

Building the moon rover

The robot should look like the following figure:



Figure 17.2

Let's build the robot by following the building instructions given:

1. Take your BOOST Hub. Ensure that the batteries are fully charged. Then place it in a vertical manner, as shown in the following figure:

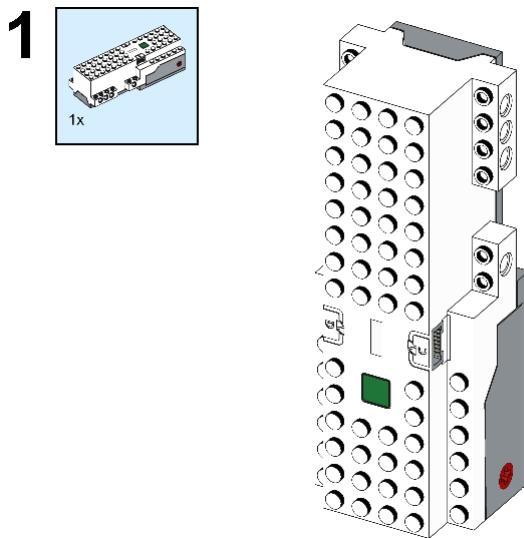


Figure 17.3

2. Take two connector pegs and two 1x8 bricks and connect the bricks to the rear side of the BOOST Hub, as shown. Then connect the connector pegs to the last hole of both bricks.

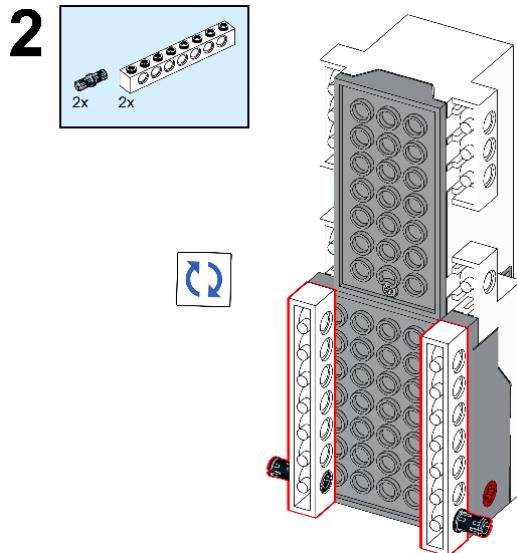


Figure 17.4

3. Take one 4x4 bearing element to make a structure that will give support to the robot to stand straight.

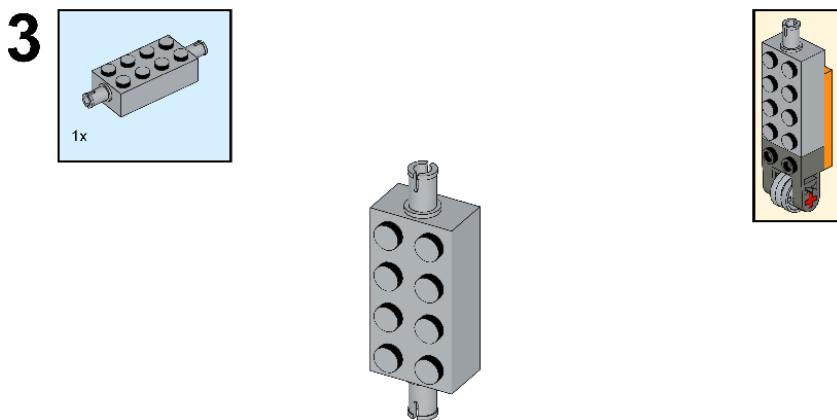


Figure 17.5

4. Now take one 2x1 half beam with a hole and connect it to the 4x4 bearing element, as shown in the following figure:

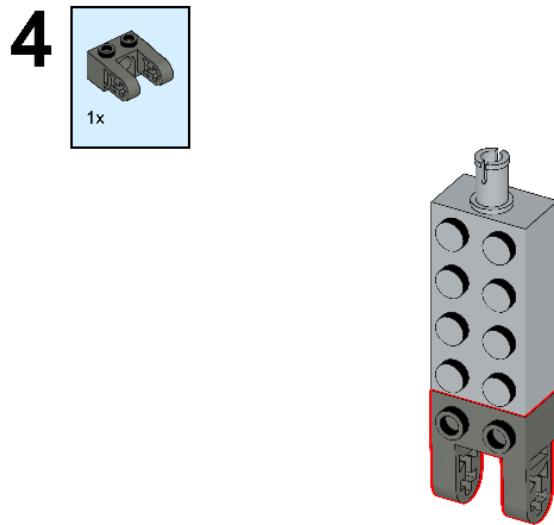


Figure 17.6

5. Take one 2x4 plate and use it to connect the bearing element and the half beam, as shown in the following figure:

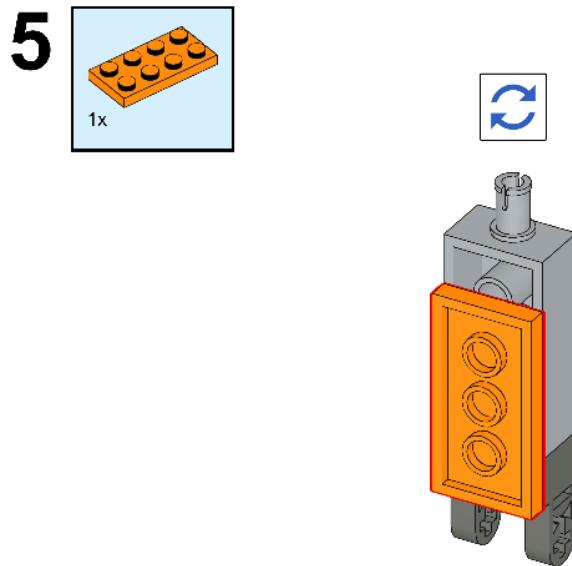


Figure 17.7

6. Take one 2M axle and one hub, then connect the hub to the half beam using a 2M axle as shown in the following figure:

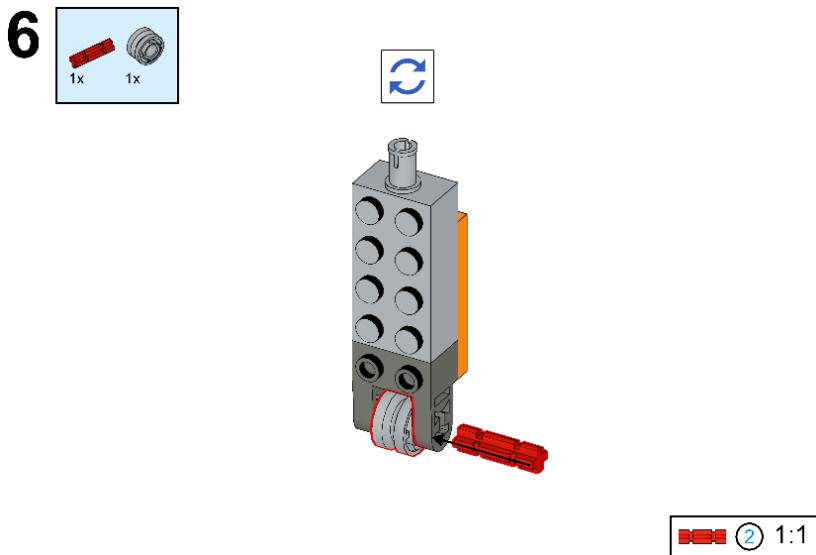


Figure 17.8

7. Now, connect this structure to the rear side of the hub between the two bricks, as shown in the following figure:

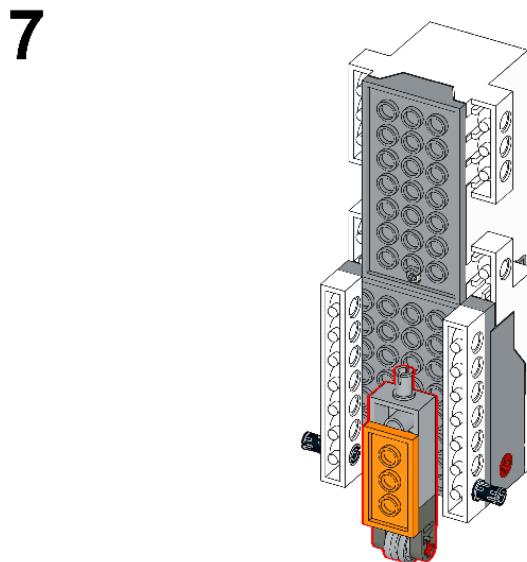


Figure 17.9

8. Then take two 1x2 bricks with a cross hole and two 1x2 bricks and connect them on both sides of the hub, as shown here:

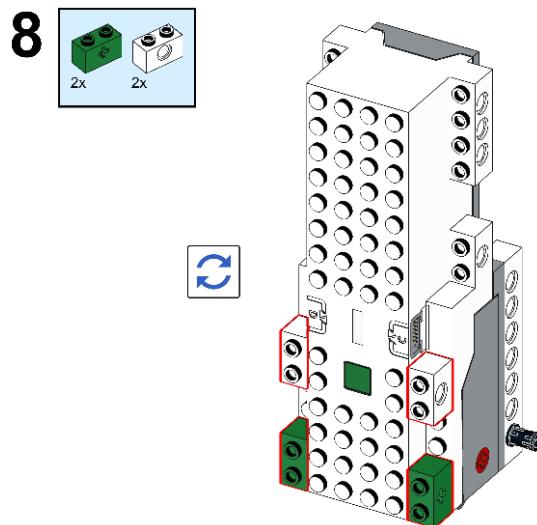


Figure 17.10

9. Take two 2x2 plates and use them to connect the 1x2 bricks with a hole to the hub. Now take two 2x2 bricks with a connector and use them to connect the 1x2 bricks with a cross hole to the BOOST Hub as shown in the following figure:

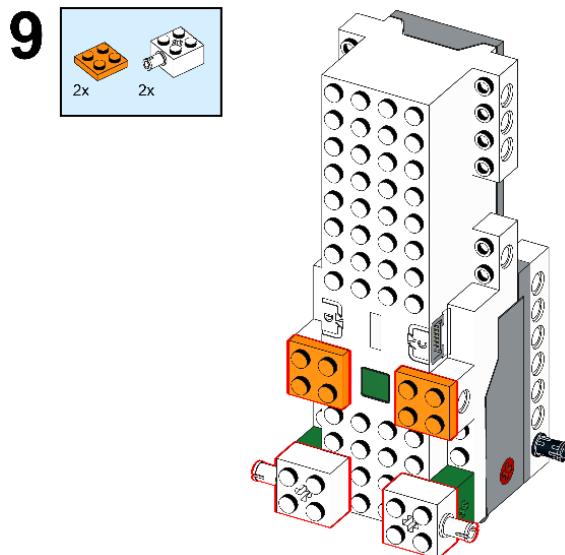


Figure 17.11

10. Take one 3M axle and connect it with motor A of the BOOST Hub. Now take one connector peg with an axle and connect it to the 1x2 brick with a hole on the same side.

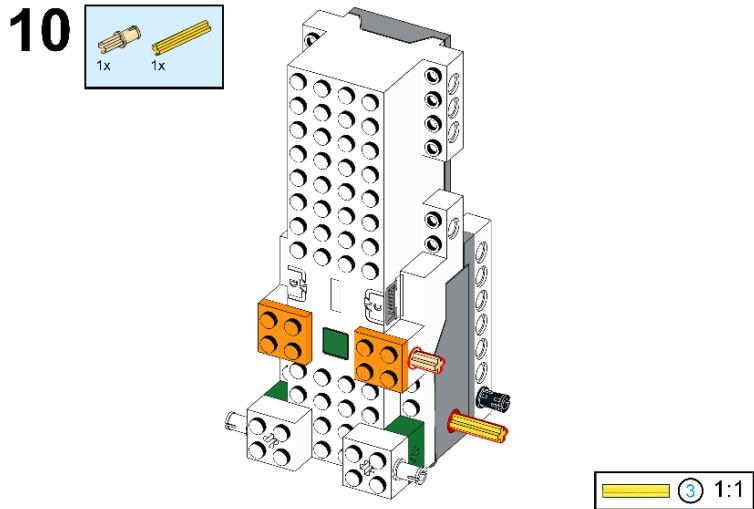


Figure 17.12

11. Now take one 9M beam and connect it to the axle, connector peg, and the brick with a connector peg, as shown in the following figure. Then take one axle extender and one 3M axle and connect them to the axle that is already connected to motor A:

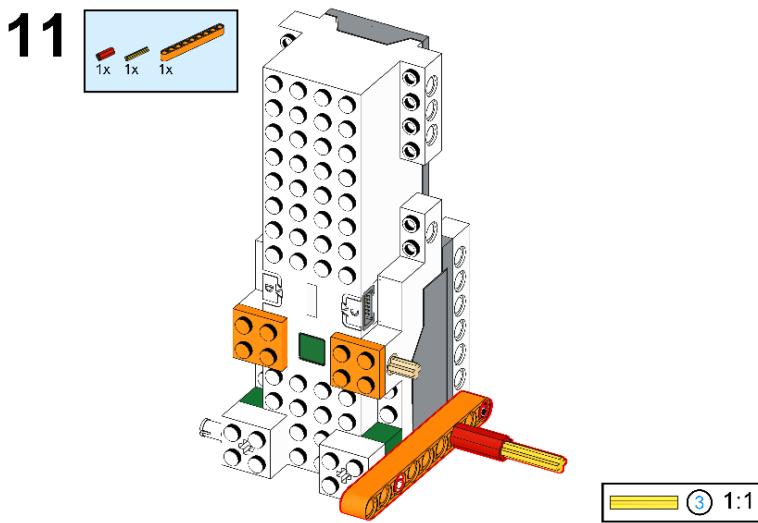


Figure 17.13

12. Then take one 4M stopper axle and place it in the first hole of the beam, as shown in the following figure. Then take a tube with a double hole and connect it to the 4M axle:

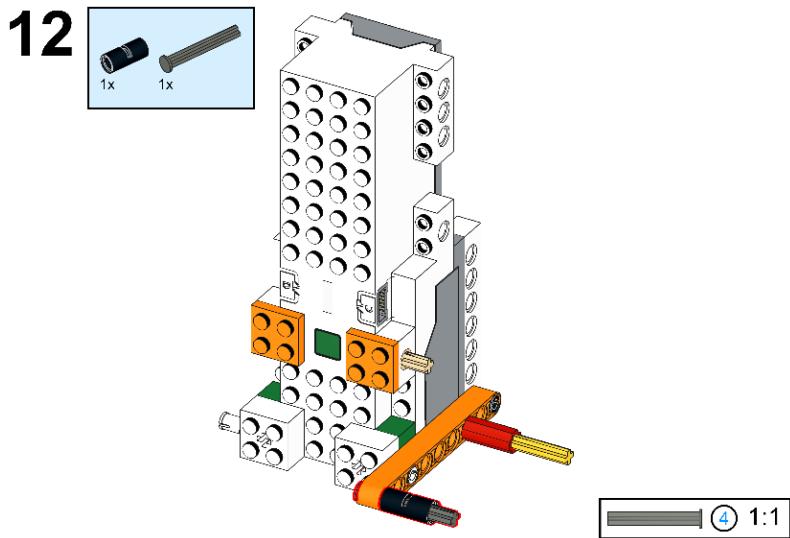


Figure 17.14

13. Take one 180-degree angle element and connect it to the brick with a hole with an axle. Now take a 2M axle and connect it to the other side of the angle element.

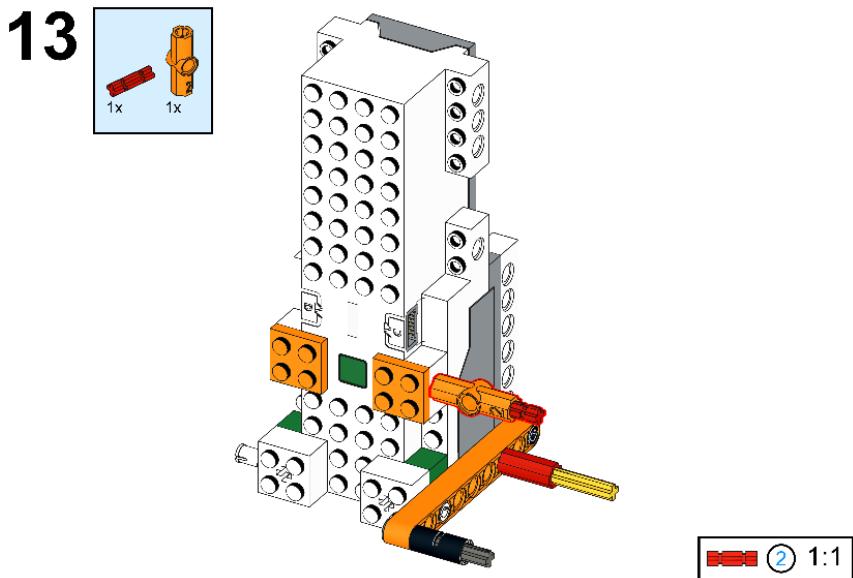


Figure 17.15

14. Then take one small-sized sprocket and one large-sized sprocket and connect them to the 2M axle and 3M axle, respectively.

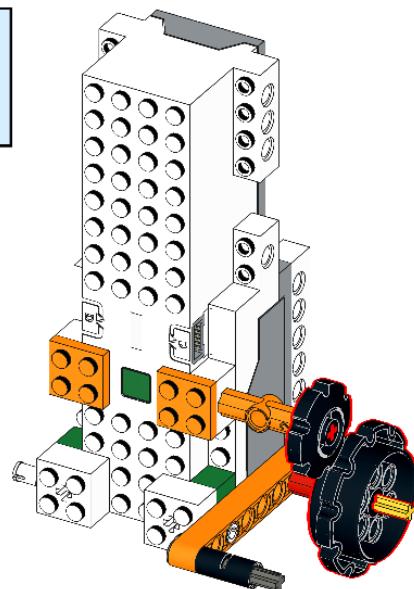
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Figure 17.16

15. Take one 4x4 round plate with a snap and one 2x2 round plate and connect them to each other, as shown in the following figure. Make two wheels in the same way:

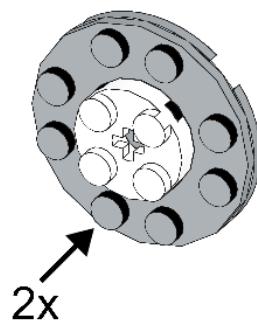
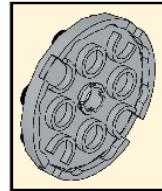
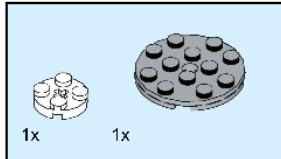
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Figure 17.17

16. Now, connect one of those wheels to the 4M stopper axle as shown in the following figure:

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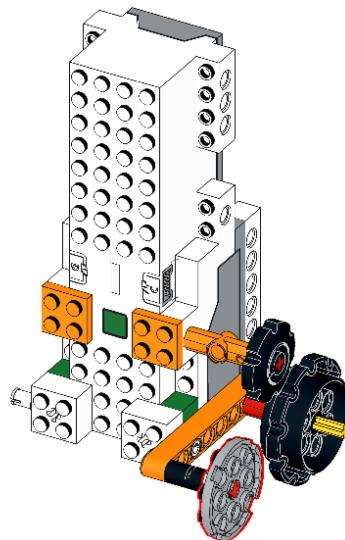


Figure 17.18

17. Now, we are going to do the same thing on the other side. Let's start by taking one 3M axle and connecting it to motor B of the BOOST Hub. Then take one connector peg with an axle and connect it to the 1x2 brick on the same side.

17

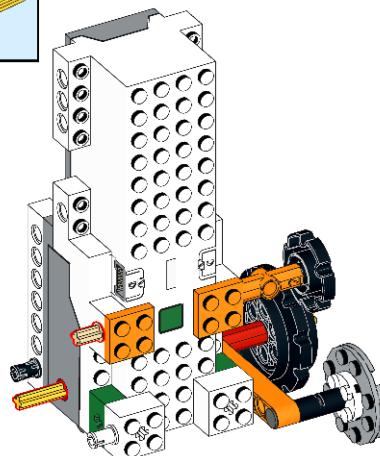
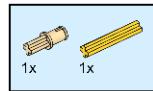


Figure 17.19

18. Now, again take one 9M beam and connect it to the axle, connector peg, and the brick with a connector peg. Then take one axle extender and one 3M axle and connect them to the axle that is already connected to motor B, as shown in the following figure:

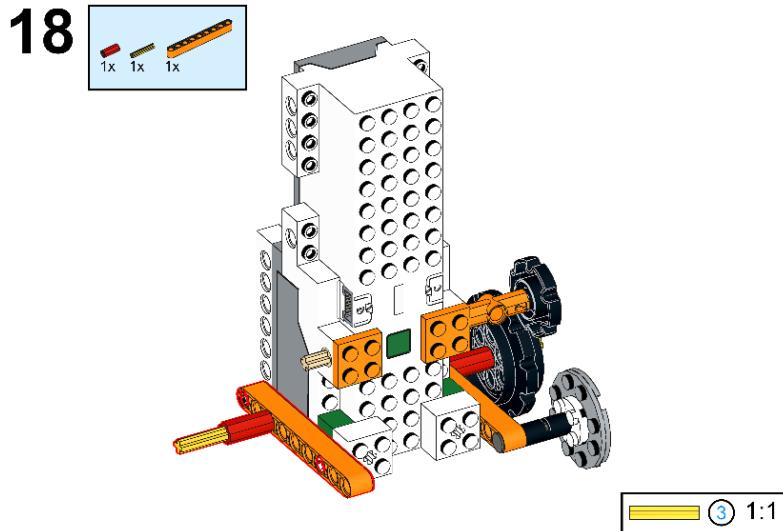


Figure 17.20

19. Take one 4M stopper axle and place it in the first hole of the beam, then take a tube with a double hole and connect it to the 4M axle.

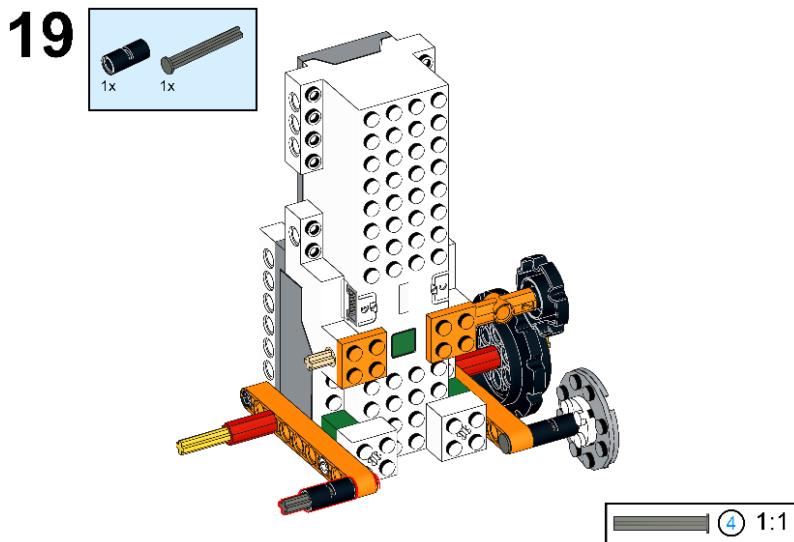


Figure 17.21

20. Take one 180-degree angle element and connect it to the brick with a hole with an axle, then take a 2M axle and connect it to the angle element.

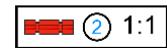
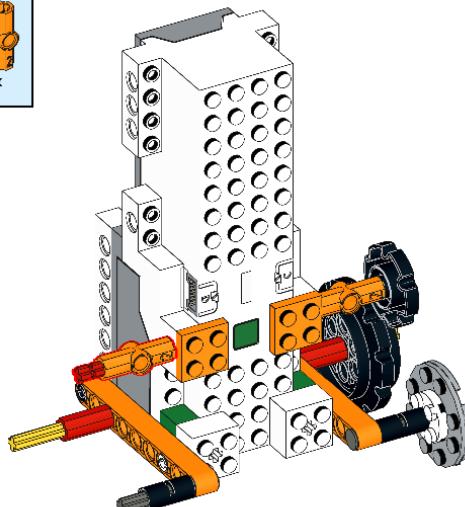
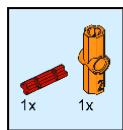
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Figure 17.22

21. Then take one small-sized sprocket and one large-sized sprocket and connect them to the 2M axle and the 3M axle, respectively.

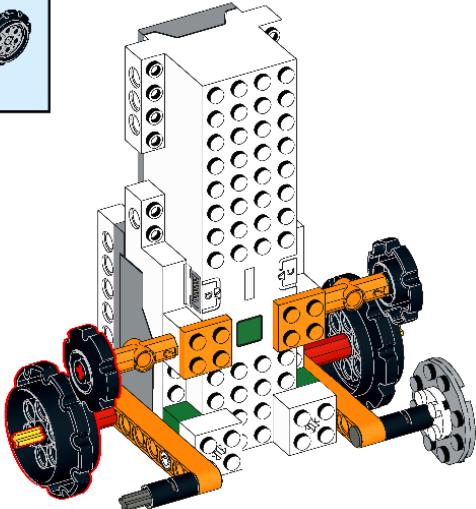
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Figure 17.23

22. Now, take the wheel that we have made by using the plates and connect it to the 4M stopper axle.

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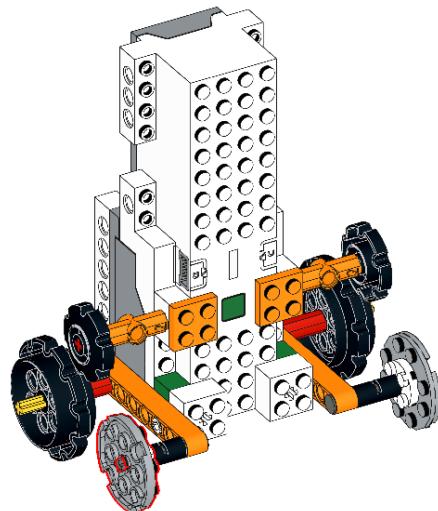


Figure 17.24

23. Now take two 1x2 plates, one 1x2 brick with a cross hole, and one 1x8 plate. Stack the 1x2 plates and connect the 1x2 brick with a cross hole on the top of it. Now, connect this on the BOOST Hub as shown in the following figure. Now, connect the 1x8 plate on the BOOST Hub as shown in the following figure:

23

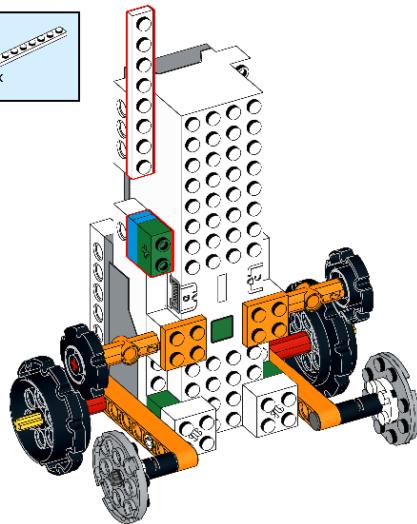
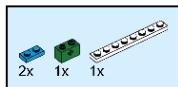


Figure 17.25

24. Take one connector peg and connect it to the hub. Then take one connector bush with friction and an axle and connect it to the brick with a cross hole. Again, take three 1x2 plates and connect them to the BOOST Hub as shown in the following figure:

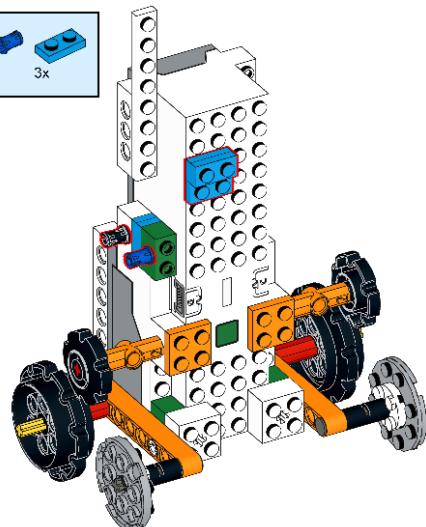
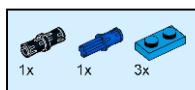
24

Figure 17.26

25. Now flip to the other side of the model, take two 1x2 plates, one 1x2 brick with a cross hole, and one 1x8 plate, and connect all these things to the BOOST Hub, as shown in the following figure:

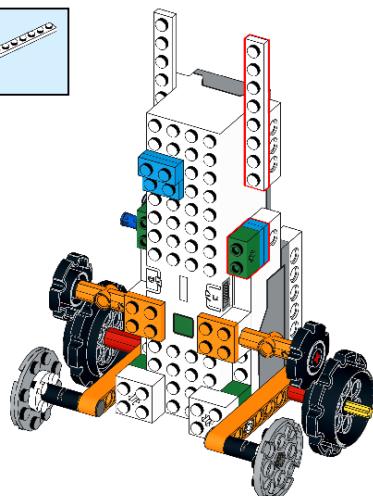
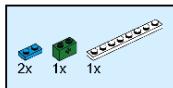
25

Figure 17.27

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26. Once again take one connector peg and connect it to the hub. Then take one connector bush with friction and an axle and connect it to the brick with a cross hole. Then take three 1x2 plates and connect them to the BOOST Hub as shown in the following figure:

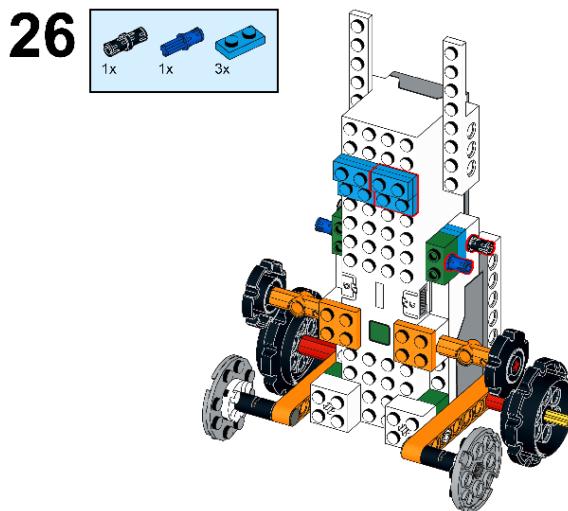


Figure 17.28

27. Take two 1x4x2/3 plates with a bow and connect them to the upper side of the hub, as shown here:

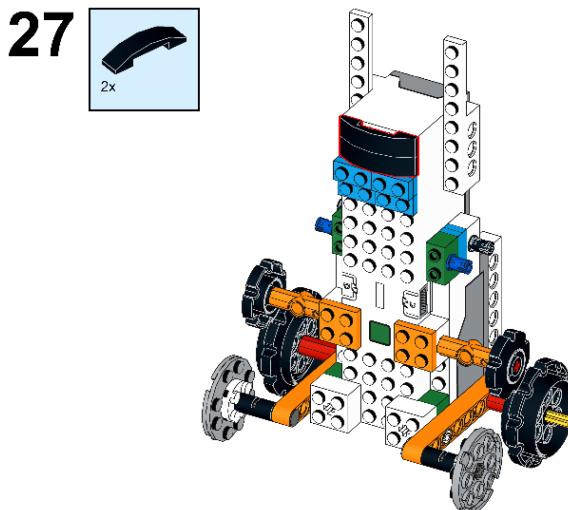


Figure 17.29

28. Take two 2x4 bricks with a bow and connect them to the 1x2 plates on the hub, as shown in the following figure:

28

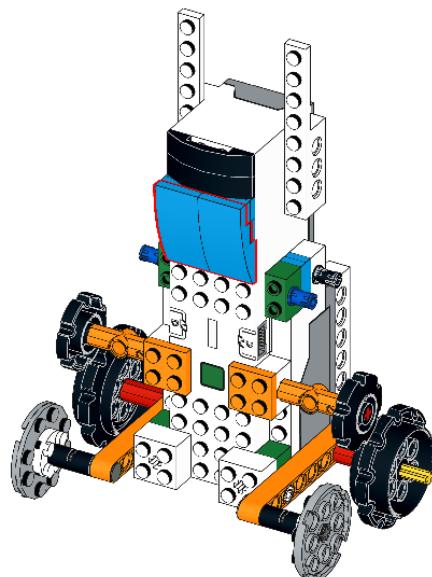
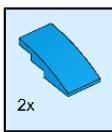


Figure 17.30

29. Now, let's make the face of the robot. For that, let's start by taking two 1x4 bricks.

29

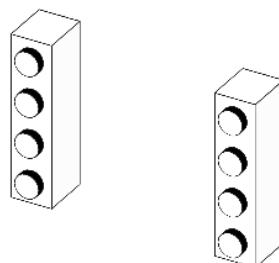
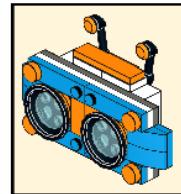
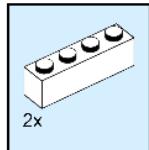


Figure 17.31

30. Take two 2x8 plates and connect them to both of the bricks, as shown in the following figure:

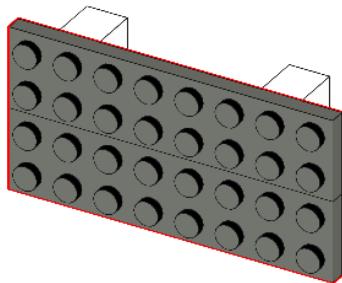
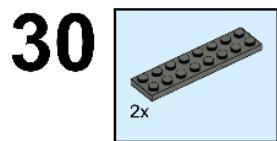


Figure 17.32

31. Now, flip the model and take two 1x2x1 2/3 bricks with four knobs and connect them to the rear side of the first plate, between the two bricks, as shown in the following figure:

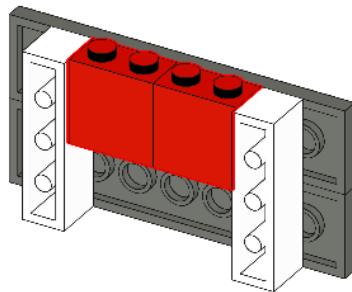
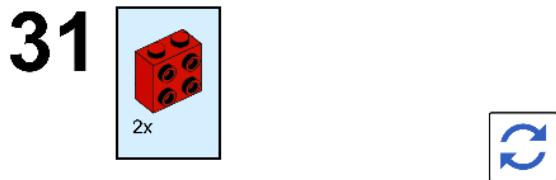


Figure 17.33

32. Now take two 1x2/2x2 angle plates and connect them to both of the bricks with knobs, as shown in the following figure:

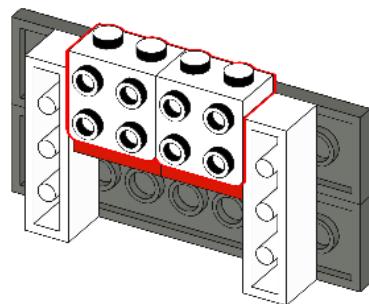
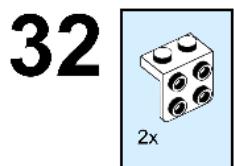


Figure 17.34

33. Take two 1x4 flat tiles and one 1x2 flat tile and connect them to the angle plates, as shown in the following figure:

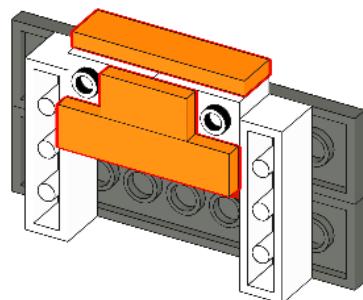
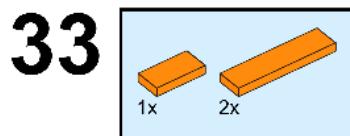


Figure 17.35

34. Take two telephone receivers and connect them to the angle plates, as shown in the following figure:

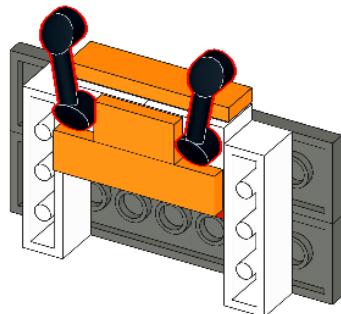


Figure 17.36

35. Take two rubber attachments and connect them with the remaining end of the telephone receiver. Then take two 1x8 plates and connect them to the top and the bottom rows of the 2x8 plates, as shown in the following figure:

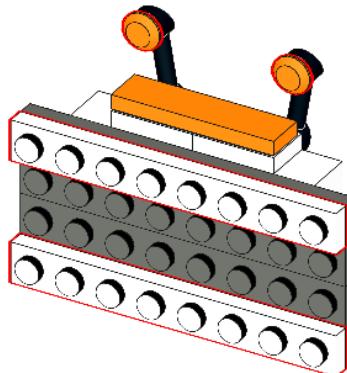
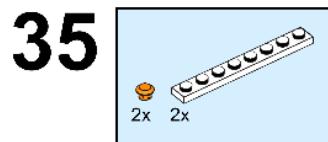


Figure 17.37

36. Take two 1x4 plates with two knobs and connect them to the 1x8 plates, so that they cover half of the plates. Then, again, take one 2x8 plate and connect it between the 1x8 plates.

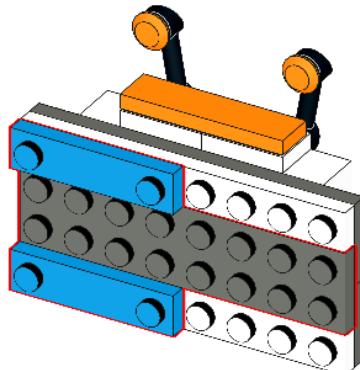
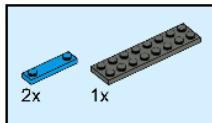
36

Figure 17.38

37. Again, take two 1x4 plates with two knobs and connect them to the 1x8 plates, so that they cover the remaining part of the plates. Then take two 2x2 round-shaped flat tiles with a hole and connect them to the 2x8 plate.

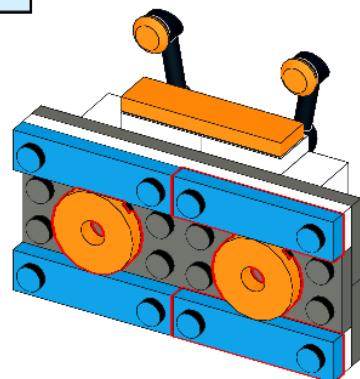
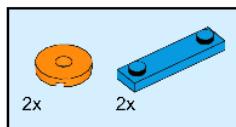
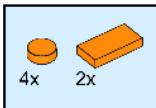
37

Figure 17.39

38. Take four 1x1 round-shaped flat tiles and connect them to all four corners, then take two 1x2 flat tiles and connect them to the center part of the 2x8 plate, as shown in the following figure:

38 

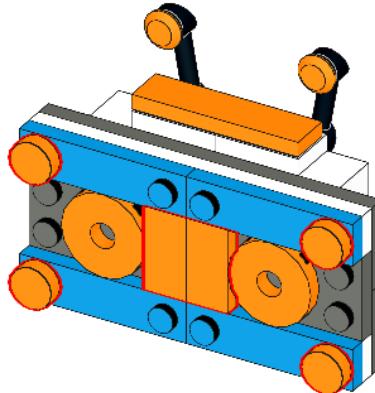
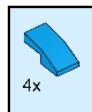


Figure 17.40

39. Now, take four 1x2x2/3 plates with a bow and connect them to the sides of the 2x8 plates, as shown in the following figure:

39 

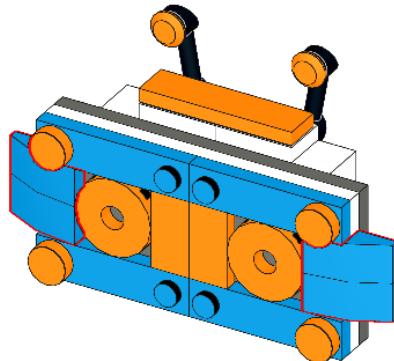


Figure 17.41

40. Take two 1x2 plates and connect them to the rear side of the plates with a bow – the arrows in the following figure show this connection:

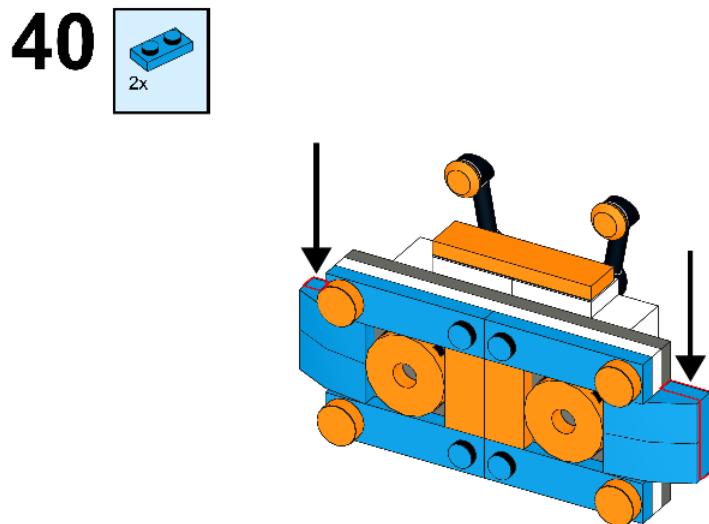


Figure 17.42

41. Now, take two parabolic reflectors and two 2x2 round slide shoes. Connect the parabolic reflectors to the two 2x2 round flat tiles, and the round slide shoes to the parabolic reflectors.

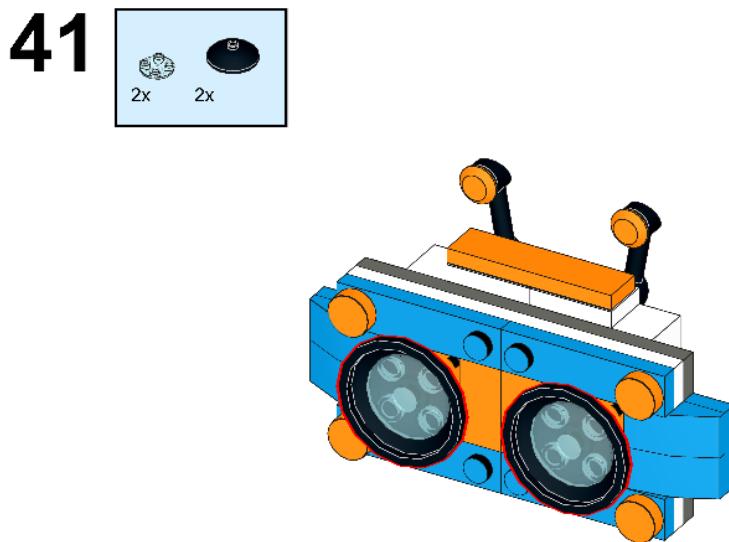


Figure 17.43

42. And here, the face is ready. To connect it to the main model, connect the two 1x4 bricks to the two 1x8 plates connected to the hub, as shown in the following figure:

42

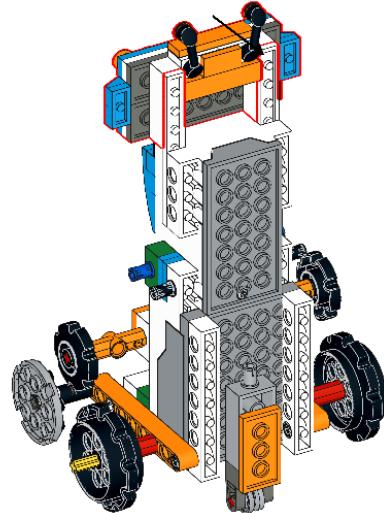


Figure 17.44

43. Check that your robot looks like the one shown in the following figure:

43

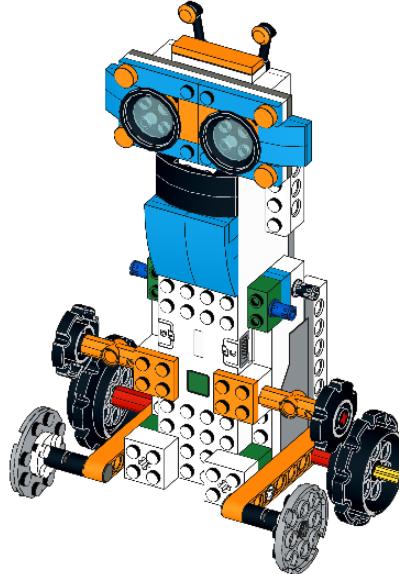


Figure 17.45

44. Now take one female 6M flex joint.

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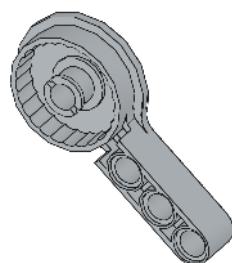
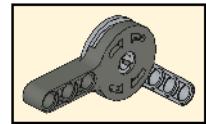
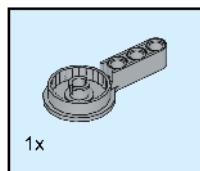


Figure 17.46

45. Then take one male 6M flex joint and connect it with the female one. Make one more of this type of structure using flex joints.

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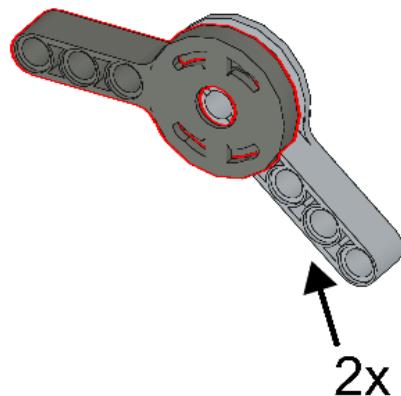
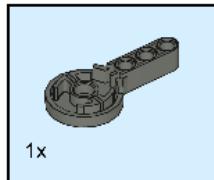


Figure 17.47

46. Now, connect one of these structures to the robot. Take one connector peg with a cross axle and place it in the first hole of the male flex joint as shown in the following figure:

46

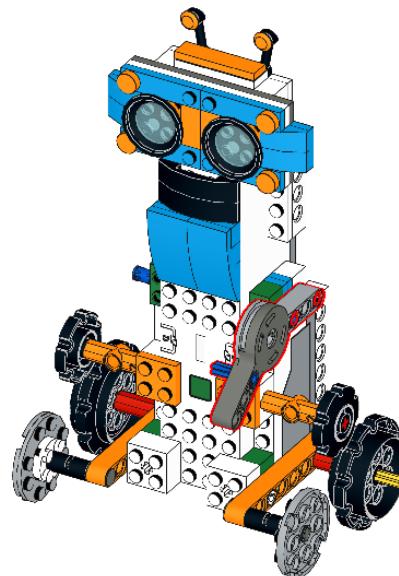
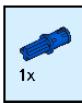


Figure 17.48

47. Now take one 4x4 plate and two 1x4 plates and place them side by side as shown in the following figure:

47

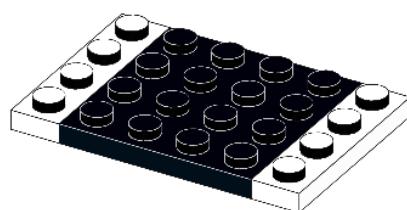
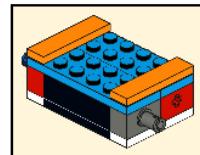
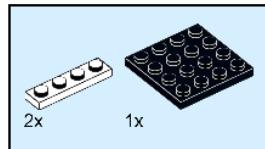


Figure 17.49

48. Take one 1x2 brick with a cross hole and one 1x2 brick with a connector peg and connect both to one of the 1x4 plates. Then take one connector peg with an axle and connect it to the brick with a cross hole.

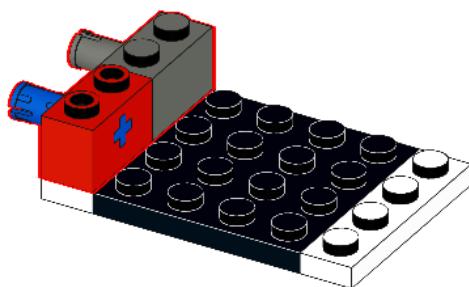
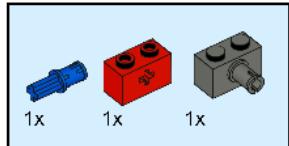
48

Figure 17.50

49. Take two 2x4 bricks and connect them to the 4x4 plate, as shown in the following figure:

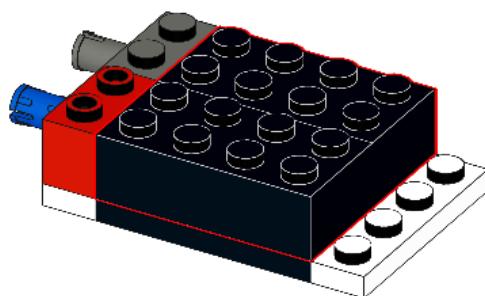
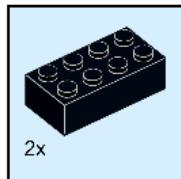
49

Figure 17.51

50. Again, take one 1x2 brick with a cross hole and one 1x2 brick with a connector peg and connect both to the other 1x4 plate, as shown in the following figure:

50

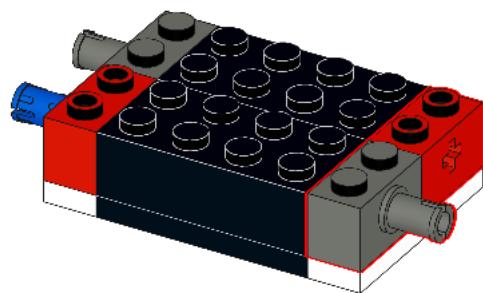
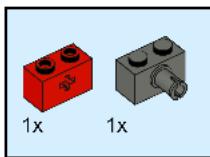


Figure 17.52

51. Take two 2x6 plates and connect them to the whole structure, as shown in the following figure:

51

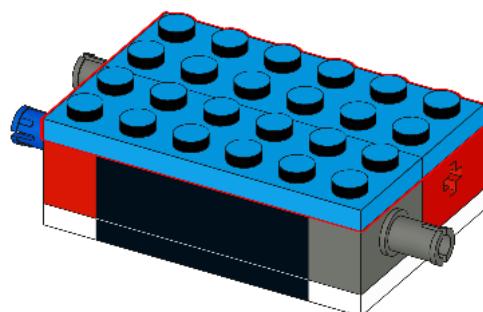
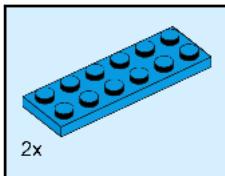


Figure 17.53

52. Take two 1x4 flat tiles and connect them to both sides of the 2x6 plates, as shown in the following figure:

52

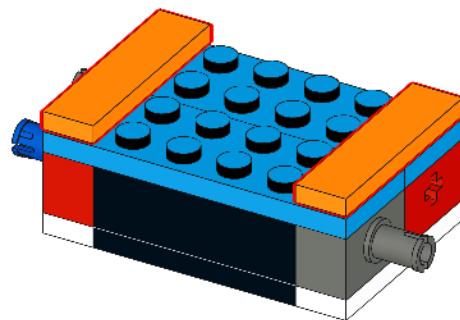
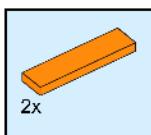


Figure 17.54

53. Now, connect this whole structure to the male flex joint of the robot.

53

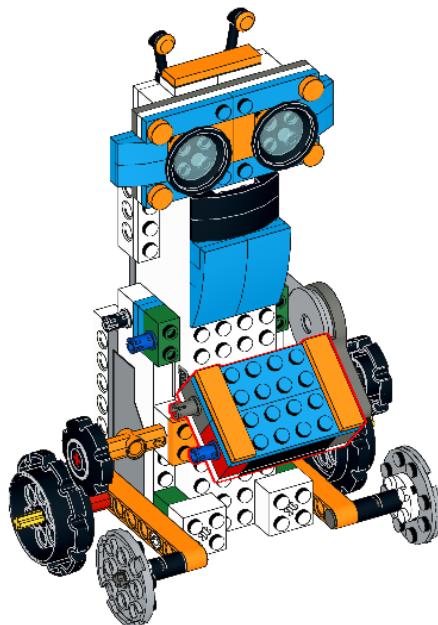


Figure 17.55

54. Now take the structure that we made in *step 45* and connect it to the other side of the robot as shown here:

54

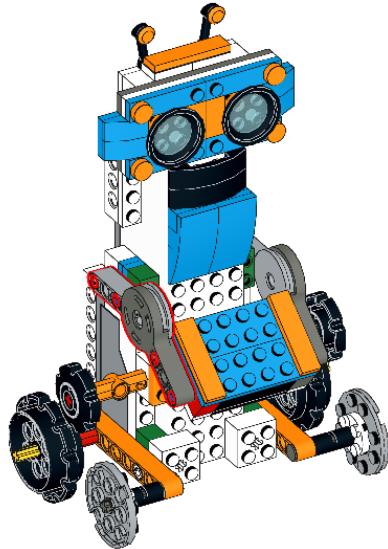


Figure 17.56

55. Take two 1x4 plates and connect them beside both 1x4 flat tiles, as shown in the following figure:

55

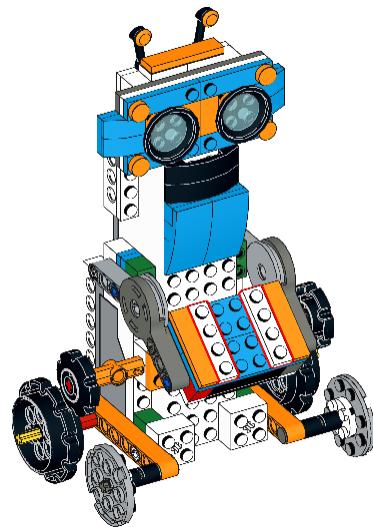
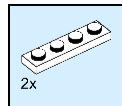


Figure 17.57

56. Now take an external motor from your BOOST kit. Then take one 3M axle and two connector pegs with an axle and connect them to the motor as shown in the following figure:

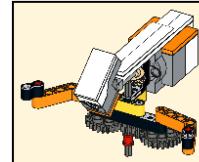
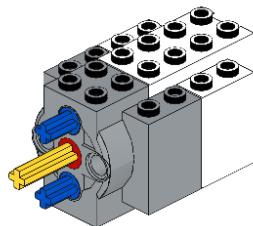
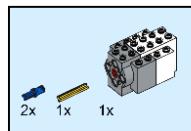
56 1:1

Figure 17.58

57. Now take two 1x4 flat tiles and connect them to the motor. Then take a 3M beam with a fork and one Z12 conical wheel and connect both to the 3M axle, as shown in the following figure:

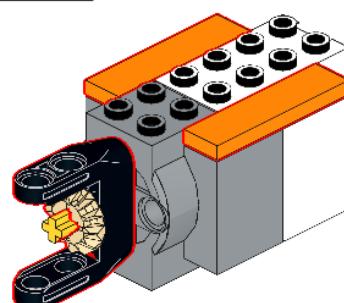
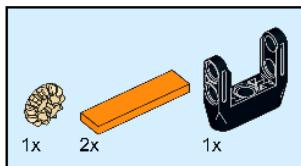
57

Figure 17.59

58. Take one Z20 bevel gear and place it inside the beam with a fork, then take one 8M stopper axle and use it to connect the bevel gear to the beam with a fork, as shown in the following figure:

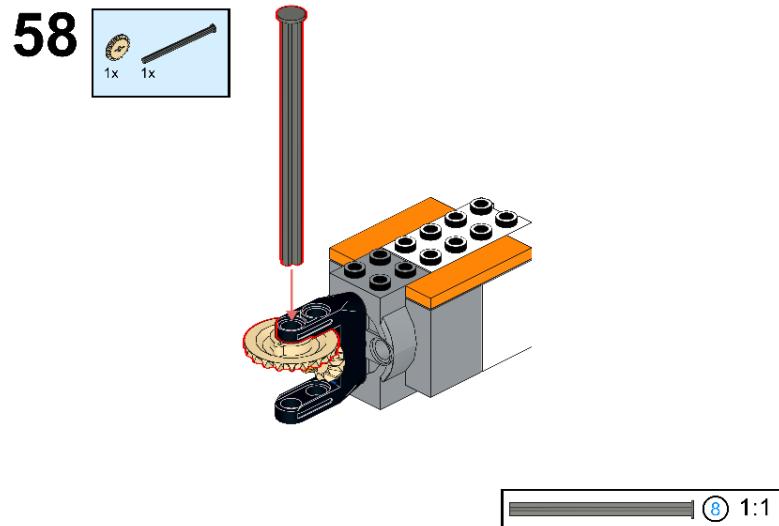


Figure 17.60

59. Take one connector peg with a knob and connect it to the beam with a fork. Then take one t-beam with a 3x3 hole and connect it to the axle and connector peg, as shown in the following figure:

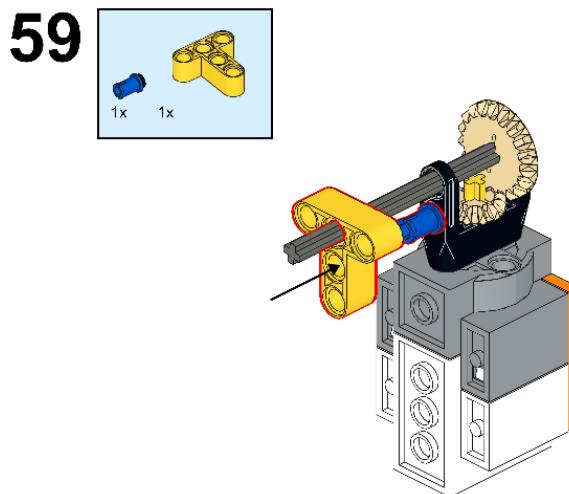


Figure 17.61

60. Now, take one 3M axle with a snap and one connector peg, and connect them to the t-beam.

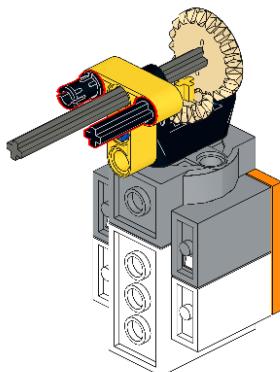
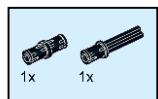
60

Figure 17.62

61. Take one 7M beam and connect it to both axles and the connector peg. Then take one 1M 8t-gear wheel and one bush, and connect them to the 8M stopper axle, as shown in the following figure:

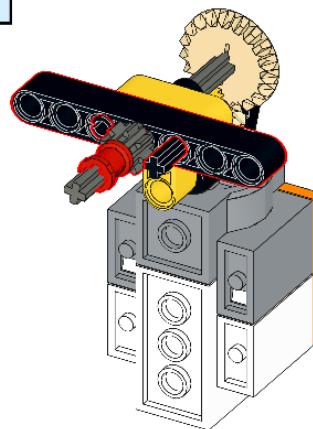
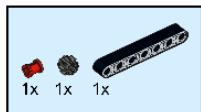
61

Figure 17.63

62. Take one 1M 8t-gear wheel and connect it to the axle with a snap. Then take one 3M stopper axle and one Z24 gear wheel and connect them to each other, then connect them to the second from last hole of the 7M beam.

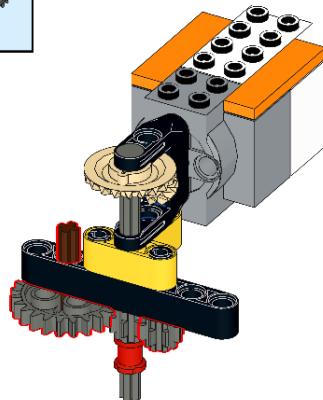
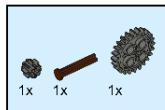
62

Figure 17.64

63. Again, take one 3M stopper axle and one Z24 gear wheel, connect them to each other, and then connect them to the first hole of the 7M beam.

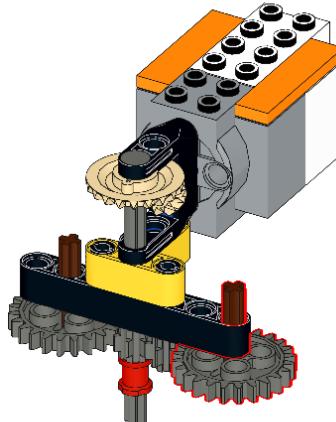
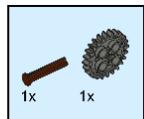
63

Figure 17.65

64. Now, take two 4x4 angular beams and connect them to both of the stopper axles, then take two 2M axles and connect them to the cross holes of the angular beams.

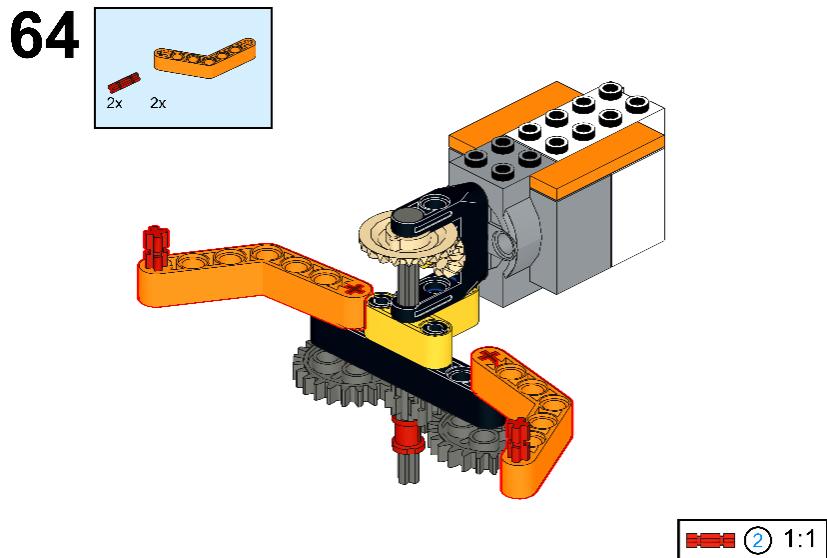


Figure 17.66

65. Take two 2M dampers and connect them to the 2M axles, then take one 2x8 plate with holes and connect it to the motor, as shown in the following figure:

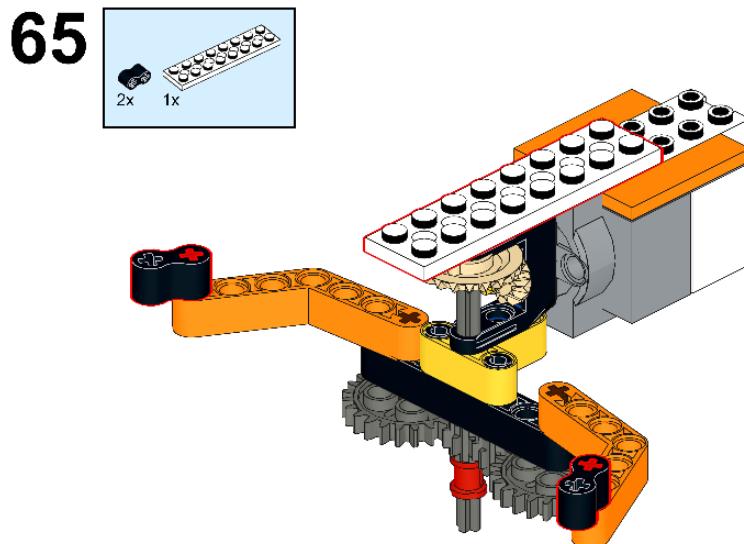


Figure 17.67

66. Now take two 1x4 flat tiles and connect them to the rear of the motor, then take two 1x2 plates with a ball cup and connect them to the front end of the 2x8 plate.

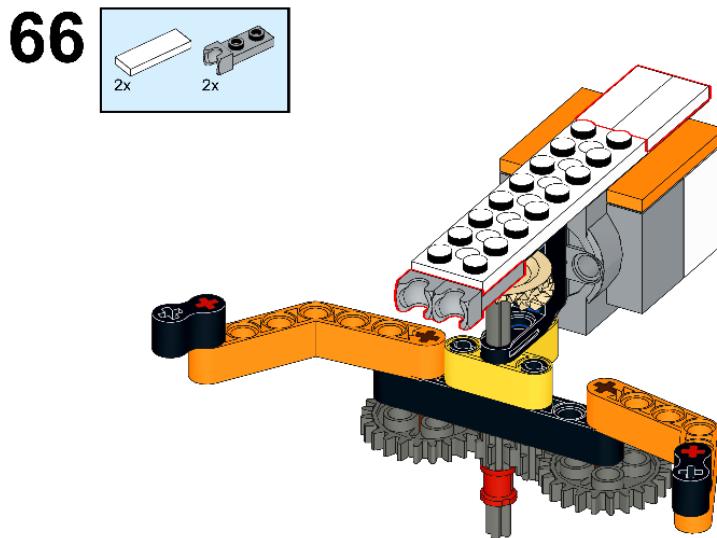


Figure 17.68

67. Take two 1x2 plates with a ball on the end and connect them to the plates with a ball cup, then take two 2x2 plates and connect them below the plates with a ball.

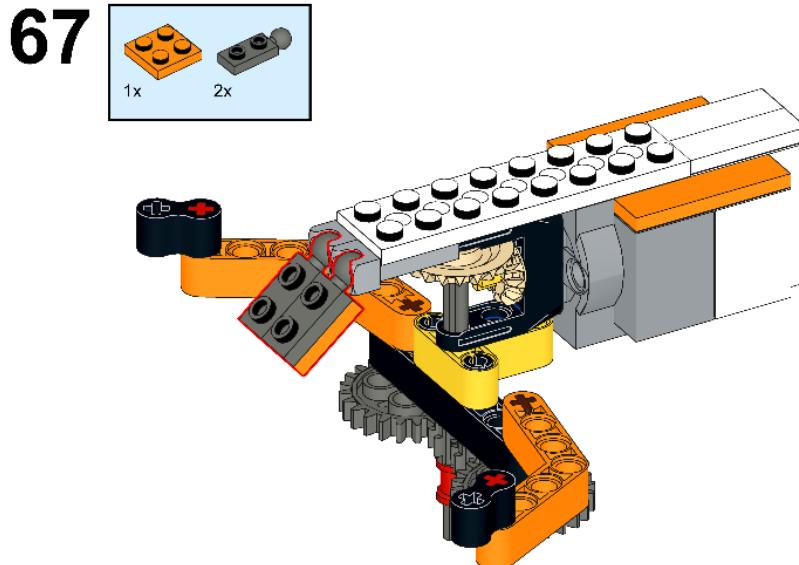


Figure 17.69

68. Take two 1x8 flat tiles and connect them to the 2x8 plate.

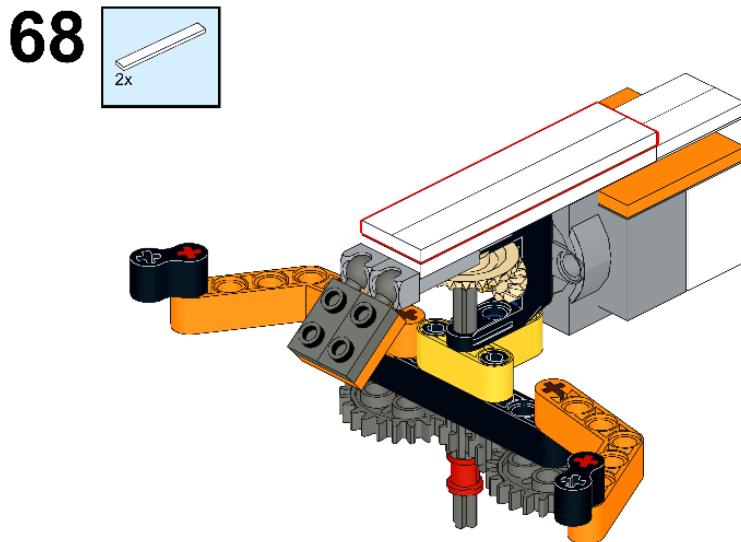


Figure 17.70

69. Take a color sensor from your BOOST kit and connect it to the 1x2 plates with a ball. Then take one 2x4 flat tile and connect it to the color sensor.

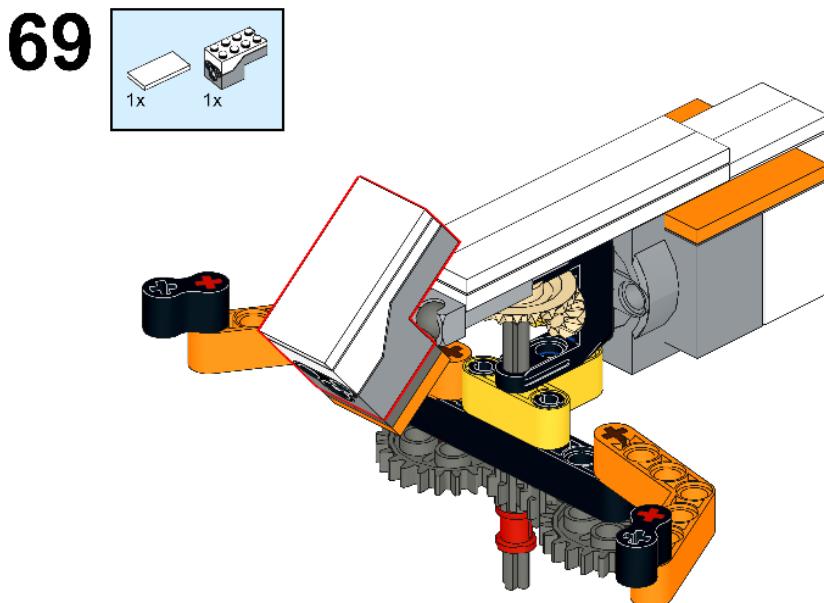


Figure 17.71

70. Now, connect the motor of this structure to the plates of the main model, as in the following figure:

70

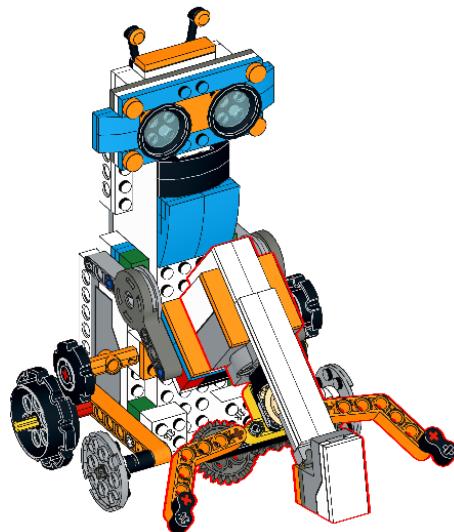


Figure 17.72

71. Set the angle of the flex joints well, so that the color sensor faces down, as shown in the following figure:

71

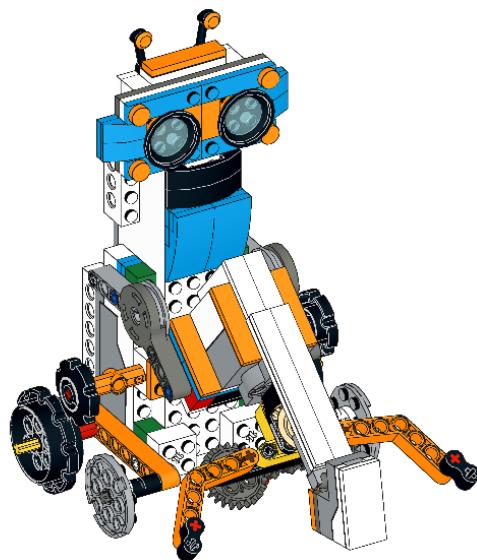


Figure 17.73

72. Now let's make a rotating belt to move the robot. For that, take seven track elements and connect them to make a small track, then take eight rubber attachments for the track, and connect two to every other track element.

72

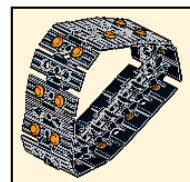
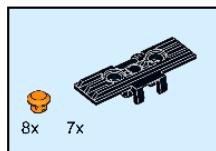


Figure 17.74

73. This time, take 12 track elements and 11 rubber attachments, then connect them to make a round-shaped track, as in the following figure. Make two of the same type of round-shaped tracks:

73

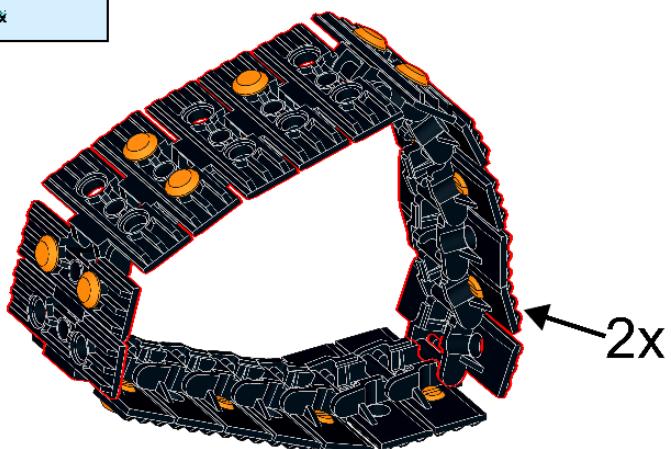


Figure 17.75

74. Now attach this track to the robot, around the two sprockets and one round plate, as shown in the following figure:

74

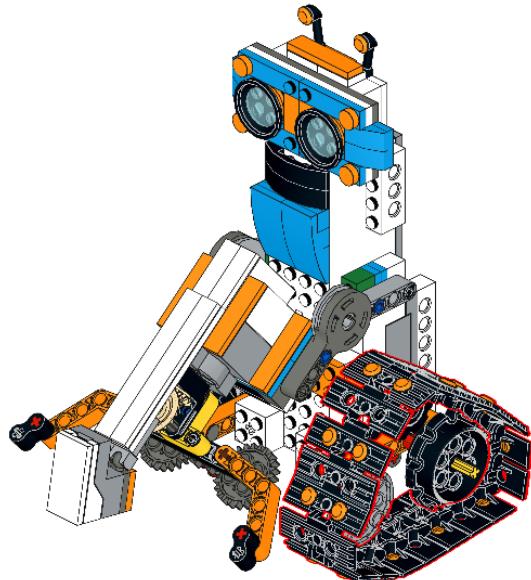


Figure 17.76

75. Take the other round-shaped track and connect it to the other side.

75

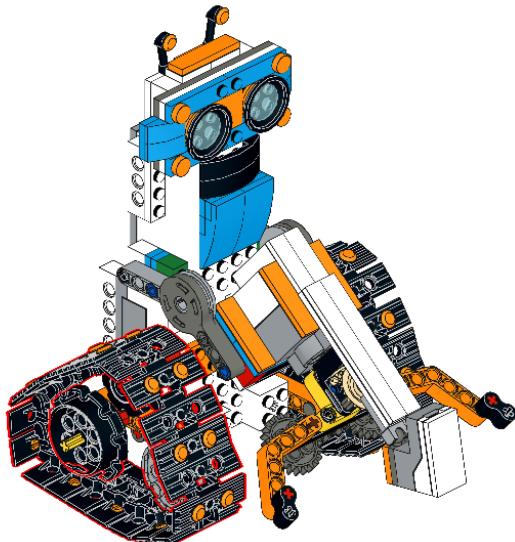


Figure 17.77

Compare your model with the one shown in the following figure and code it to run:

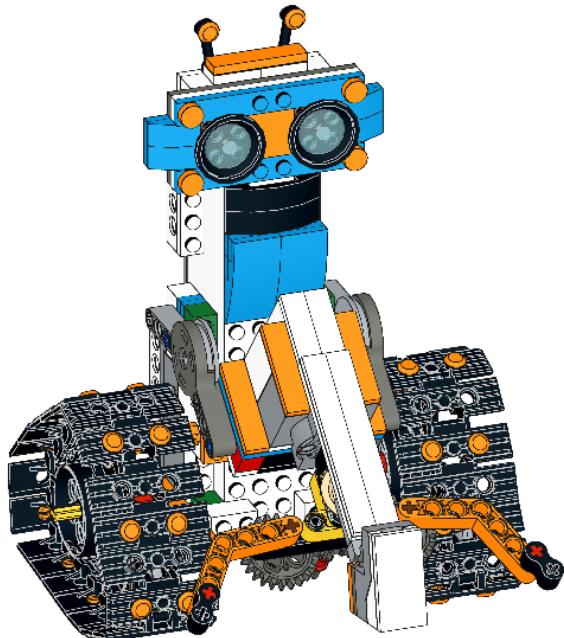


Figure 17.78

Let's now move on to the coding section to perform interesting activities with this moon rover.

