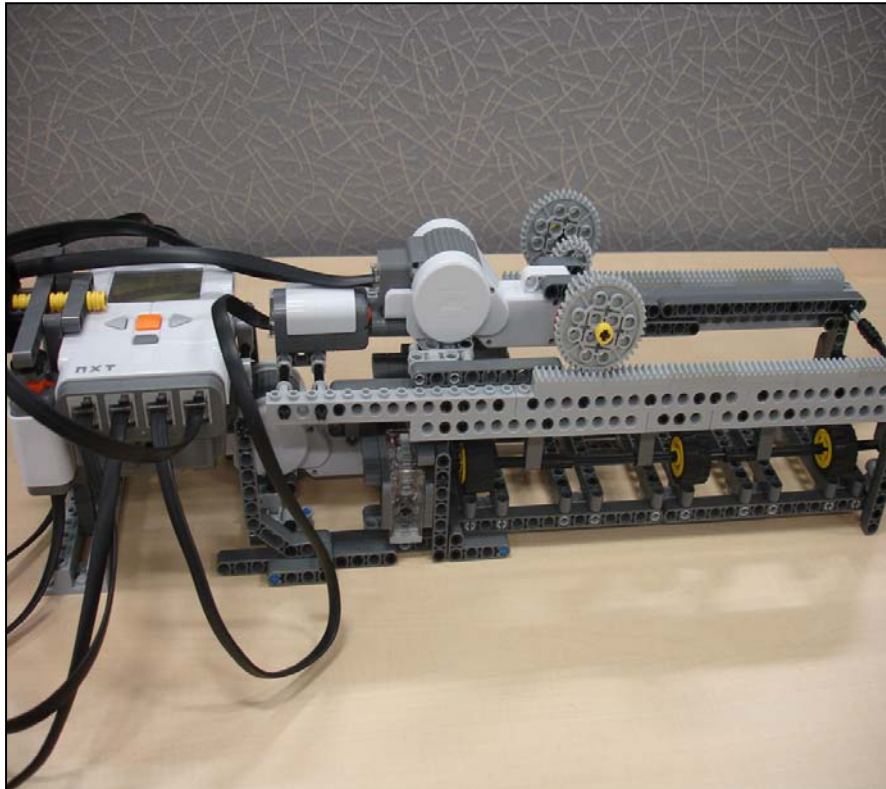


NXT Scanner Building Instructions



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■ Revision History

Revision	Date	Description	Author/Editor
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The contents and URL described in this document can be changed with no previous notice.

Introduction

This document describes the required products for an NXT Scanner and how to build it. The NXT Scanner is a sheet feed image scanner and is built with LEGO Mindstorms NXT.

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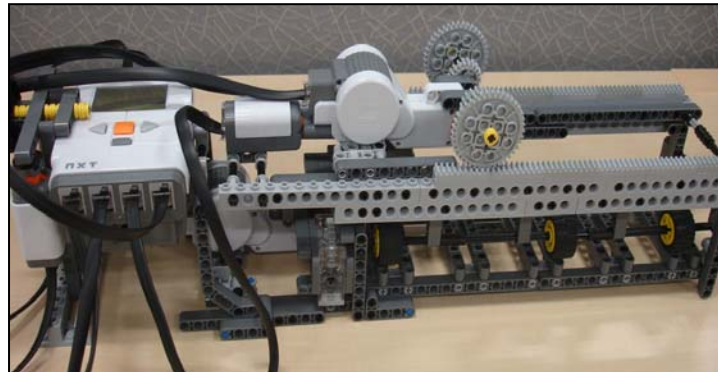
1 What is an NXT Scanner? 1

2 Required Products 2

3 Building Procedure 3

1 What is an NXT Scanner?

An NXT Scanner is a sheet feed image scanner, built with LEGO Mindstorms NXT. The figure below is its externals.



The NXT Scanner has following features.

- Scan the monochrome images by using a light sensor
 - Control of scan position and paper position by using DC motors
 - Translate the image data from the NXT Scanner to a NXT Viewer via USB
 - Show scan image data and image Processing with a NXT Viewer
- (A NXT Viewer : Image viewer and image processing application powered by MATLAB)

You can see the NXT Scanner movie at the URL: http://www.youtube.com/watch?hl=en&v=hadVwPJw3_0



2 Required Products

This chapter describes the required products for the NXT Scanner. Contact LEGO Mindstorms Education distributor in your country for consultation and estimation about the products. The following information is described at the North America LEGO Education site <http://www.legoeducation.com/store/>. If there are not enough blocks, you are able to buy individual resale blocks from a specialty store.

LEGO Products

- LEGO Mindstorms Education NXT Base Set
Product ID : W979797



- Education Resource Set
Product ID : W979648



- AC Adaptor
Product ID : W979833
This is required for the NXT Rechargeable Battery.



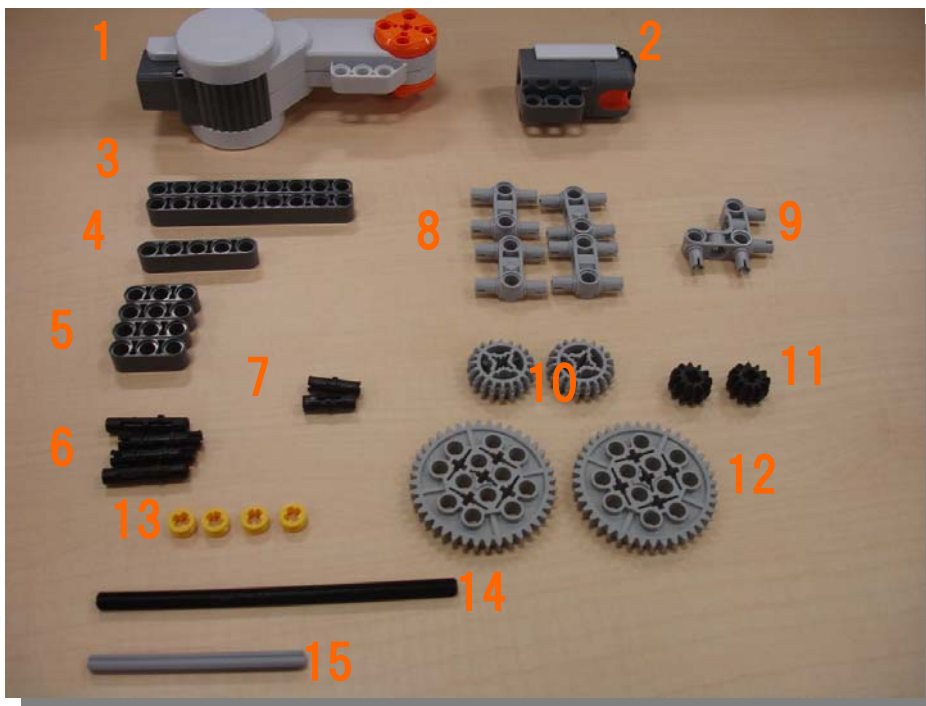
- NXT Bluetooth Dongle
Product ID : W979847
This is a USB dongle for Bluetooth communication.
It is required for the NXT GamePad utility.



3 Building Procedure

This chapter describes the building procedure of the NXT Scanner.

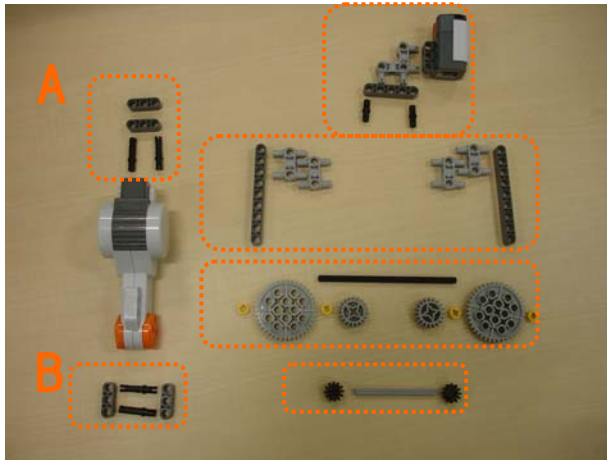
Scanner Head



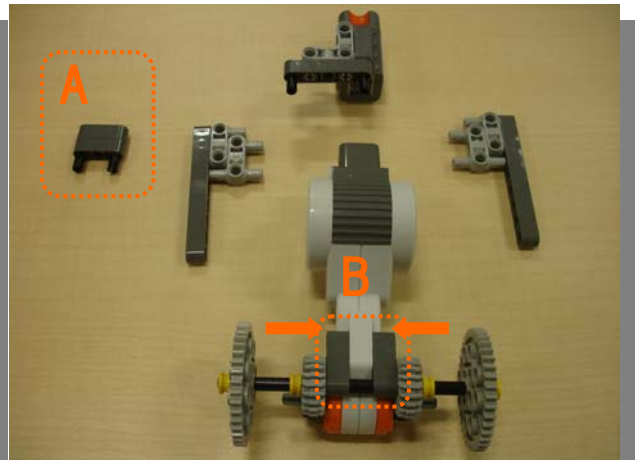
1. 4297008 × 1
2. 4296917 × 1
3. 4210757 × 2
4. 4210686 × 1
5. 4210751 × 4
6. 655826 × 4
7. 4121715 × 2
8. 4225033 × 4
9. 4296059 × 1
10. 4211635 × 1
11. 4177431 × 2
12. 4285634 × 2
13. 4239601 × 4
14. 370826 × 1
15. 4211085 × 1

Building Procedure

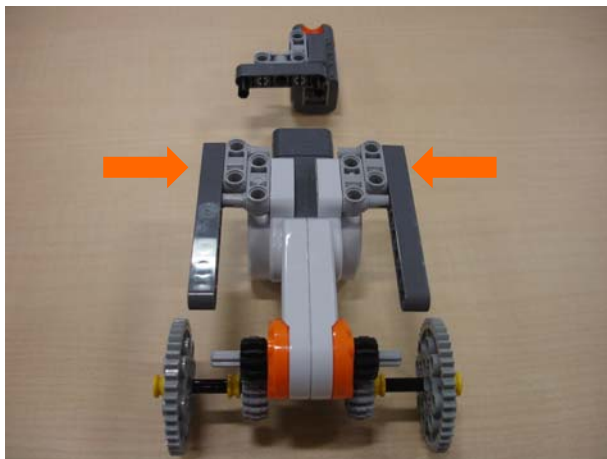
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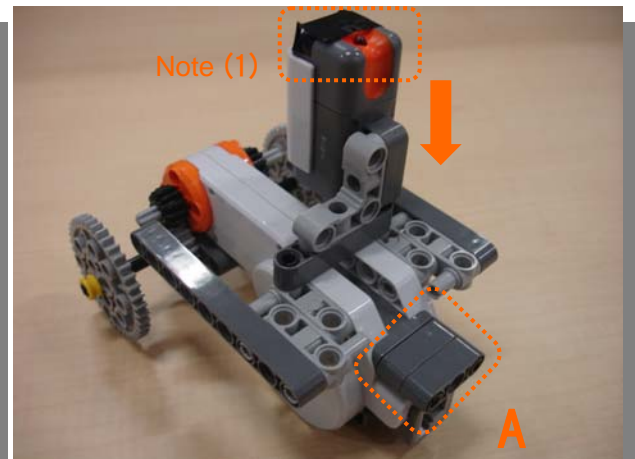
2



3

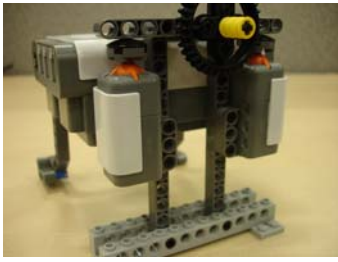


4



Note (1) :

You can reduce the noise of the ambient light by attaching a cover to the light sensor receiving part.

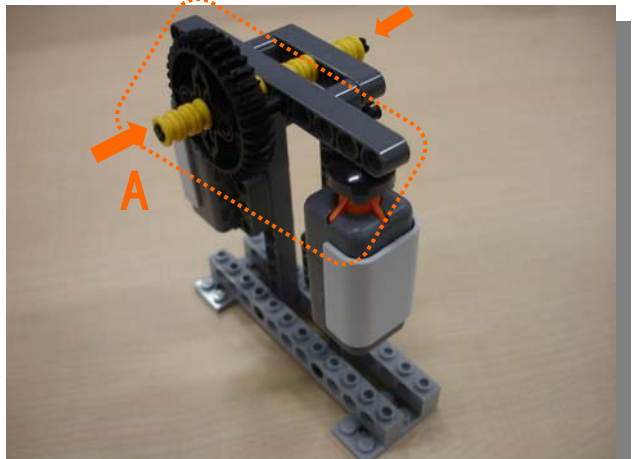
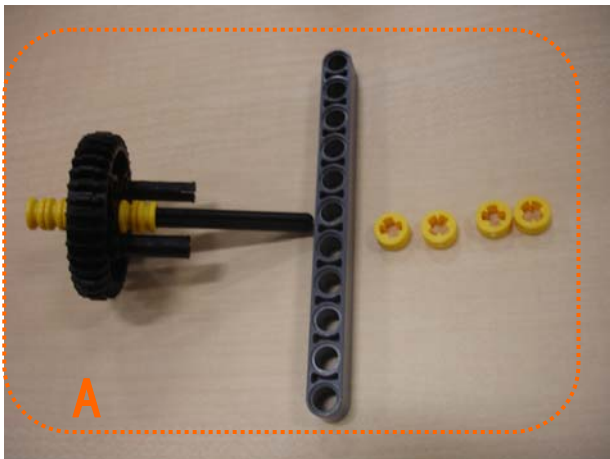
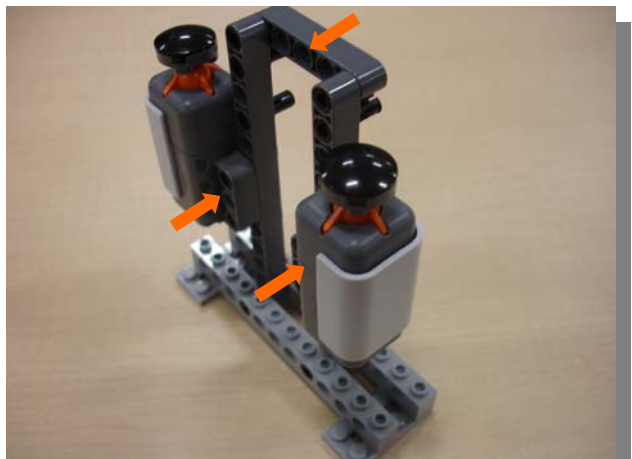
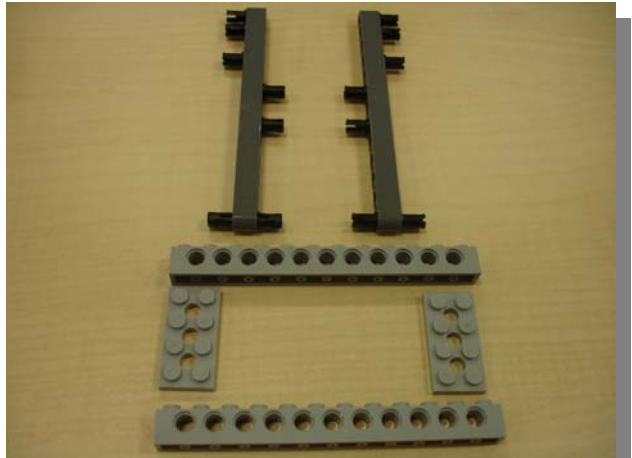
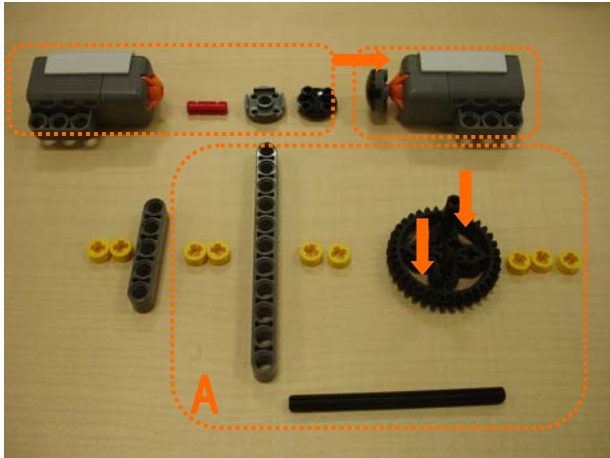


1. 4296929 × 2
2. 4296825 × 1
3. 4261932 × 2
4. 4210755 × 1
5. 4210686 × 4
6. 4210668 × 2
7. 4210667 × 2
8. 4142865 × 2
9. 4278359 × 2
10. 4211042 × 2
11. 4255563 × 1
12. 4239601 × 9
13. 655826 × 4
14. 370826 × 1
15. 370726 × 1
16. 4211775 × 2
17. 4211860 × 2
18. 4211444 × 2
19. 4121715 × 14
20. 4206482 × 4

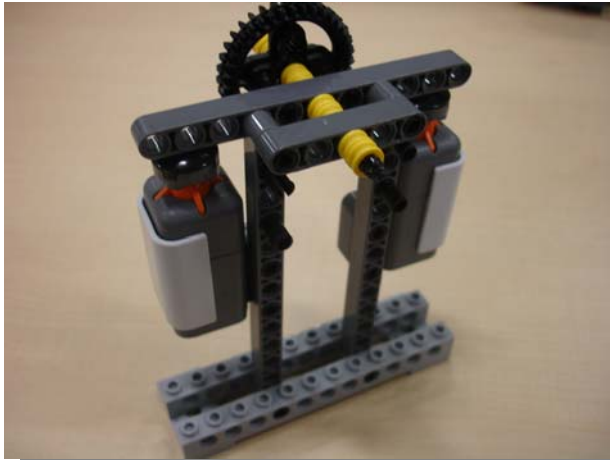
Note:

You can use the other part with different length for parts #14 and #17.

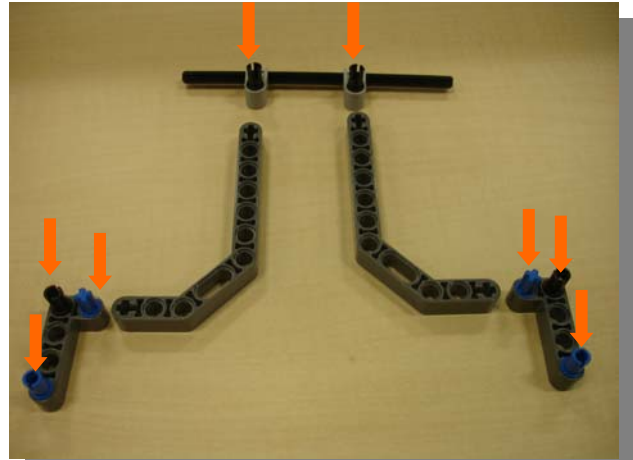
Building Procedure



10



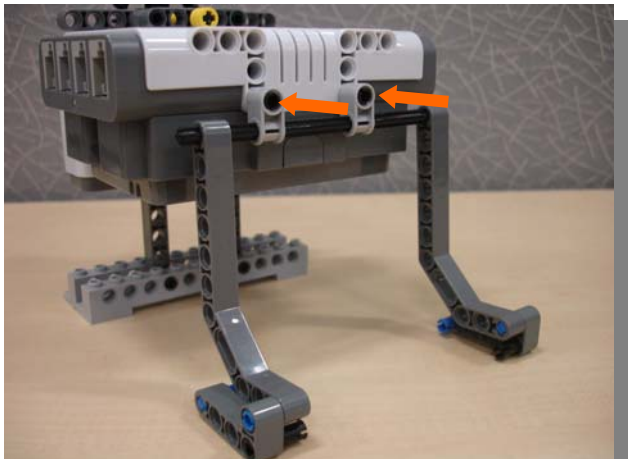
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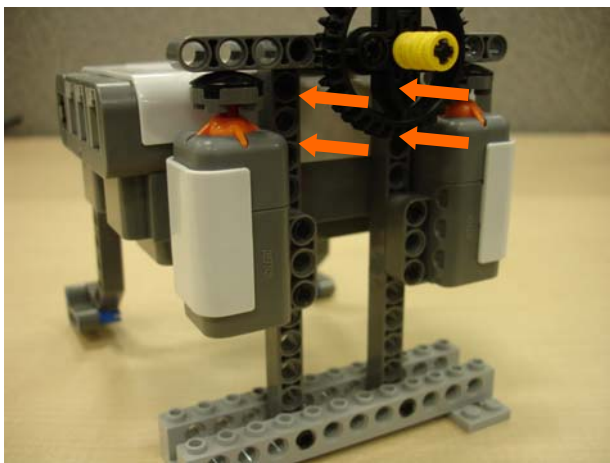
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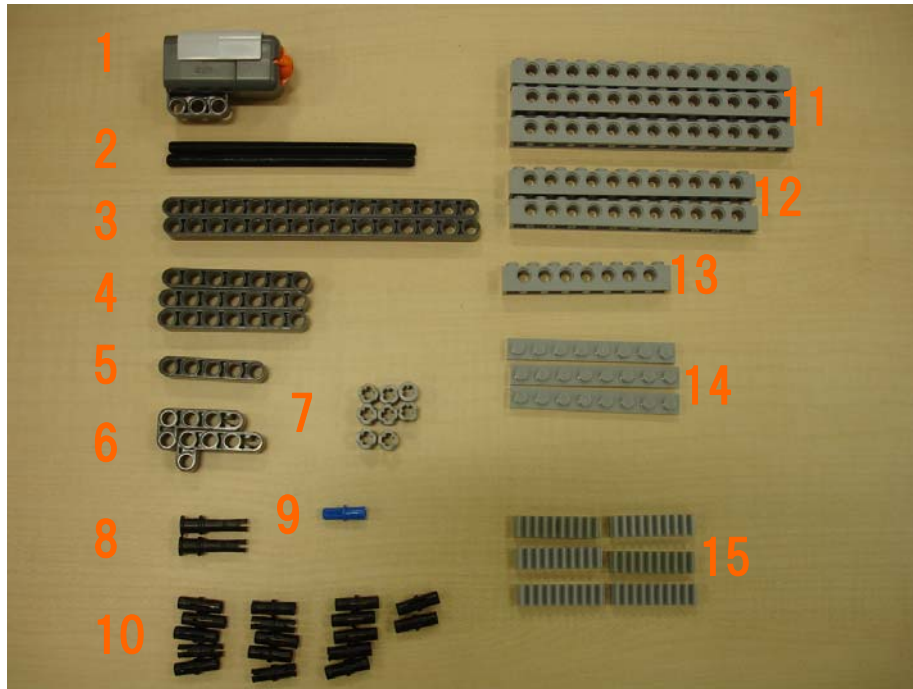
13



14



Paper Feed (part1)



1. 4296929 × 1
2. 370826 × 2
3. 4210687 × 2
4. 4495931 × 4
5. 4210686 × 1
6. 4210667 × 2
7. 4211622 × 8
8. 4140801 × 2
9. 4206482 × 1
10. 655826 × 17
11. 4211705 × 3
12. 4211860 × 2
13. 4211442 × 1
14. 4211425 × 3
15. 4211450 × 6

Note:

You should purchase a sufficient number of block parts #1 and #15.

You can use the other part with different length for parts #11, #12 and #14.

Building Procedure

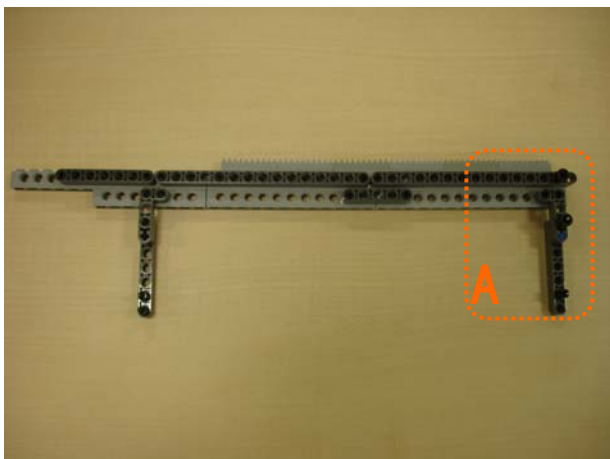
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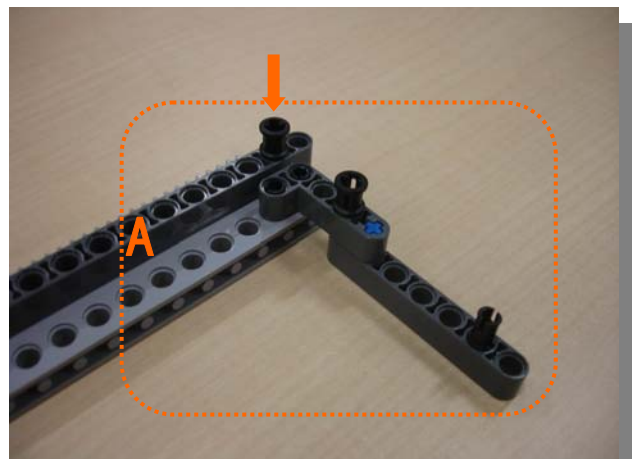
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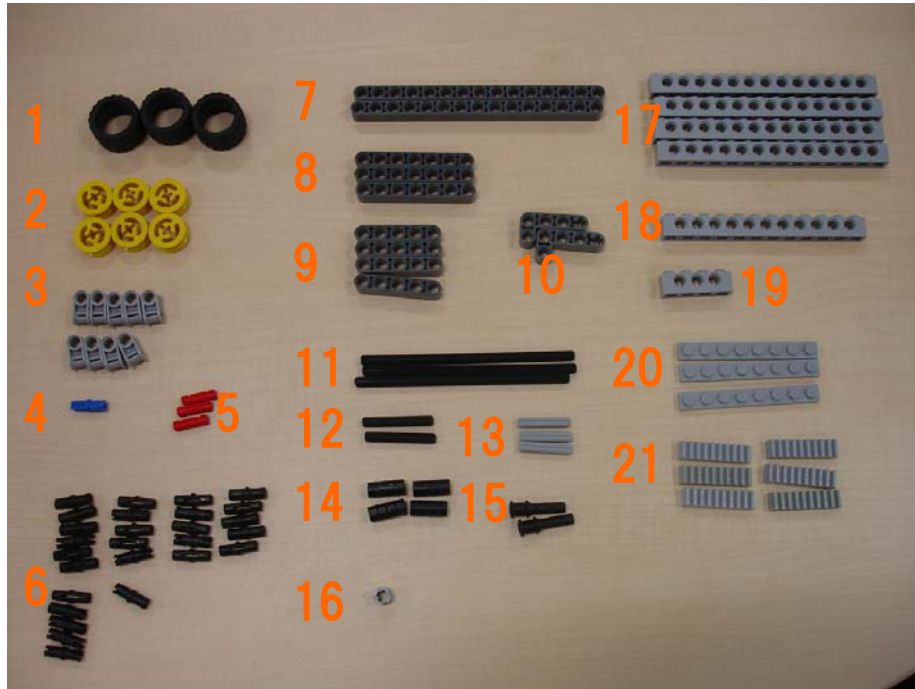


17



18





1. 4153005 × 3
2. - × 6
3. 4211775 × 9
4. 4206482 × 1
5. 4142865 × 3
6. 4121715 × 26
7. 4210687 × 2
8. 4495931 × 3
9. 4210686 × 4
10. 4210667 × 2
11. 370826 × 3
12. 370726 × 2
13. 4211815 × 3
14. 4113805 × 4
15. 4140801 × 2
16. 4211622 × 1
17. 4211705 × 4
18. 4211860 × 1
19. 4211441 × 1
20. 4211425 × 3
21. 4211450 × 6

Note:

You should purchase a sufficient number of block parts #1, #2 and #21. Especially, #2 is not included in "LEGO Mindstorms Education NXT Base Set" and "Education Resource Set".

You can use the other part with different length for parts #17, #18 and #20.

Building Procedure

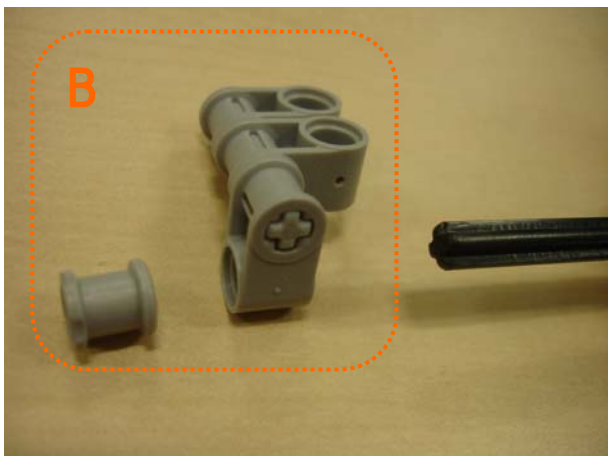
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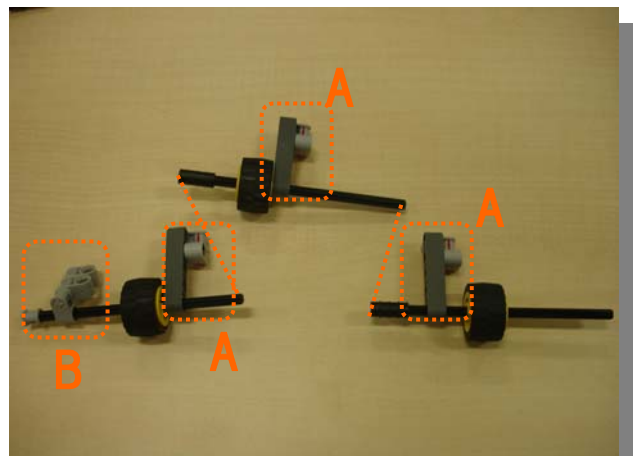
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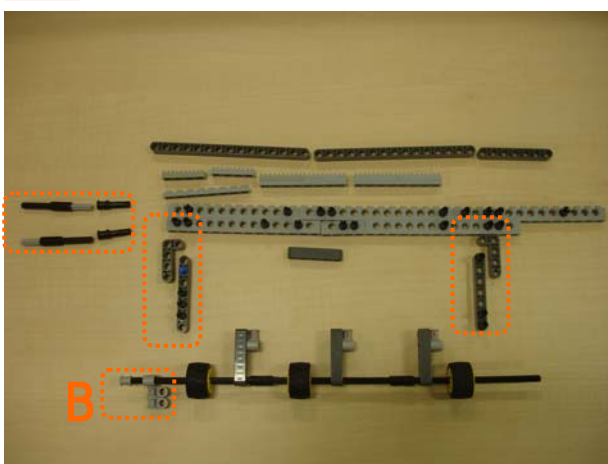
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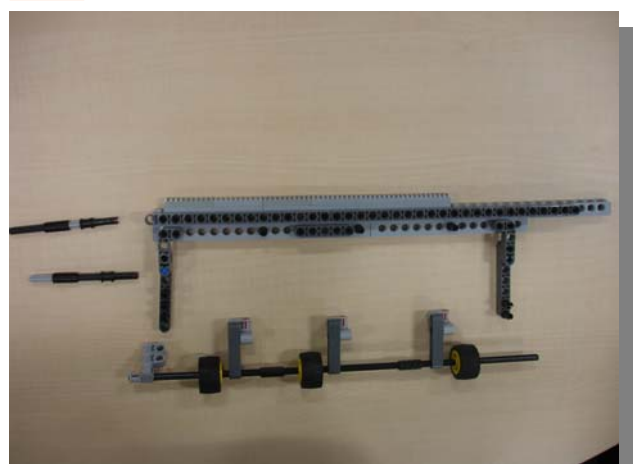
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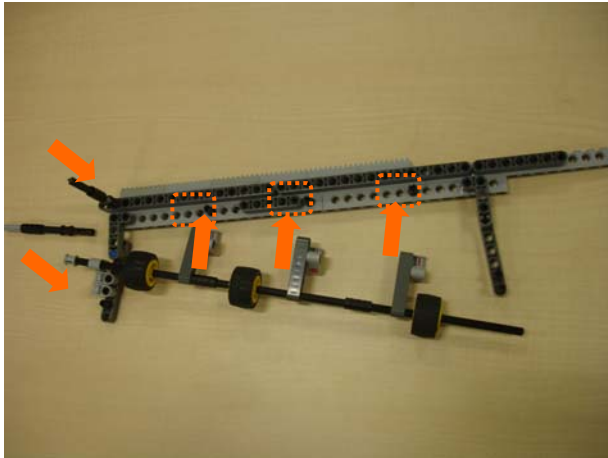
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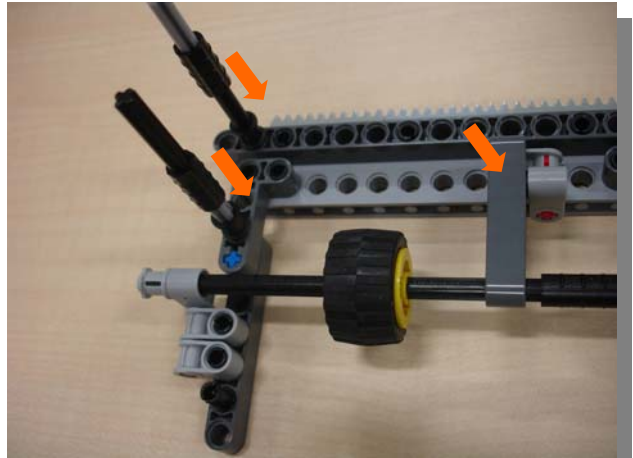
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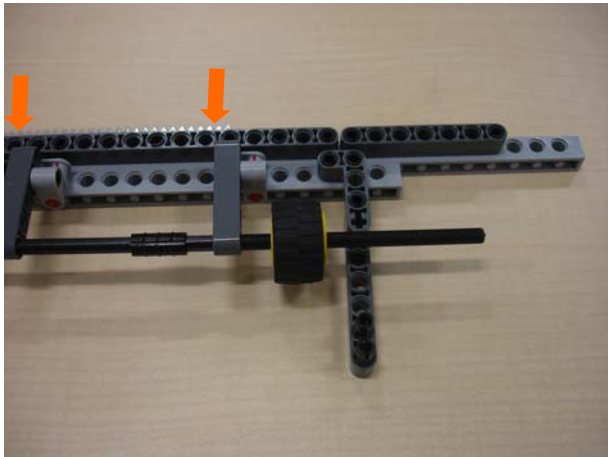
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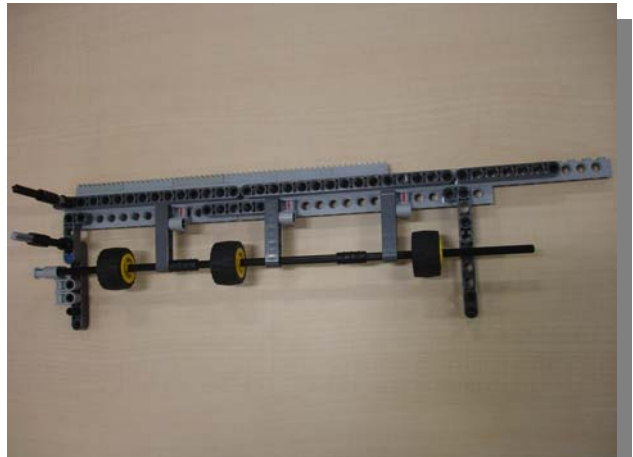
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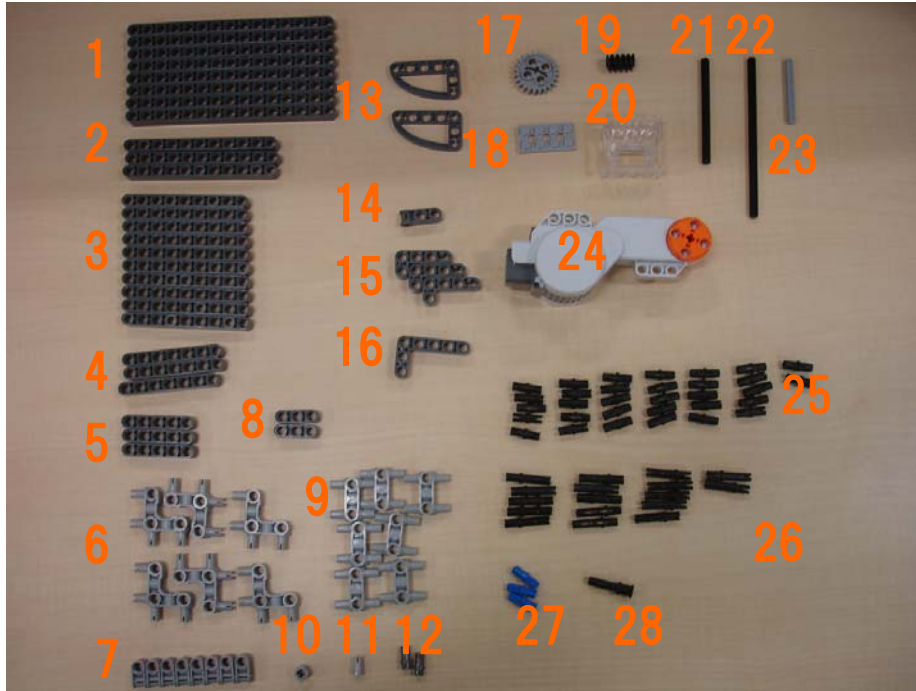
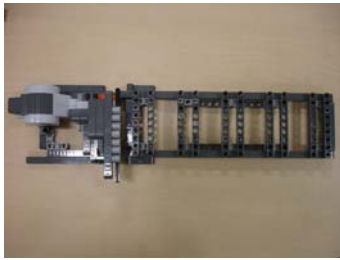


23



24





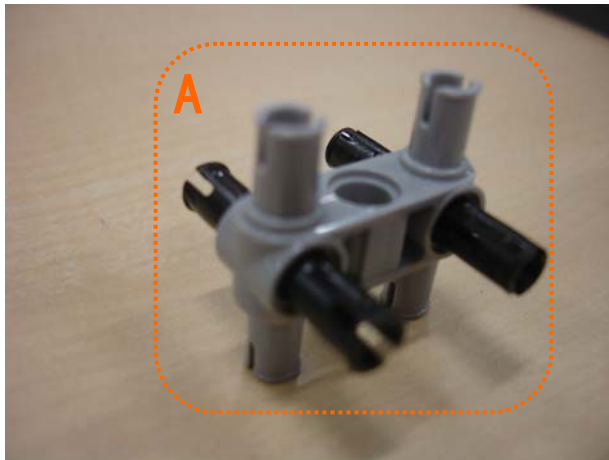
1. 4210687 × 8
2. 4210755 × 3
3. 4210757 × 10
4. 4495931 × 3
5. 4210686 × 3
6. 4296059 × 6
7. 4211775 × 8
8. 4210751 × 2
9. 4225033 × 7
10. 4211622 × 1
11. 4211483 × 1
12. 4211050 × 2
13. 4239896 × 2
14. 4210857 × 1
15. 4210667 × 3
16. 4210753 × 1
17. 4211635 × 1
18. 4211444 × 1
19. 471626 × 1
20. 4142824 × 1
21. 370726 × 1
22. 370826 × 1
23. 4211639 × 1
24. 4297008 × 1
25. 4121715 × 32
26. 655826 × 17
27. 4206482 × 3
28. 4140801 × 1

Note:

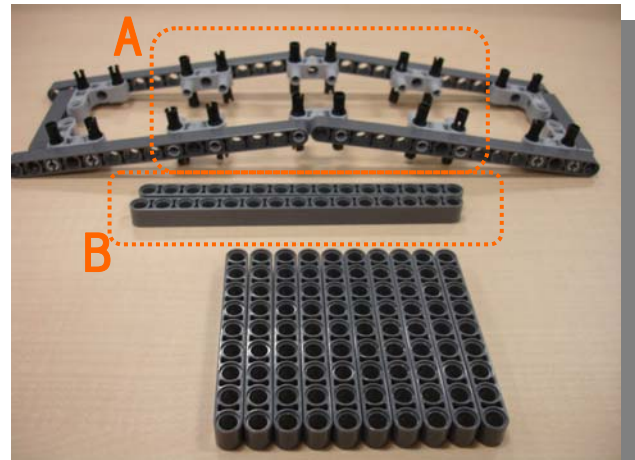
You can use the other part with different length for parts #3.

Building Procedure

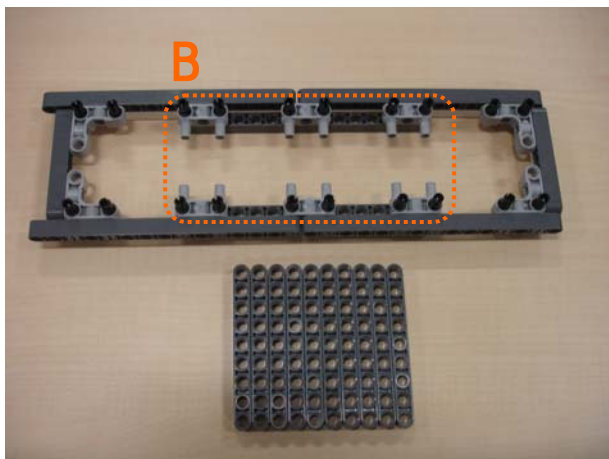
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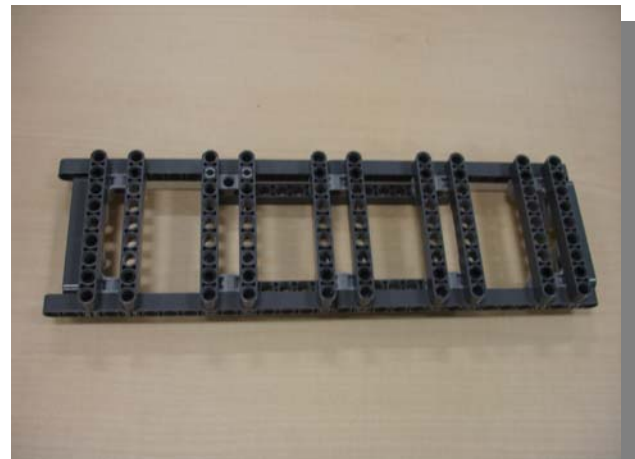
26



27



28



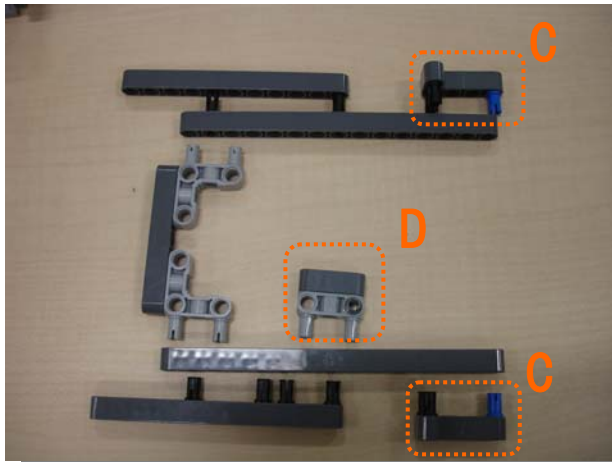
29



30



31



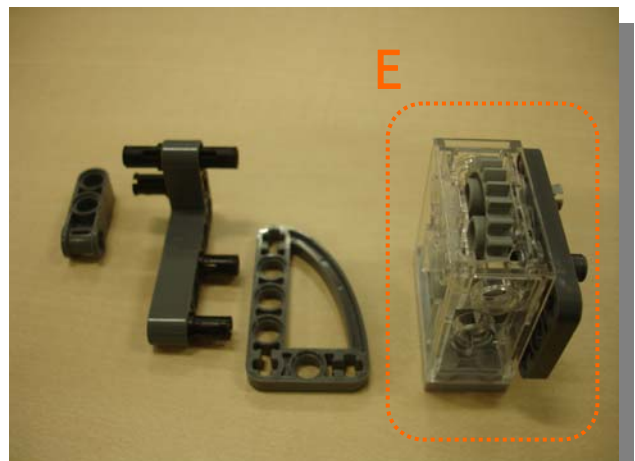
32



33



34



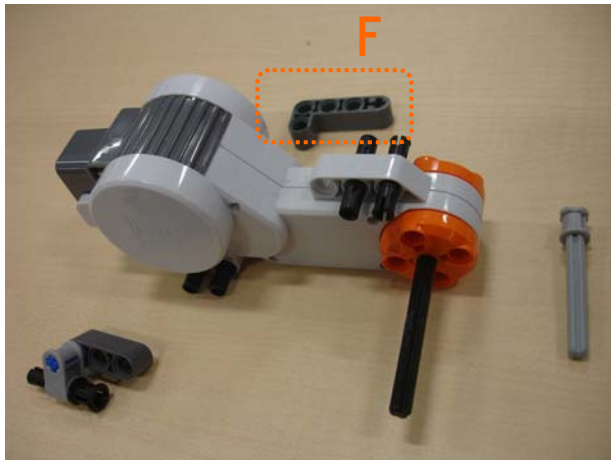
35



36



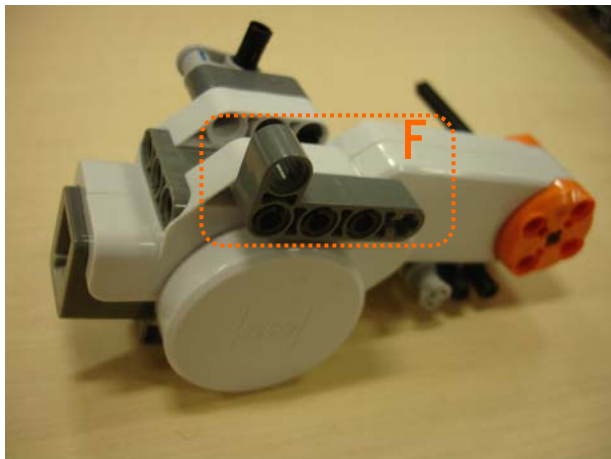
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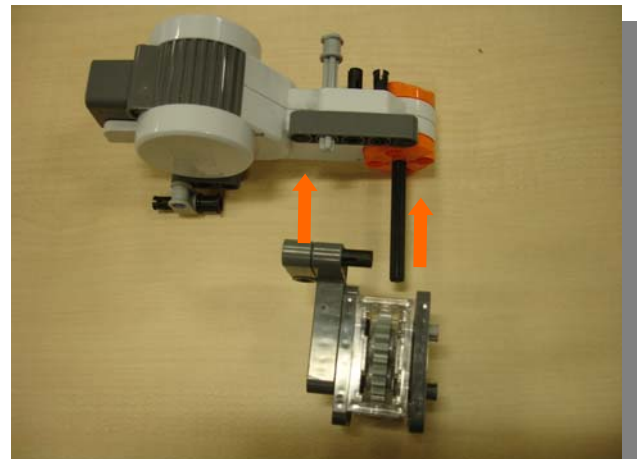
38



39



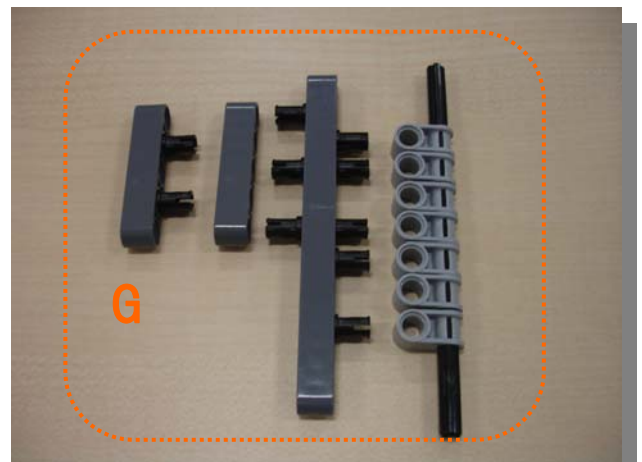
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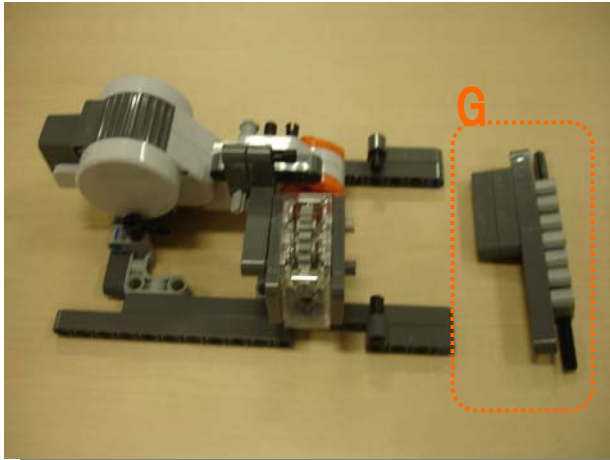
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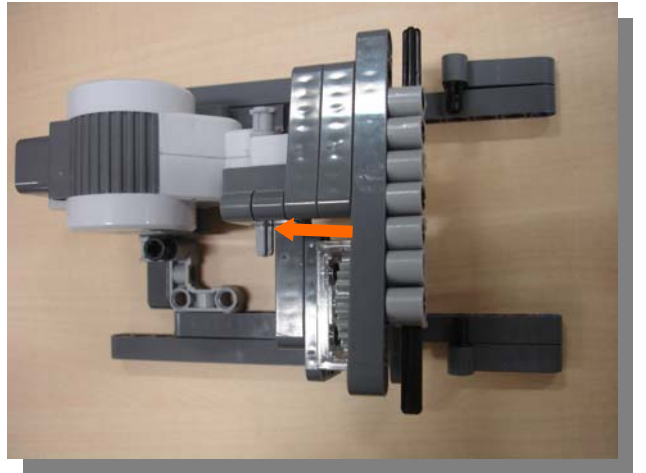
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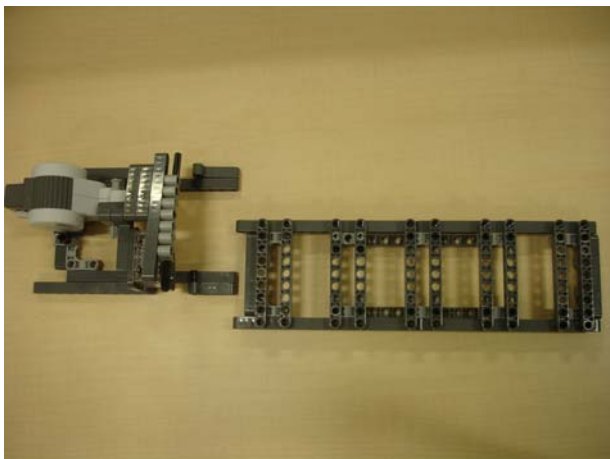
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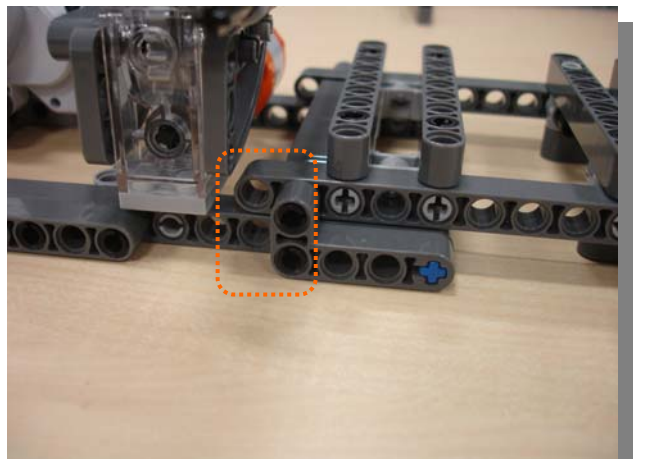
44



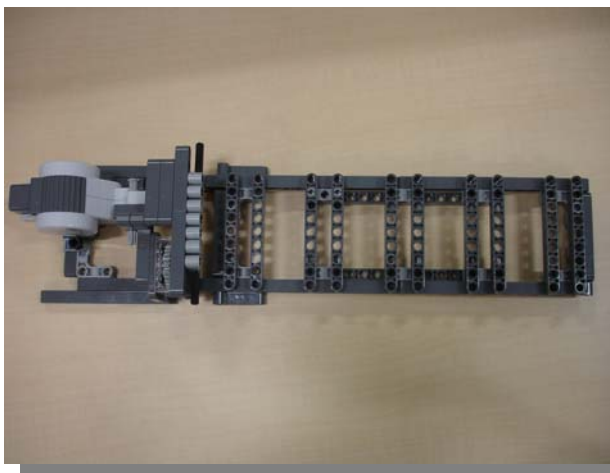
45

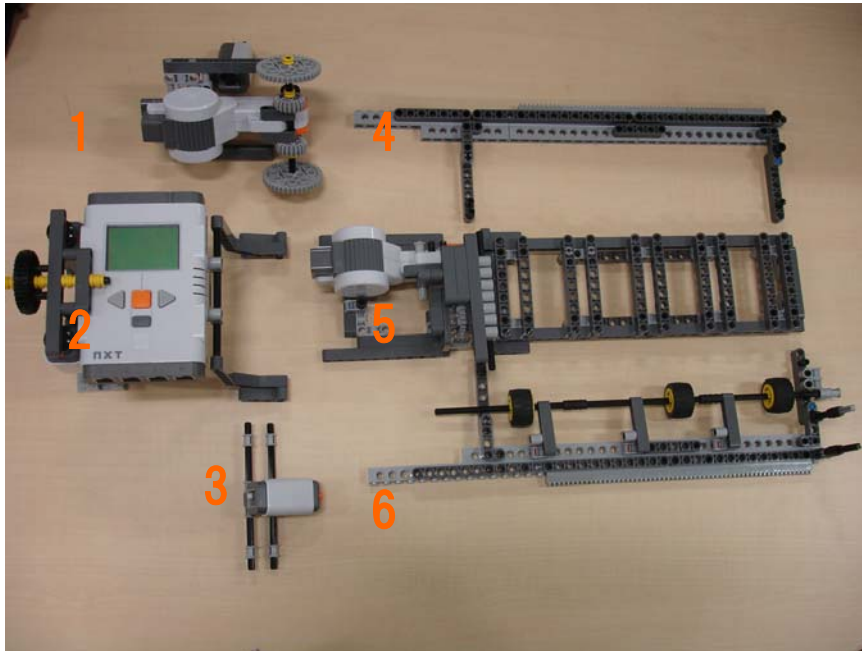


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47

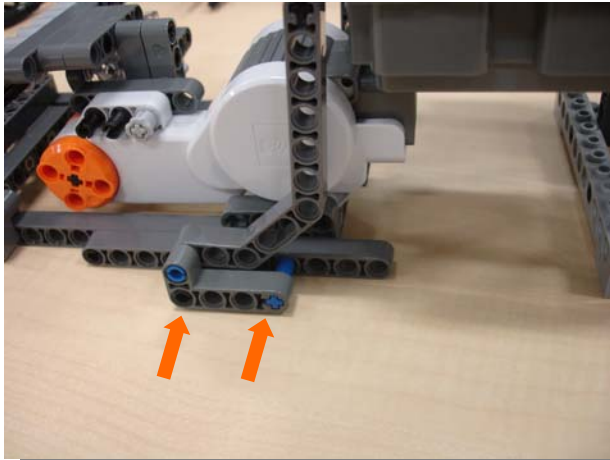




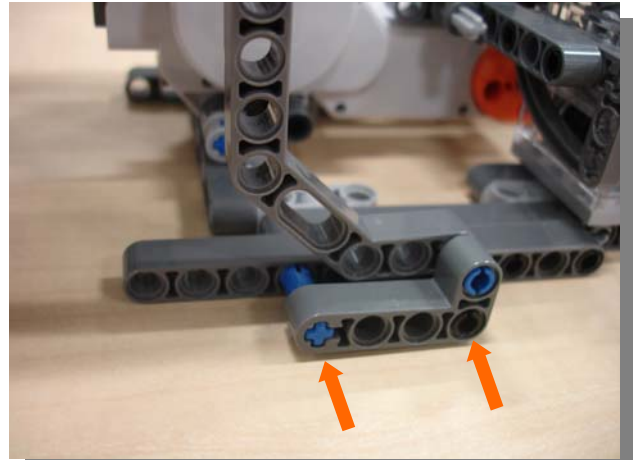
1. Scanner head
2. Operating portion
3. Paper Feed (part1)
4. Paper Feed (part1)
5. Paper Feed (part3)
6. Paper Feed (part2)

Building Procedure

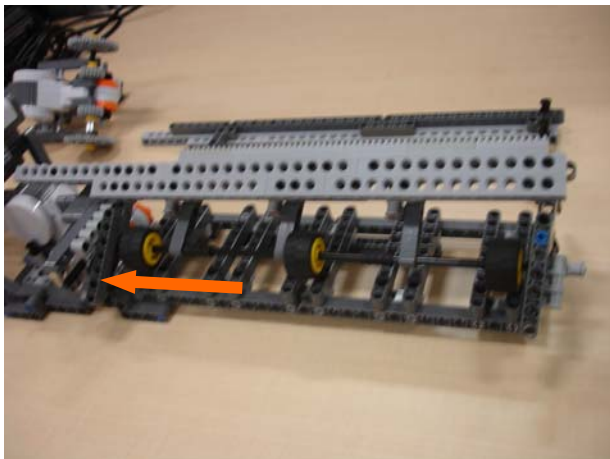
48



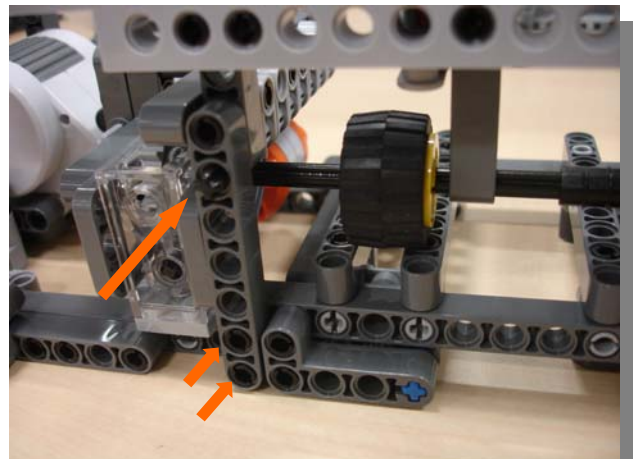
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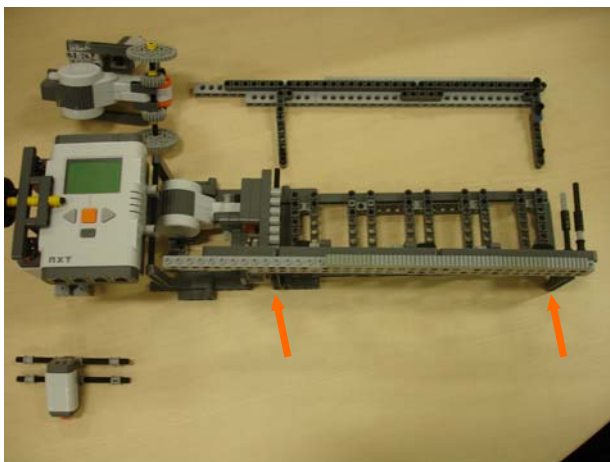
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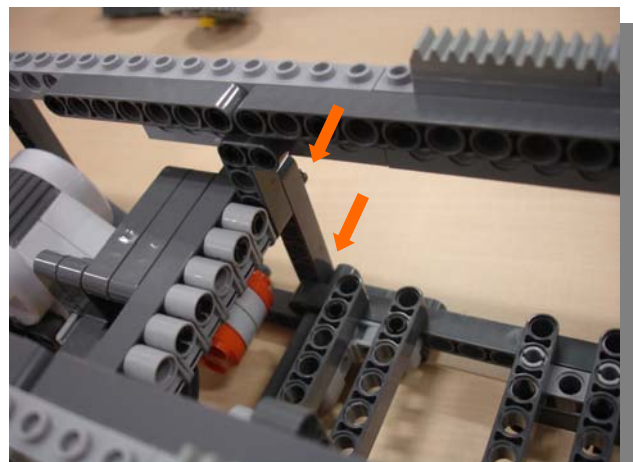
51



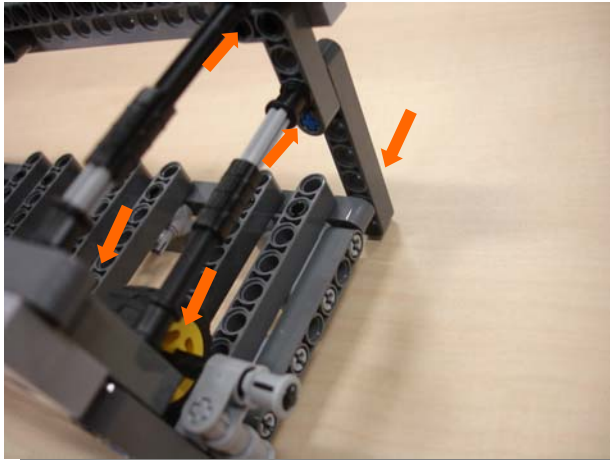
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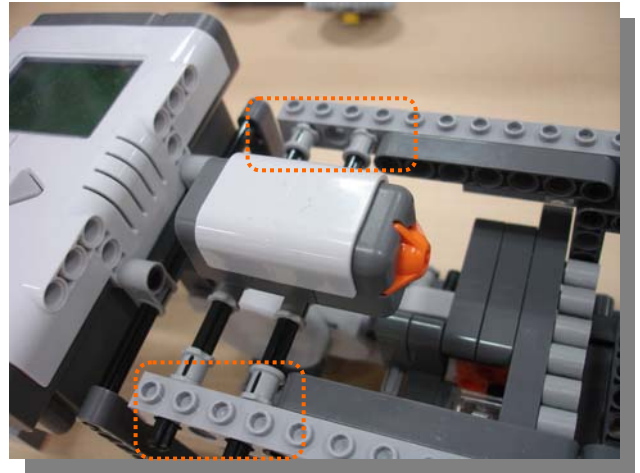
53



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55



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1. 4297185 × 2
2. 4297188 × 4

Please connect each sensor and motor with NXT using its own cable.

port	sensor, motor	Description	cable
1	the touch sensor	Paper exhaust button	2
2	the touch sensor	Paper feed button	2
3	the touch sensor	Scanner head detect SW	2
4	the light sensor	Get scan data	2
A	none	none	none
B	the servo motor	Shift the paper	1
C	the servo motor	Shift the scanner head	1

This is the end of the NXT Scanner building procedure. Thank you for reading.