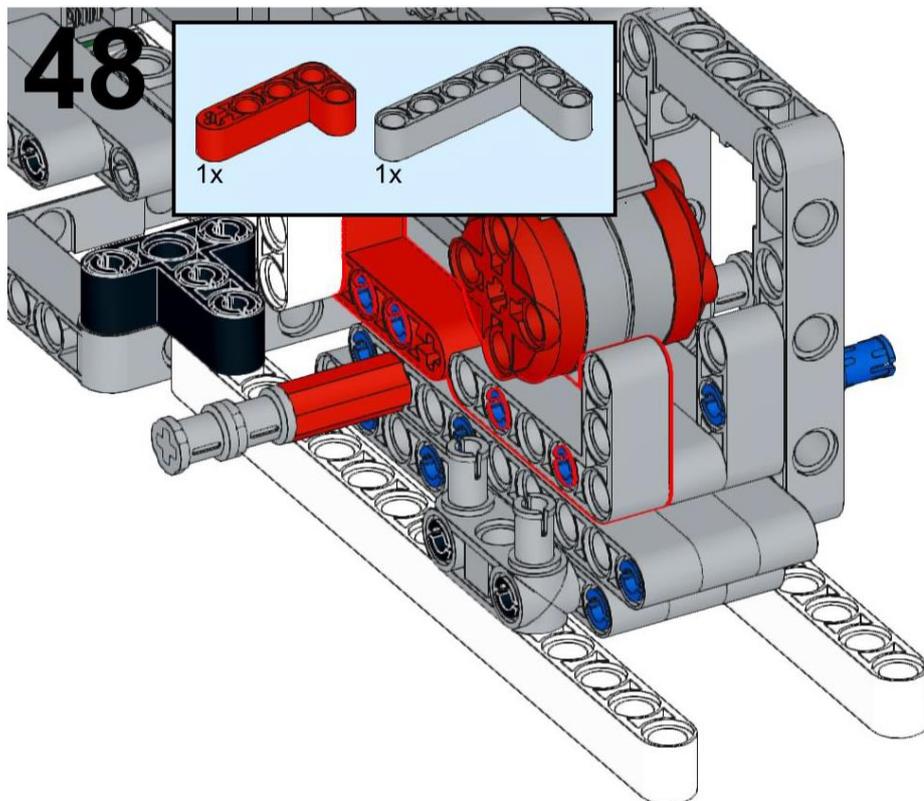
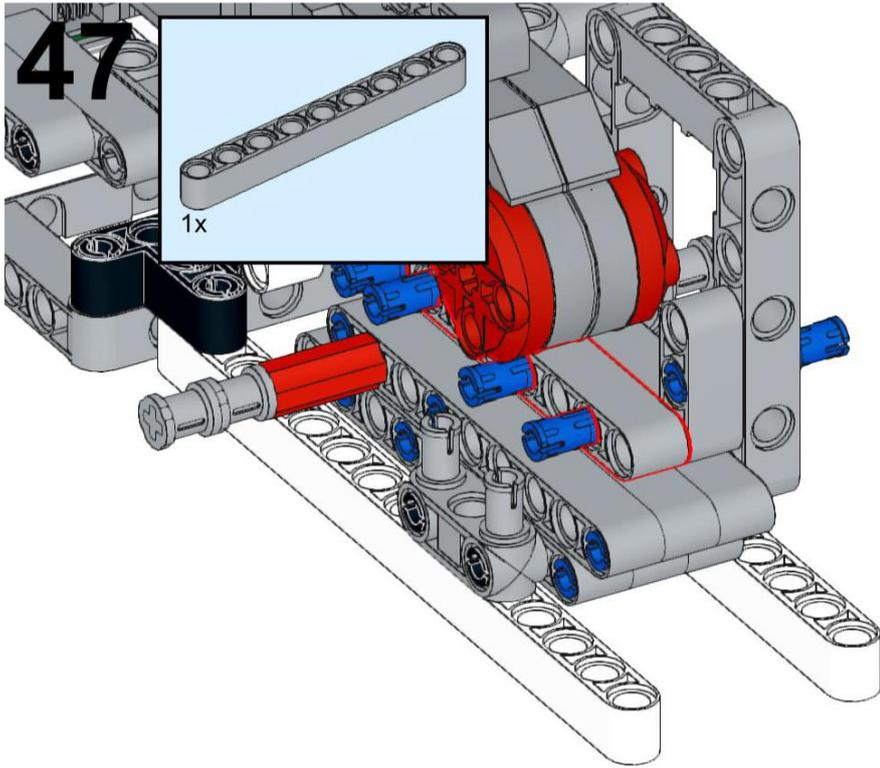
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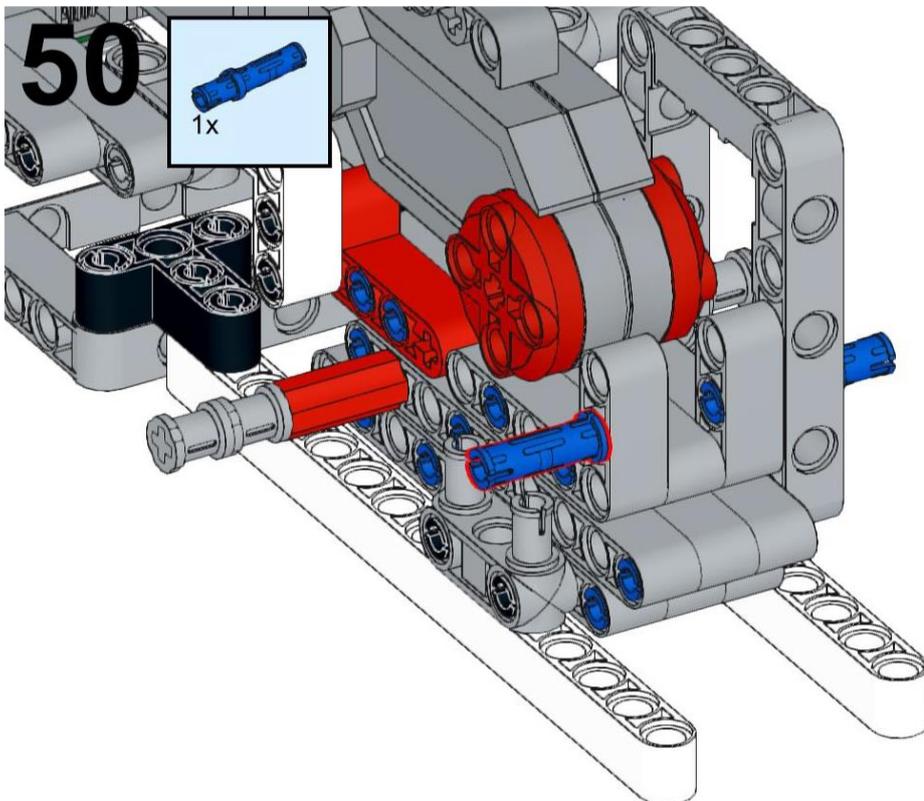
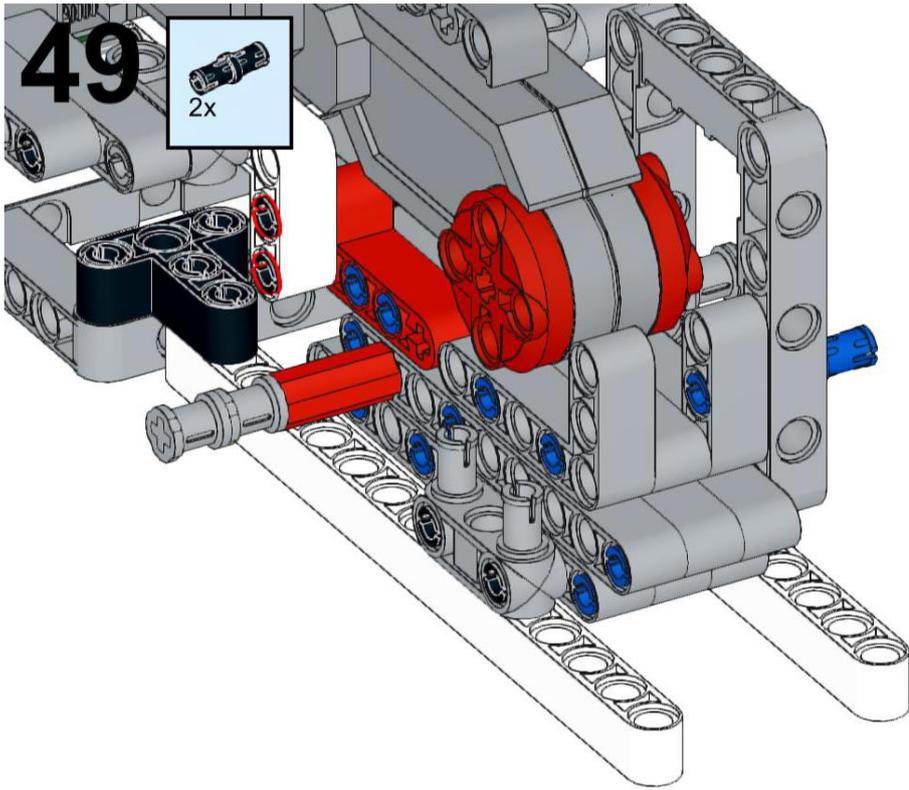


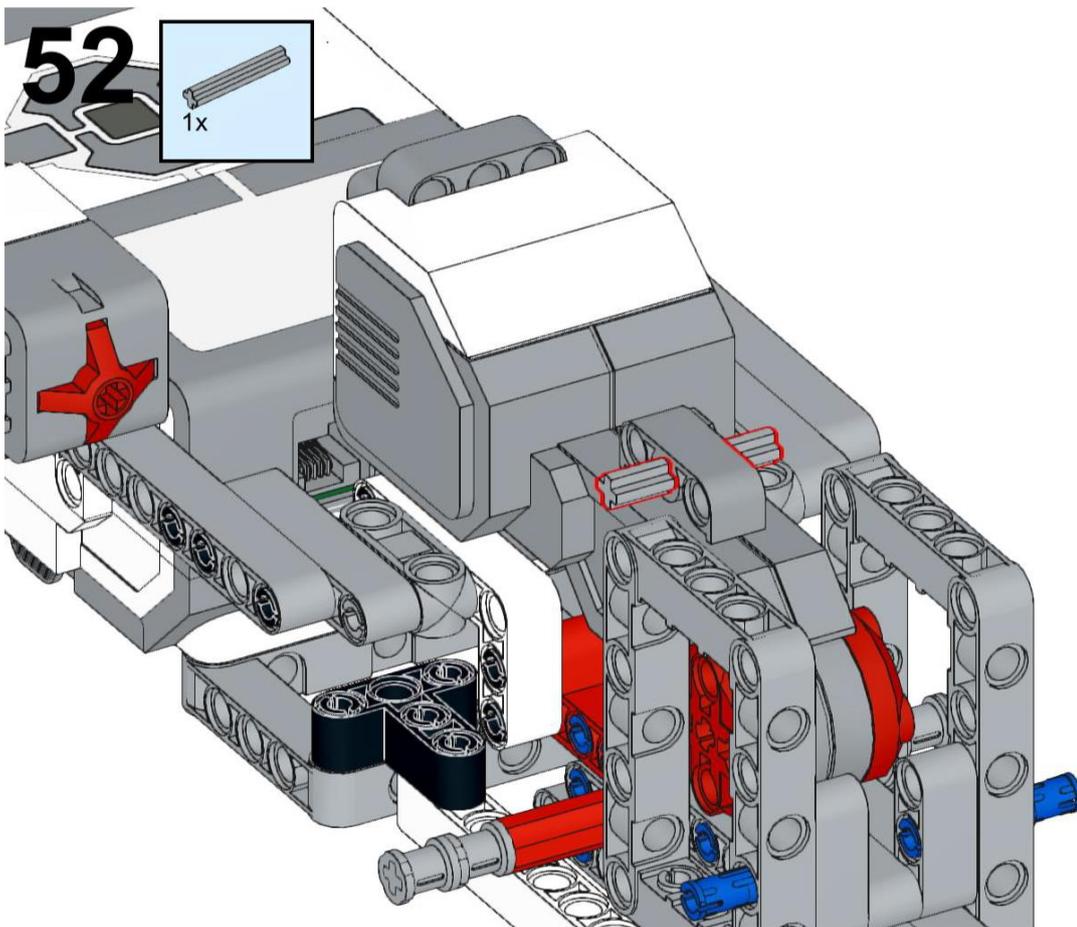
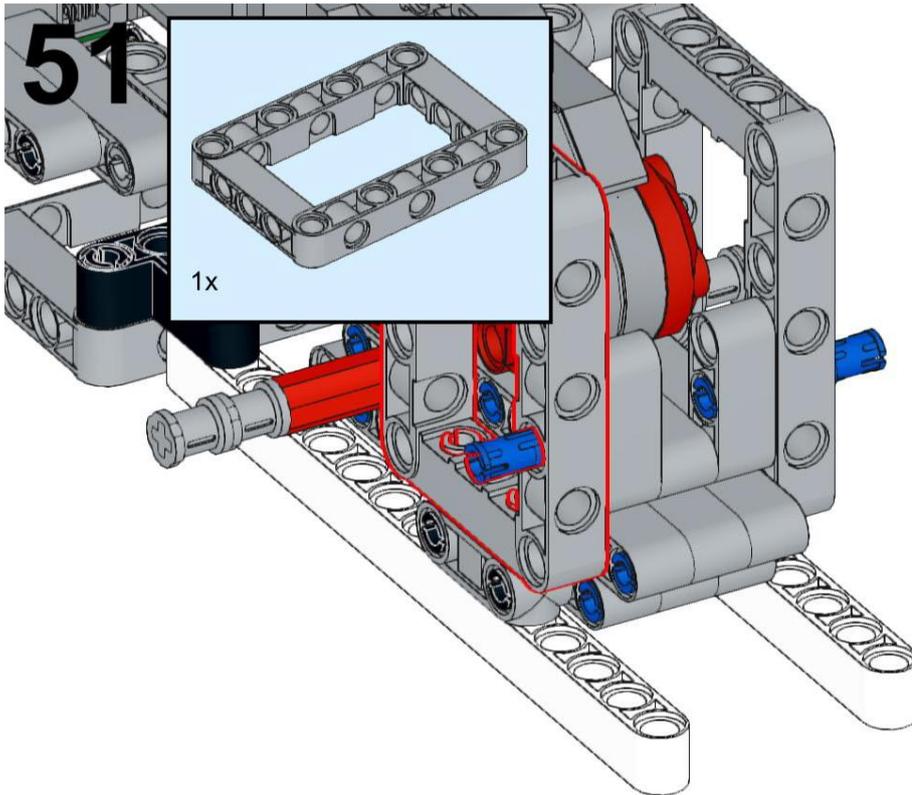
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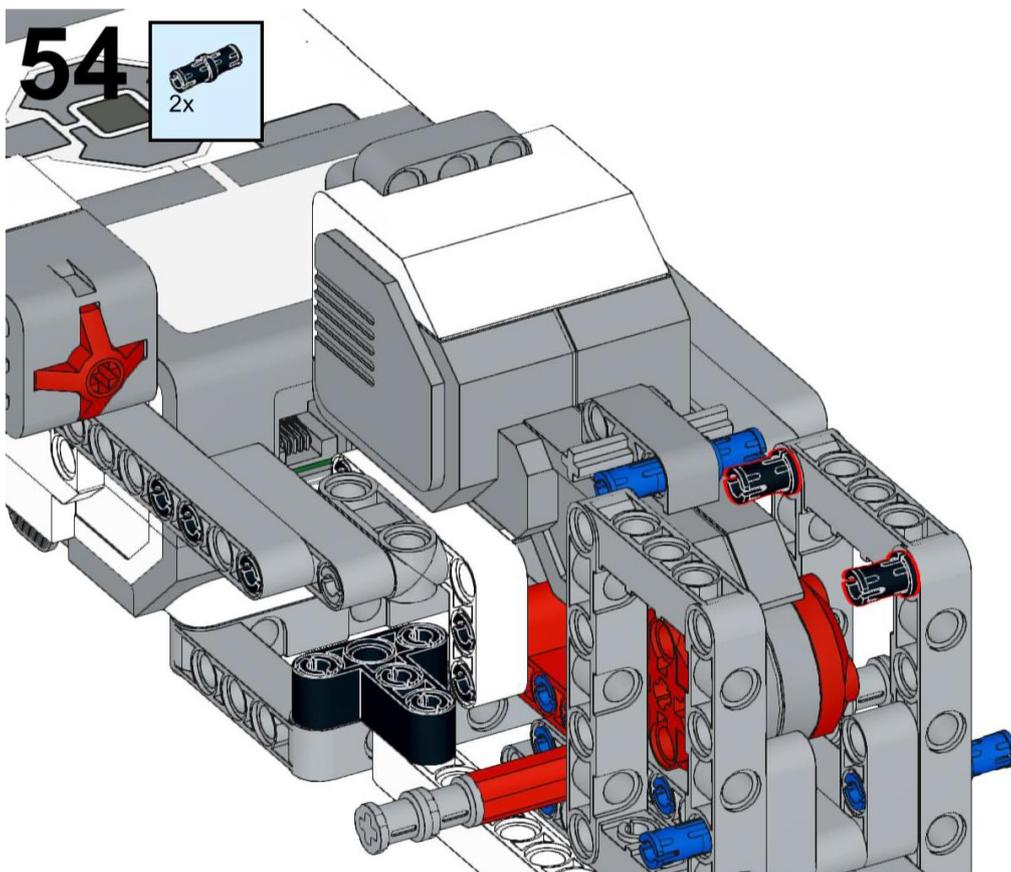
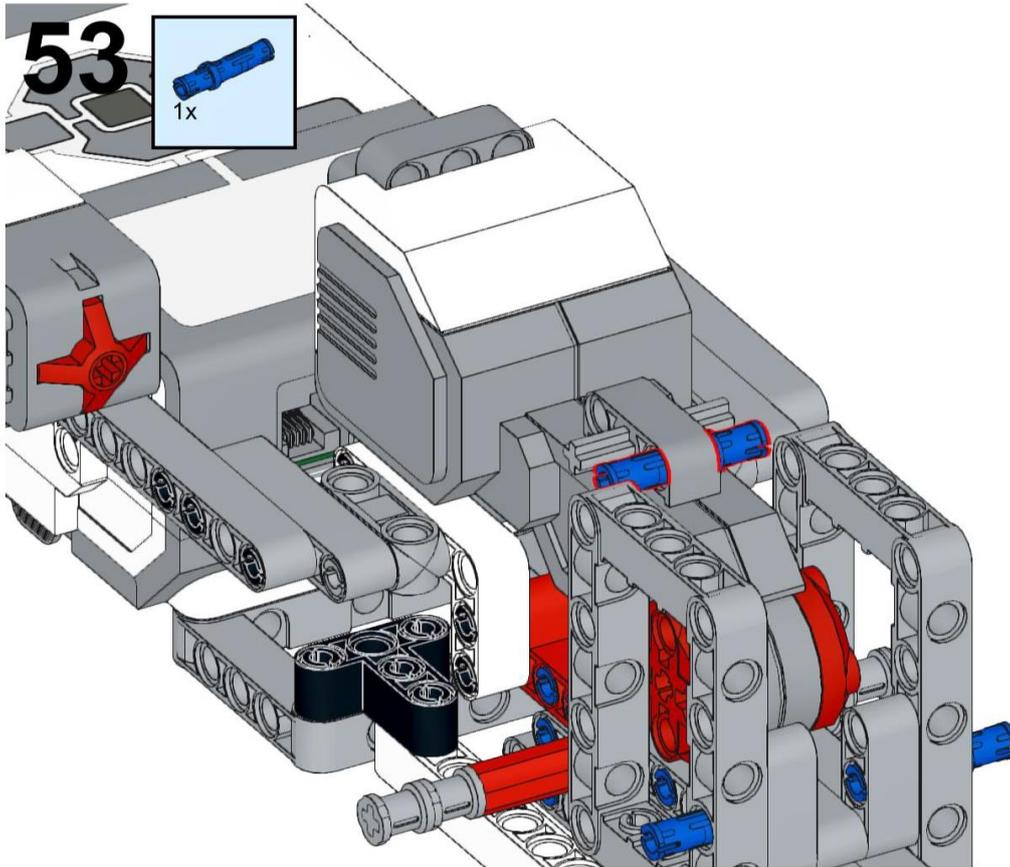




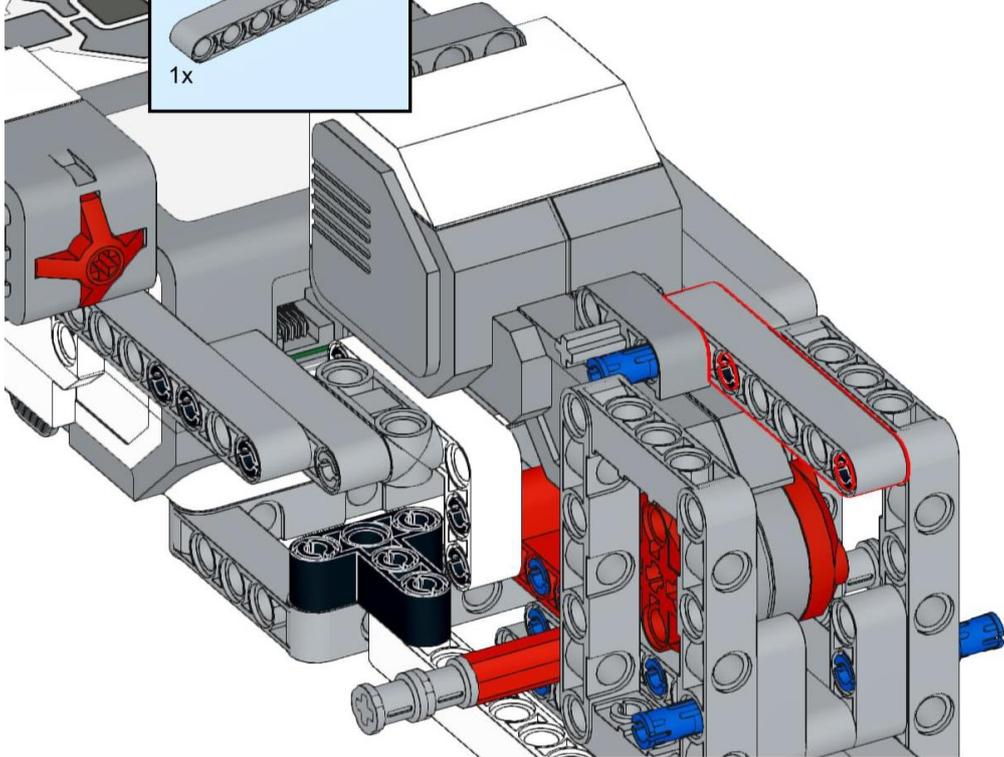
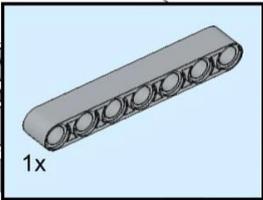




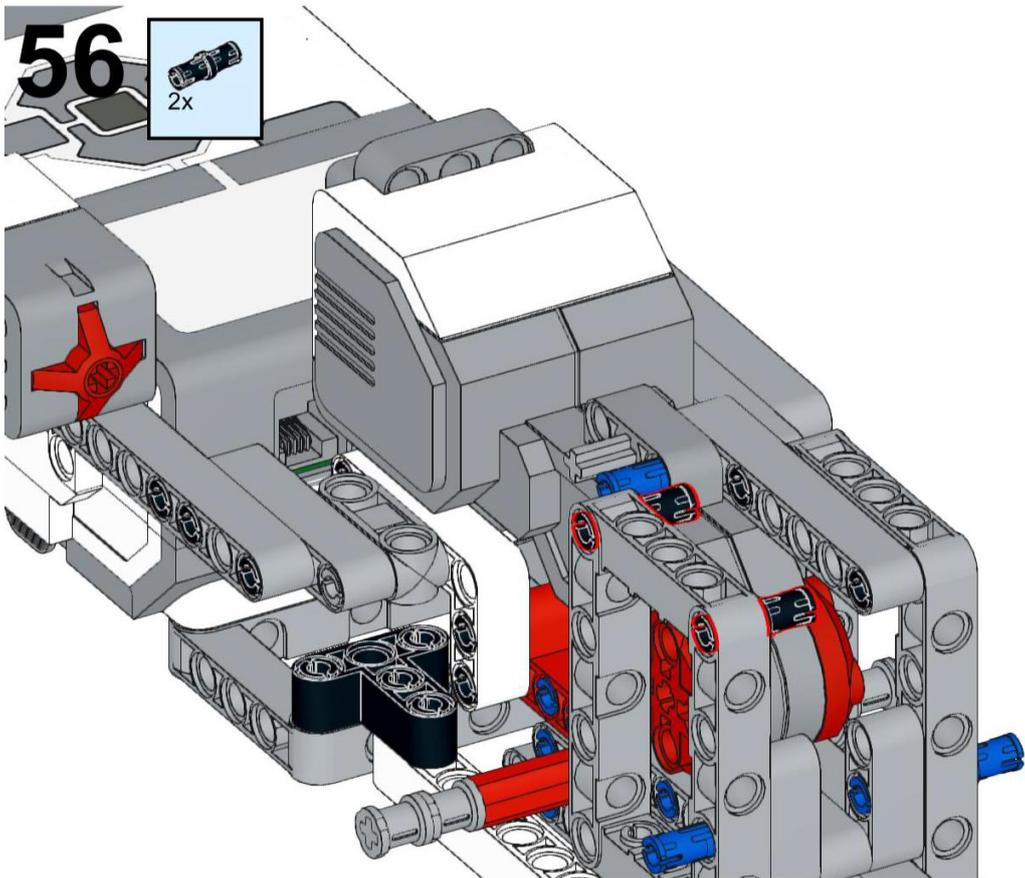


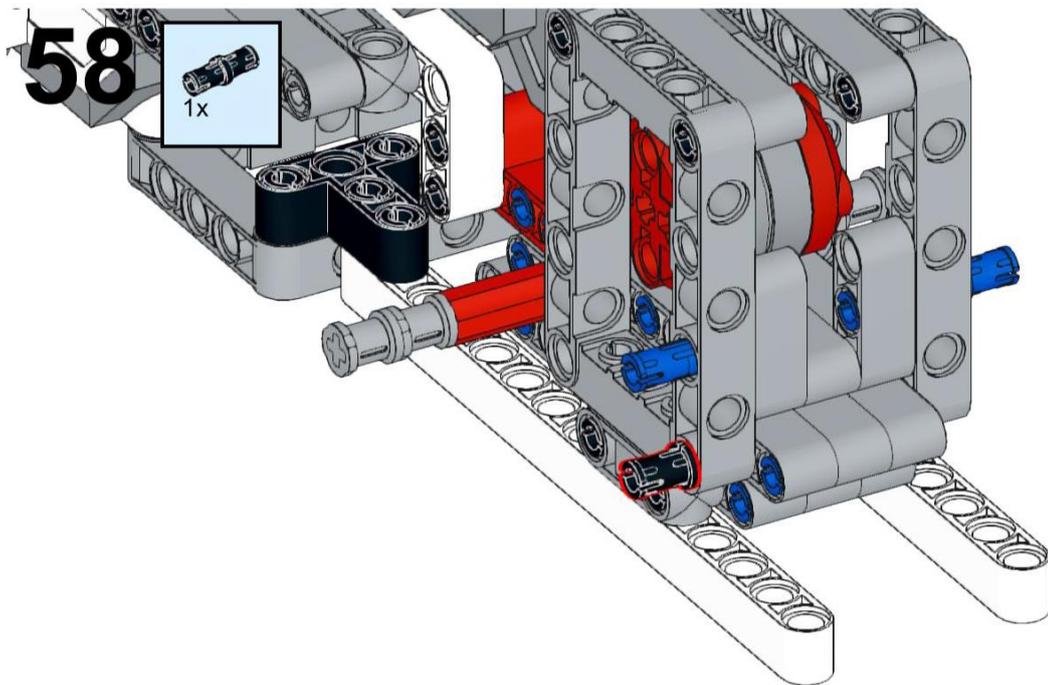
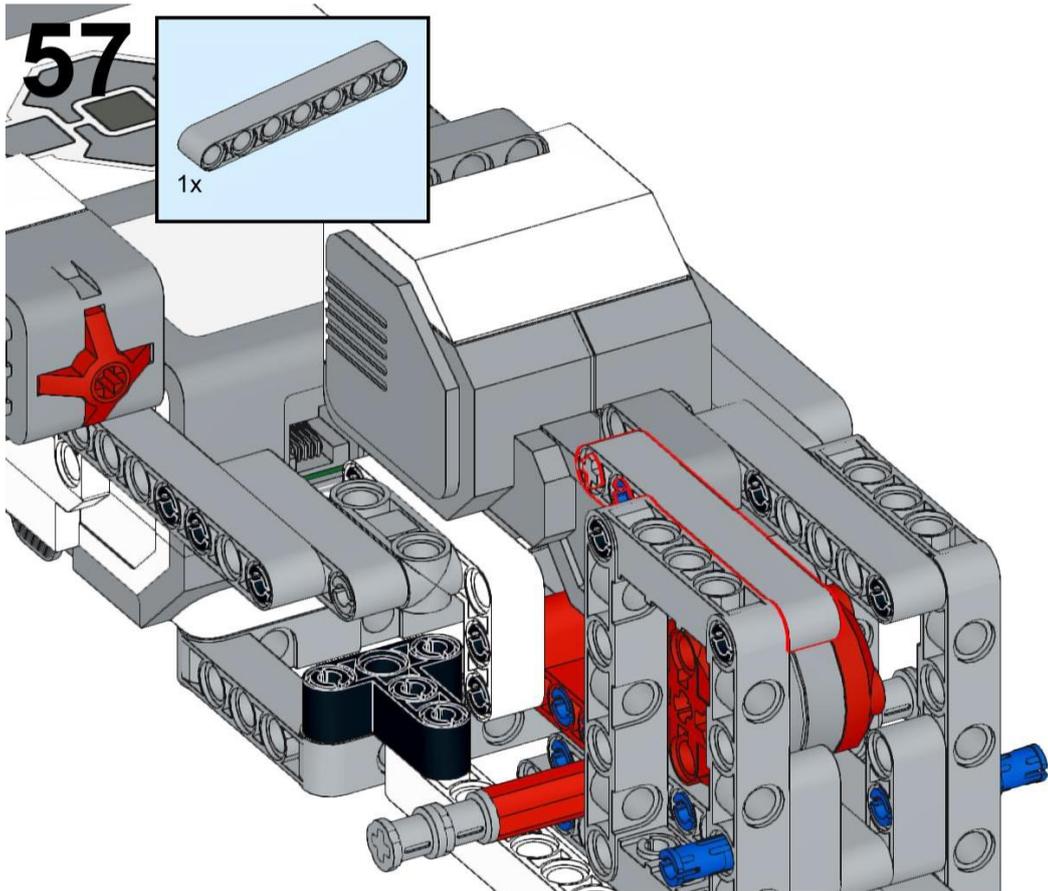


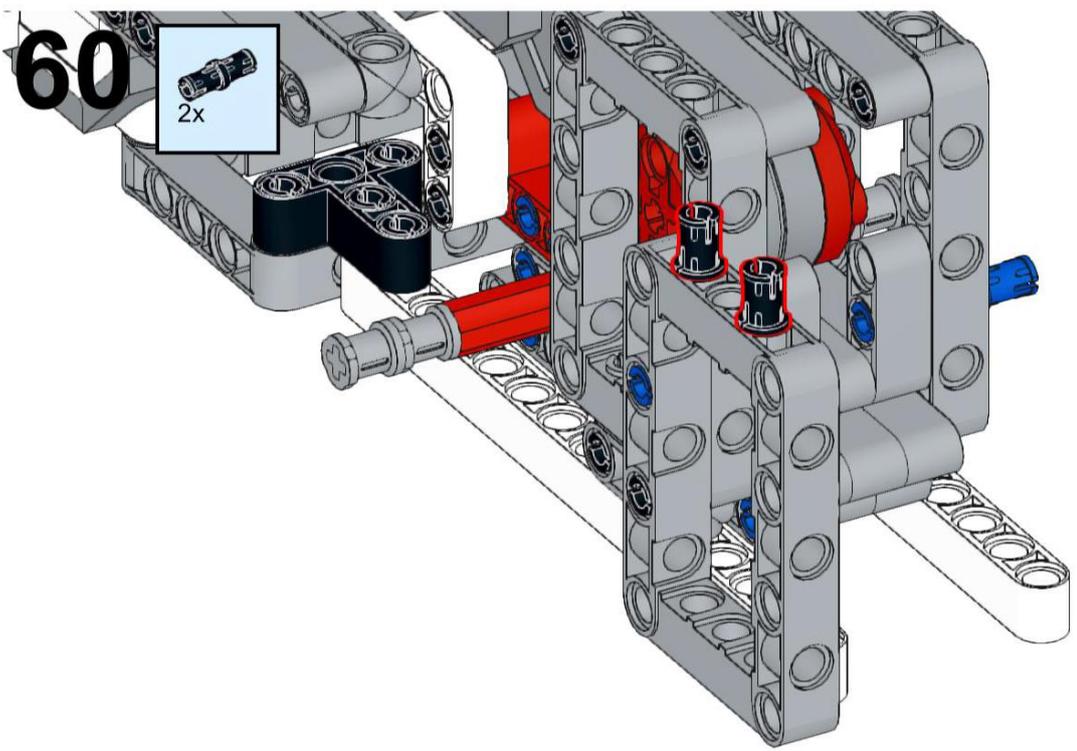
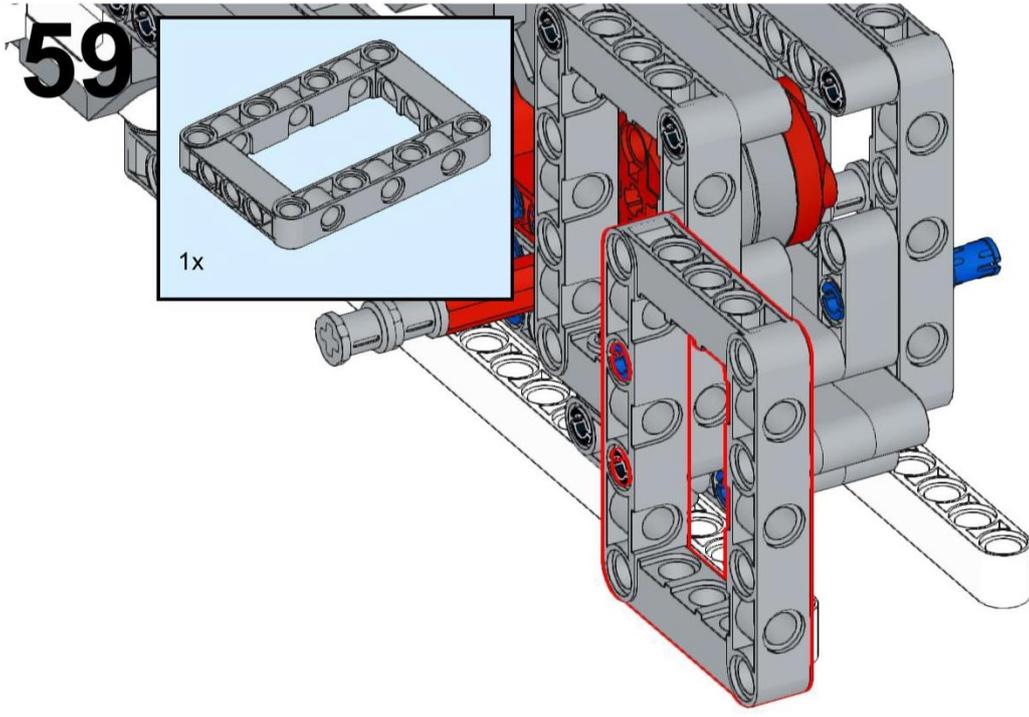
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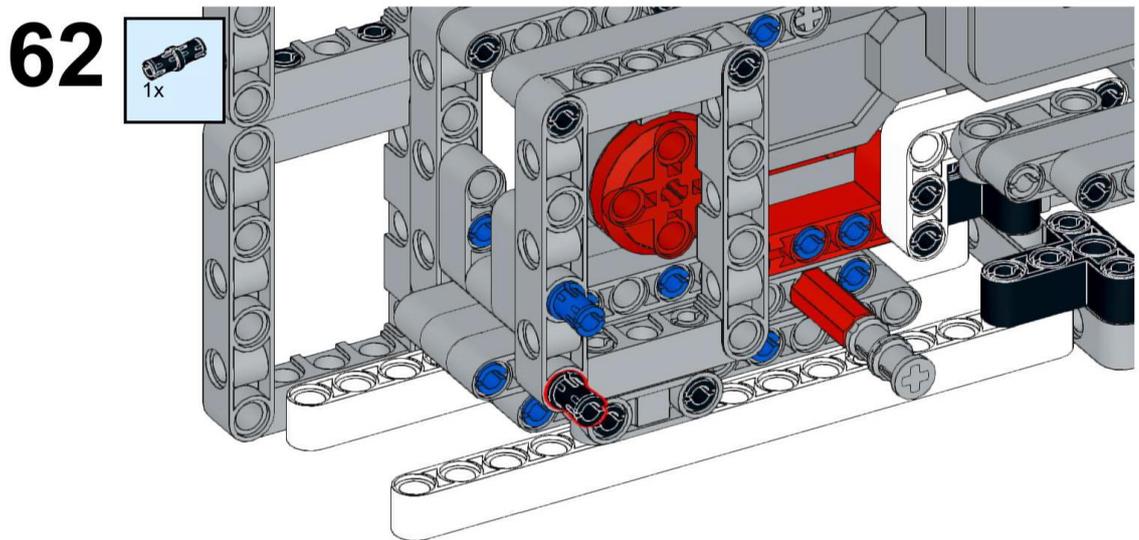
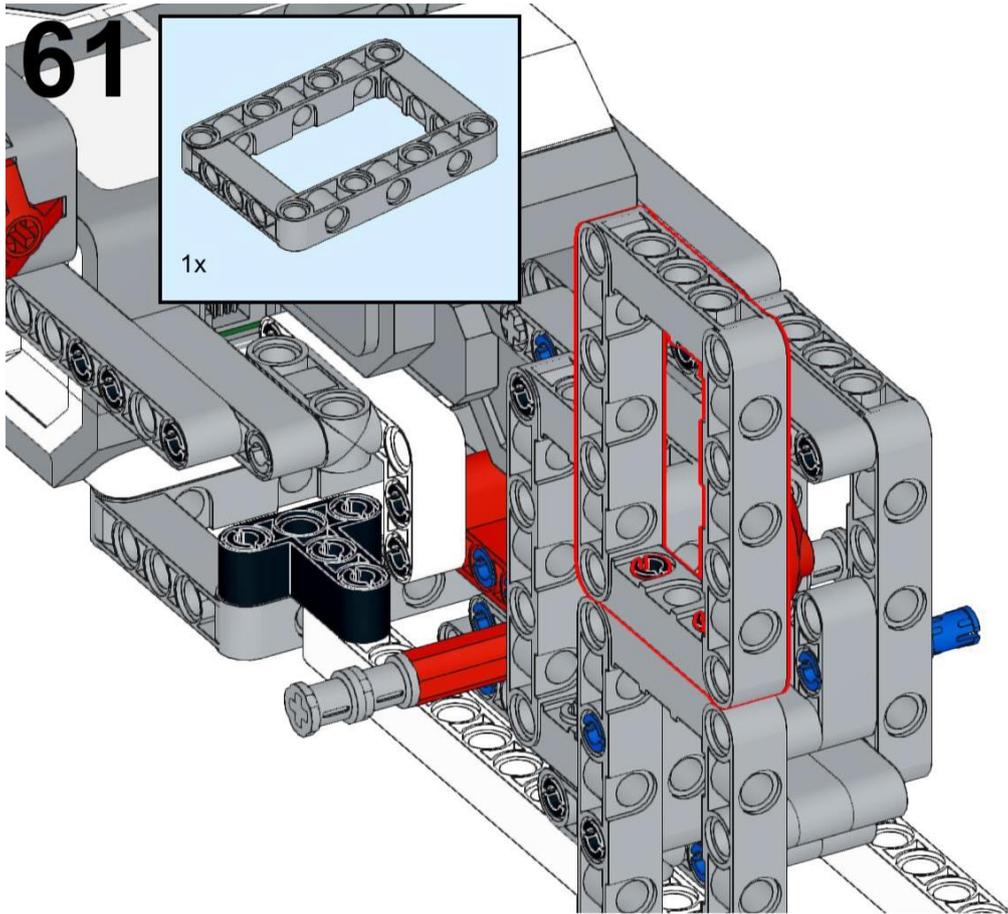


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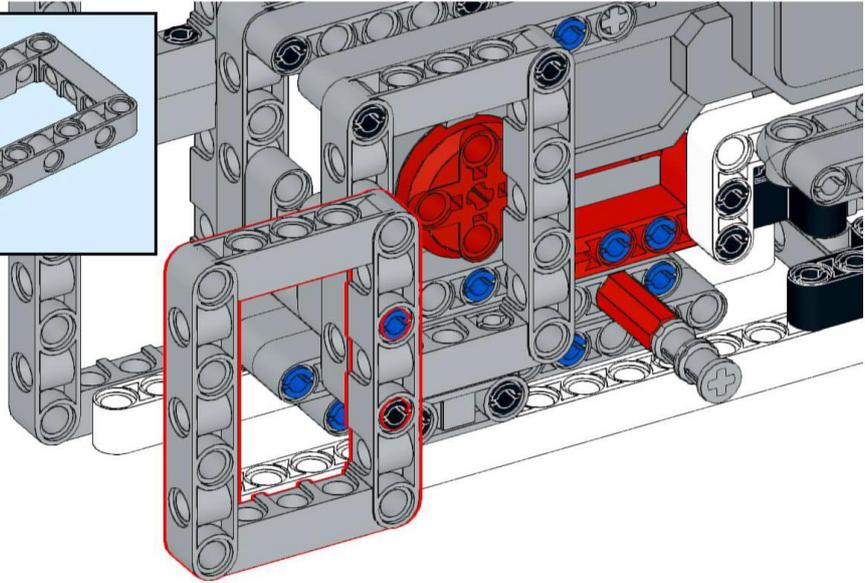
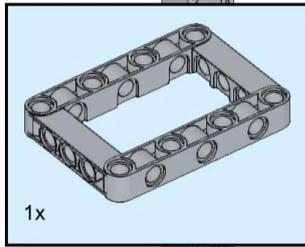




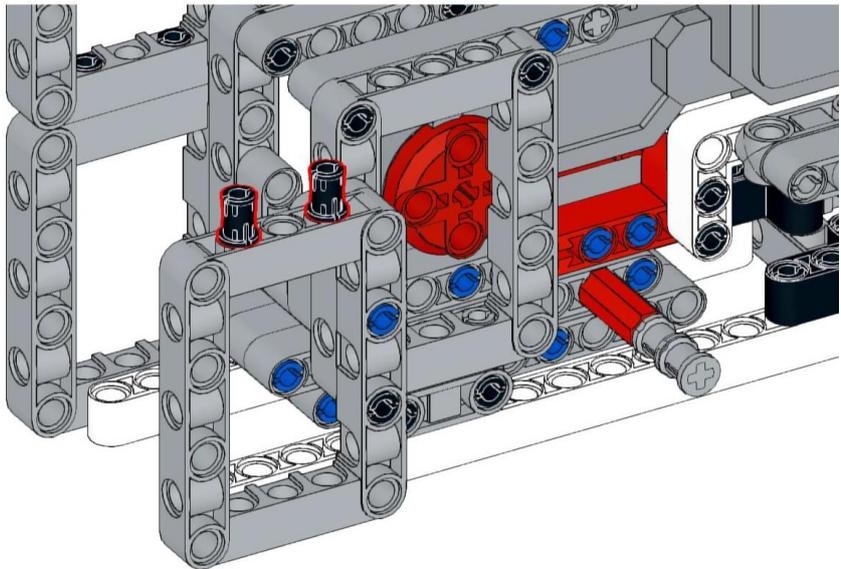




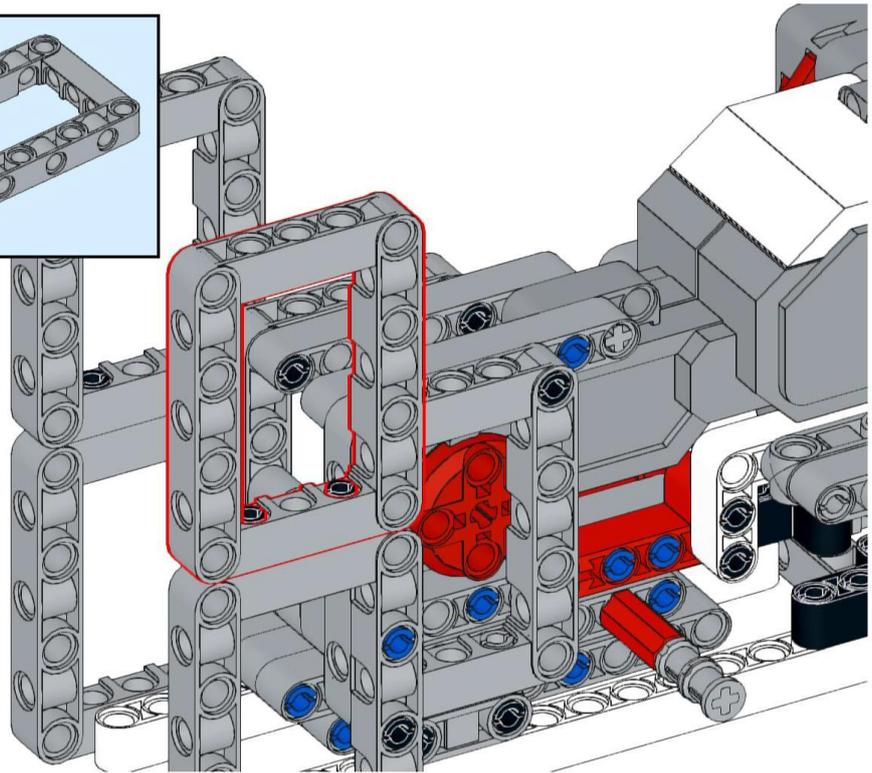
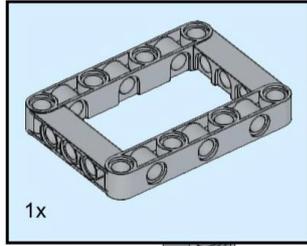
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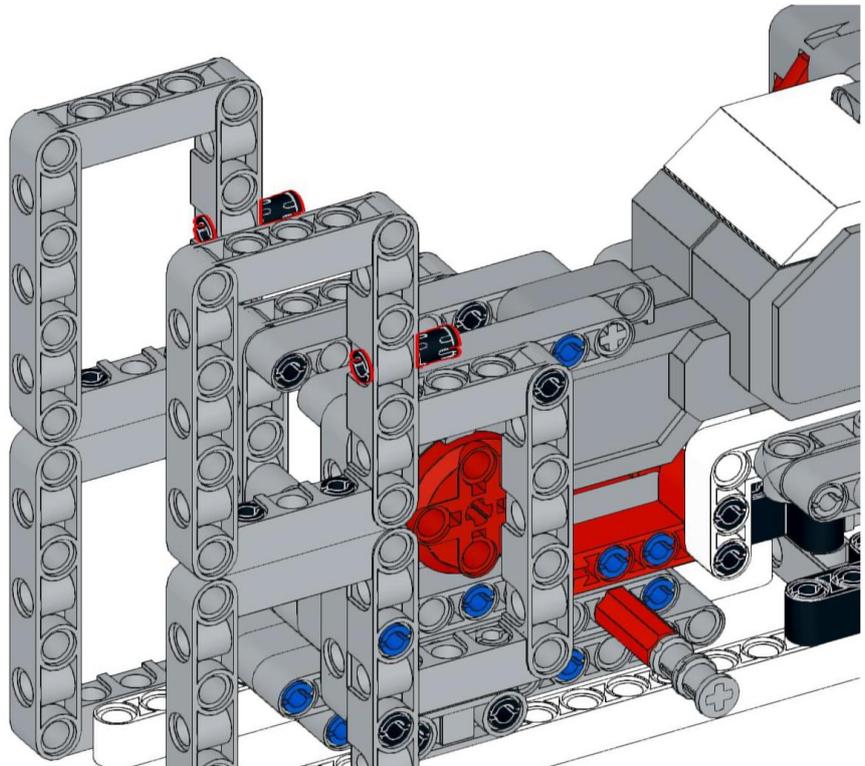
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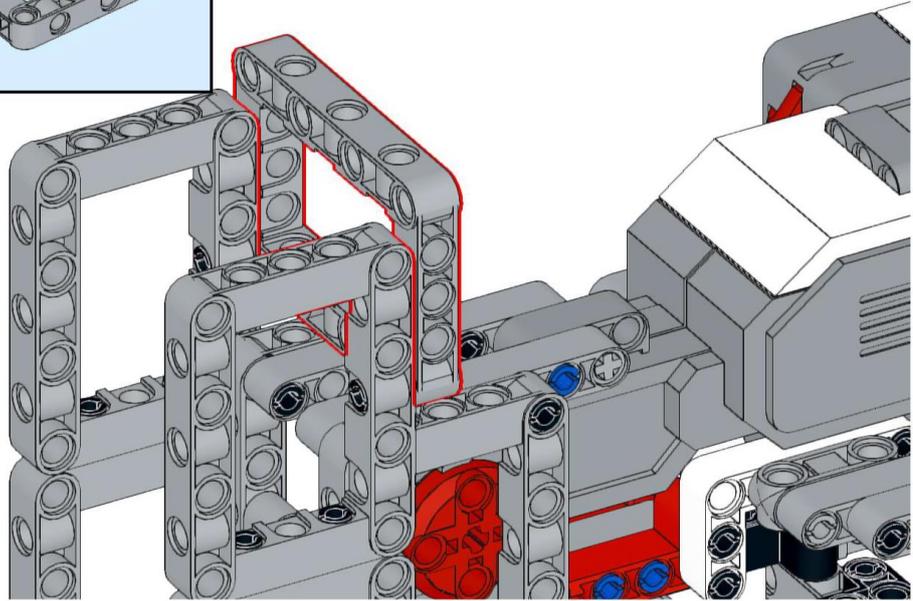
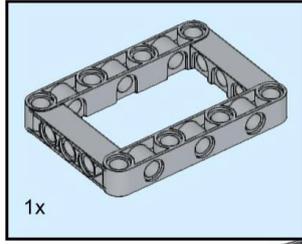
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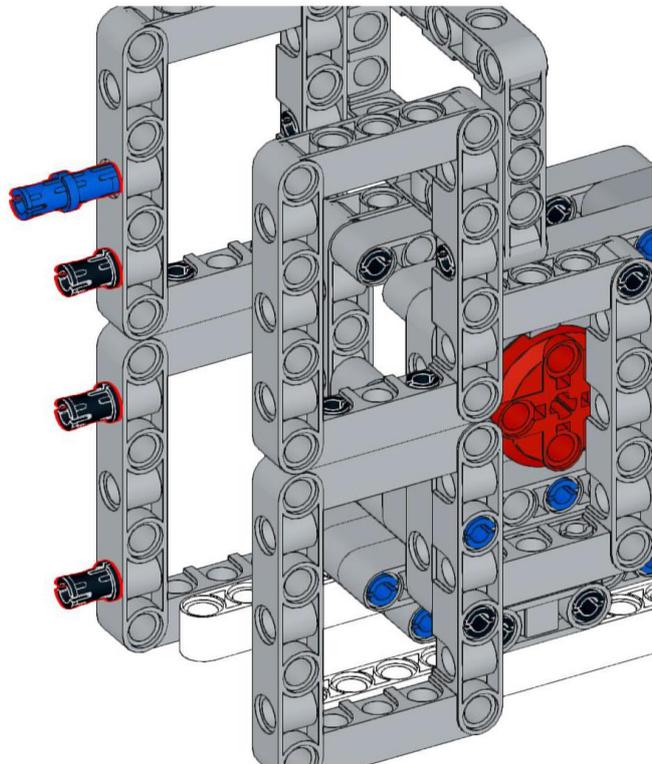
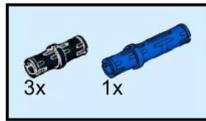
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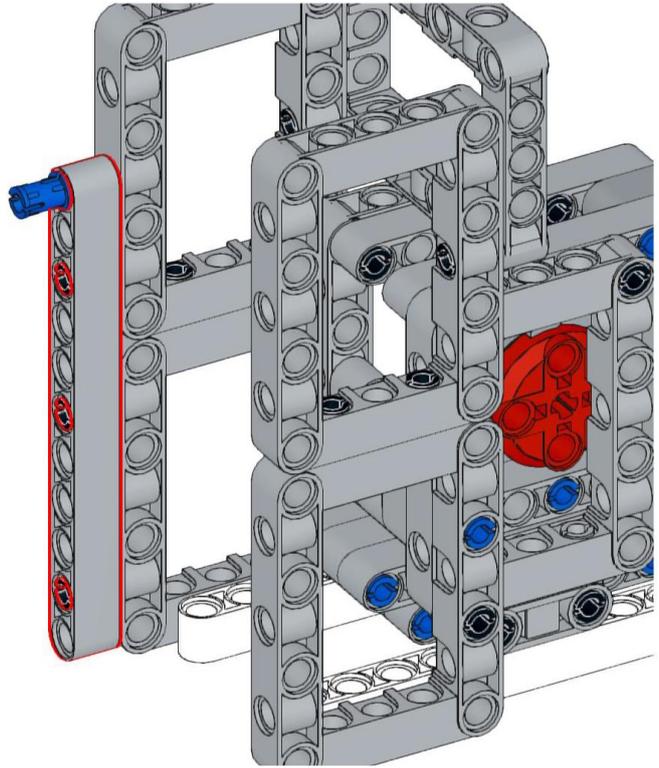
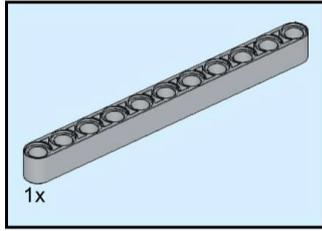
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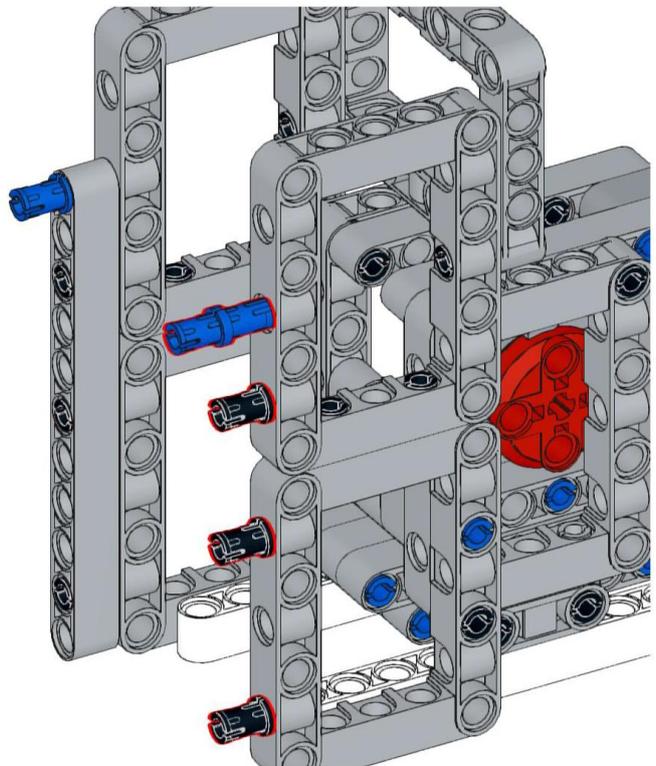
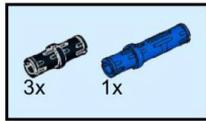
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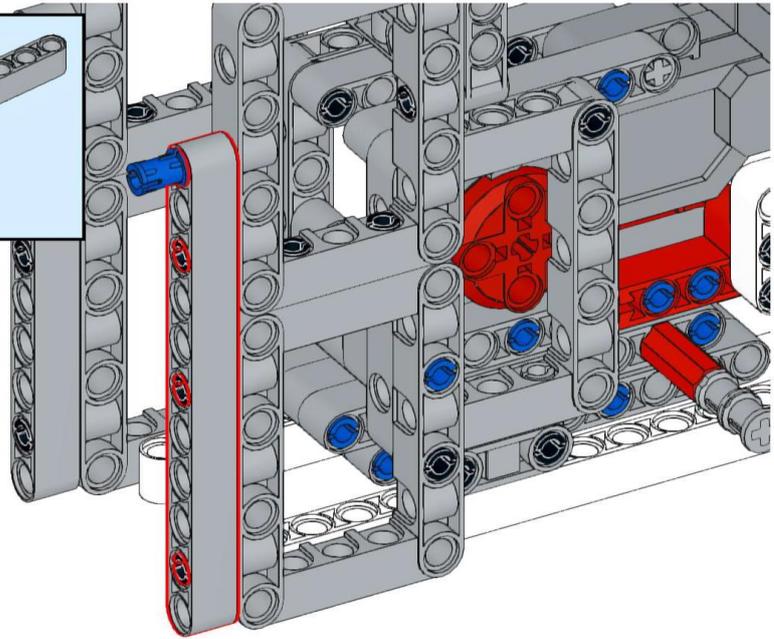
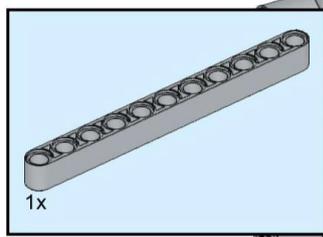
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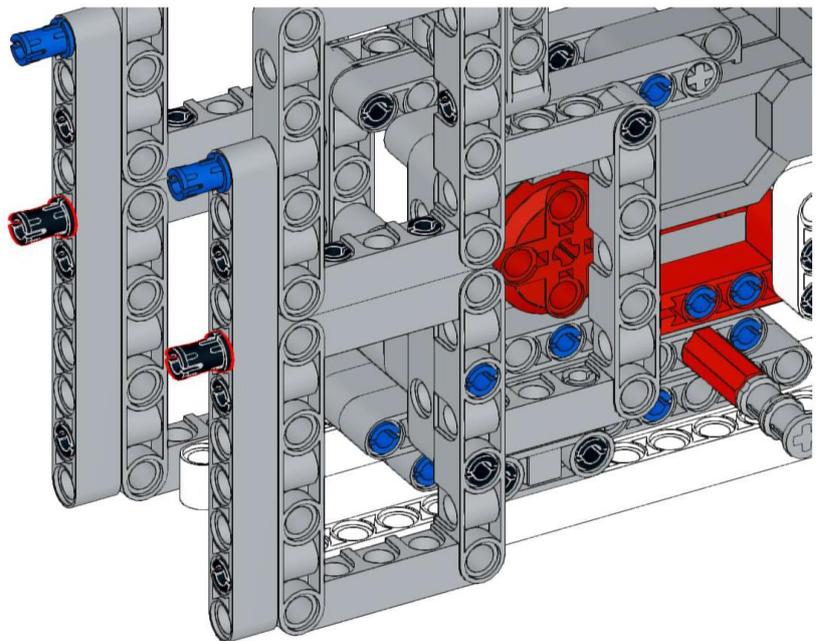
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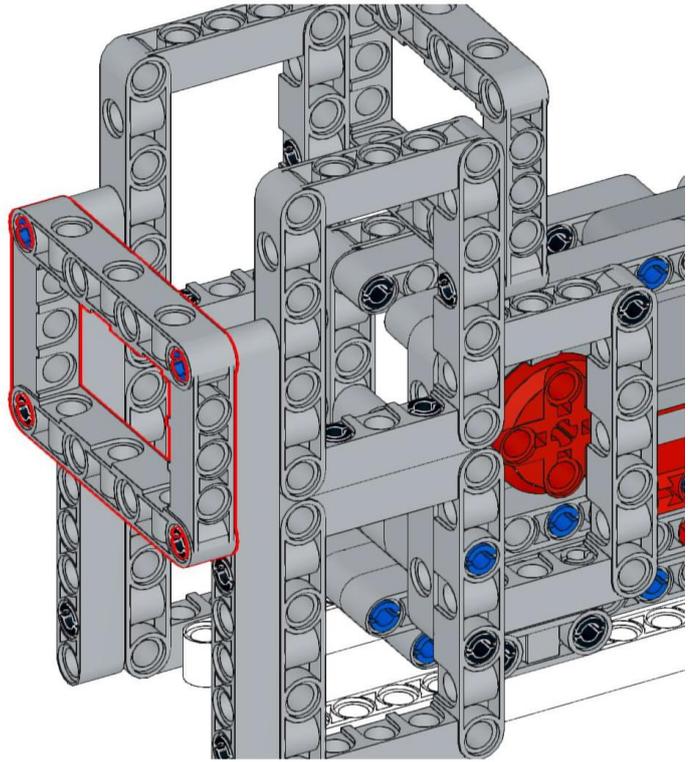
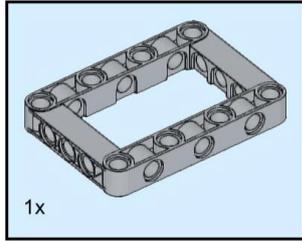
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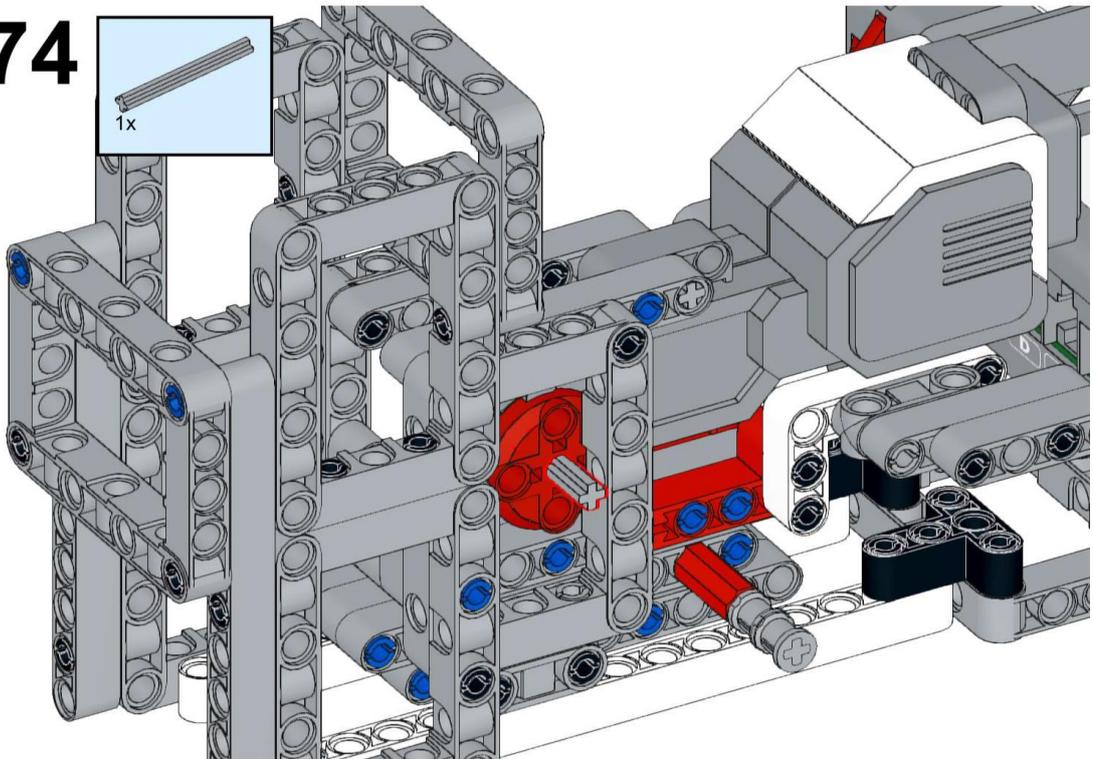
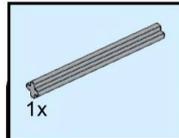
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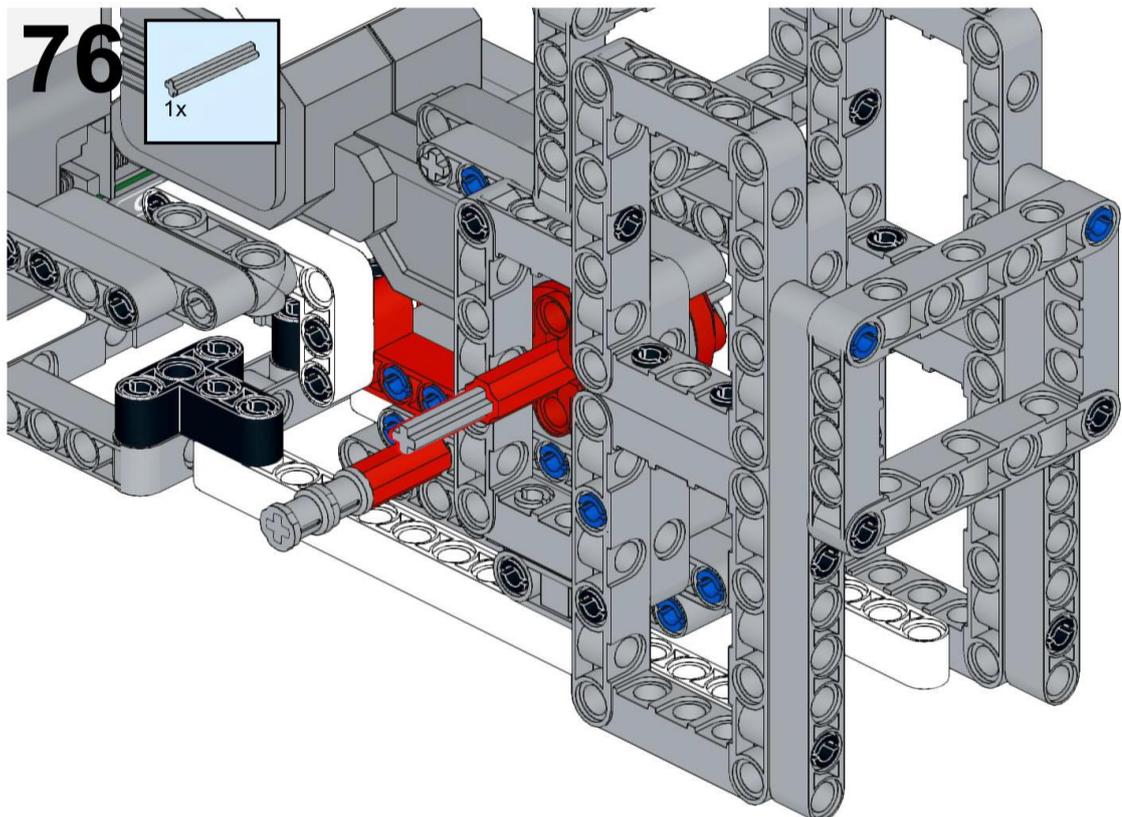
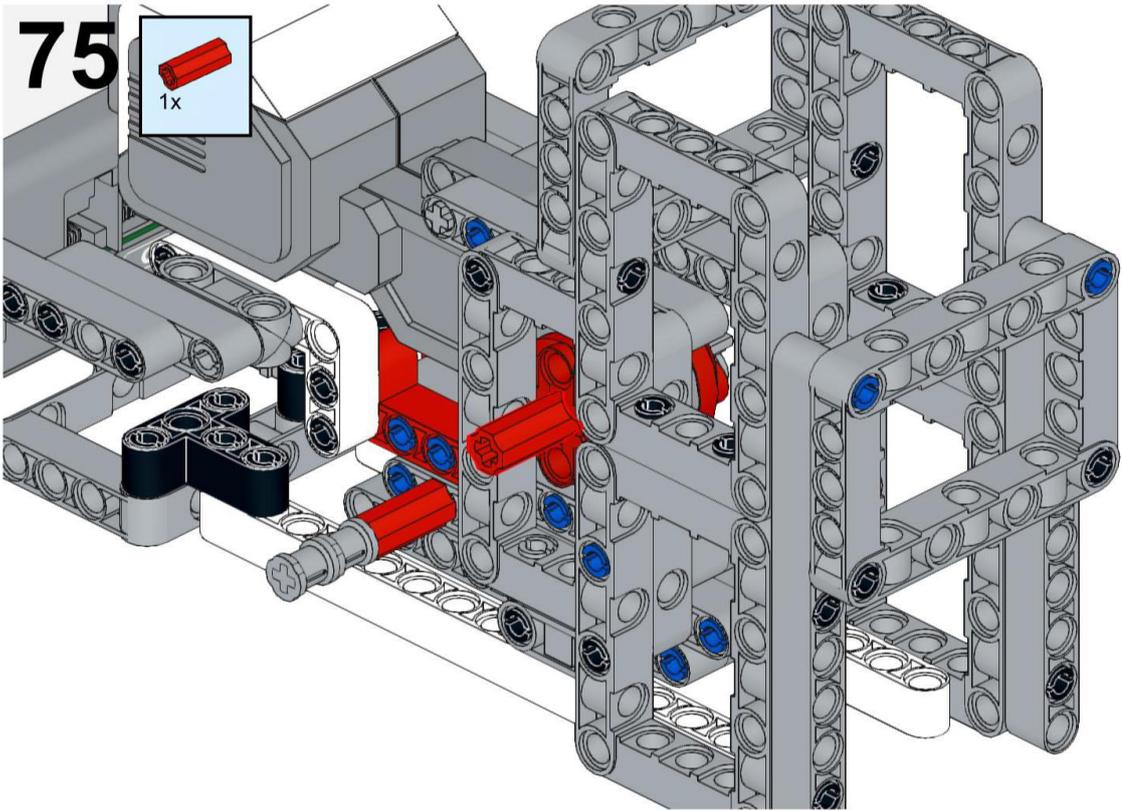


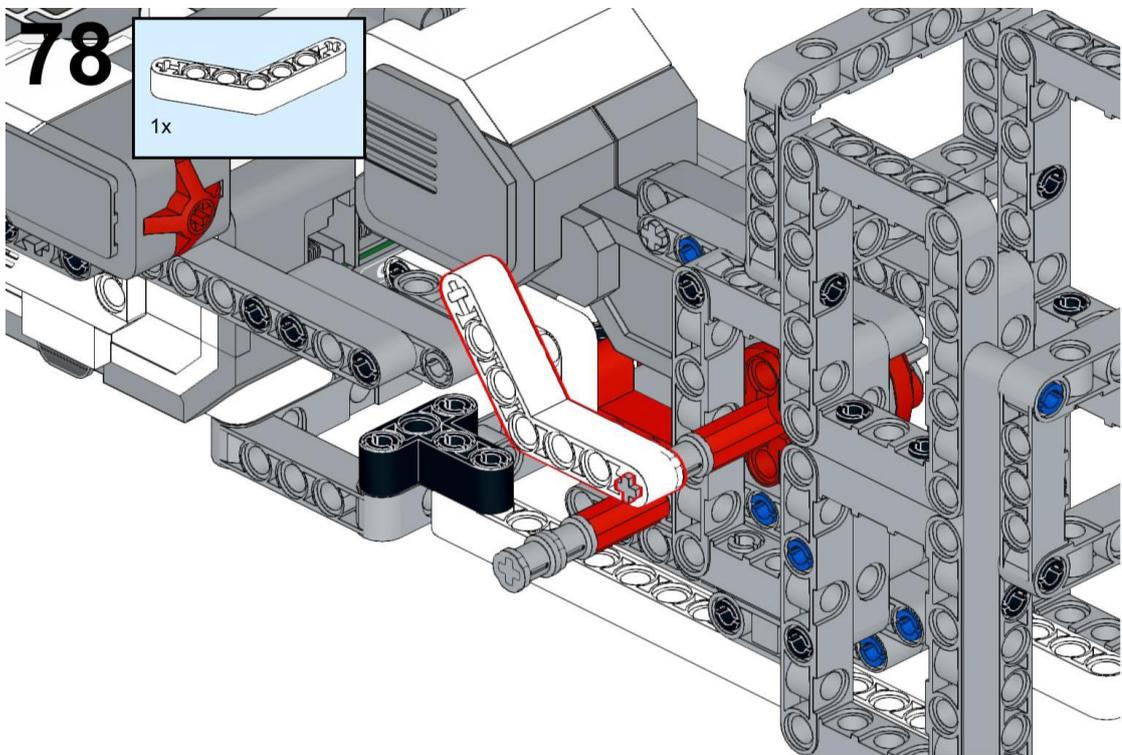
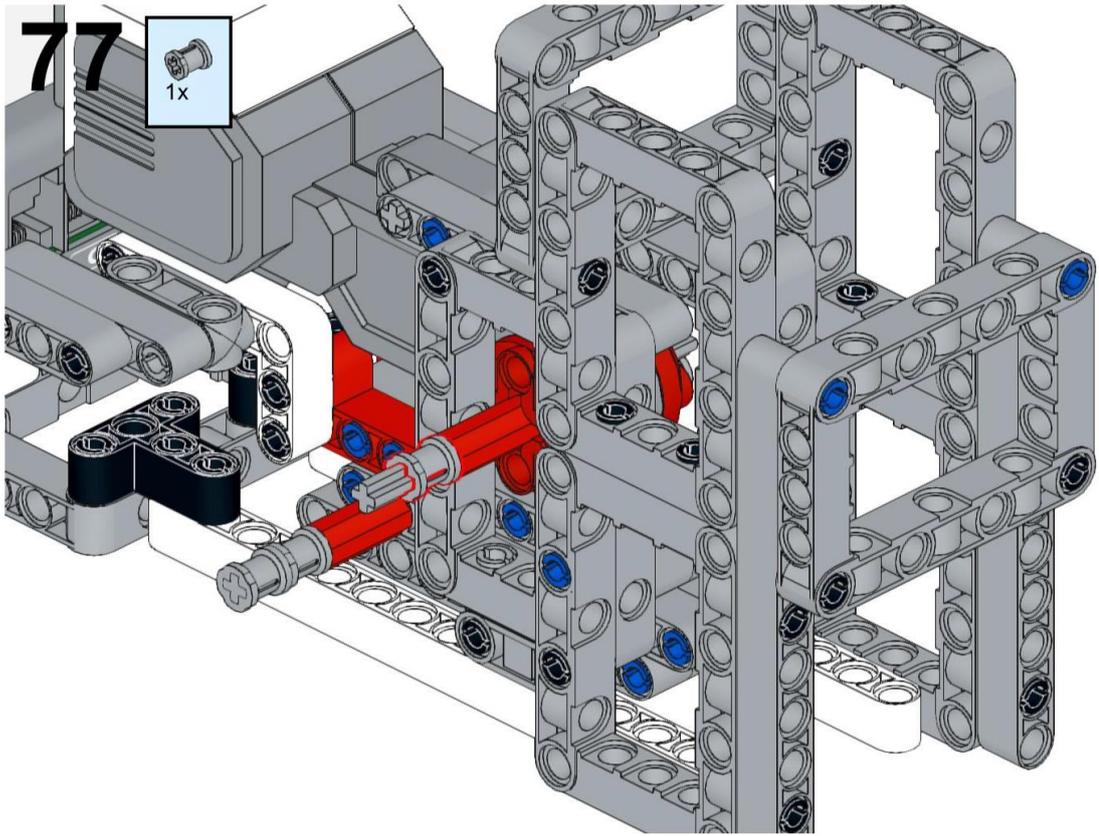
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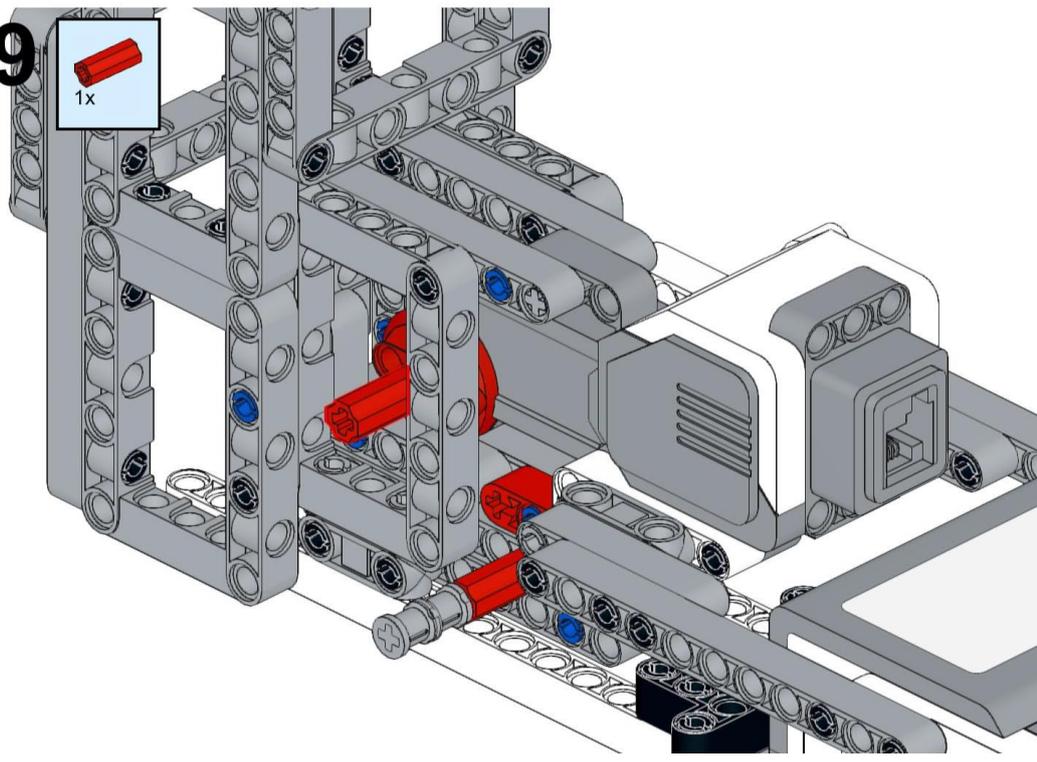
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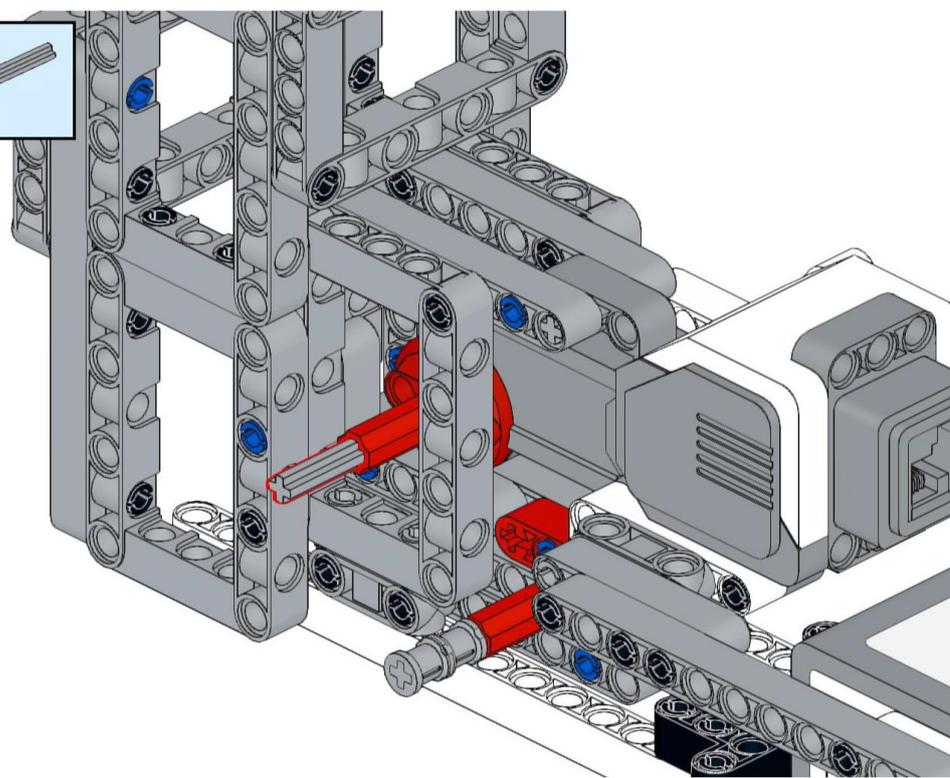
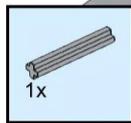


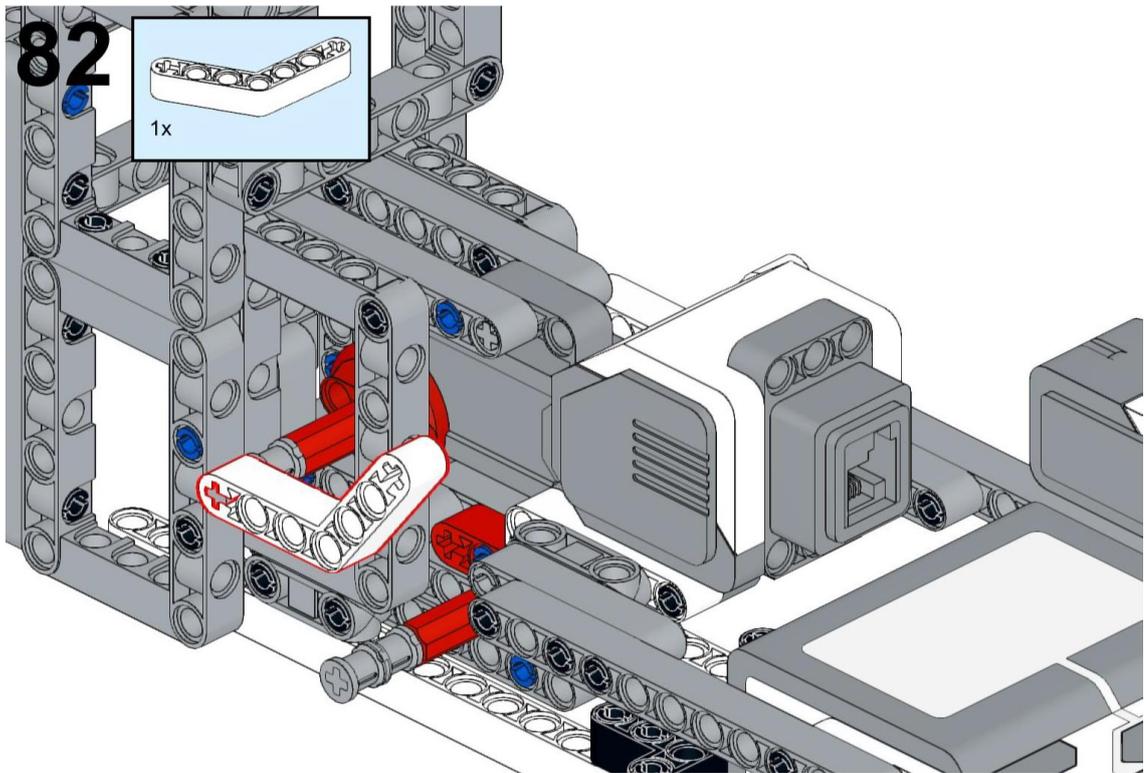
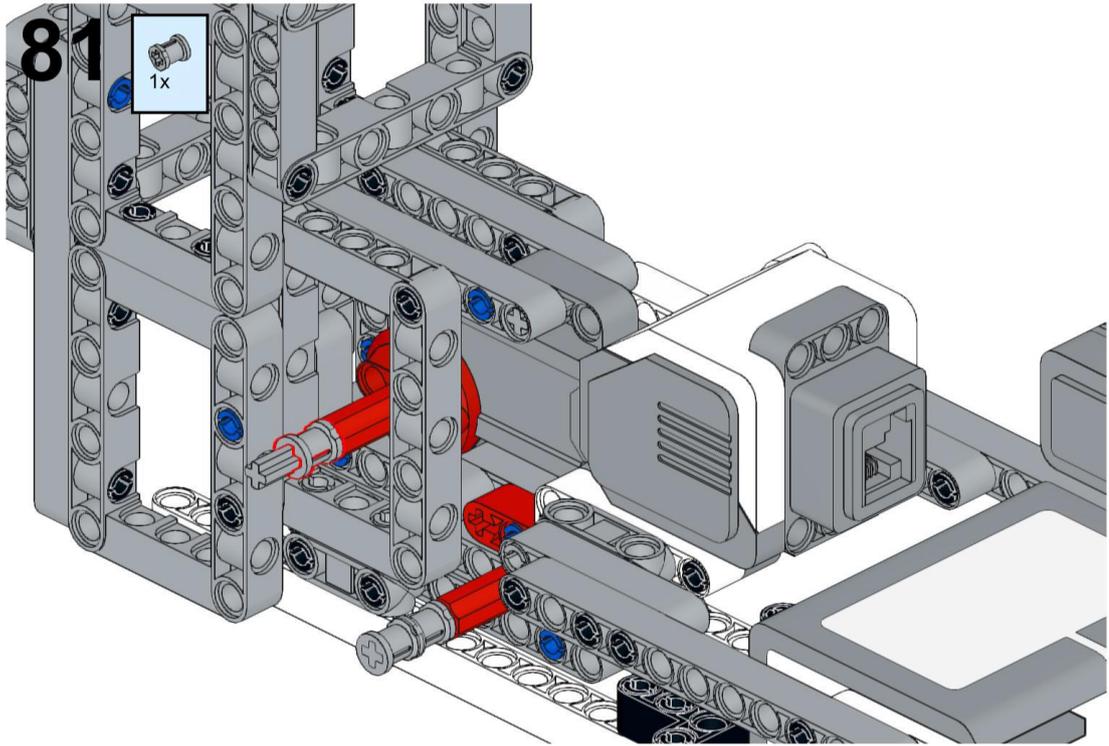


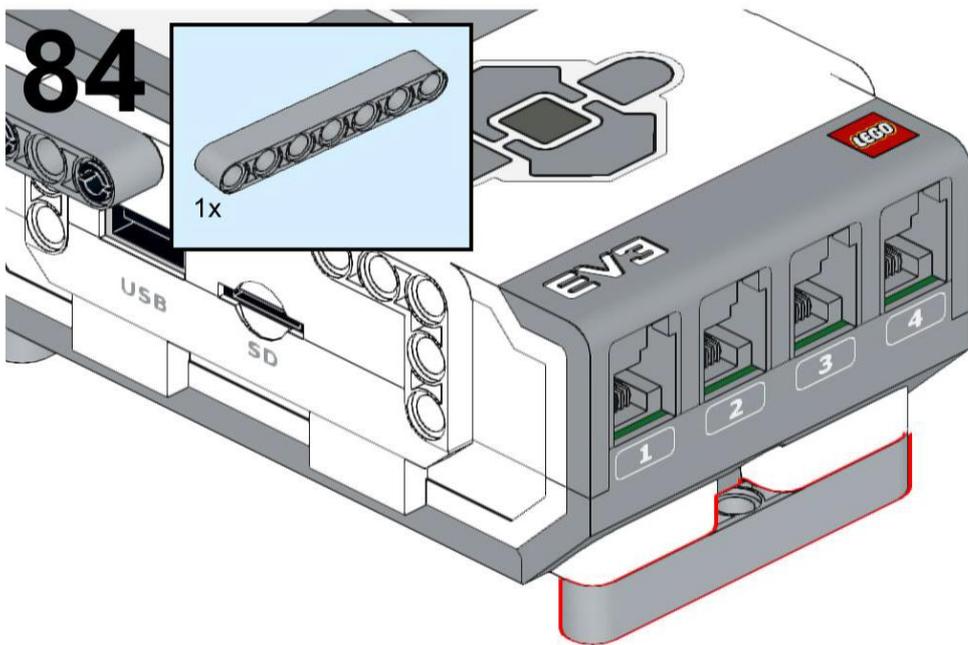
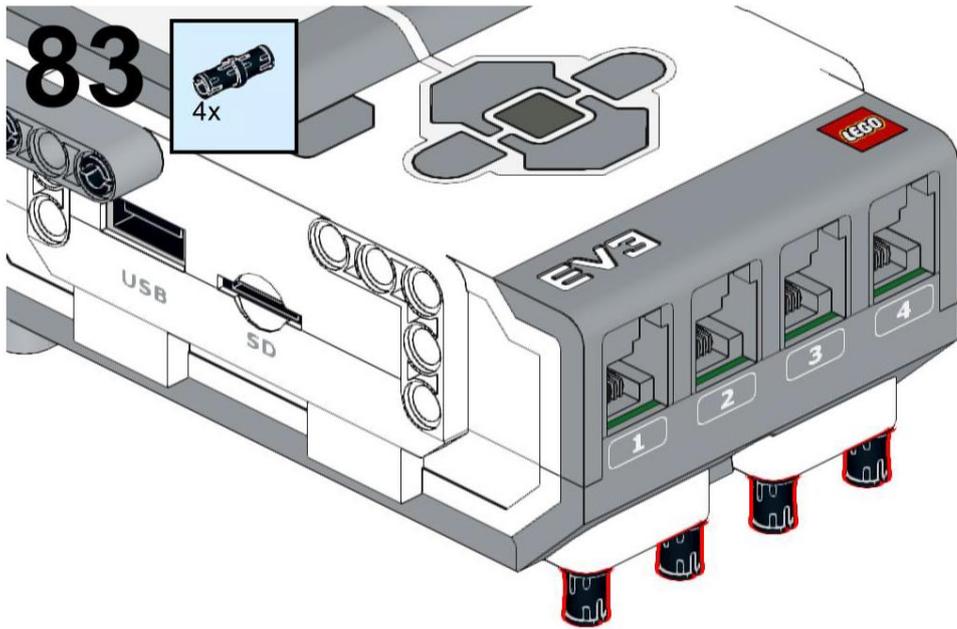
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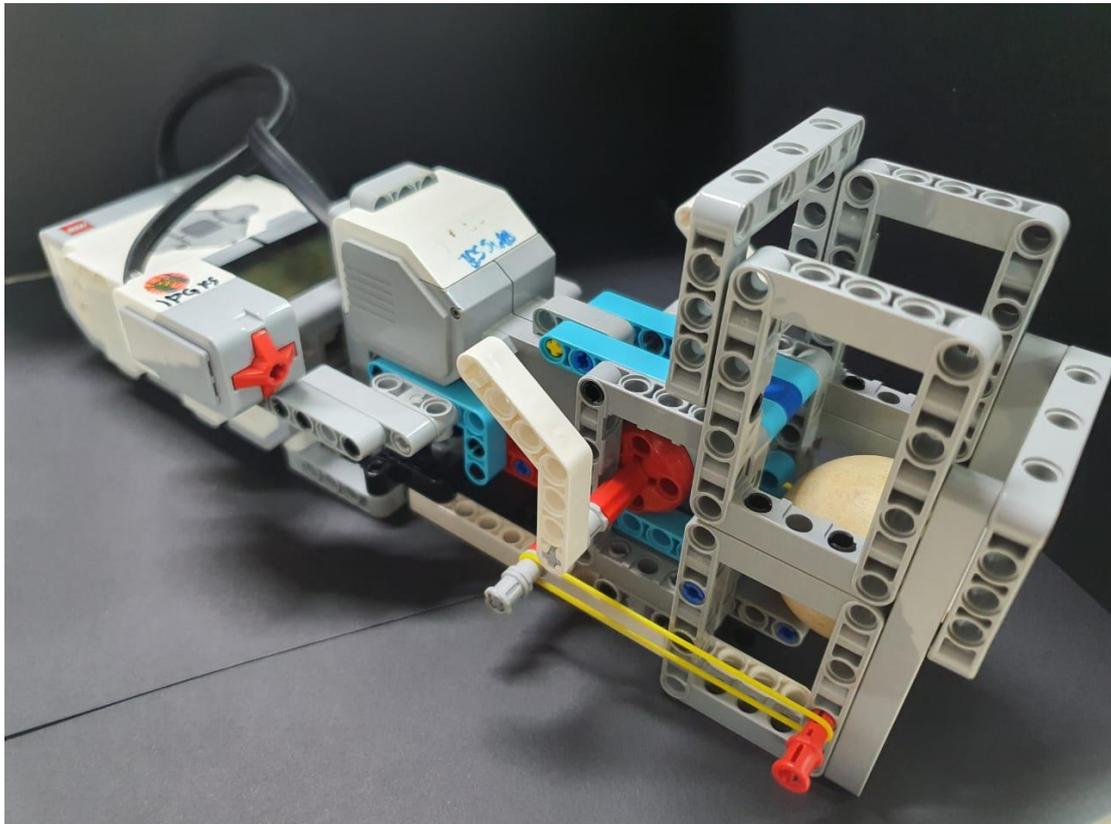
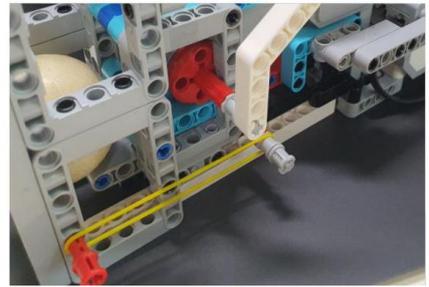
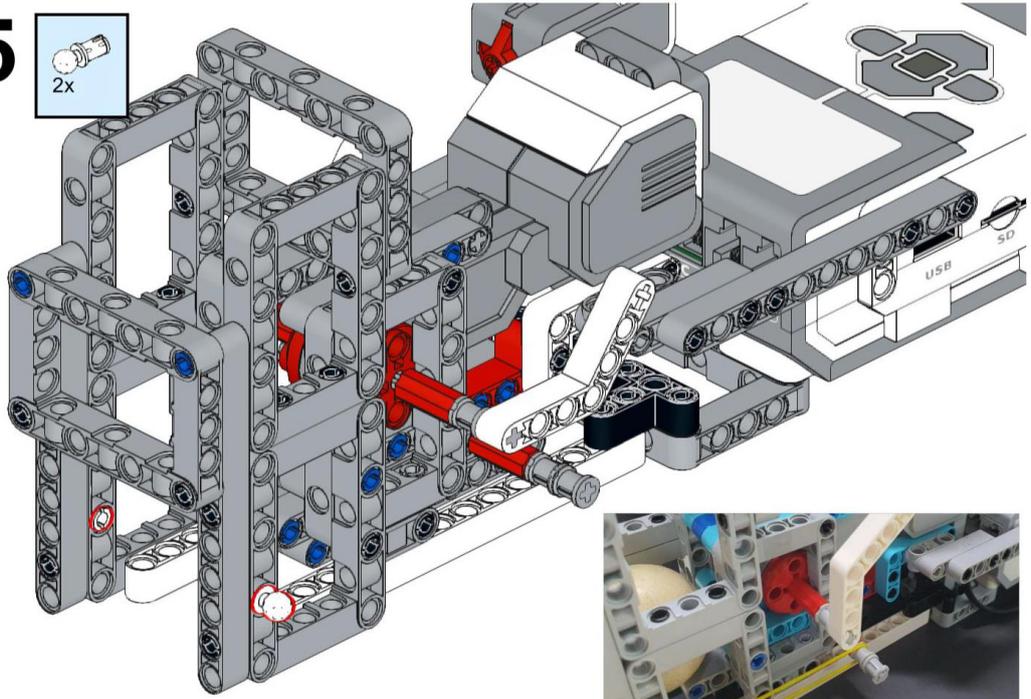
80







85



**Penyambungan wayar ke EV3 Brick**  
*Connection of wire towards EV3 Brick*

Berikut menunjukkan bahagian penyambung yang terdapat pada *EV3 Brick Lego Shooter* serta jenis wayar yang diperlukan.

*Below shows the wires that need to connect to the ports of Lego Shooter EV3 Brick.*

 <p><i>EV3 Brick Lego Shooter</i> <i>Lego Shooter EV3 Brick</i></p>	 <p><i>EV3 Brick Lego Shooter</i> <i>Lego Shooter EV3 Brick</i></p>
	<p>Dua <i>EV3</i> wires yang berukuran 35 cm.  <i>Two EV3 wires, each measuring 35 cm in length.</i></p>
<p>Port A-D menyambungkan <i>EV3 Brick</i> dengan motor.  <i>Port A-D connect EV3 Brick to the motors.</i></p> <p>Port 1-4 menyambungkan <i>EV3 Brick</i> dengan sensor.  <i>Port 1-4 connect EV3 Brick to the sensors.</i></p>	

Jadual di bawah menunjukkan jenis motor dan *sensor* yang disambungkan pada bahagian penyambung *EV3 Brick Lego Shooter*.

*The table below shows the types of motors and sensors connected to the ports of the Lego Shooter EV3 Brick.*

<b>Bahagian penyambung</b> <i>Port</i>	<b>Sambungan</b> <i>Connection</i>
<p><i>Port 1 connect to sensor</i></p>	 <p><i>Touch sensor</i></p>

*Port A connect to motor*

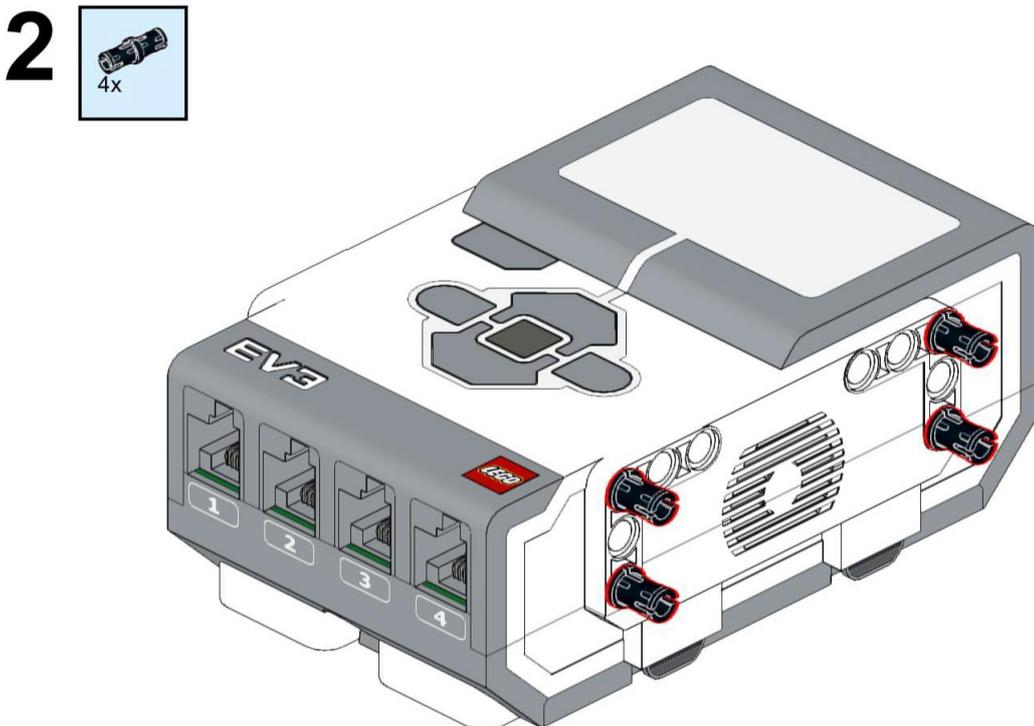
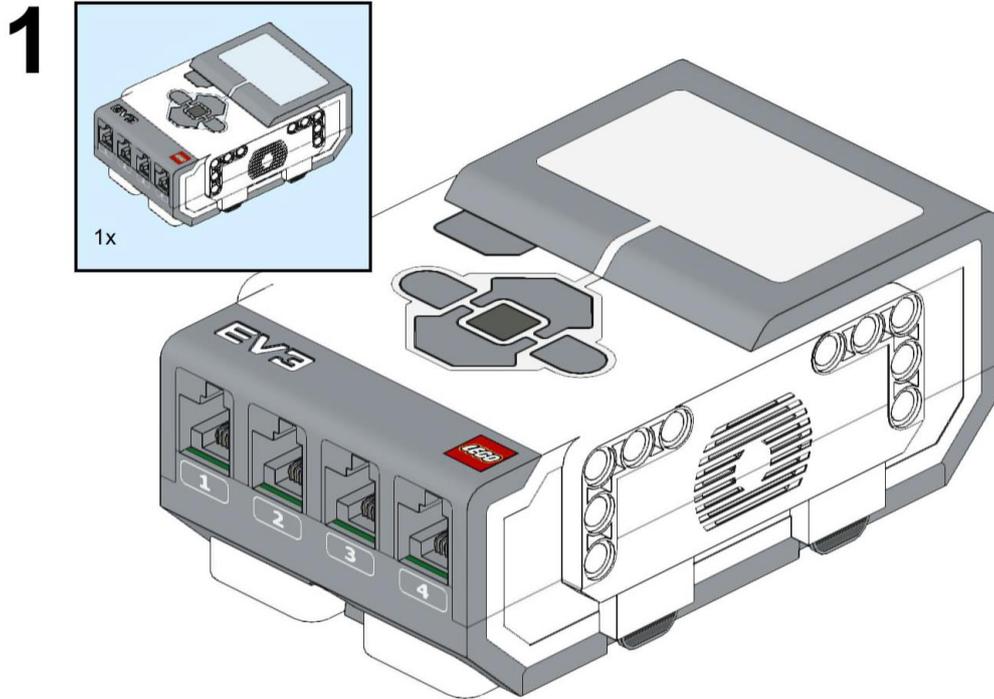


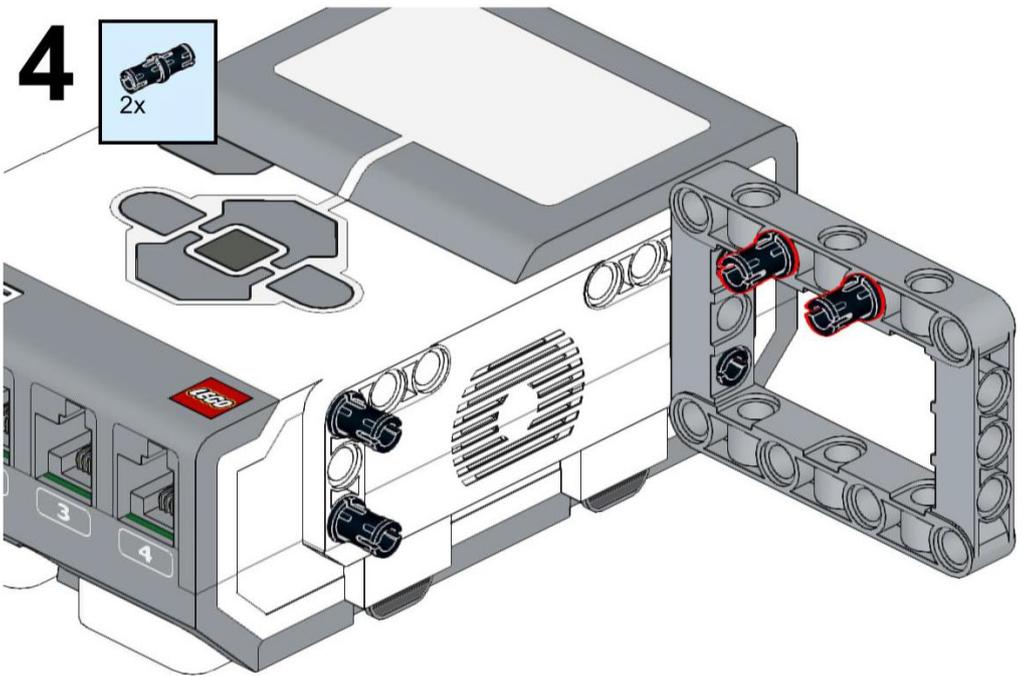
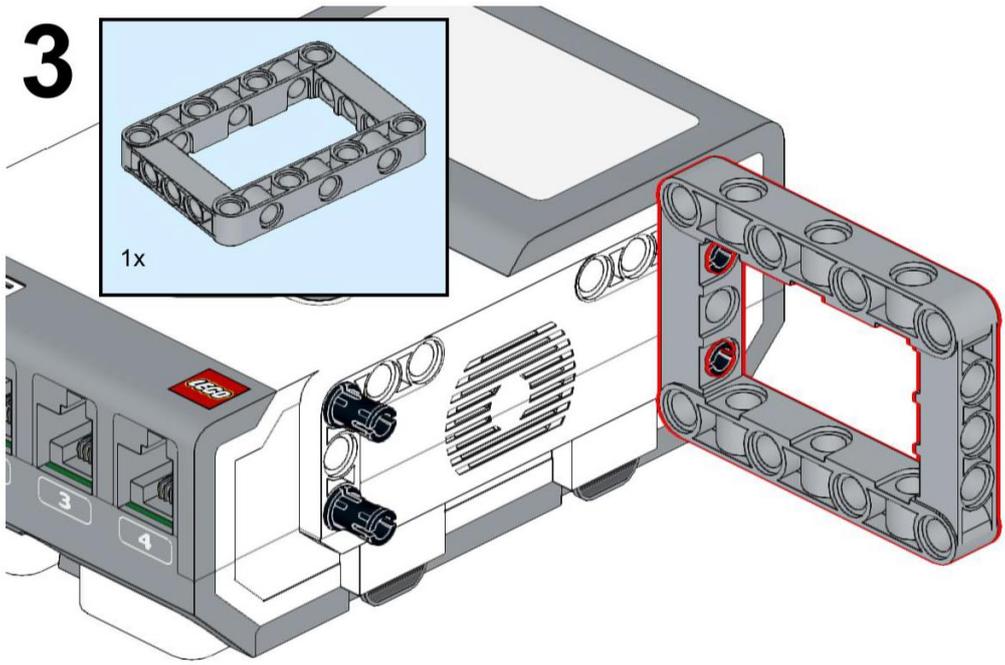
*Large motor*

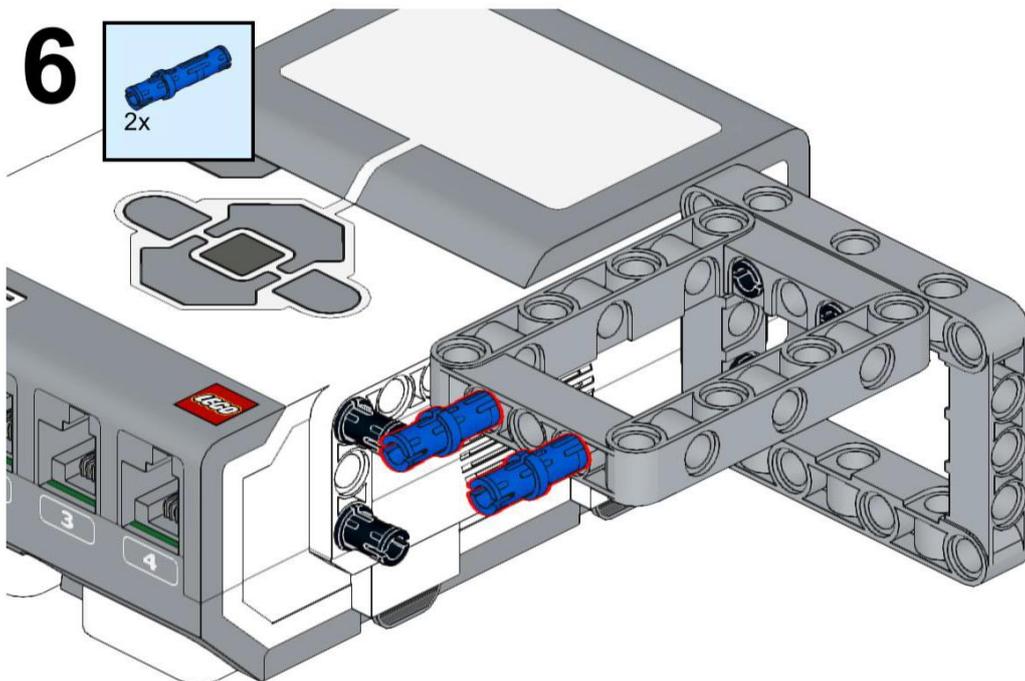
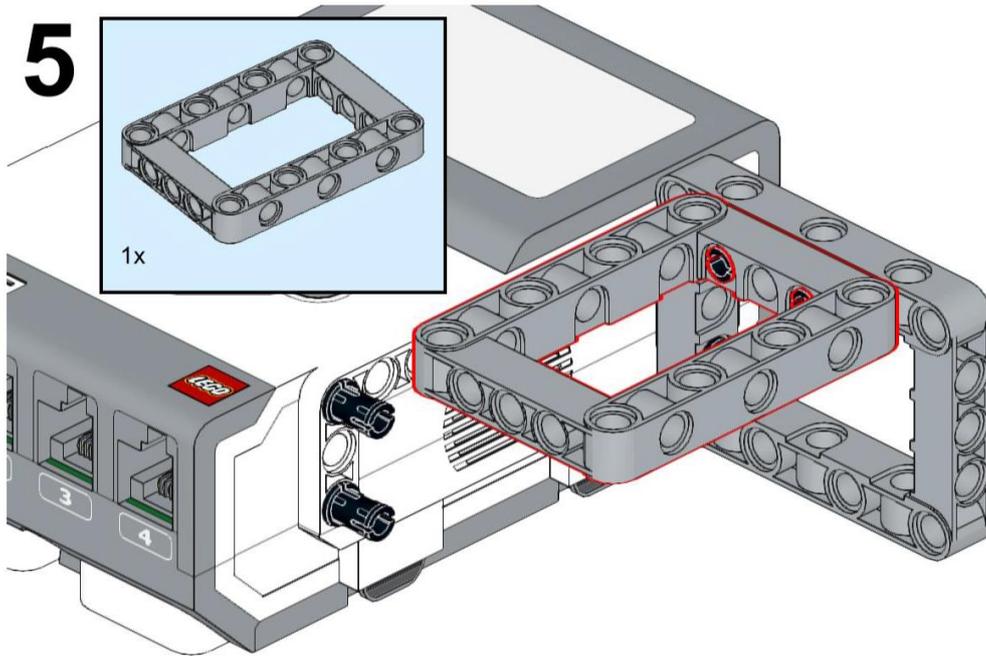
### 5.3 Teacher Spin Master *Teacher Spin Master*

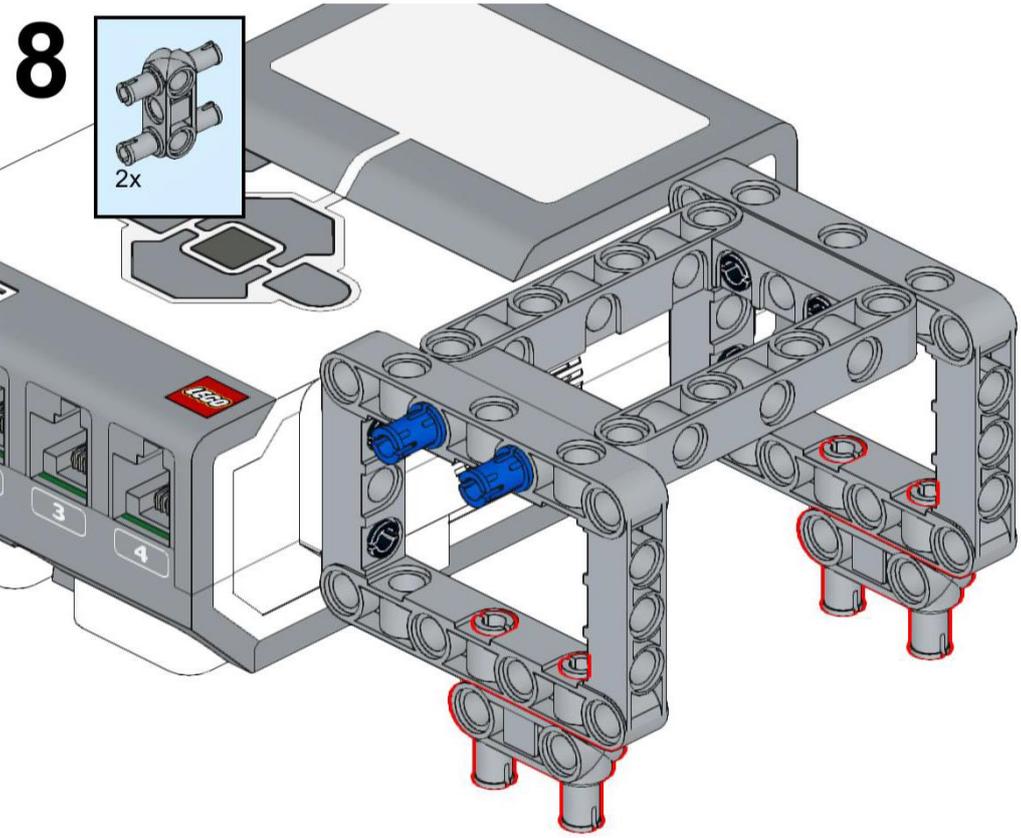
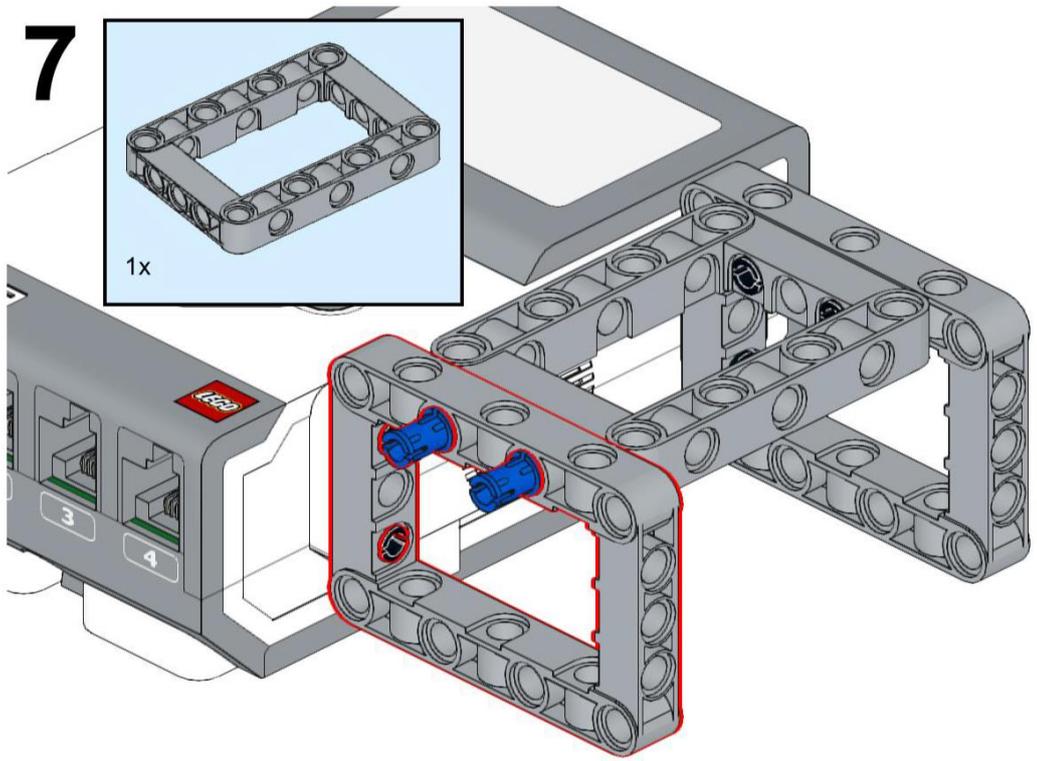
Pembinaan Teacher Spin Master adalah menggunakan Lego Mindstorms EV3 Educaiton Core Set dan Mindstorms EV3 Educaiton Expansion Set.

*The construction of Teacher Spin Master is using Lego Mindstorms EV3 Educaiton Core Set and Mindstorms EV3 Educaiton Expansion Set.*

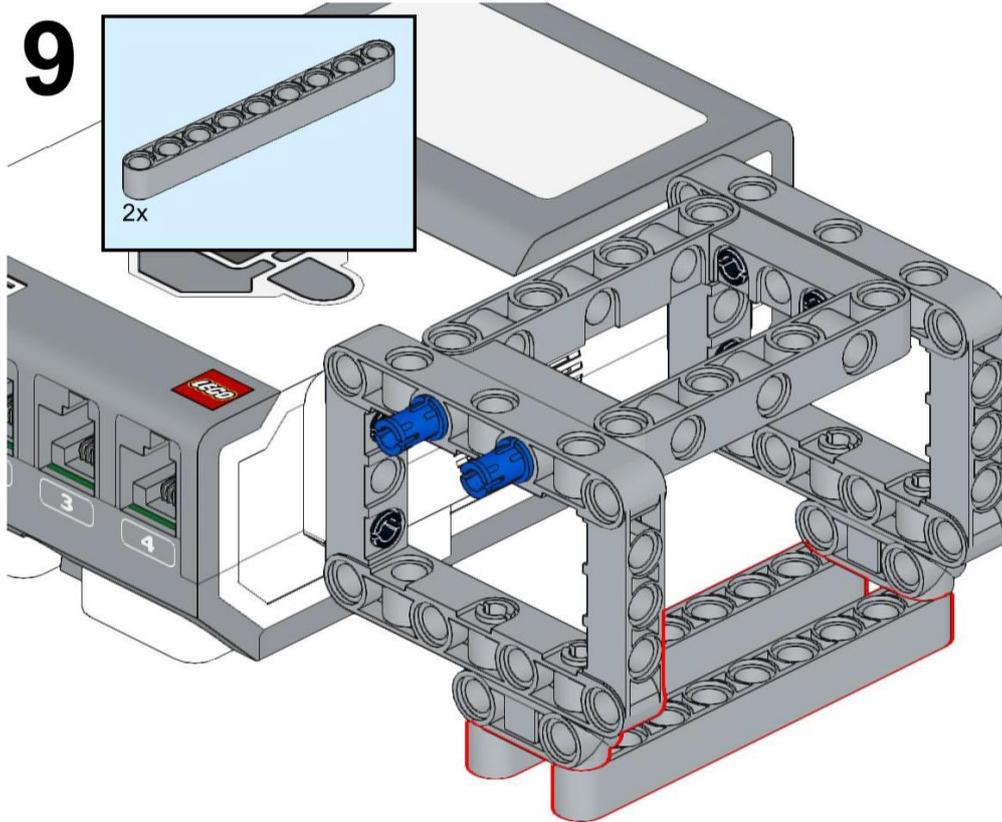




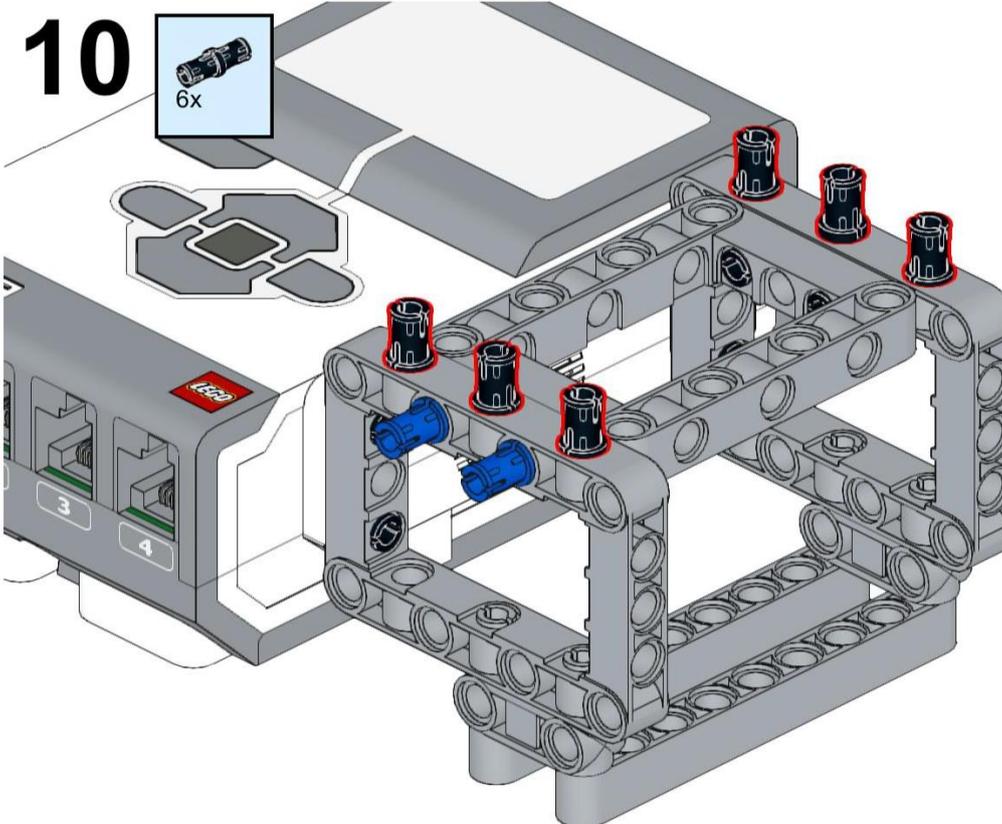




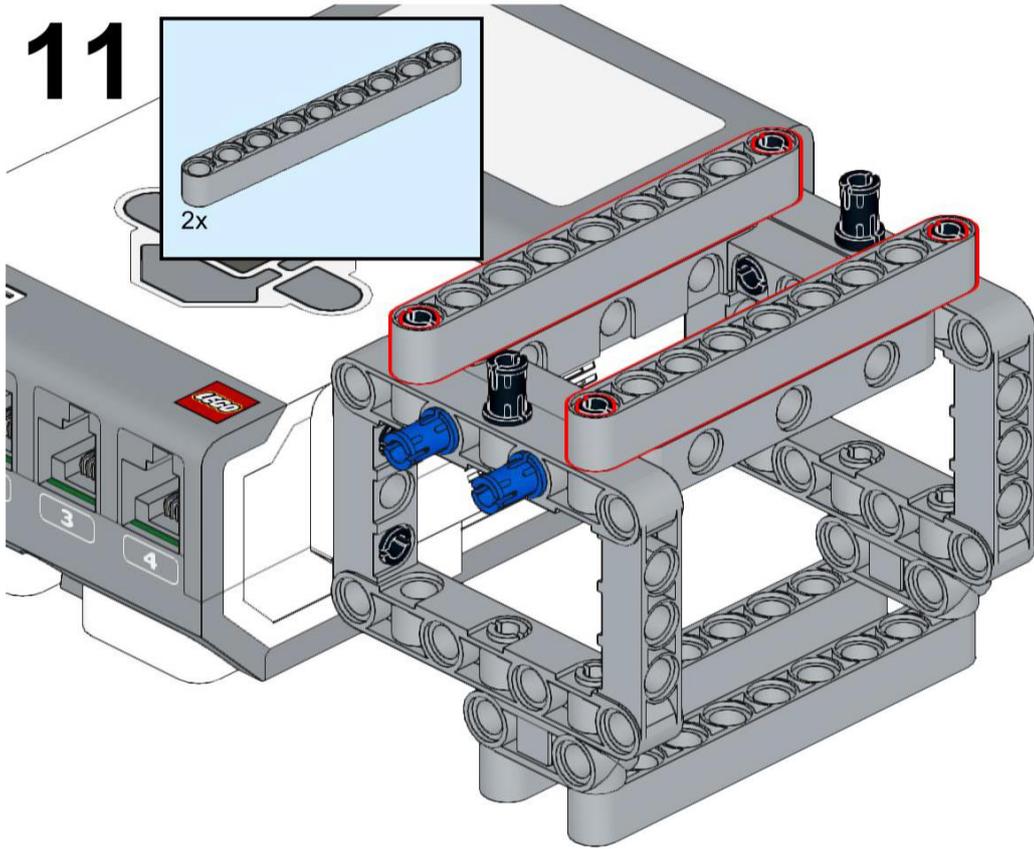
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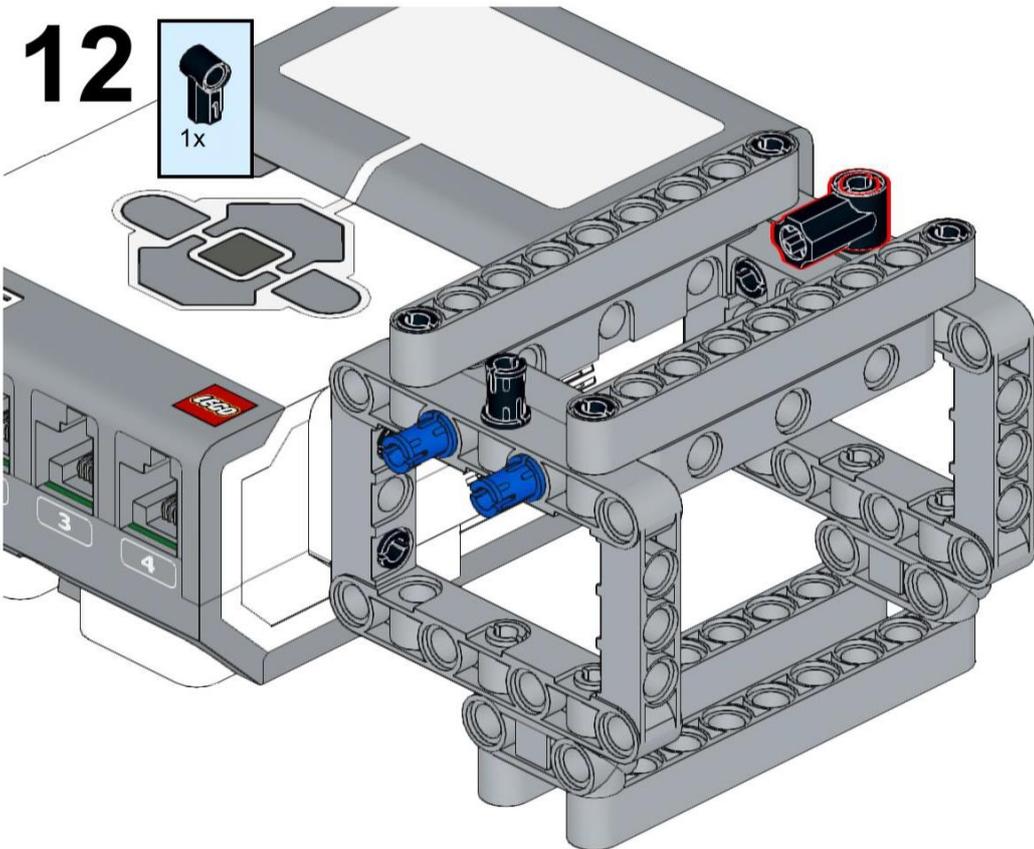
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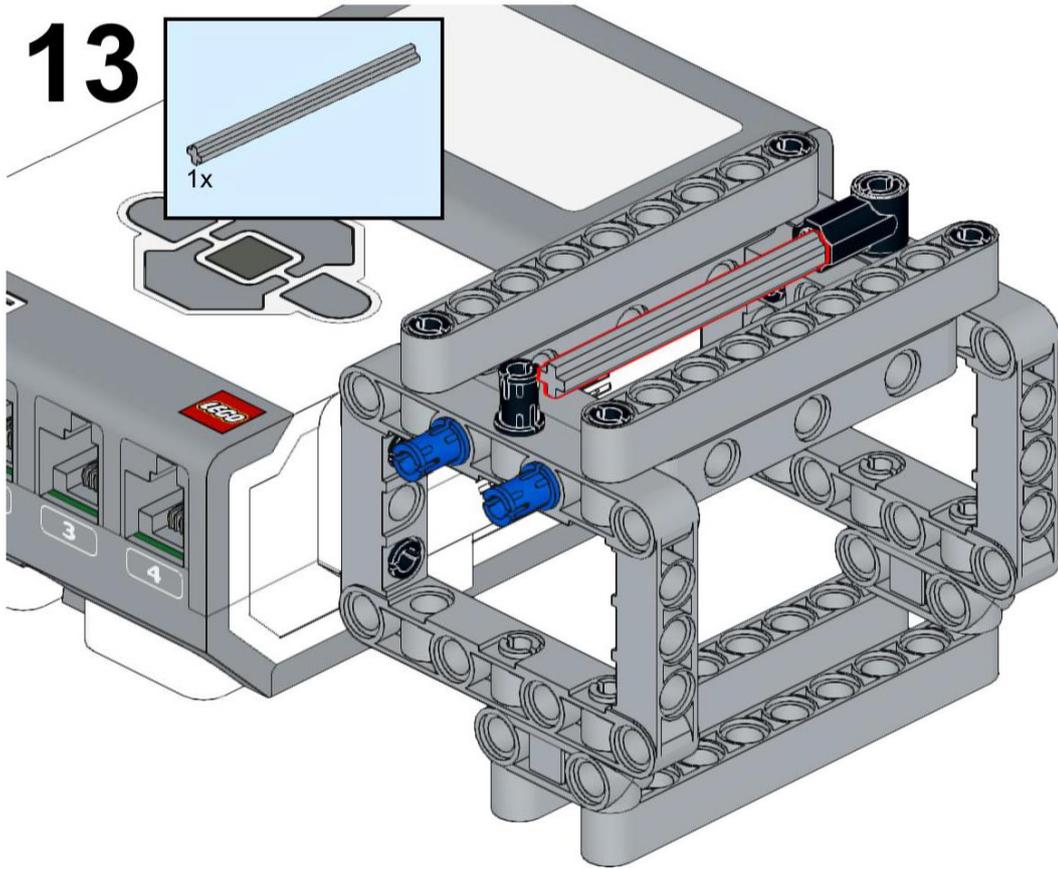
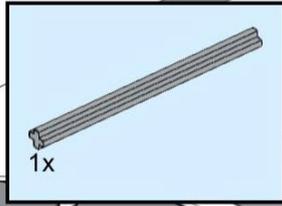
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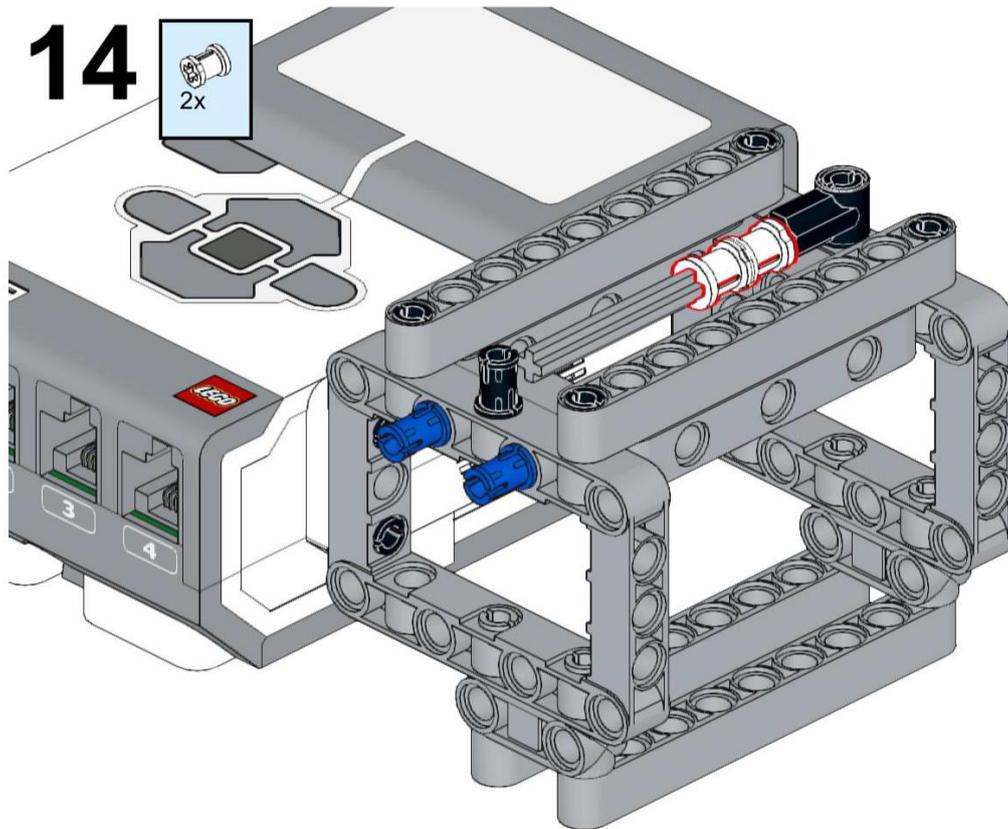
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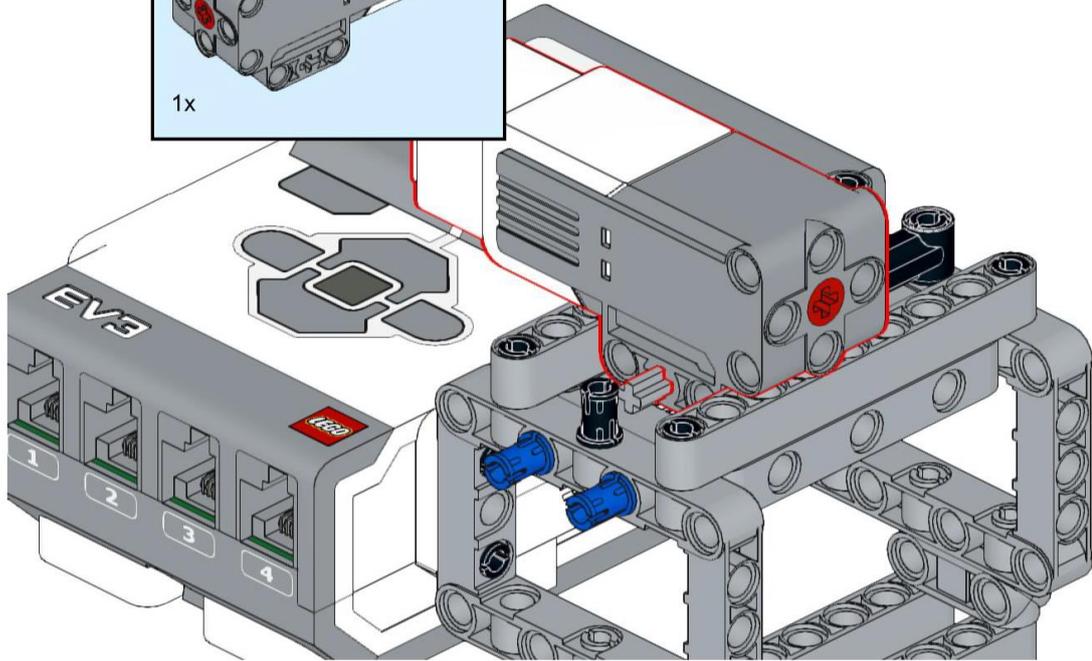
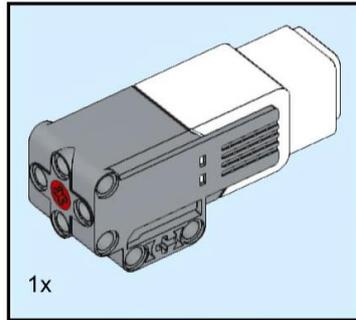
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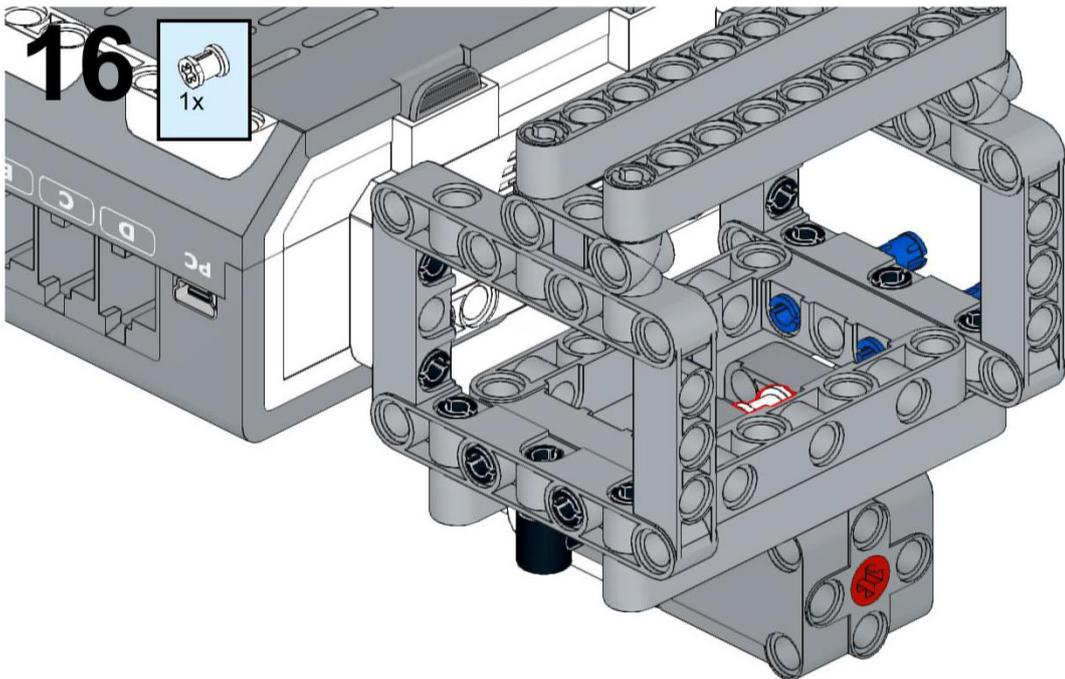
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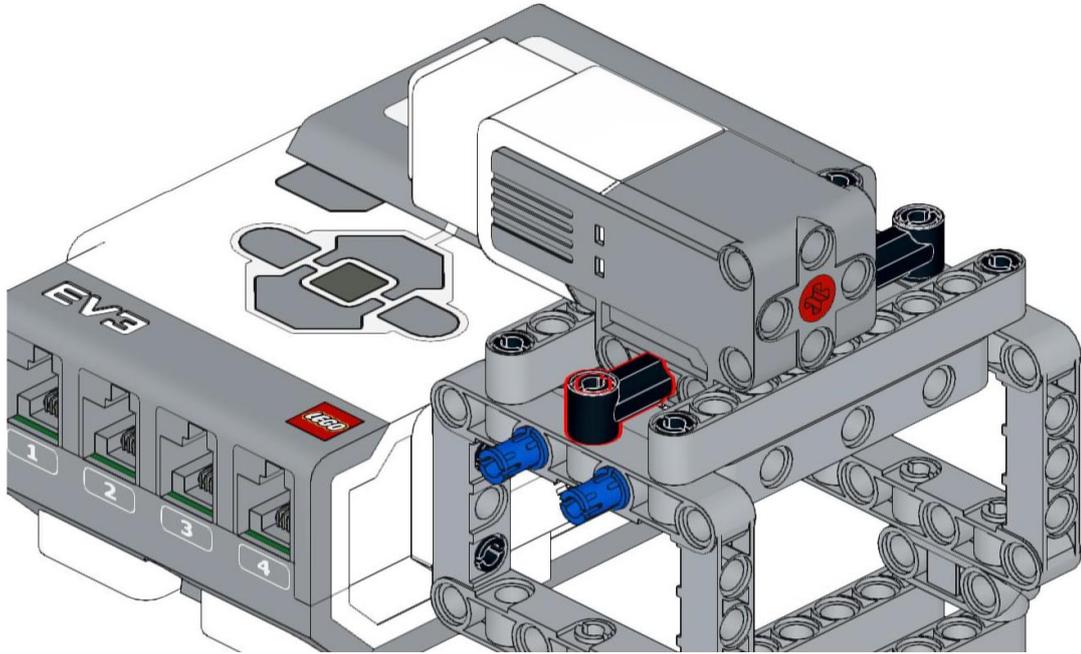
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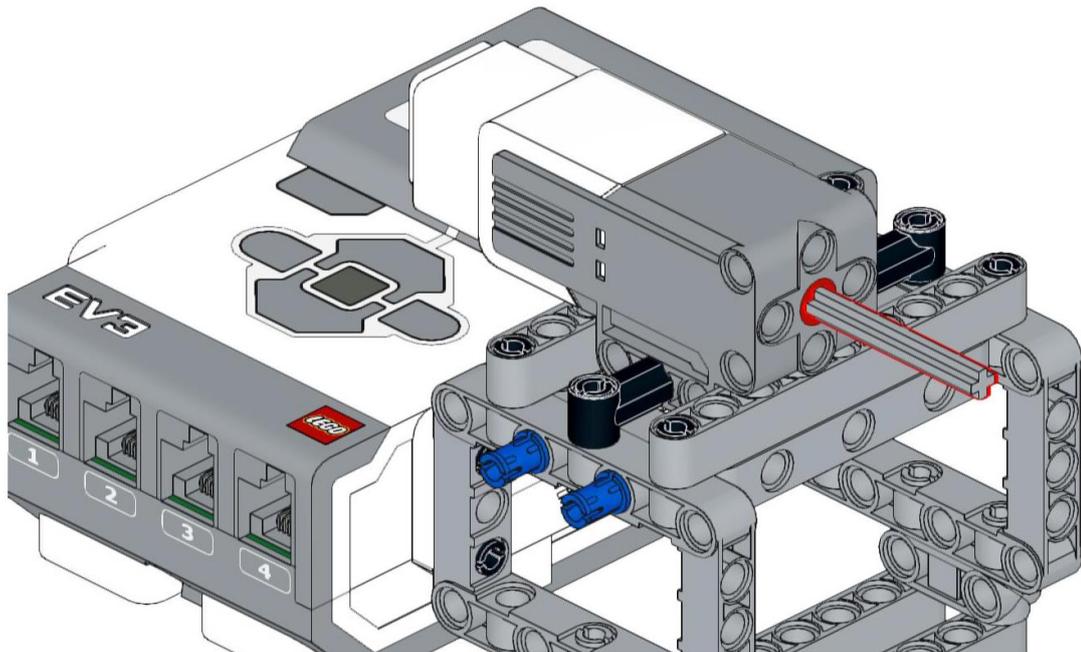
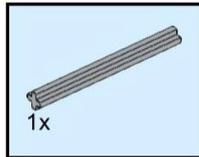
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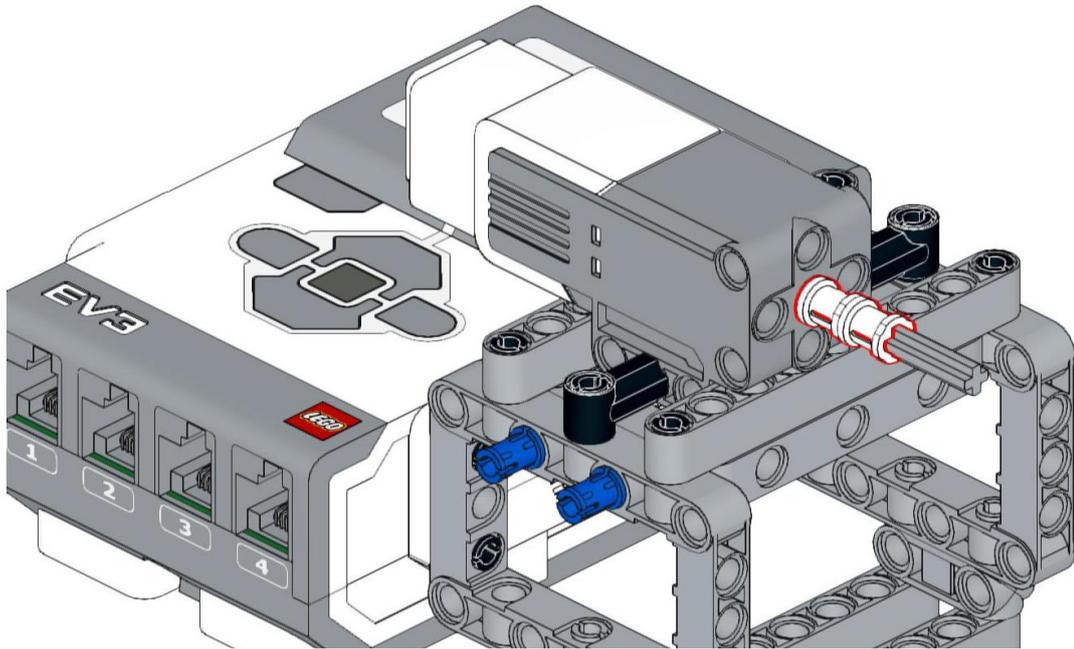
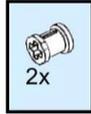
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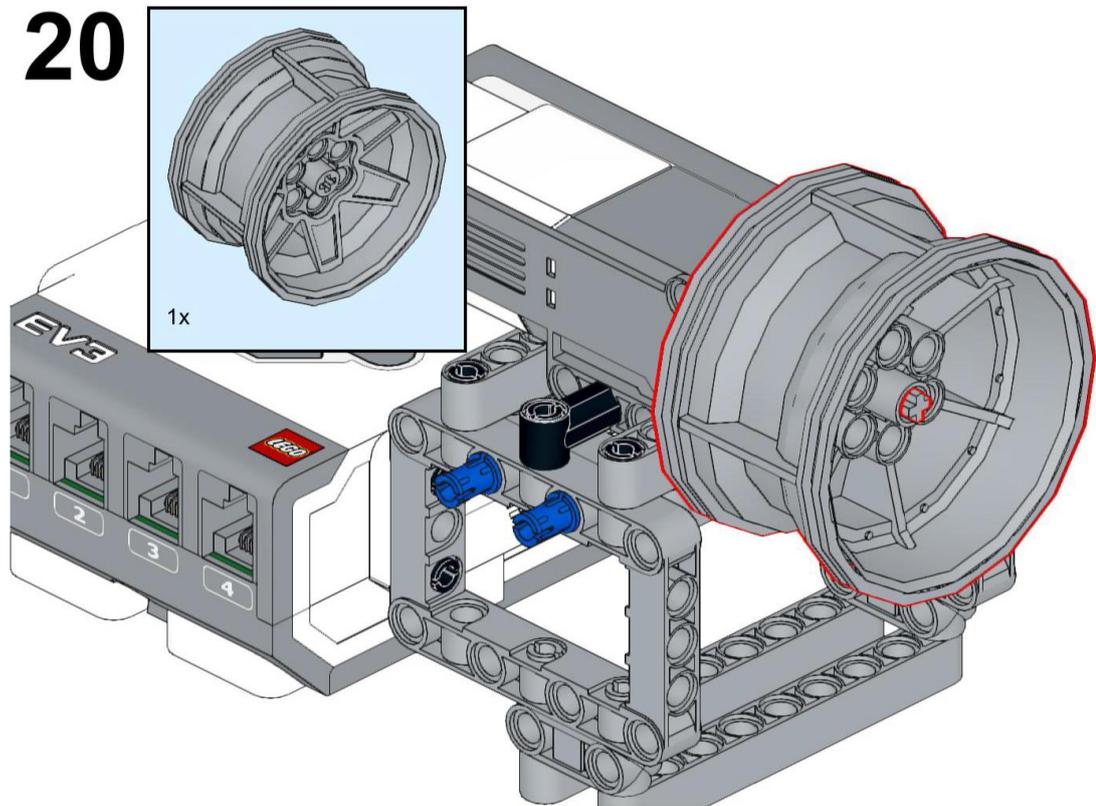
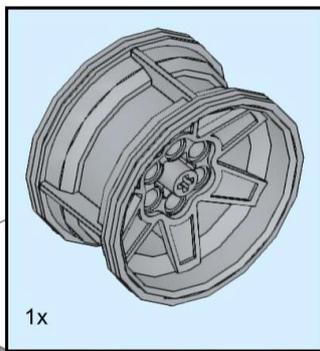
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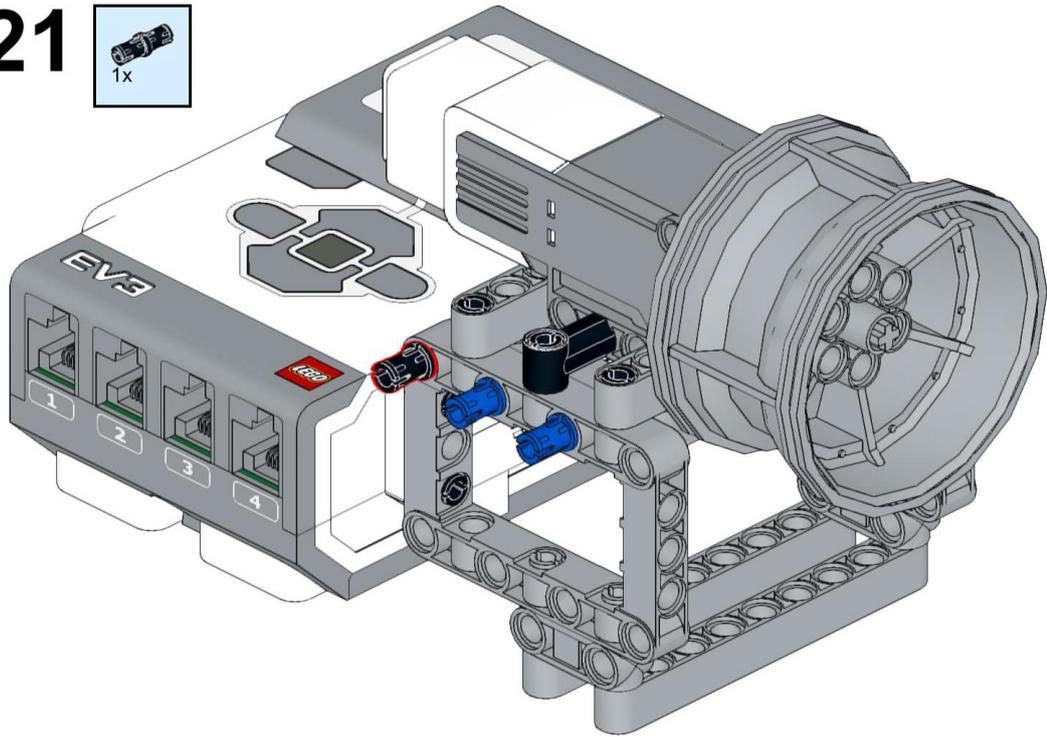
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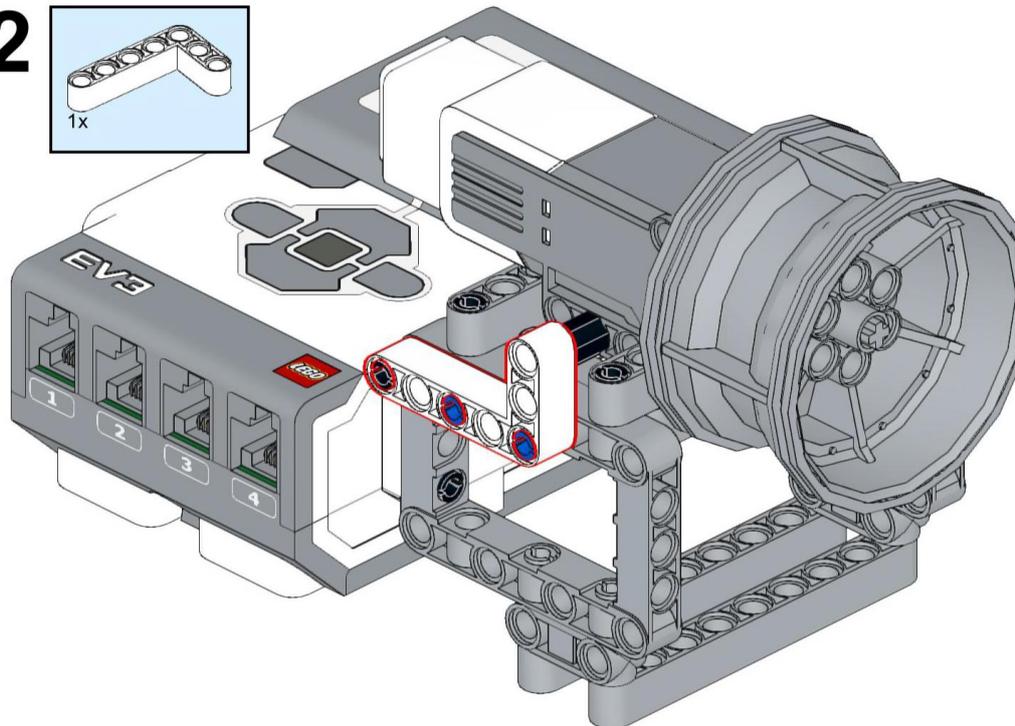
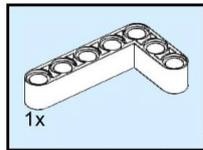
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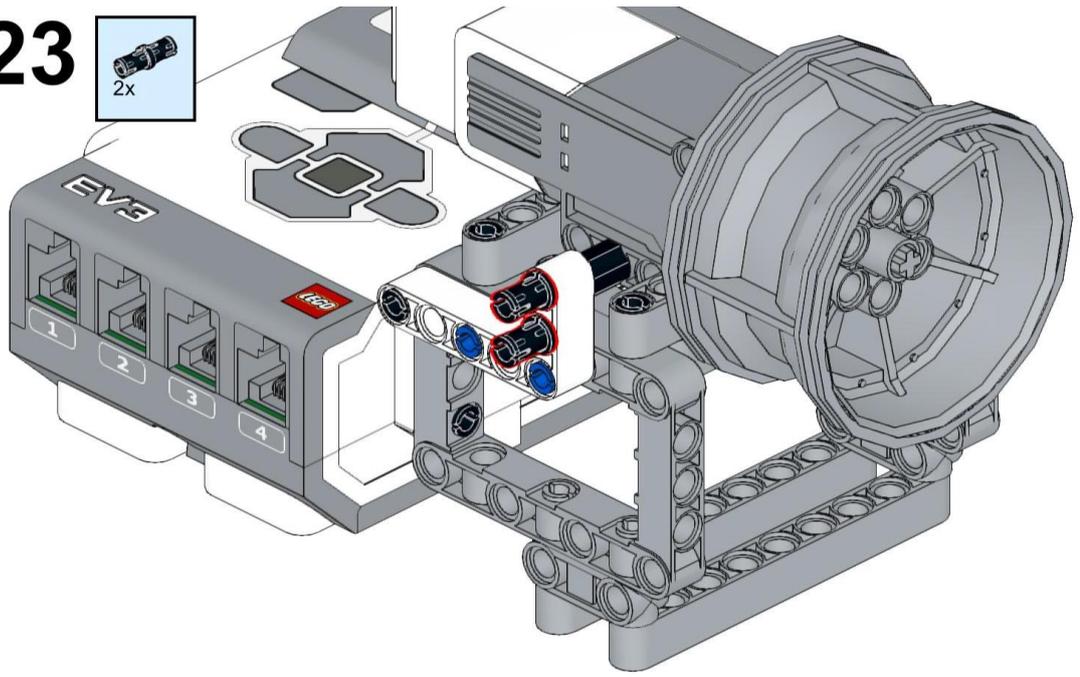
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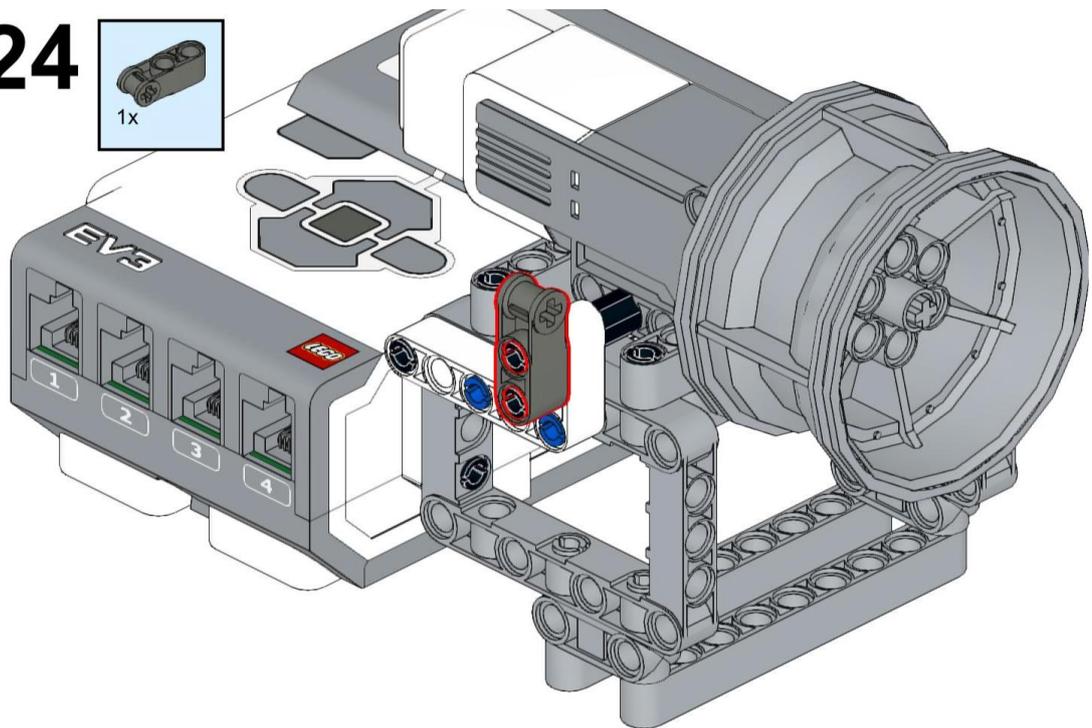
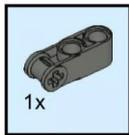
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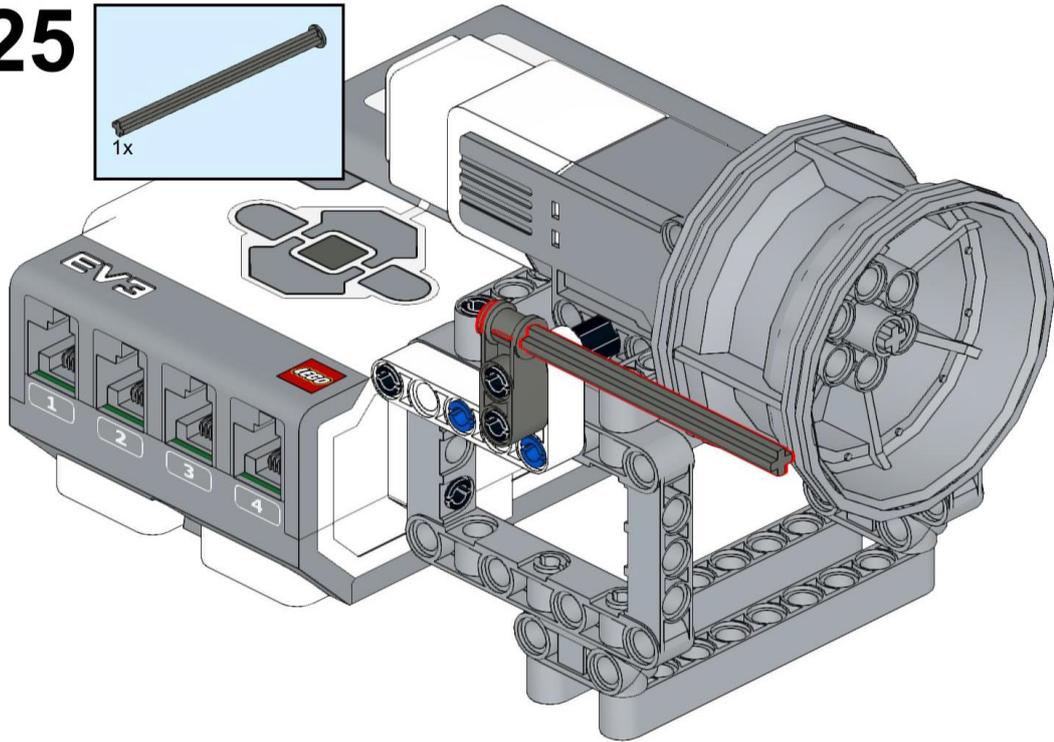
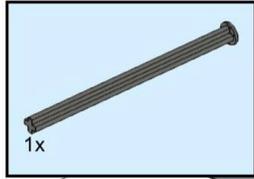
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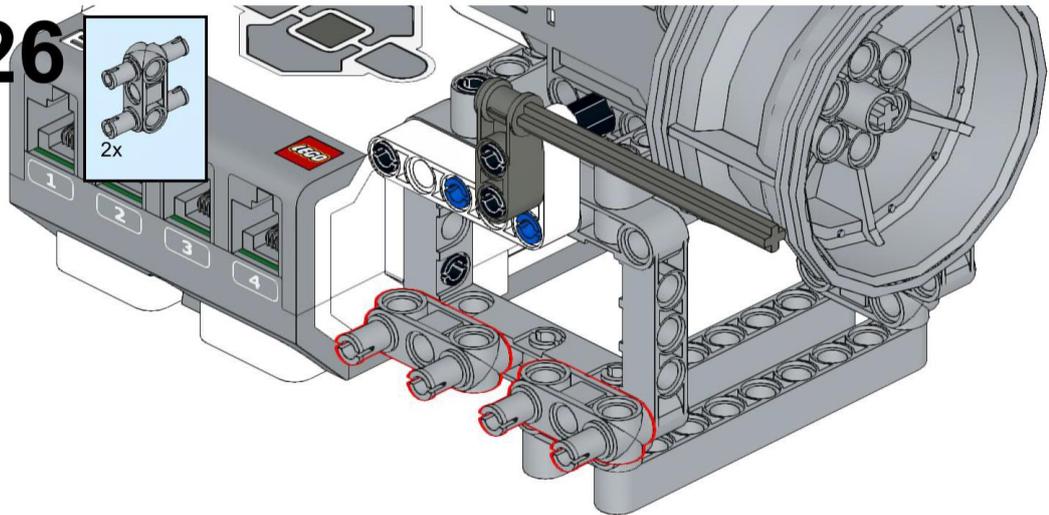
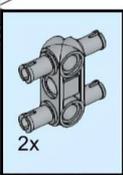
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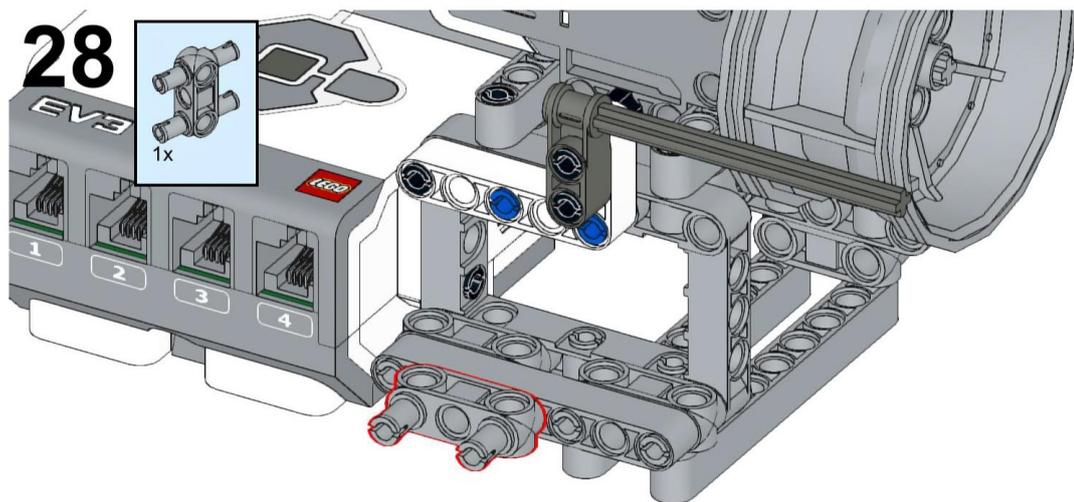
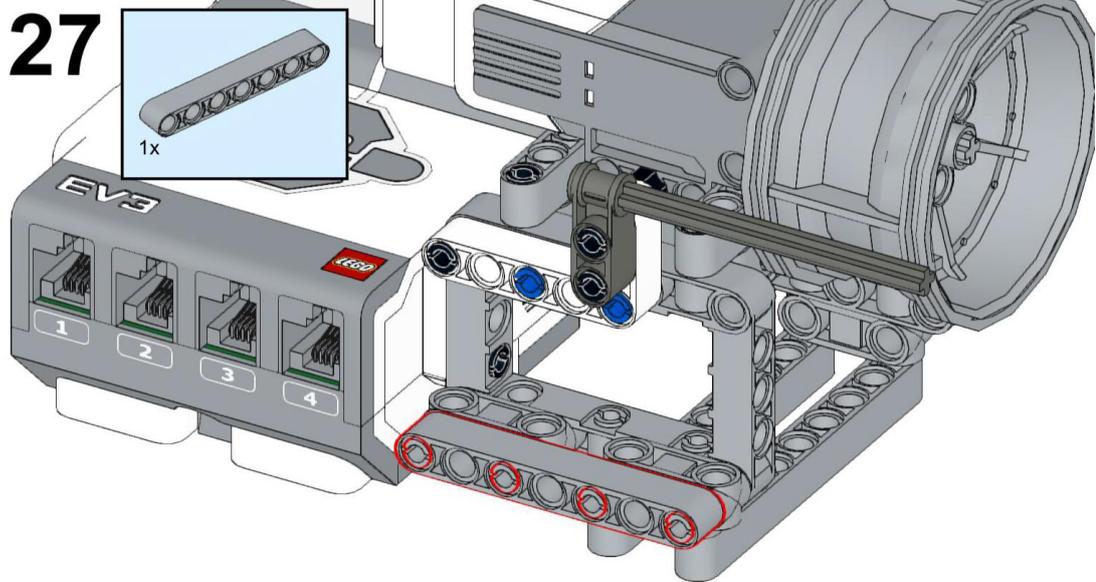


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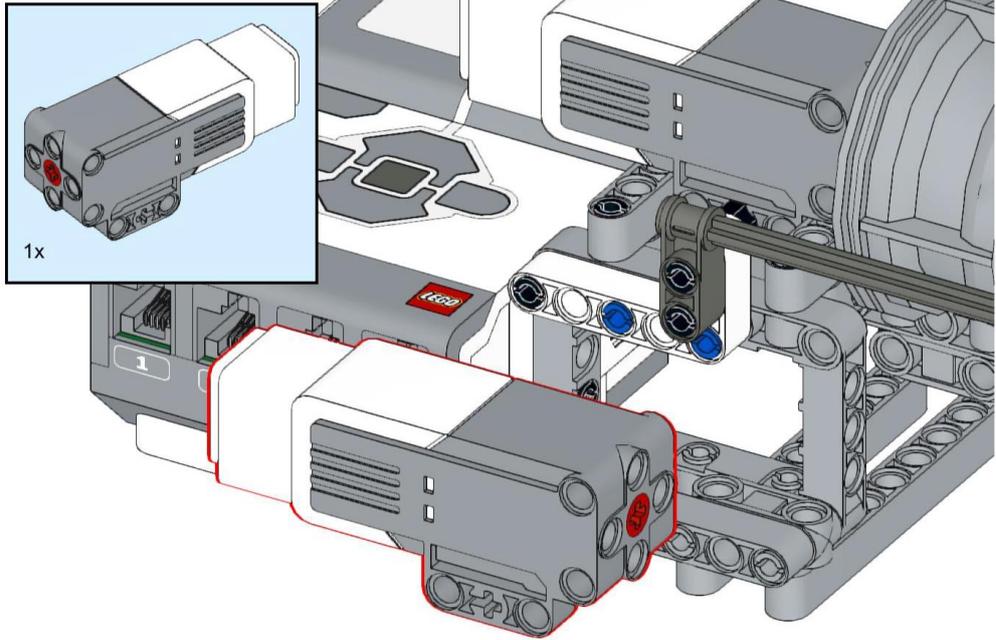


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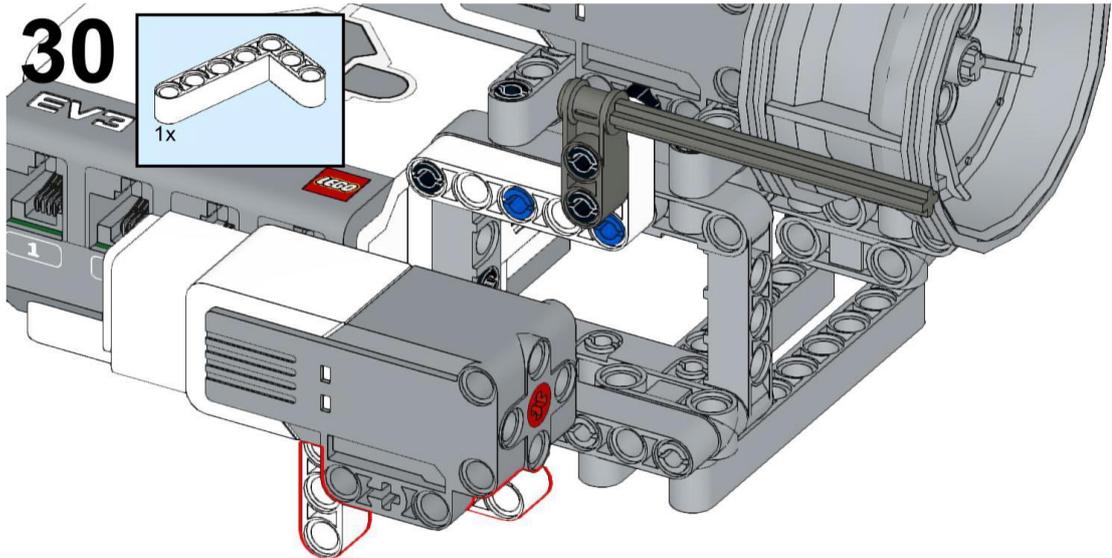


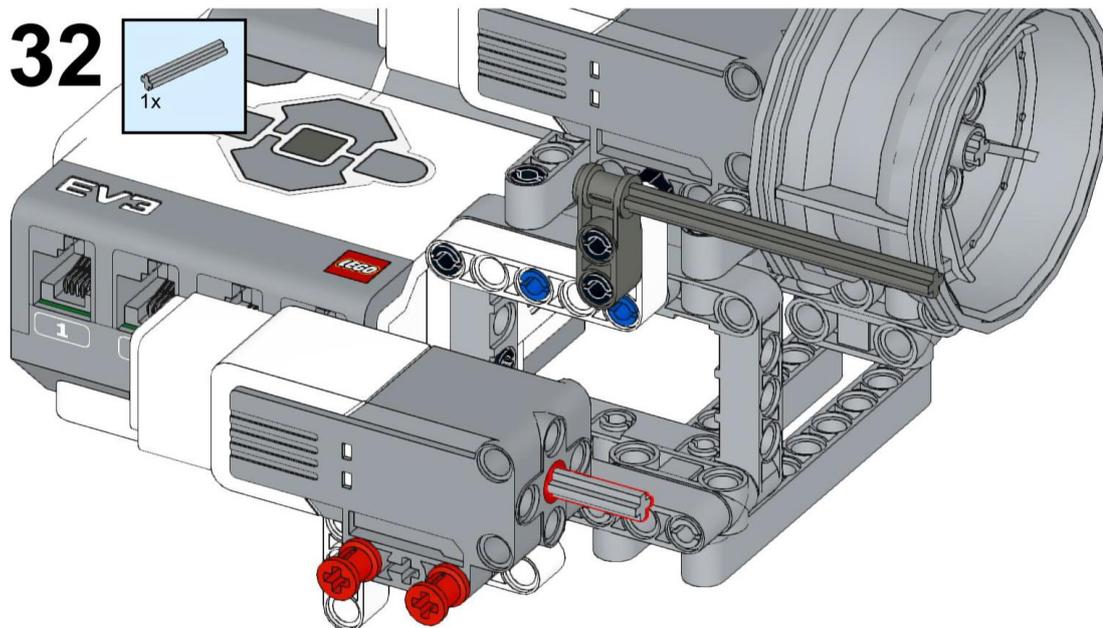
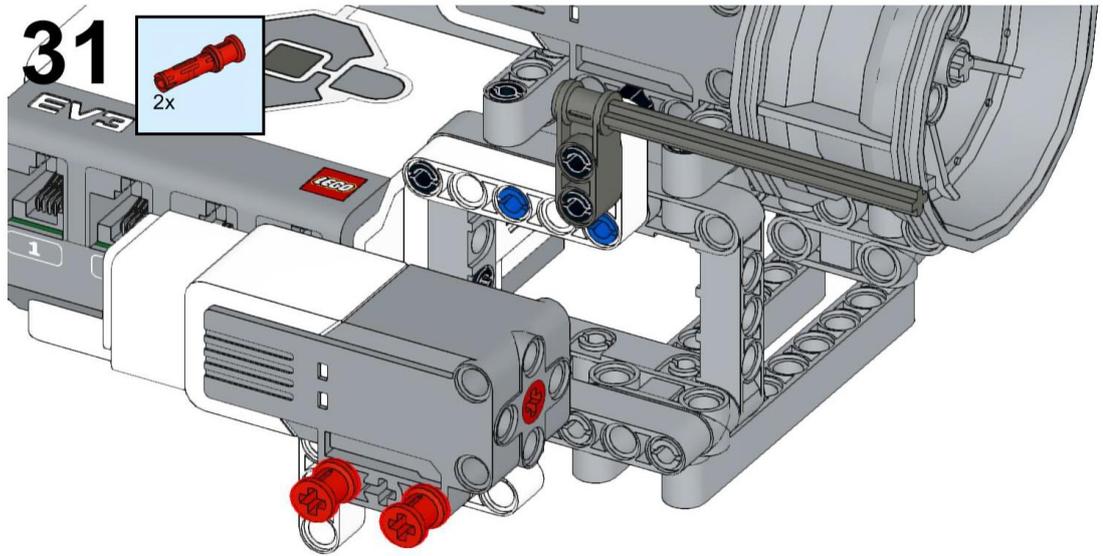


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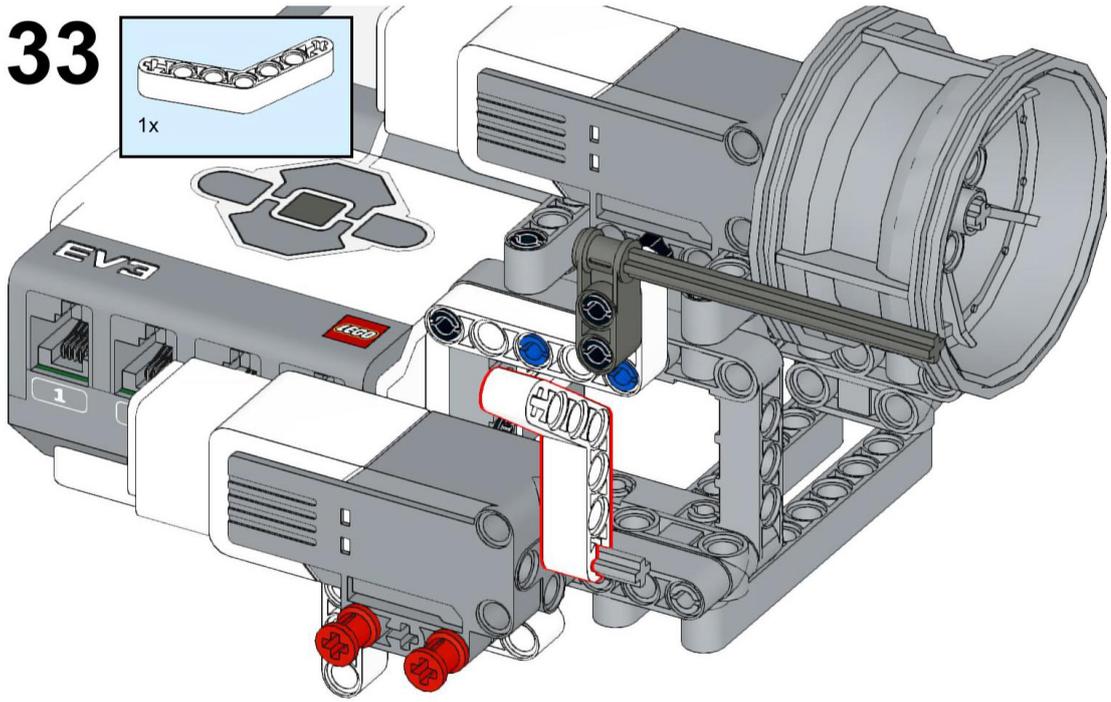
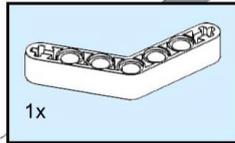


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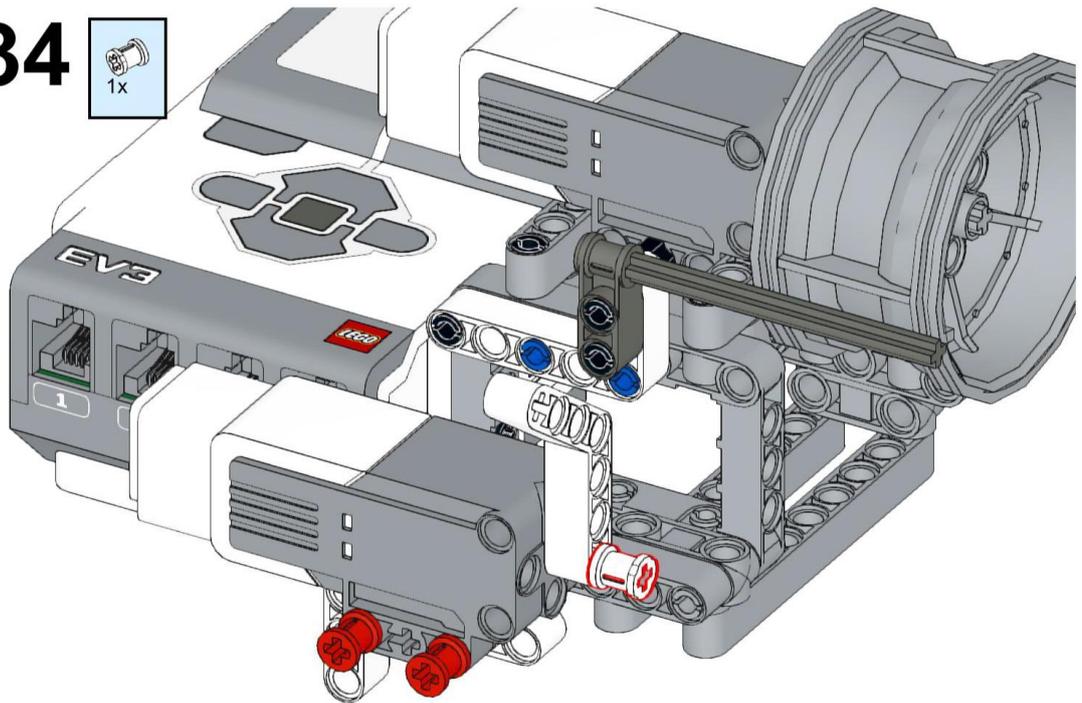
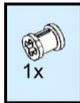




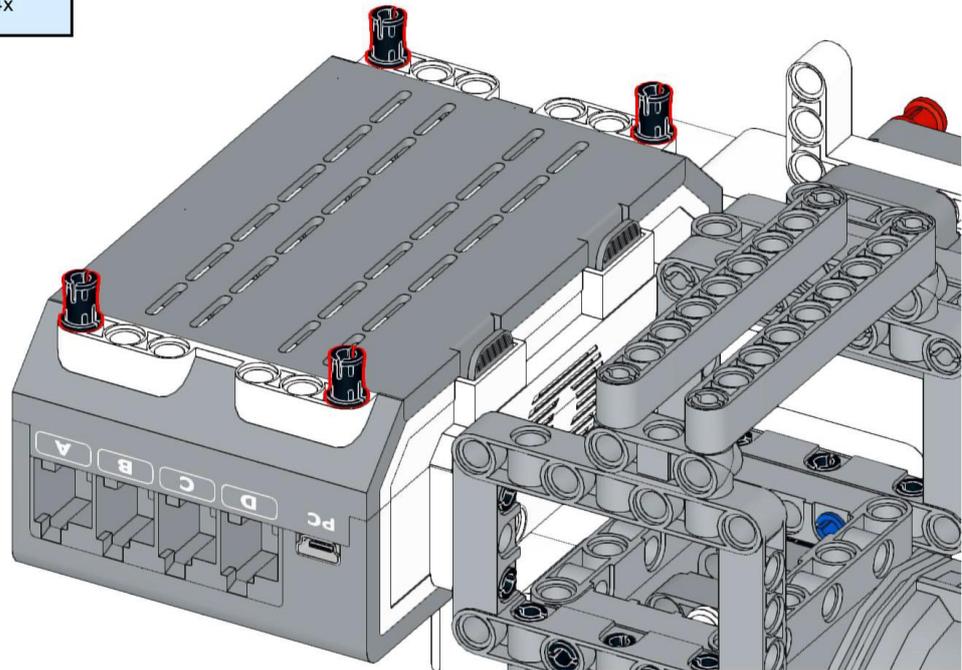
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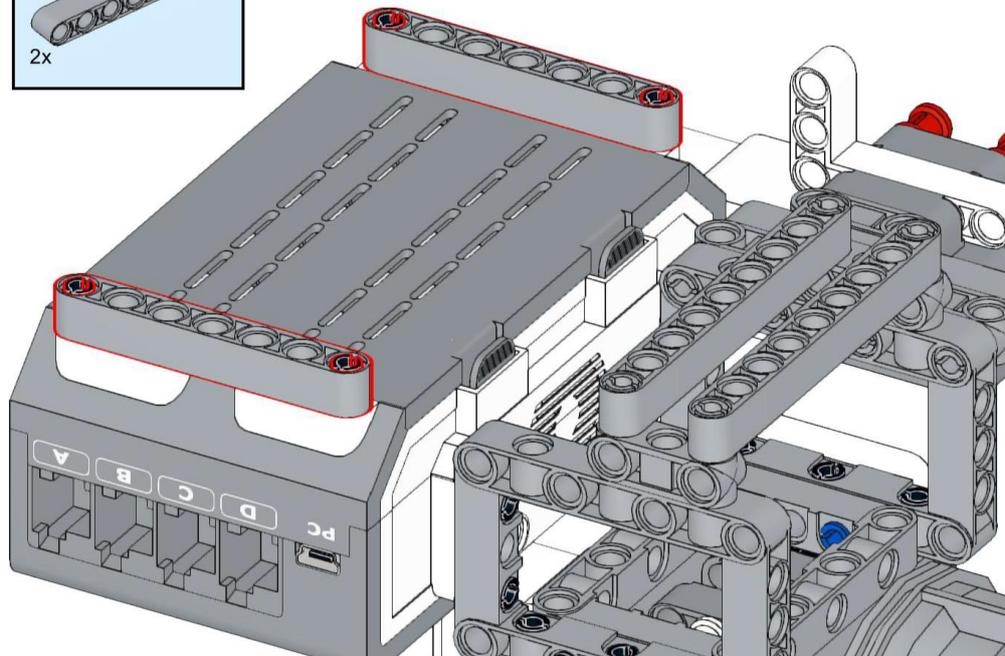
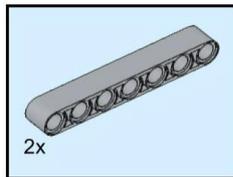
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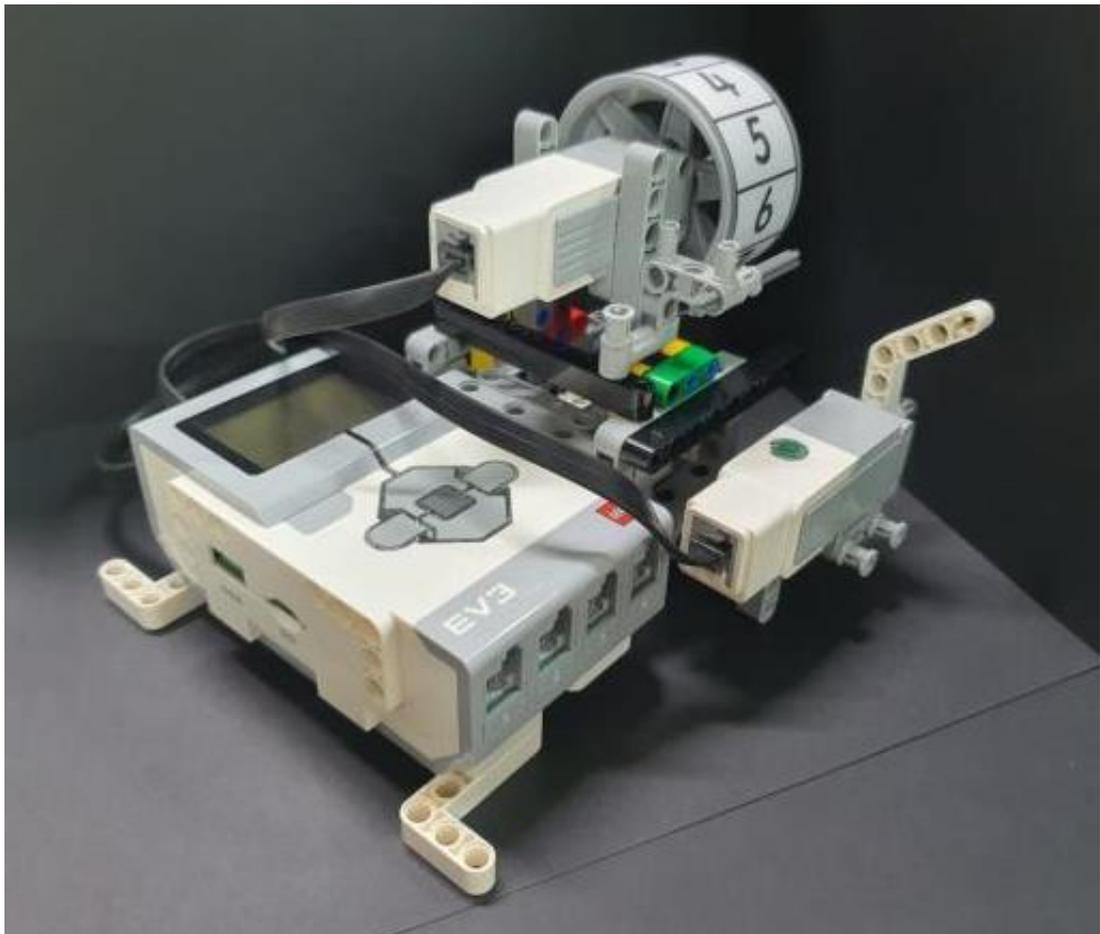
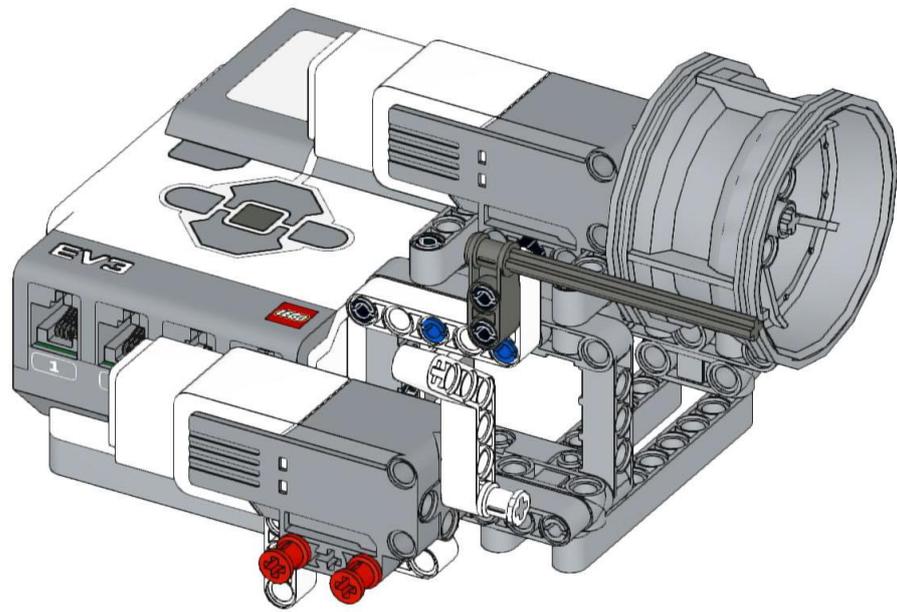
# 35



# 36



# 37



## Penyambungan wayar ke EV3 Brick

*Connection of wire towards EV3 Brick*

Berikut menunjukkan bahagian penyambung yang terdapat pada *EV3 Brick Teacher Spin Master* serta jenis wayar yang diperlukan.

*Below shows the wires that need to connect to the ports of Teacher Spin Master EV3 Brick.*

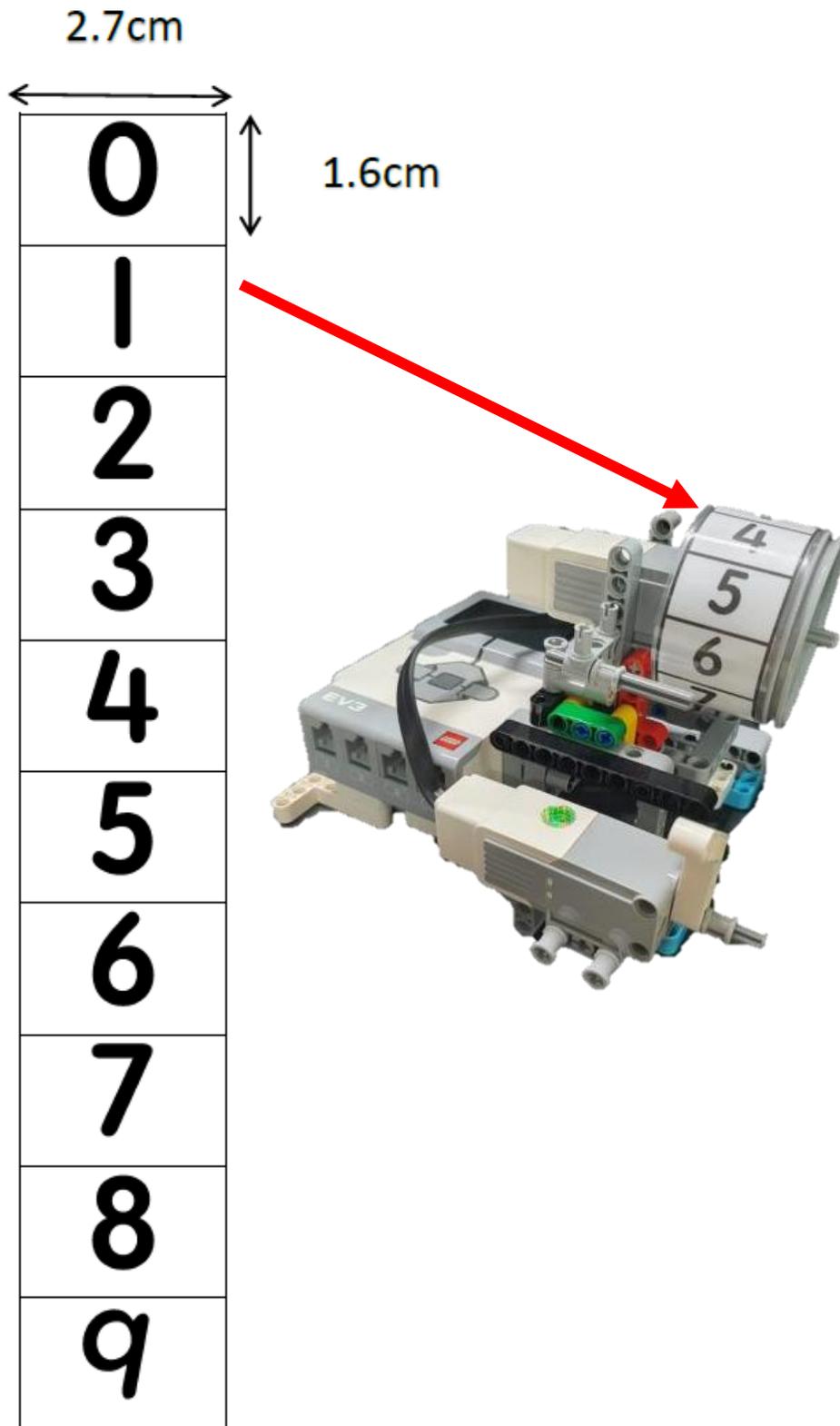
 <p style="text-align: center;"><b>EV3 Brick</b>                      <b>motor</b></p> <p>Port A-D menyambungkan EV3 Brick dengan motor. <i>Port A-D connect EV3 Brick to the motors.</i></p>	 <p>Satu EV3 wire yang berukuran 25cm. <i>One EV3 wire, each measuring 25 cm in length.</i></p> <p>Satu EV3 wire yang berukuran 35cm. <i>One EV3 wire, each measuring 35 cm in length.</i></p>
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Jadual di bawah menunjukkan jenis motor yang disambungkan pada bahagian penyambung *EV3 Brick Teacher Spin Master*.

*The table below shows the types of motors connected to the ports of the Teacher Spin Master EV3 Brick.*

<p>Port A sambung dengan motor medium <i>Port A connect to medium motor</i></p>  <p style="text-align: center;"><b>Medium motor (Handle)</b> <i>*35 cm wire</i></p>	<p>Port B sambung dengan motor medium <i>Port B connect to medium motor</i></p>  <p style="text-align: center;"><b>Medium motor (Spinning wheel)</b> <i>*25 cm wire</i></p>
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Jalur Nombor (*Number Strip*)

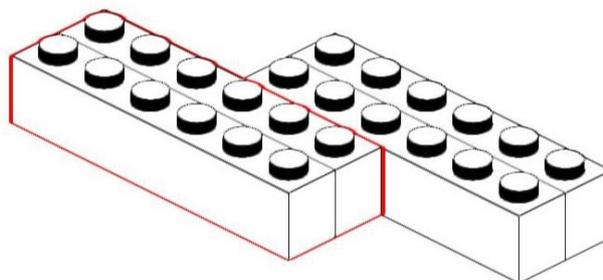
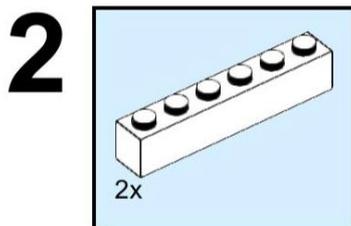
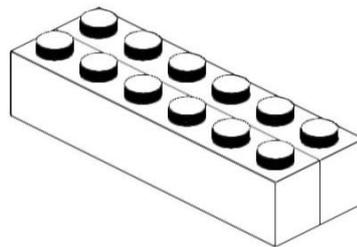
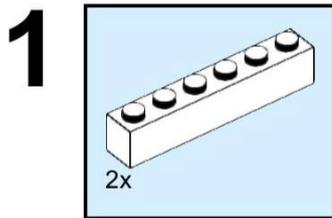


## 6.0 PEMASANGAN ELEMENT PERMAINAN *BUILDING INSTRUCTION OF GAME ELEMENTS*

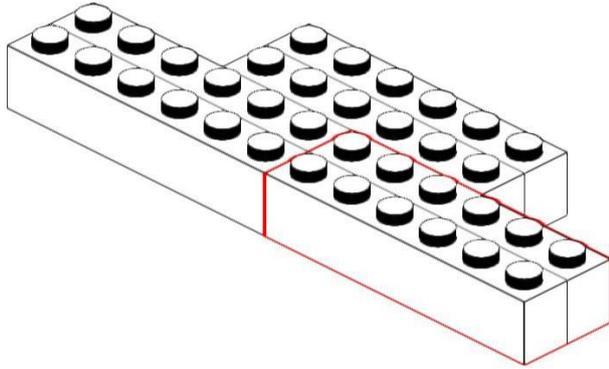
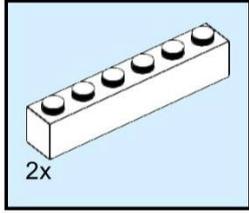
Bahagian ini akan menunjukkan urutan gambar-gambar pemasangan element permainan iaitu Kubu Nombor, tiang gol dan pemegang bola. Pemasangan element permainan ini adalah menggunakan Lego Education SPIKE Prime Expansion Set atau Mindstorms EV3 Educaiton Expansion Set.

*This section will show a sequence of pictures for building instruction of Number fortress, gol post and ball's stand. The installation of this game element is using Lego Education SPIKE Prime Expansion Set or Mindstorms EV3 Educaiton Expansion Set.*

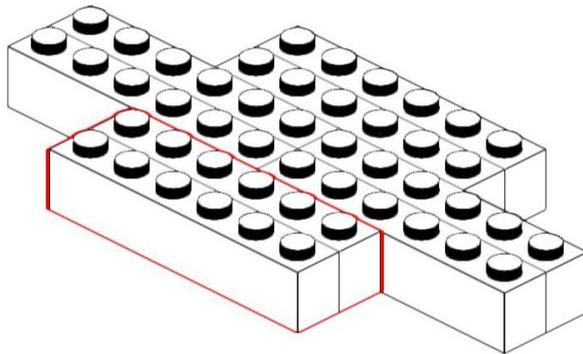
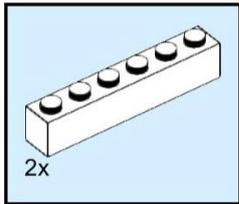
### 6.1 Kubu nombor *Number fortress*



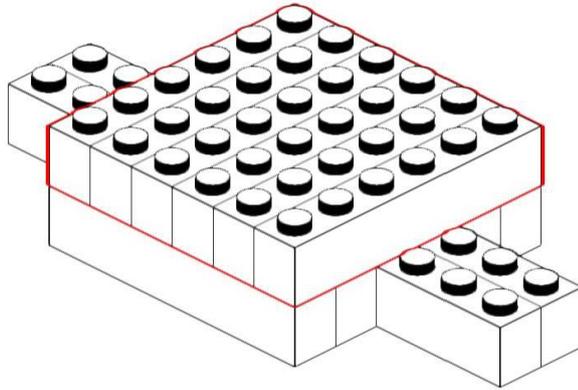
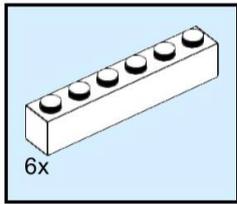
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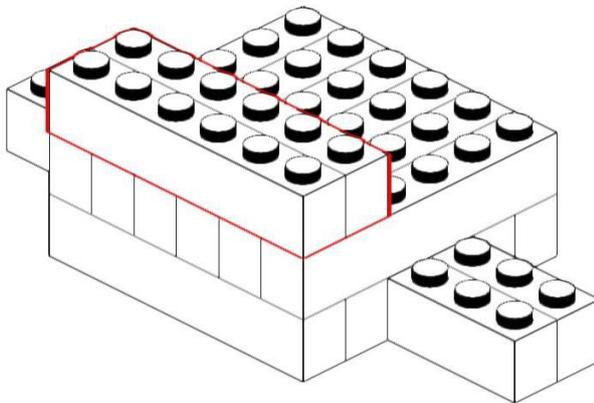
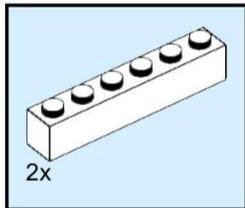
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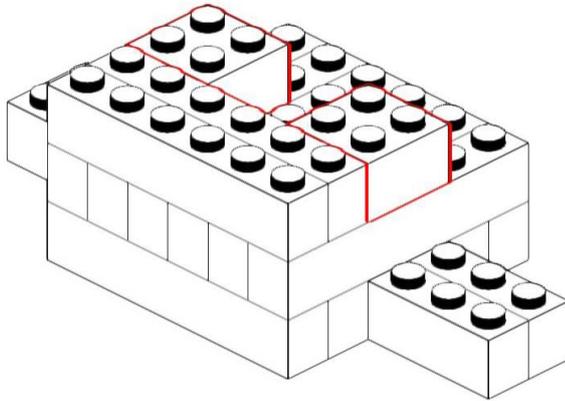
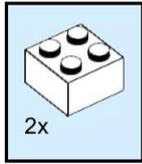
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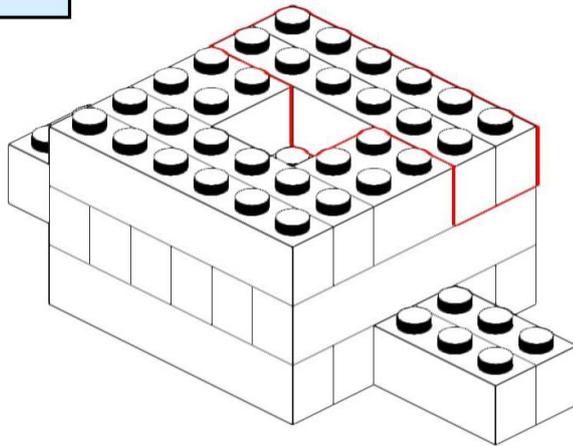
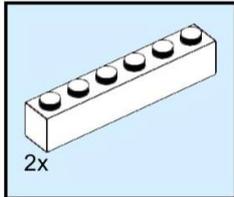
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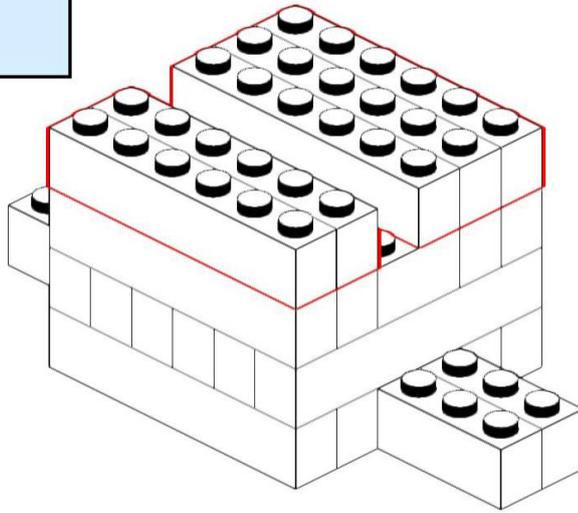
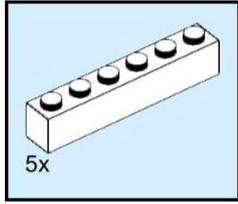
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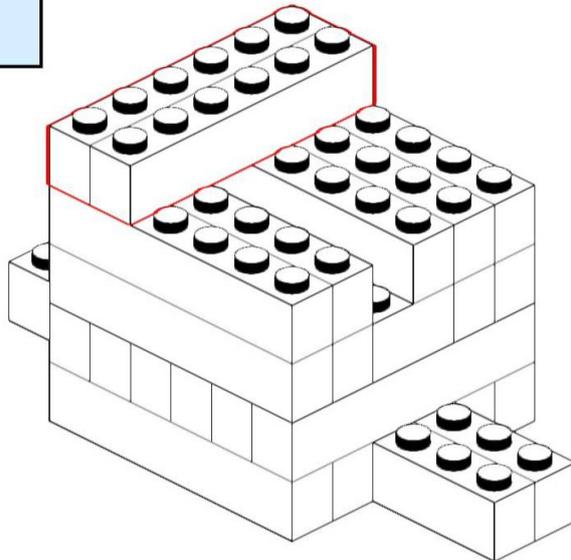
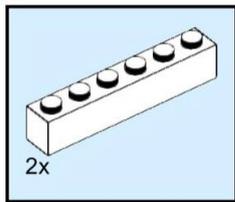
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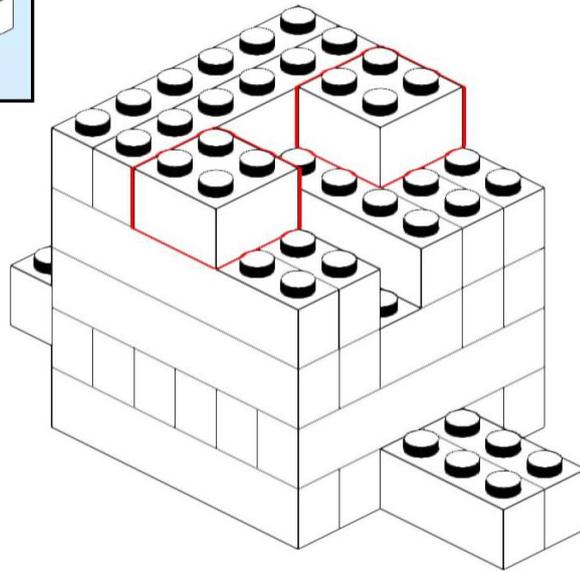
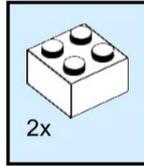
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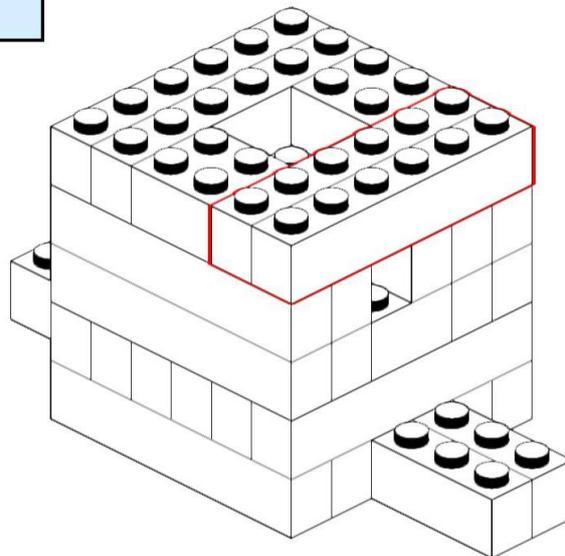
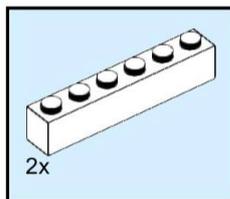
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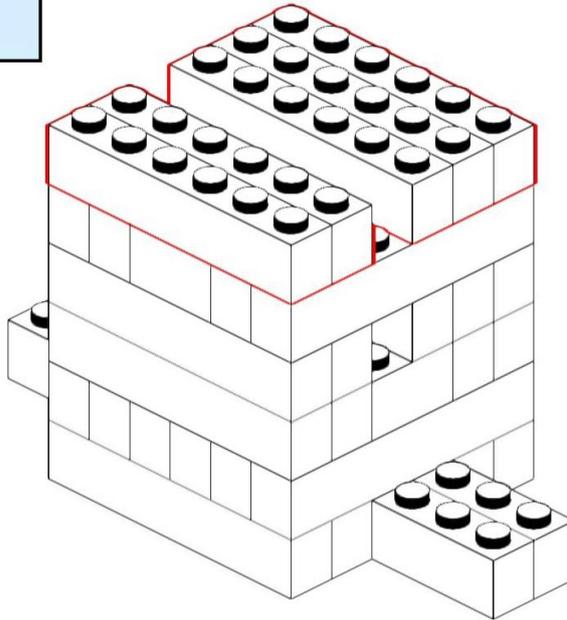
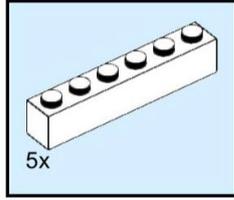
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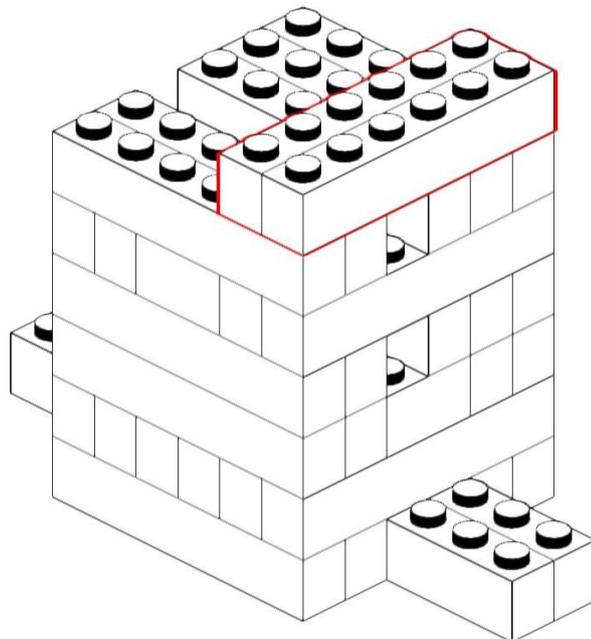
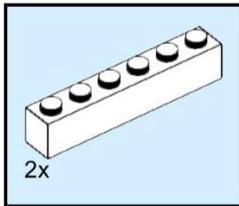
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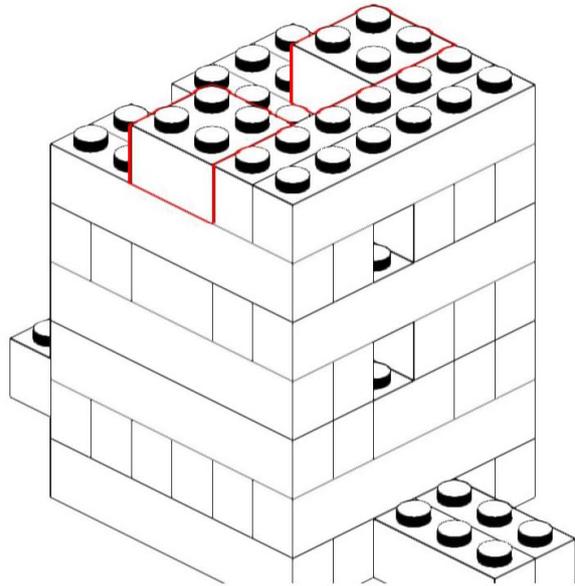
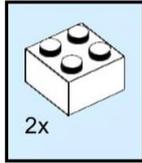
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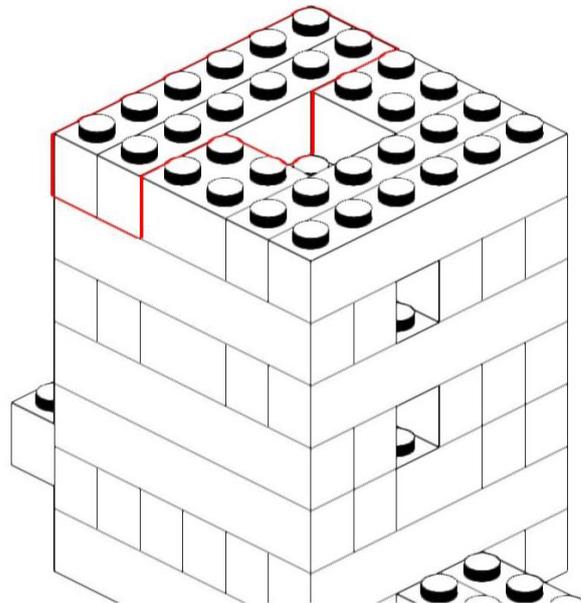
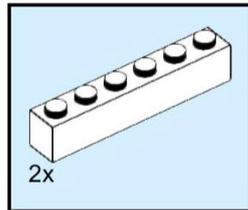
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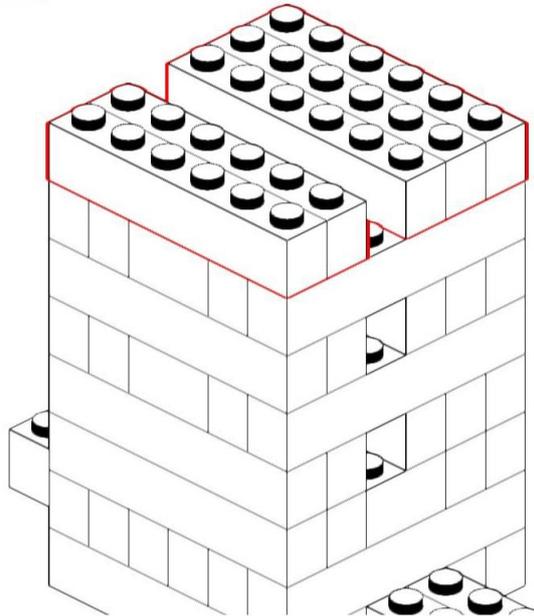
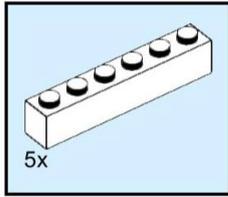
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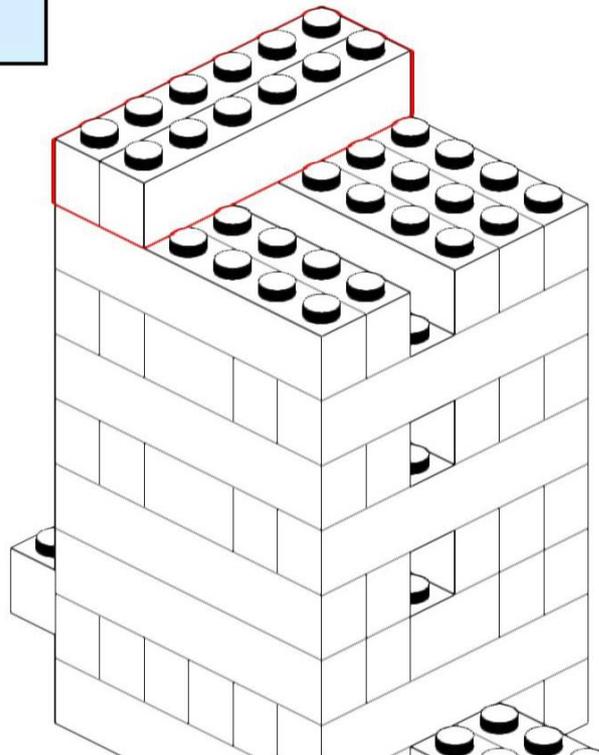
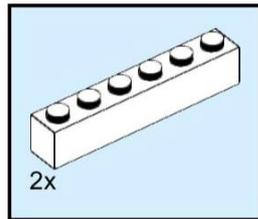
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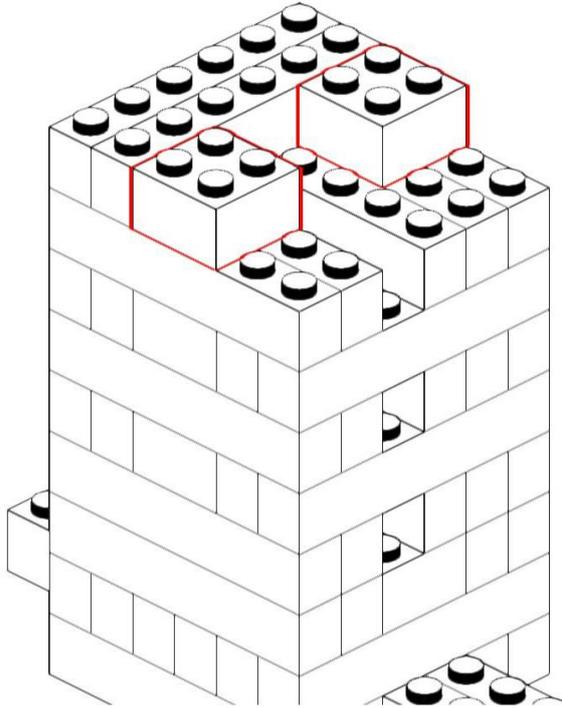
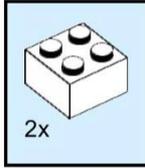
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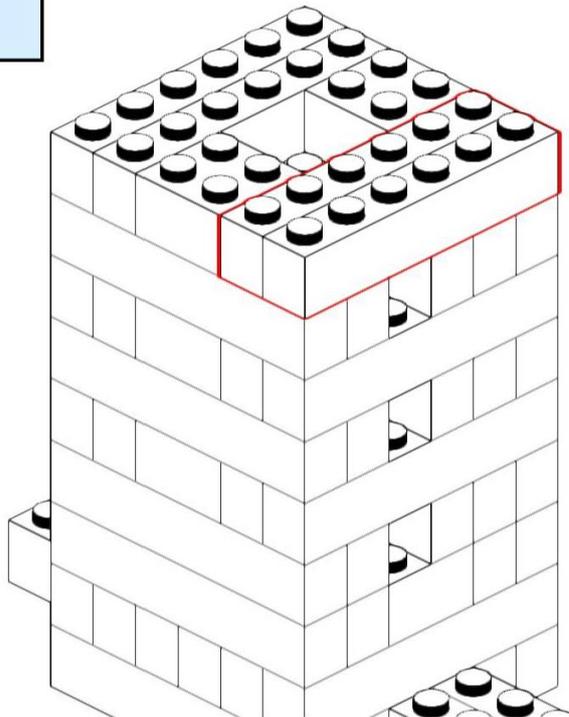
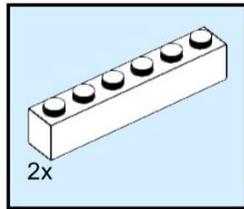
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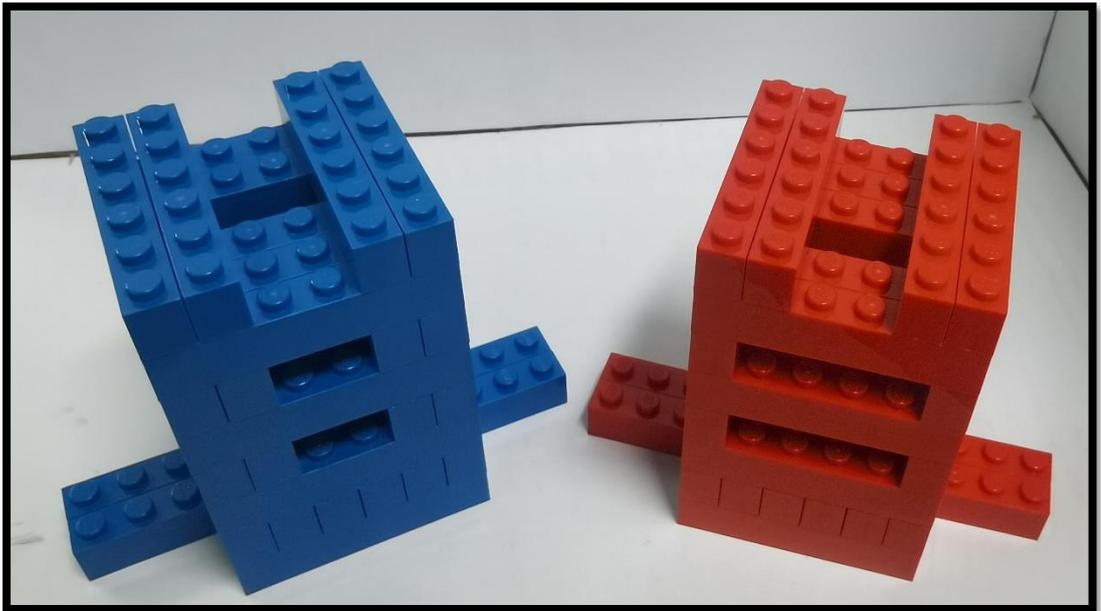
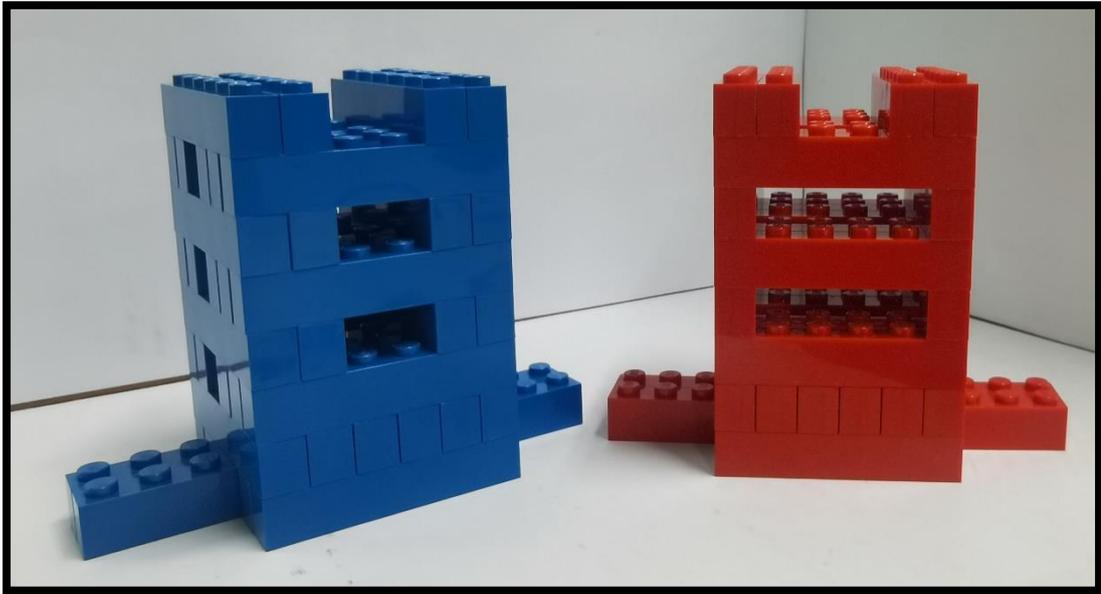


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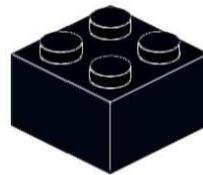
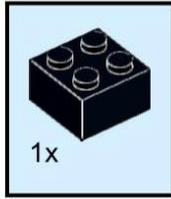
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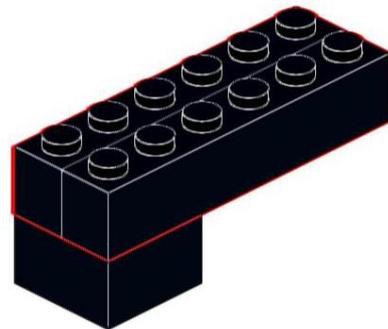
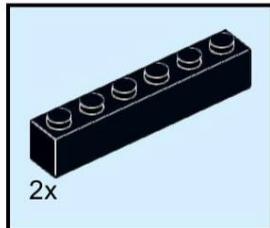


6.2 **Tiang Gol**  
*Gol Post*

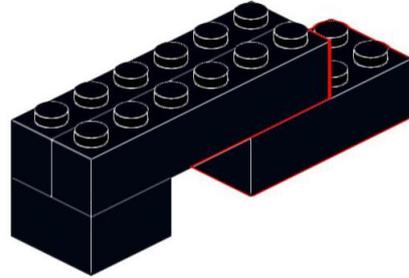
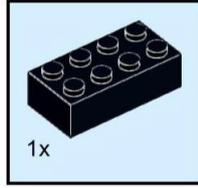
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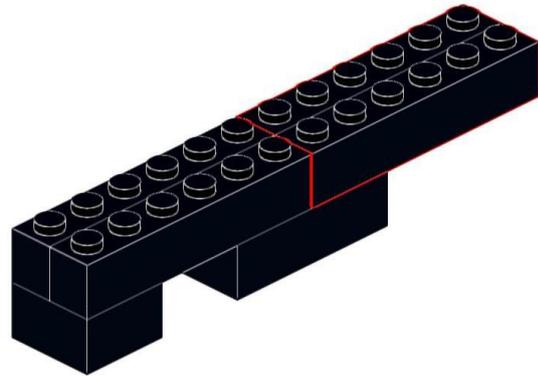
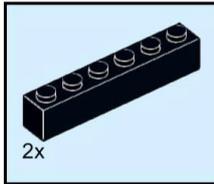
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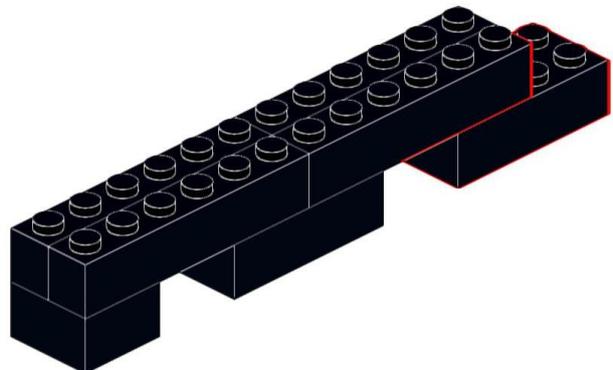
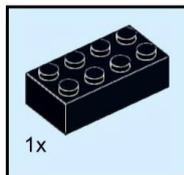
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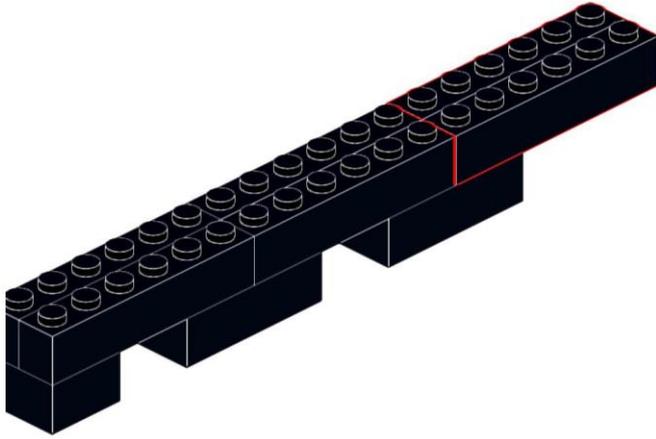
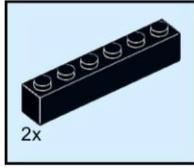
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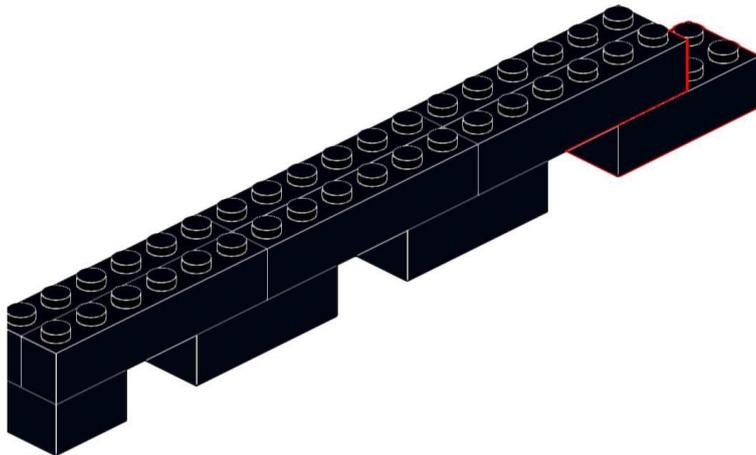
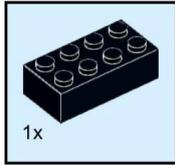
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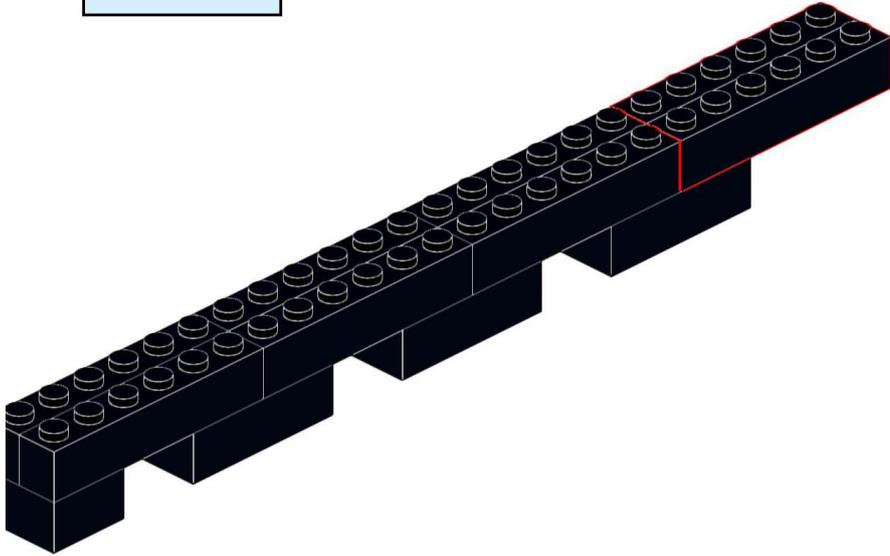
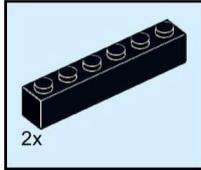
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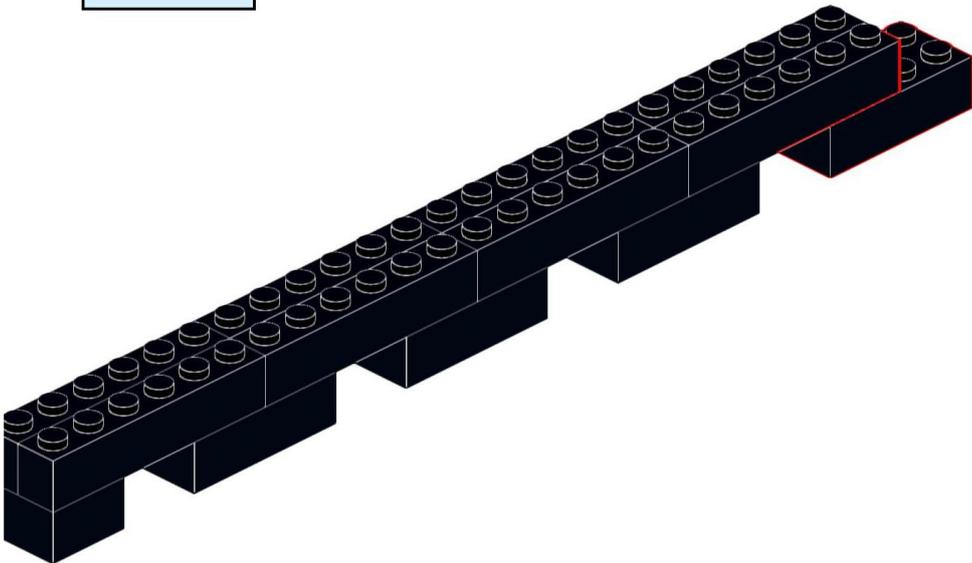
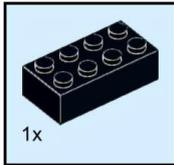
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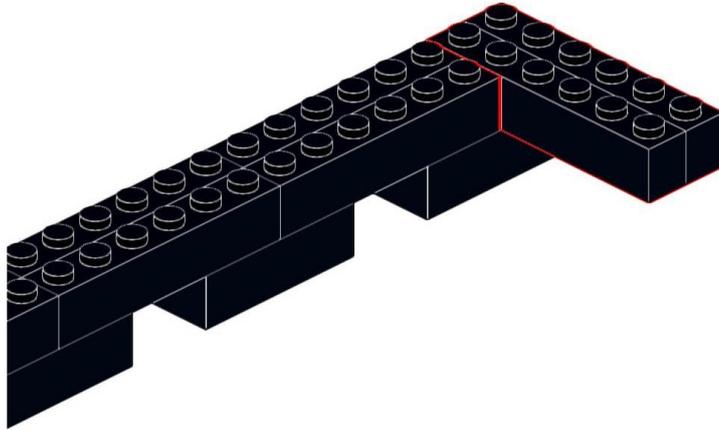
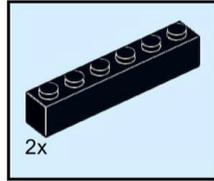
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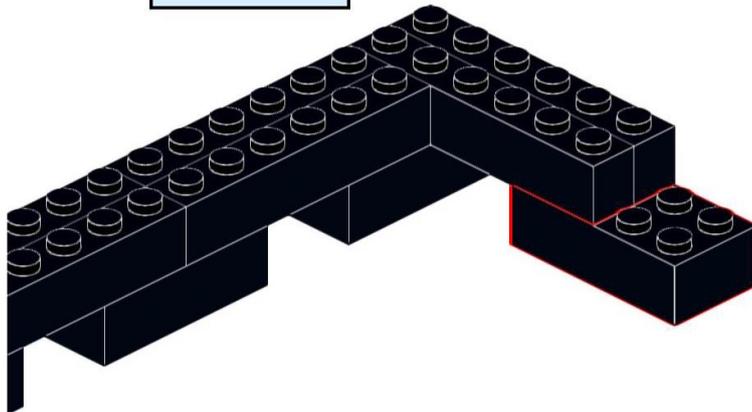
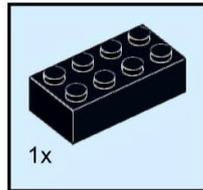
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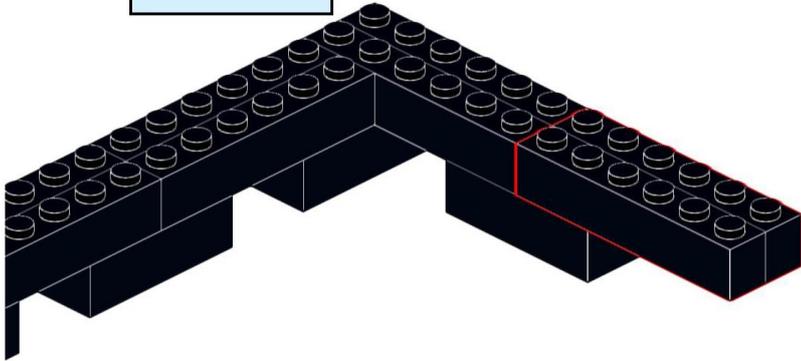
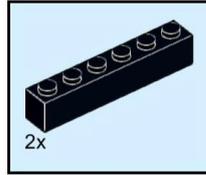
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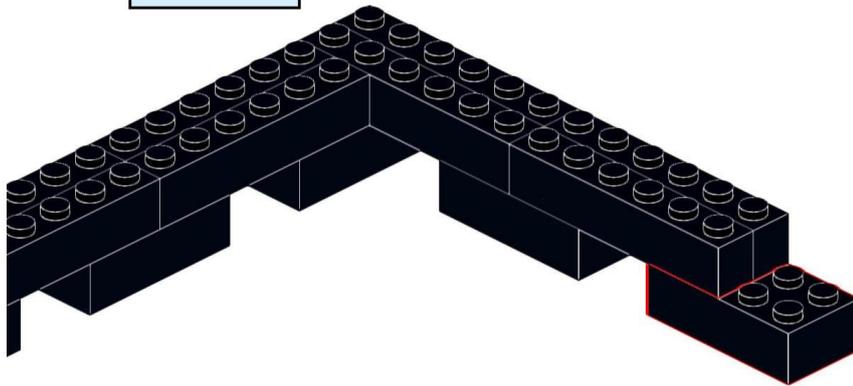
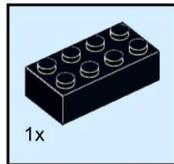
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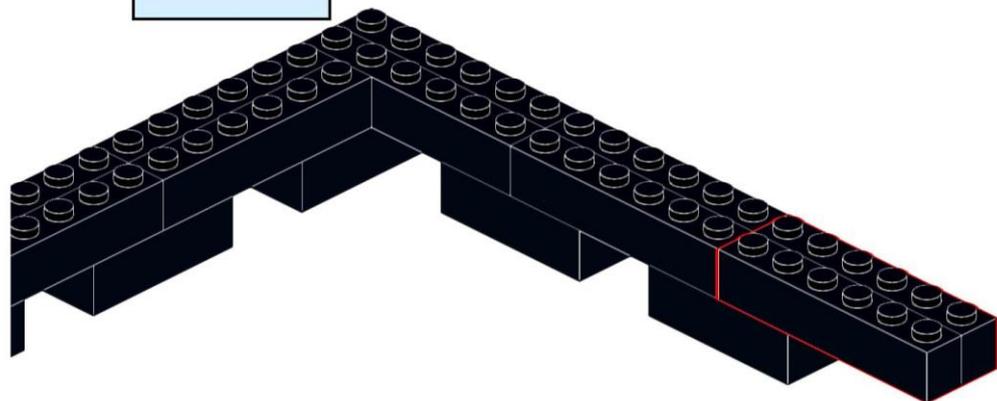
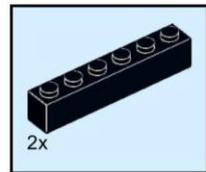
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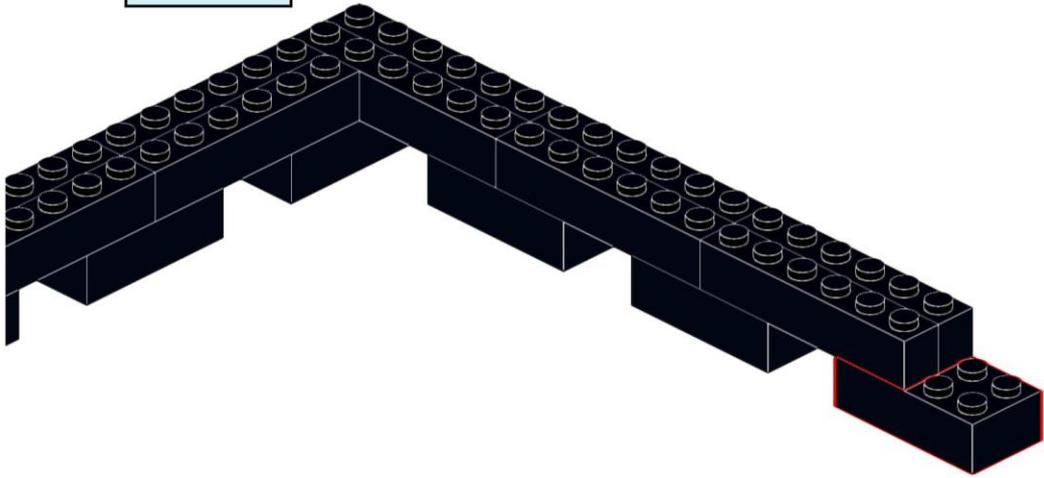
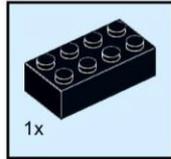
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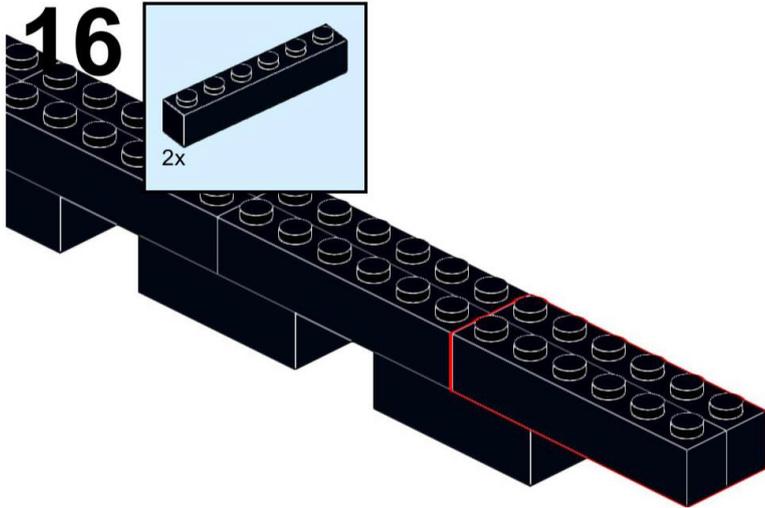
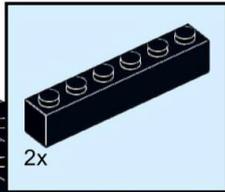
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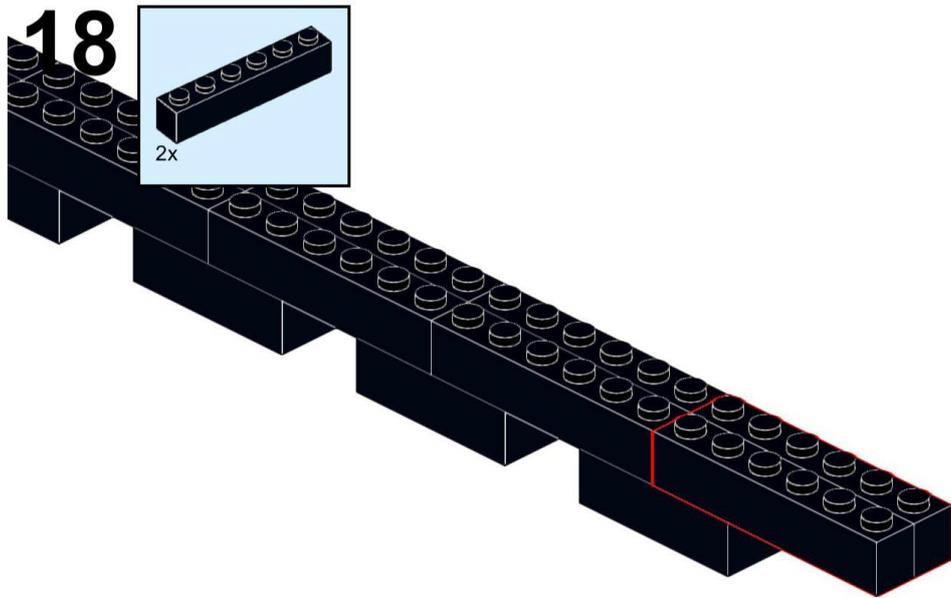
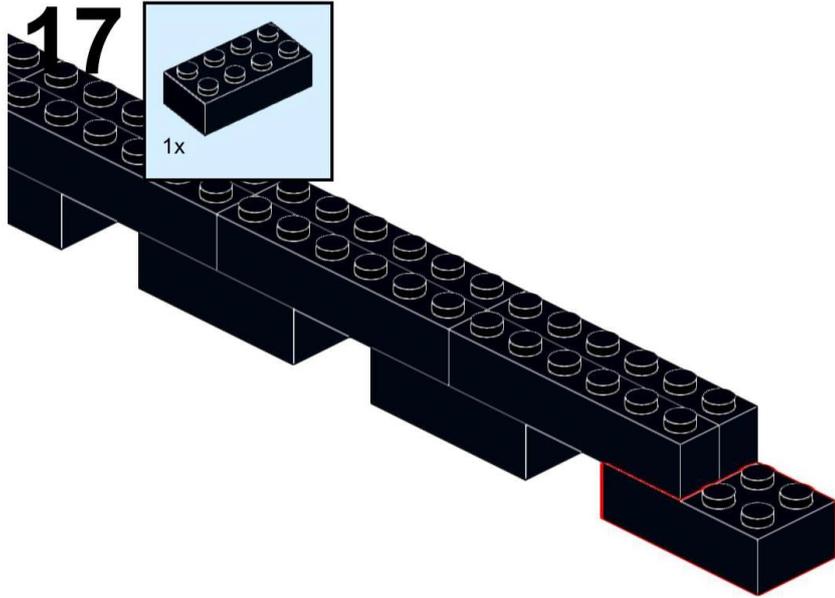


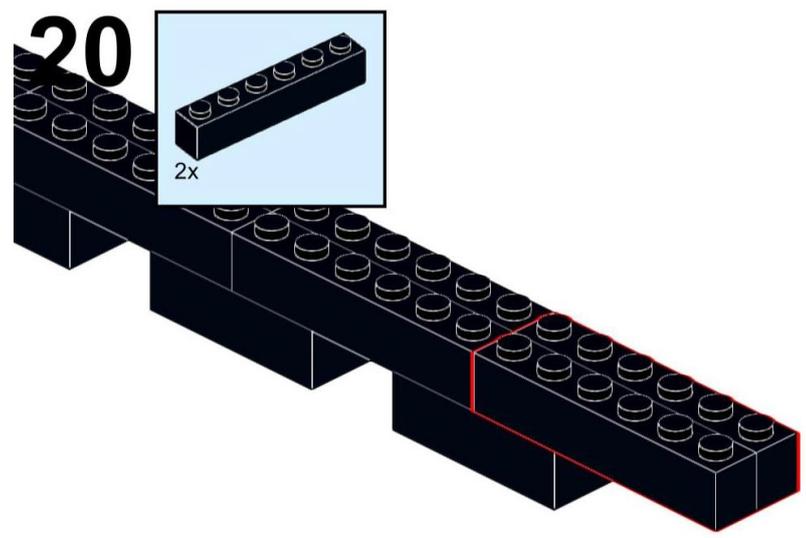
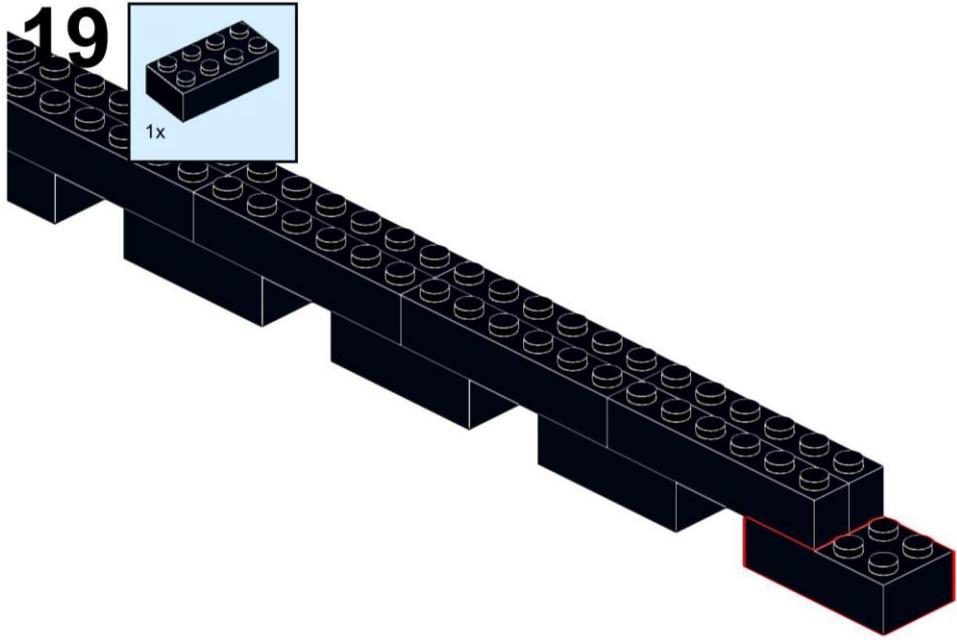
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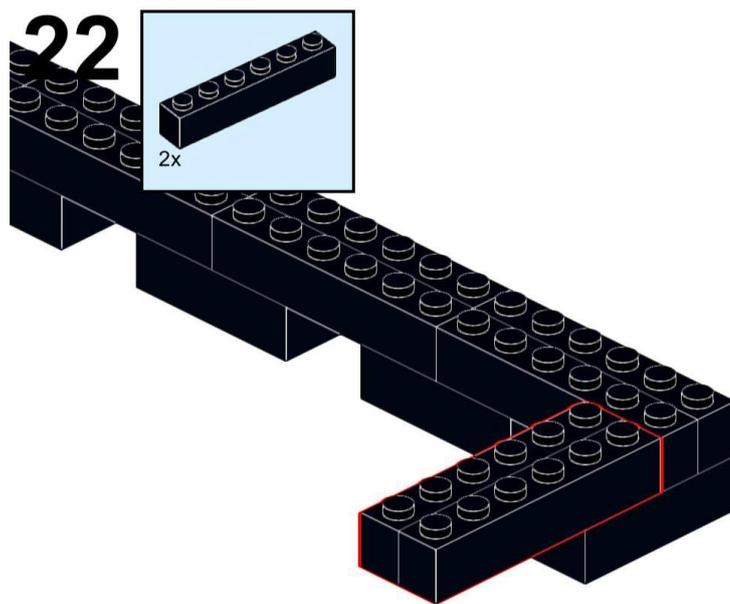
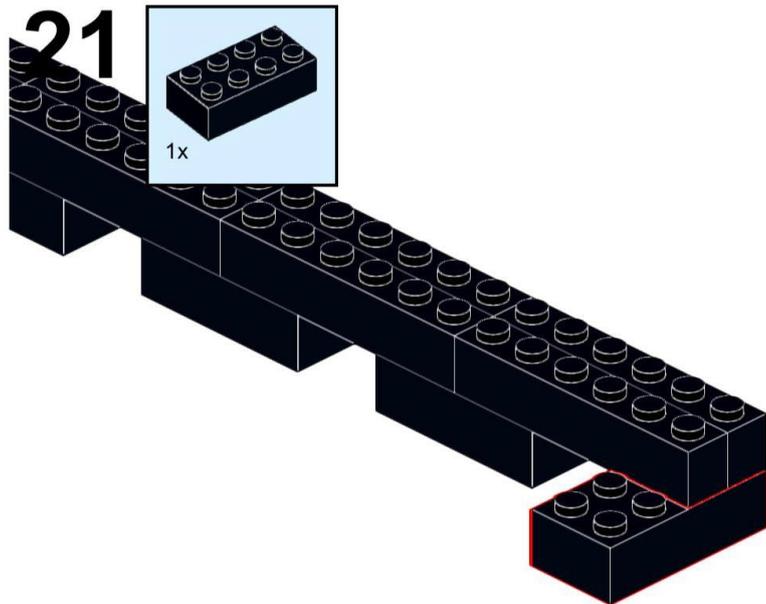


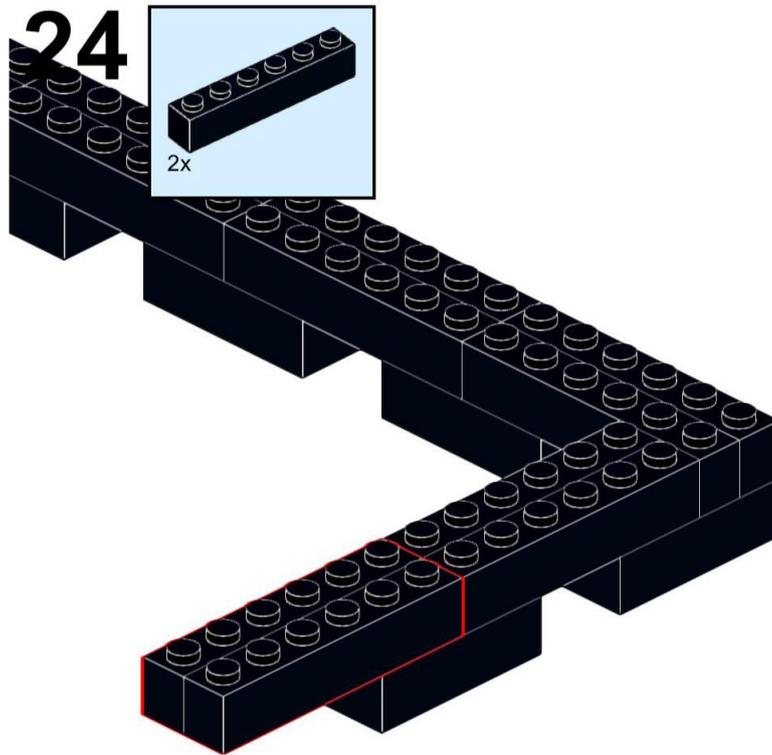
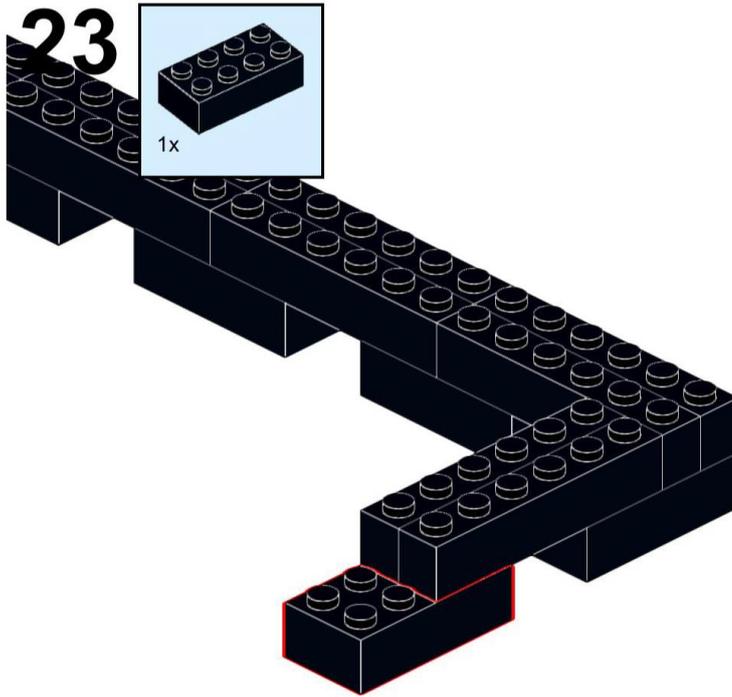
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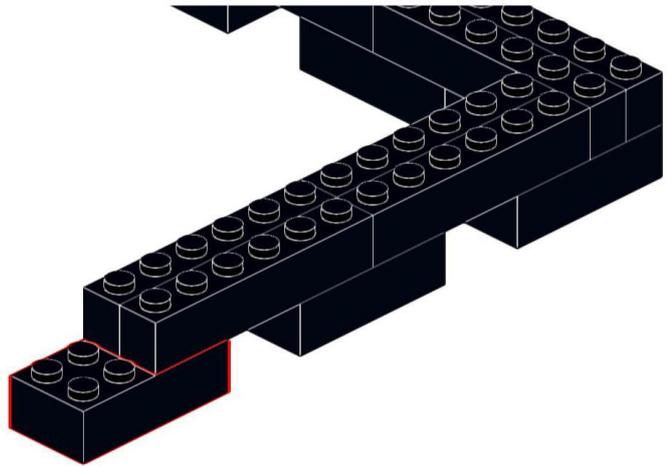
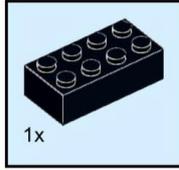




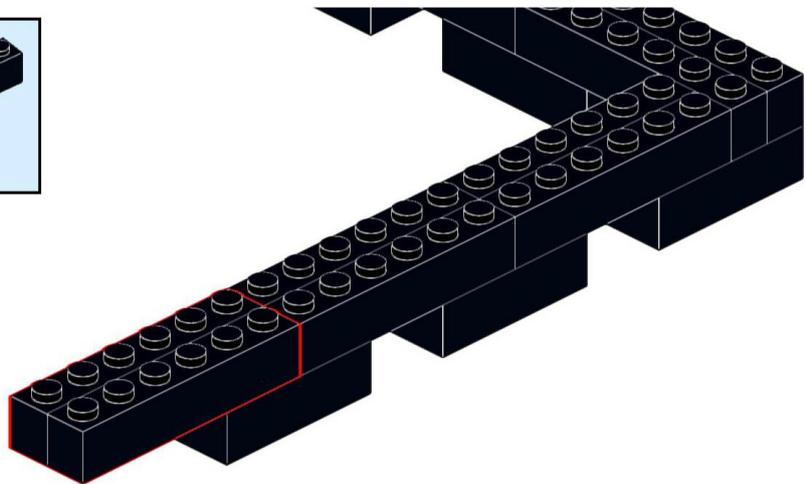
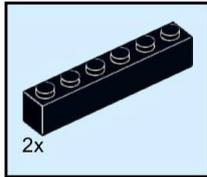




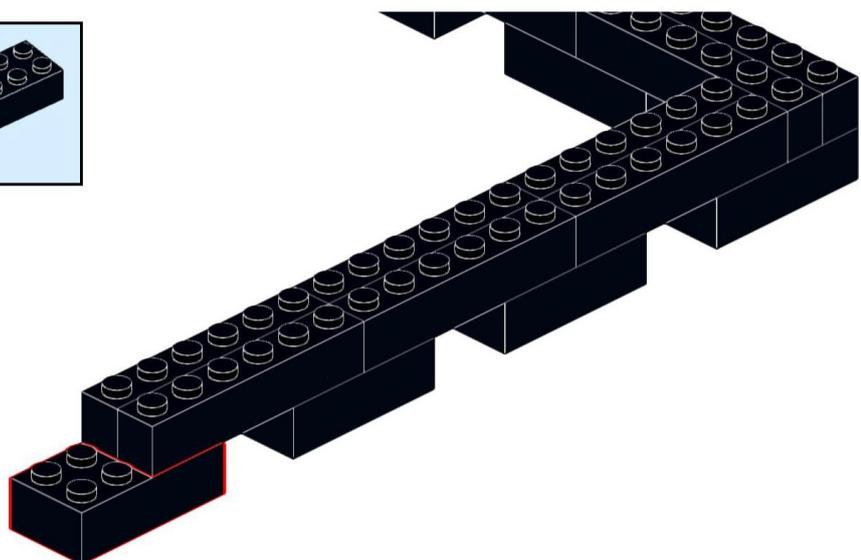
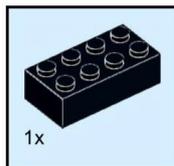
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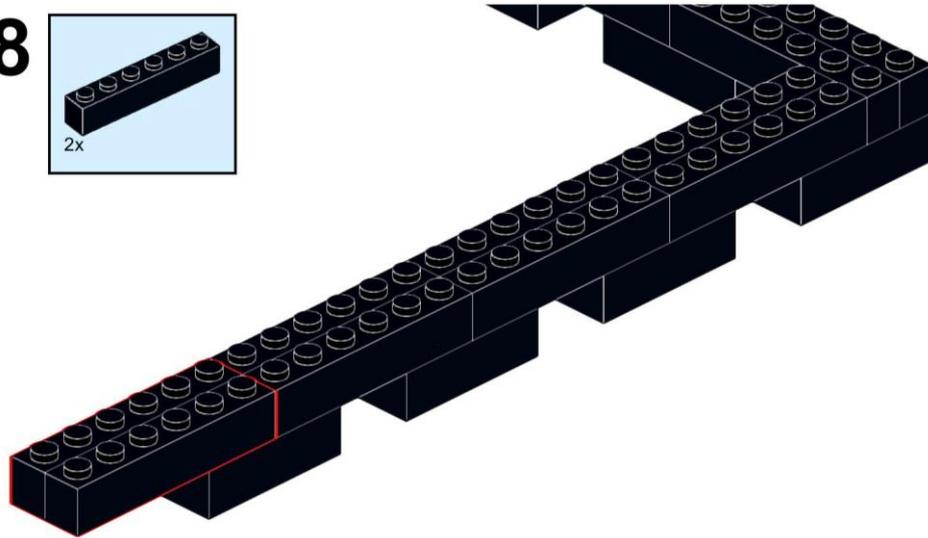
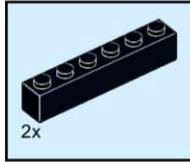
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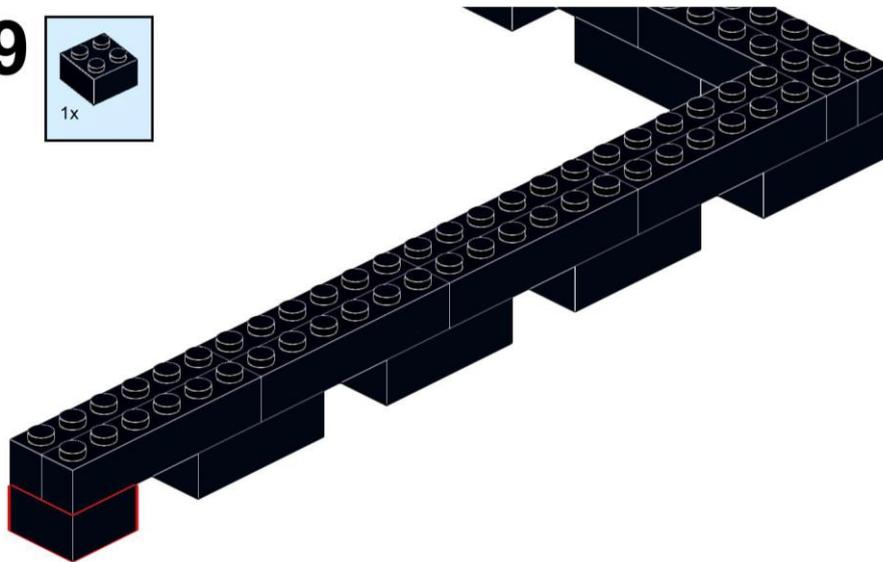
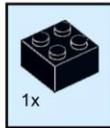
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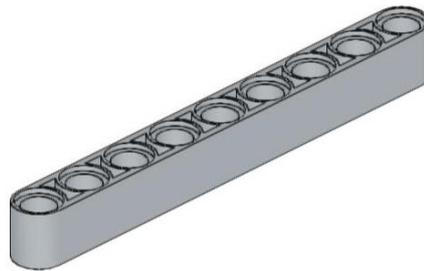
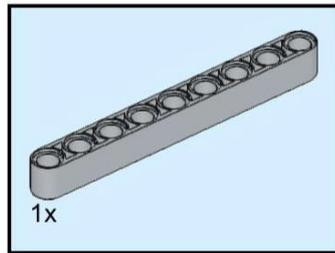


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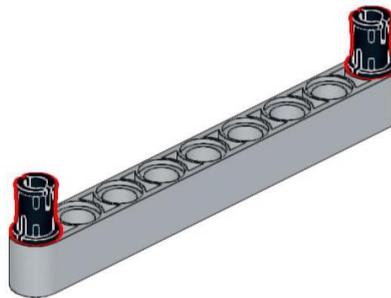


## 6.4 Pemegang Bola *Ball's Stand*

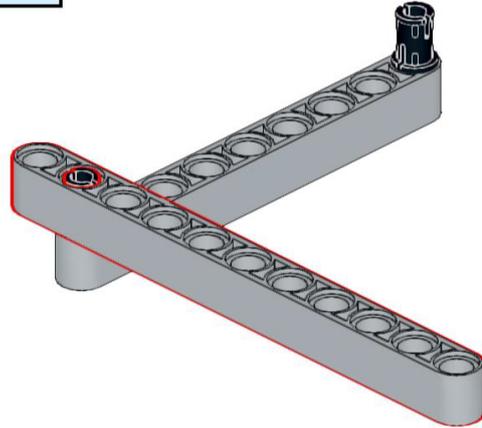
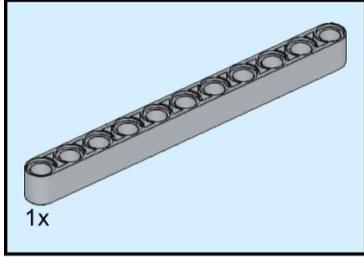
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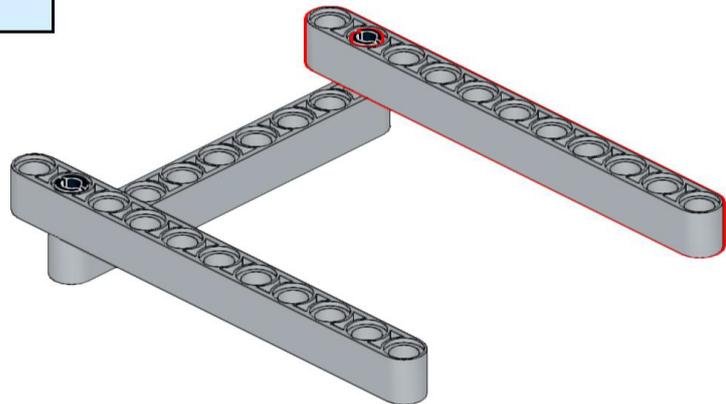
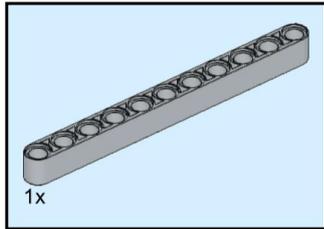
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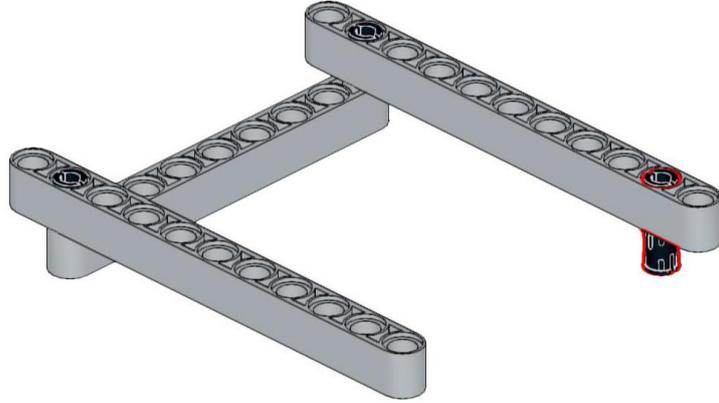
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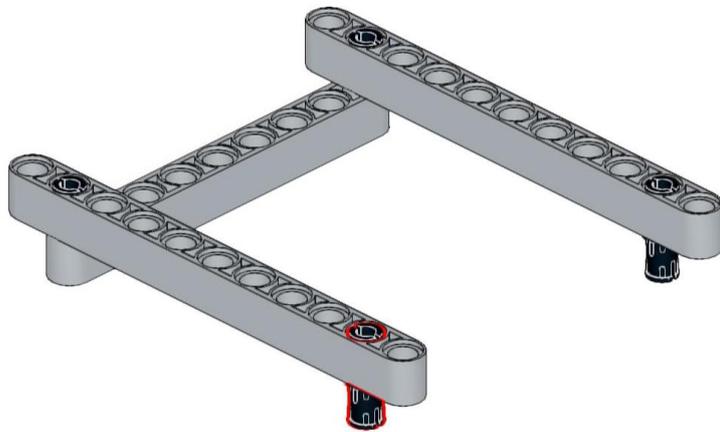
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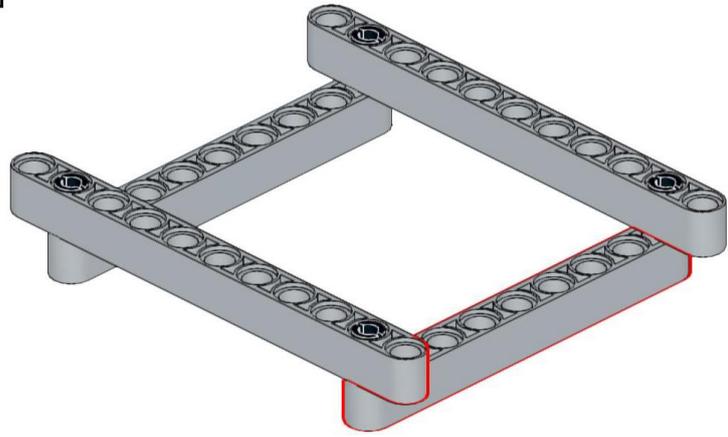
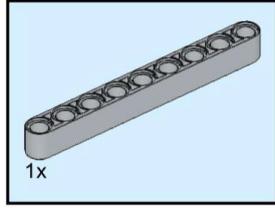
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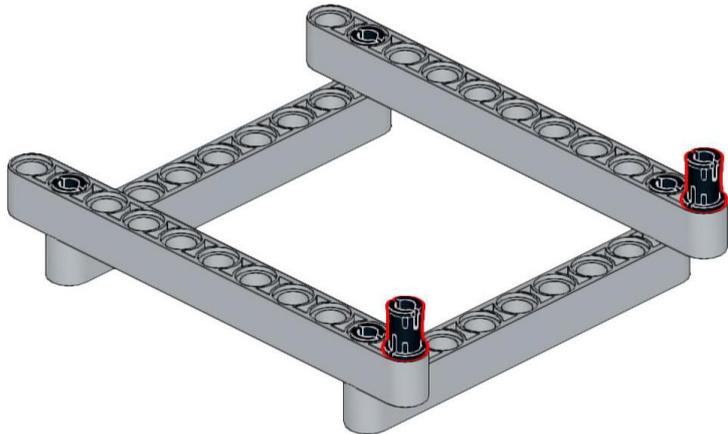
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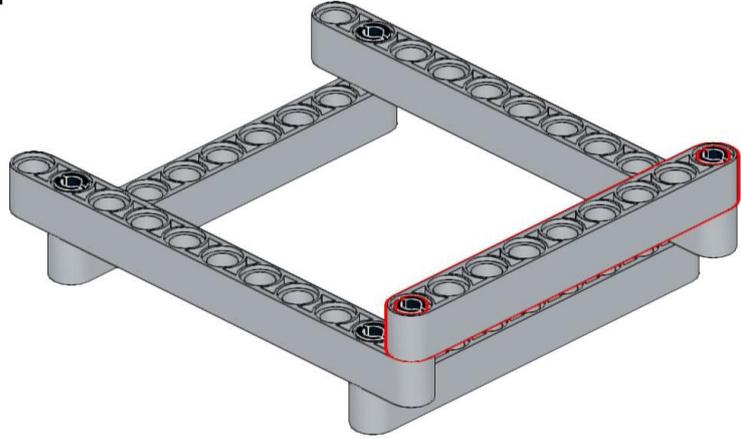
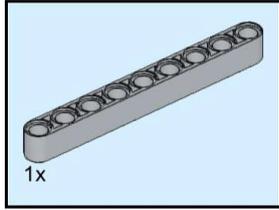
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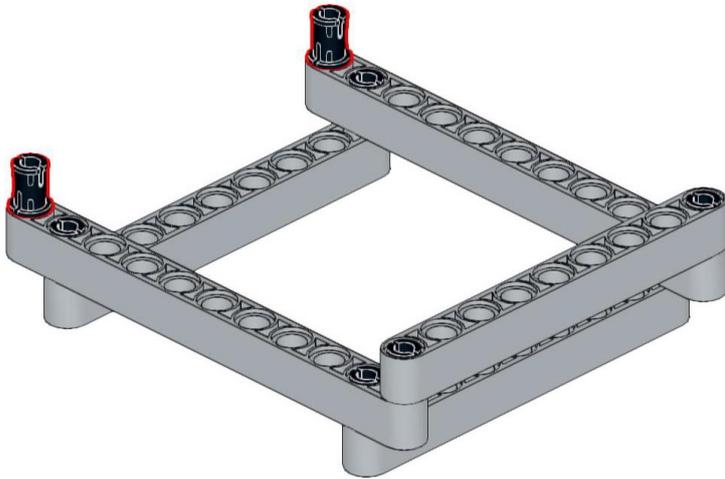
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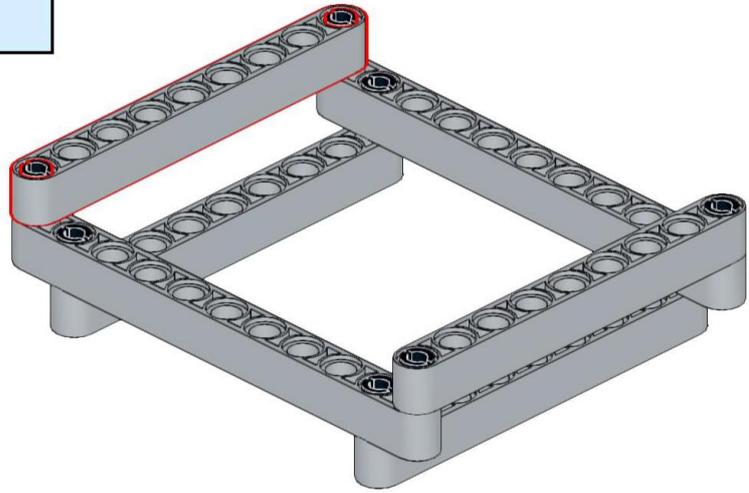
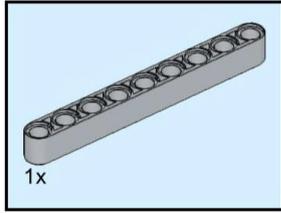
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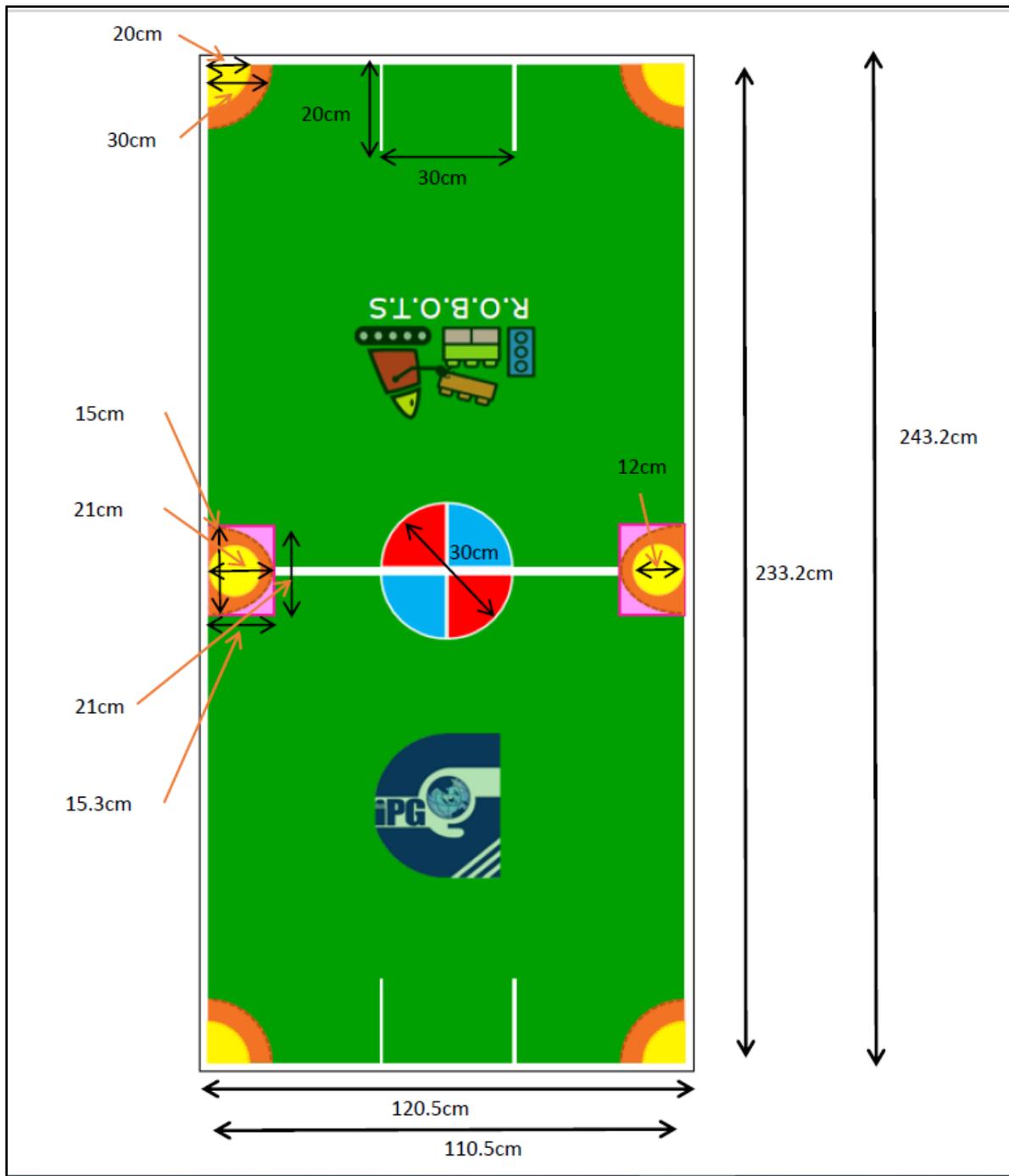
10



# 11



**LAMPIRAN 1 : Padang R.O.B.O.T.S**  
**APPENDIX 1 : R.O.B.O.T.S Field**



**LAMPIRAN 2 : Kipas Bernombor**  
*APPENDIX 2 : Numbered Fan*



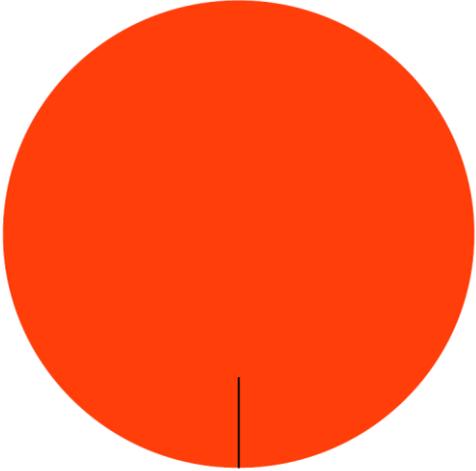
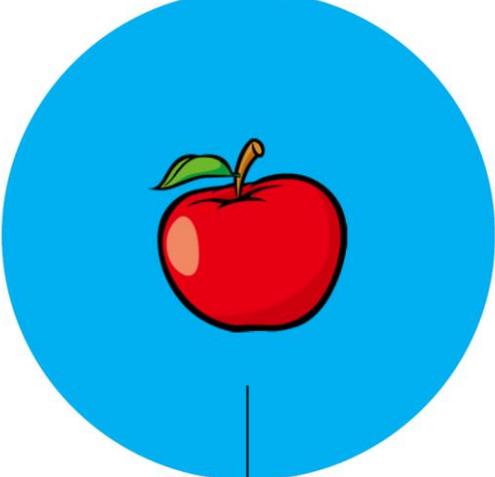
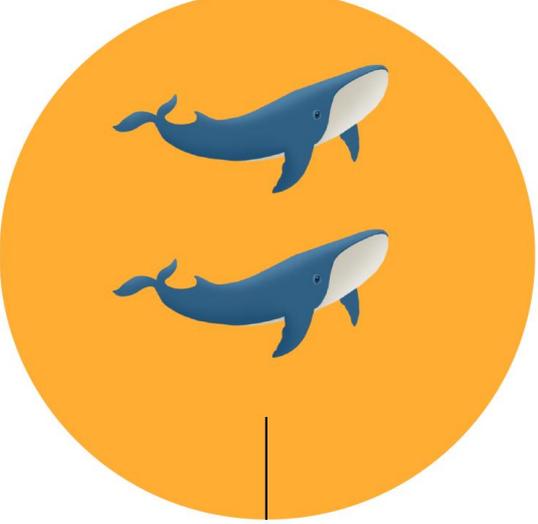
Satu set Kipas Bernombor (angka 0 hingga 9)  
*One set of Numbered Fans (numbers 0 to 9)*



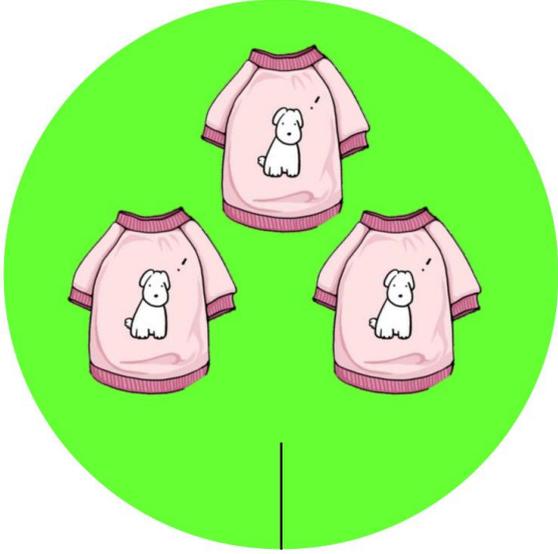
Kipas Bernombor "3" (depan & belakang)  
*"3" Numbered Fans (front & back)*



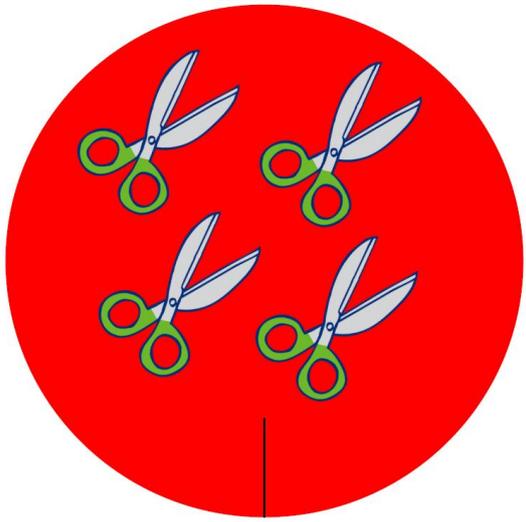
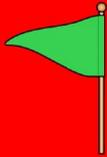
Kipas Bernombor "8" (depan & belakang)  
*"8" Numbered Fans (front & back)*

Kipas Bernombor (reka bentuk depan) <i>Numbered Fan (front design)</i>	Kipas Bernombor (reka bentuk belakang) <i>Numbered Fan (back design)</i>
	
	
	

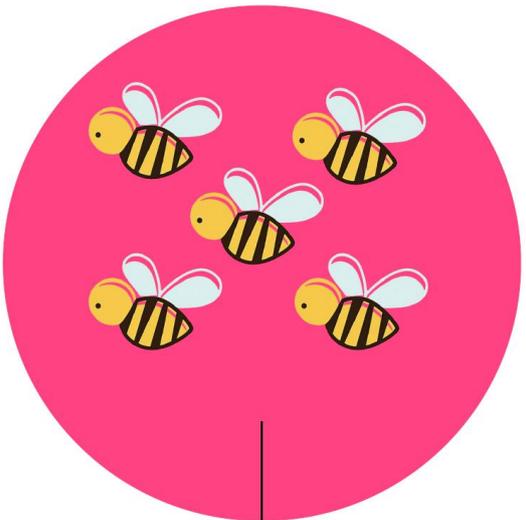
three  
tiga



four  
empat



five  
lima



six  
enam



6

R.O.B.O.T.S



seven  
tujuh



7

R.O.B.O.T.S

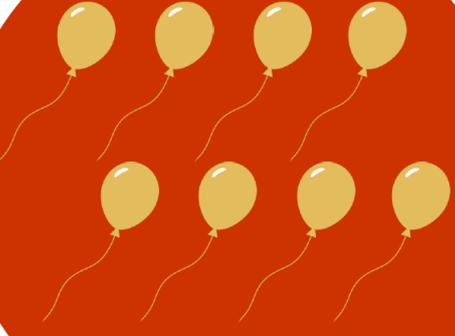


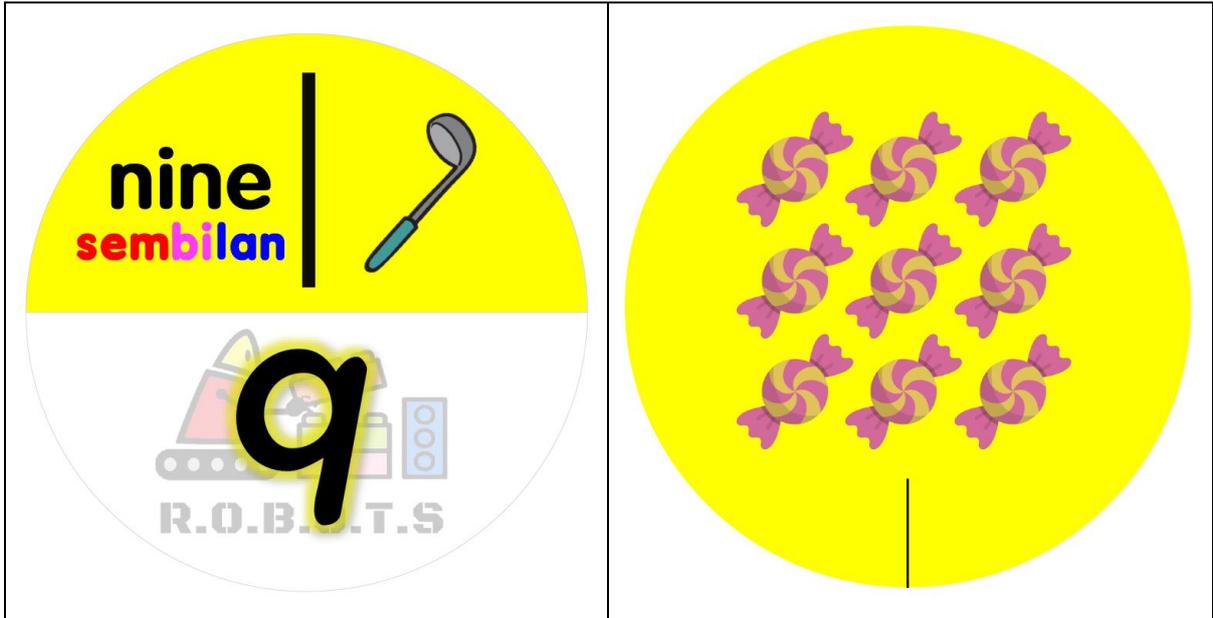
eight  
lapan

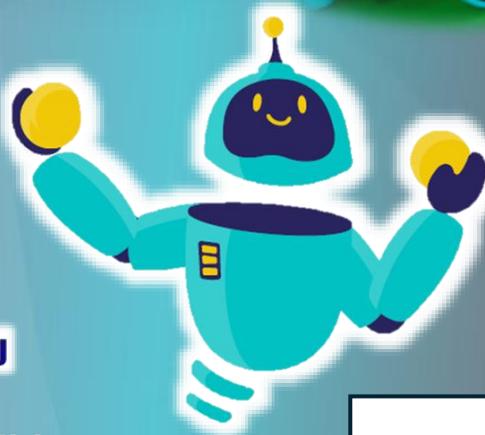
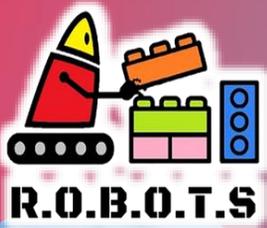


8

R.O.B.O.T.S







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