Building an obstacle avoidance robot

The robot should look like the following figure:

Figure 15.1

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

1. Take your BOOST Hub. Ensure that the batteries are fully charged.

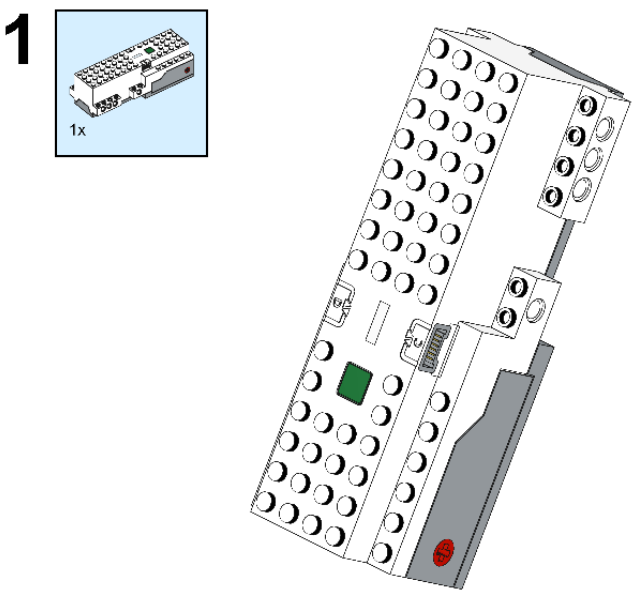


Figure 15.2

2. Take three connector pegs and connect them to the BOOST Hub.

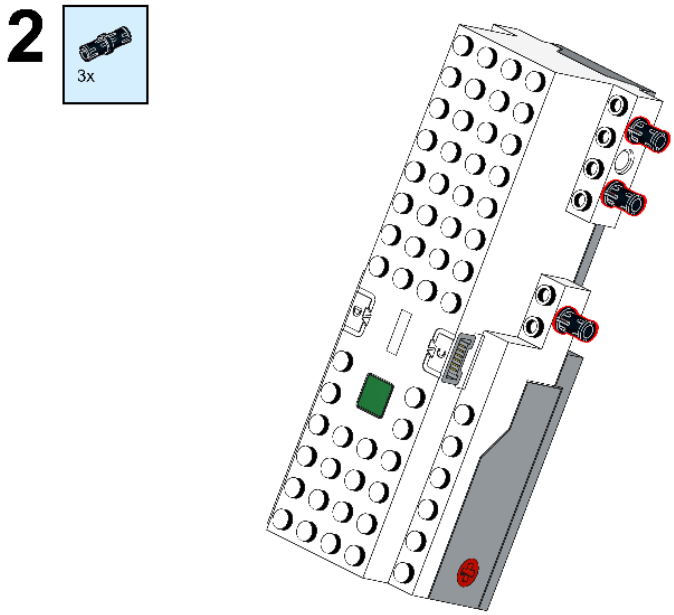


Figure 15.3

3. Now we are going to make the sub-model shown in the top-right corner of the following figure. Let's start by taking one 3x5 angular beam.

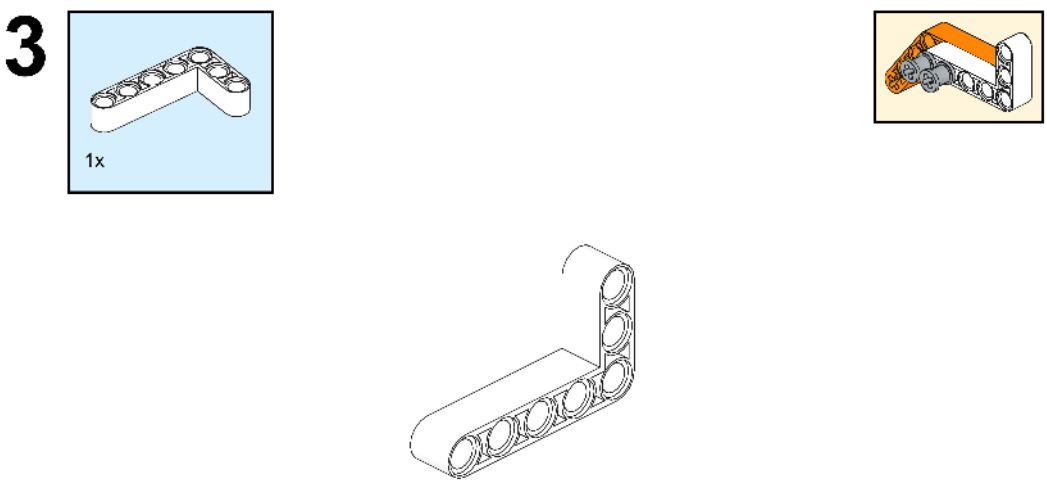


Figure 15.4

4. Take two 2M frictional snaps and connect them to the angular beam, as shown in the following figure:

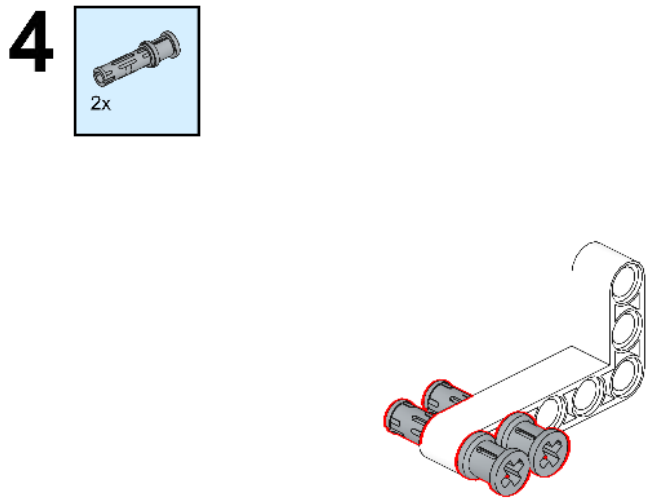


Figure 15.5

5. Take one 4x4 angular beam and connect it to a frictional snap.

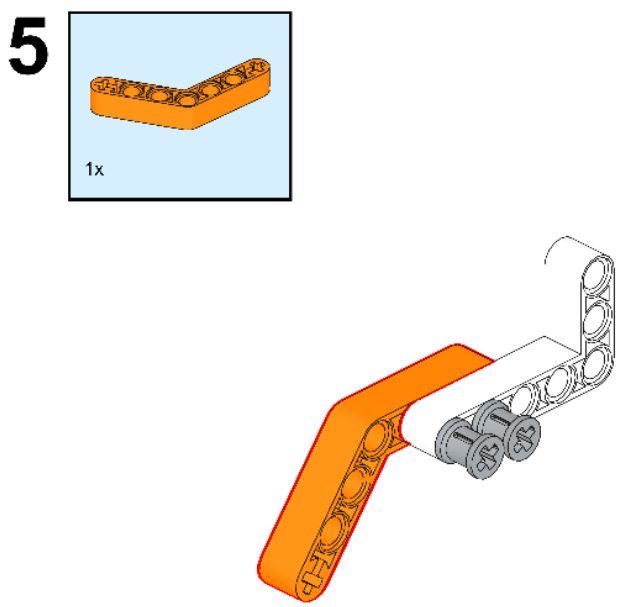


Figure 15.6

6. So, now that we are done with the sub-model, let's connect it to the BOOST Hub.

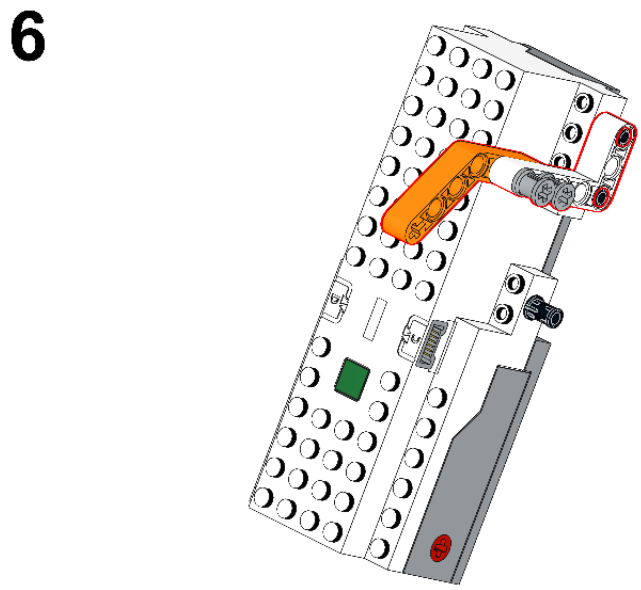


Figure 15.7

7. Take one 1x10 brick and connect it to the hub. Take two connector pegs and connect one of them to the 3x5 angular beam and the other to the 1x10 brick.

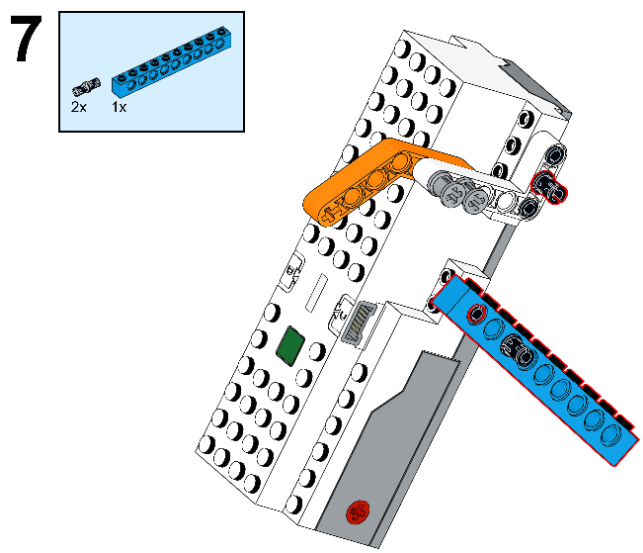


Figure 15.8

8. Take one 7M beam and attach it as shown in the following figure:

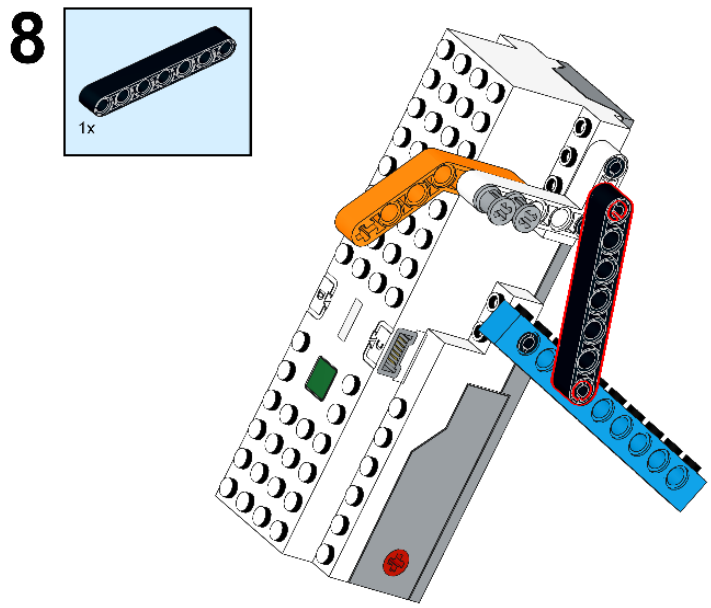


Figure 15.9

9. Take two 2x4 bearing elements and connect them to the 4x4 angular beam.

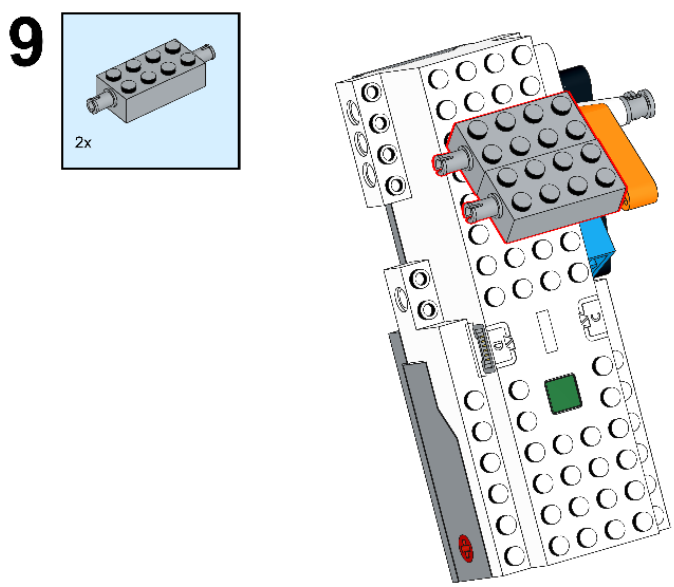


Figure 15.10

10. Take one 4x4 angular beam and connect it as shown in the following figure. Also take two connector pegs and connect them to the BOOST Hub.

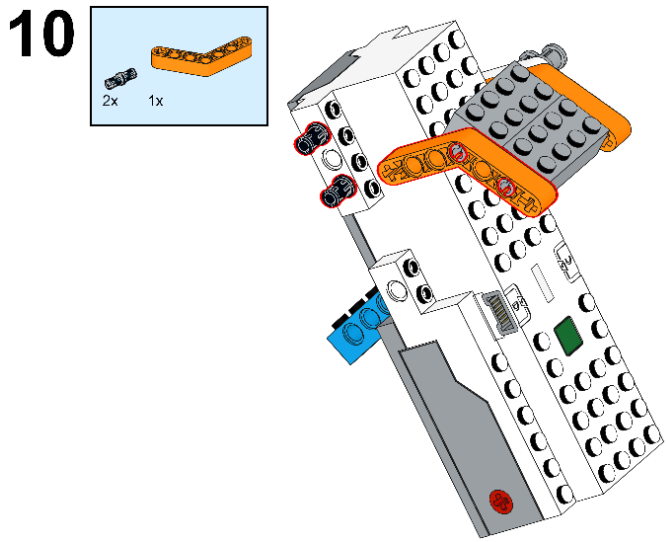


Figure 15.11

11. Take one 3x5 angular beam and connect it to the connector pegs. Then, take two 2M frictional snaps and connect them as shown in the following figure:

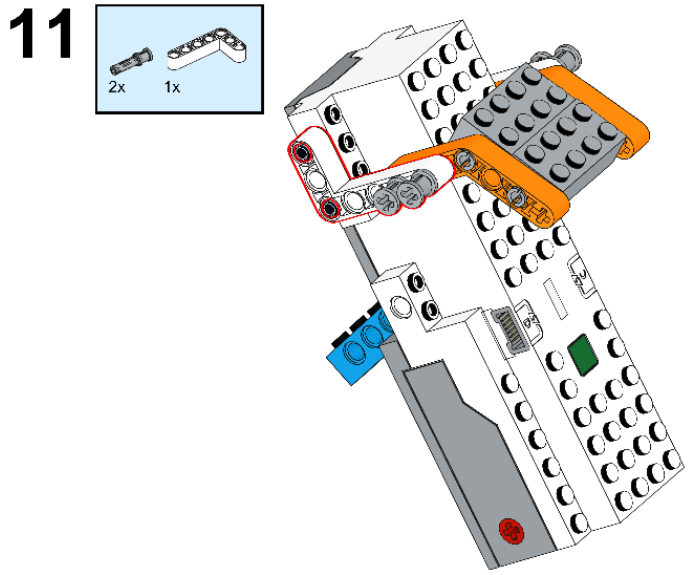


Figure 15.12

12. Now, take two connector pegs and connect them as shown in the following figure:

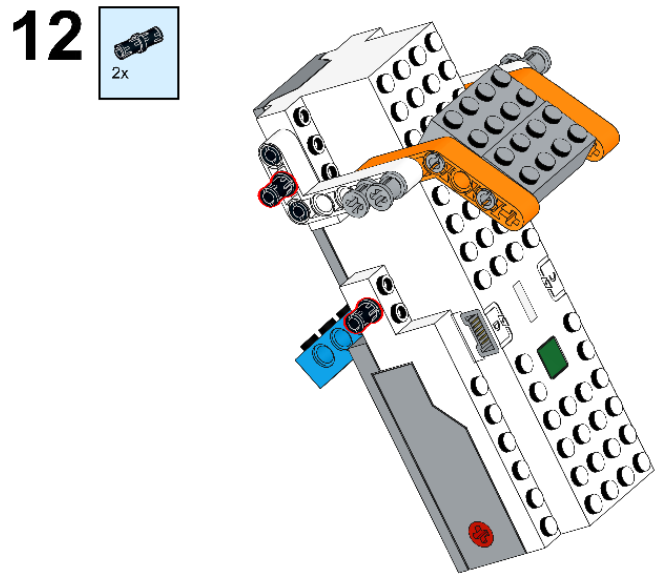


Figure 15.13

13. Take one 1x10 brick and connect it to the hub. Now, connect one connector peg to it.

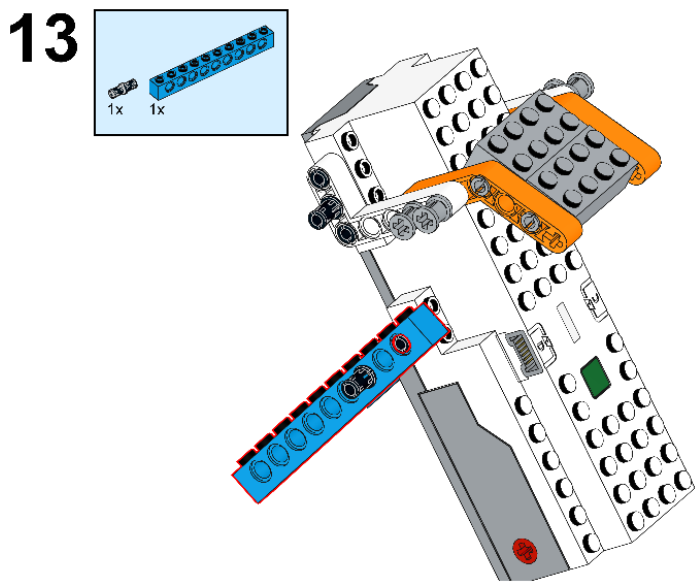


Figure 15.14

14. Take one 7M beam and connect it as shown in the following figure to make a stable connection:

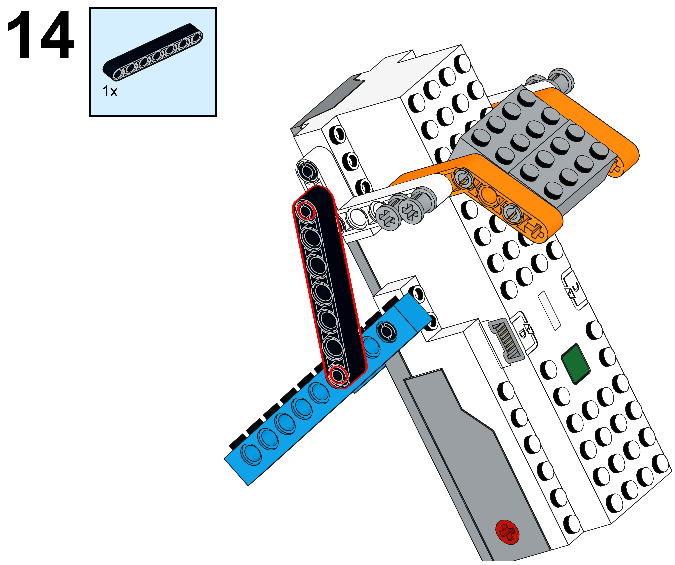


Figure 15.15

15. Take one 2M axle and one connector peg and connect them as shown in the following figure:

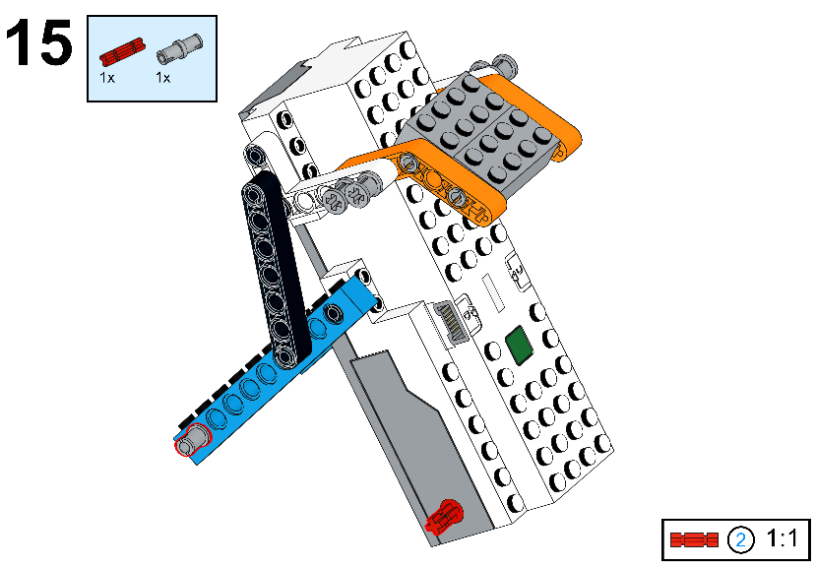


Figure 15.16

16. Now, connect a wheel to a 2M axle. Then, take one 2x2 flat round tile with a hole and one 4x4 round plate with a snap and connect them as shown in the following figure:

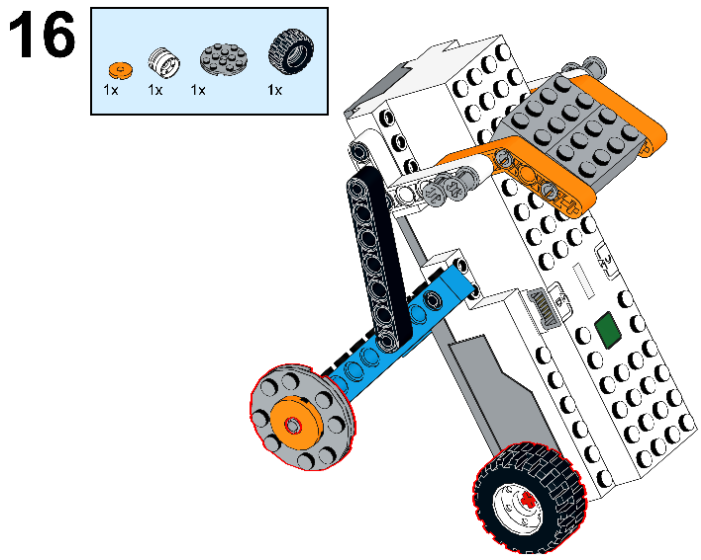


Figure 15.17

17. Take one 2M axle and one connector peg and connect them to the opposite side, as shown in the following figure:

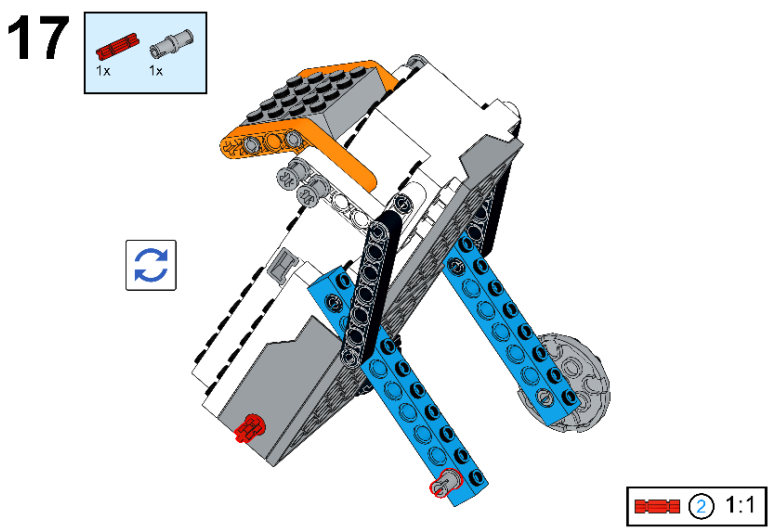


Figure 15.18

18. Now, again connect a wheel with a 2M axle. Then, take one 2x2 flat round tile with a hole and one 4x4 round plate with a snap and connect them as shown in the following figure:

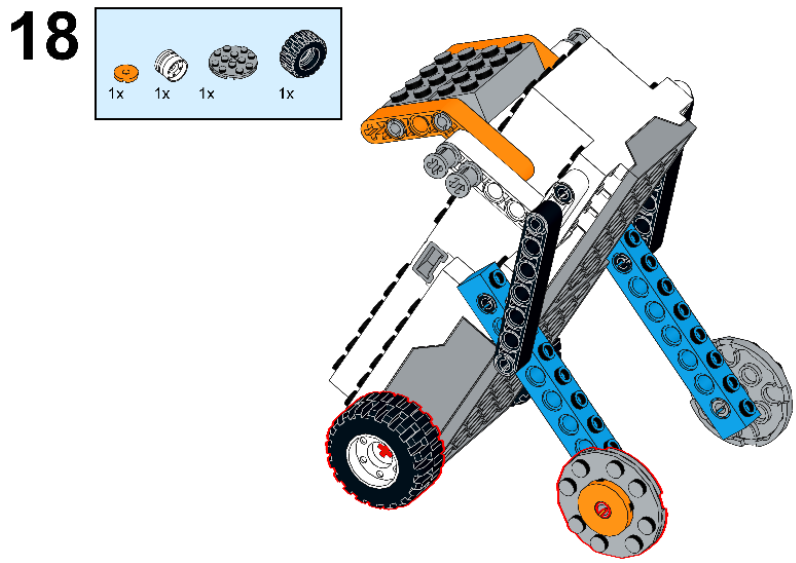


Figure 15.19

19. Take one 2x8 plate with a hole and connect it as shown in the following figure:

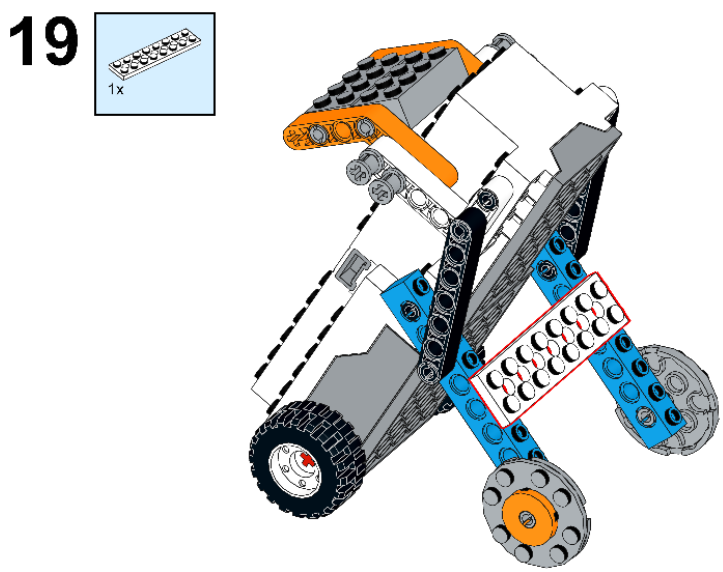


Figure 15.20

20. Now, take three 1x2 plates and connect them to the BOOST Hub as shown in the following figure:

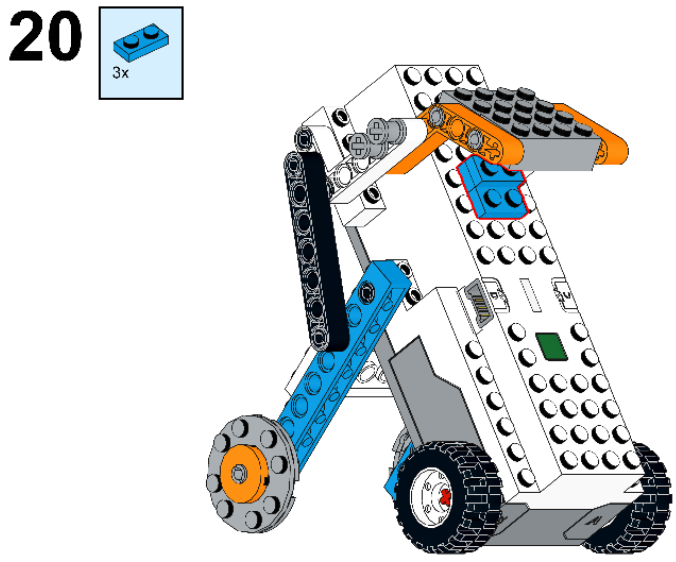


Figure 15.21

21. Take one 2x4 brick with a bow and connect it to the 1x2 plates as shown in the following figure:

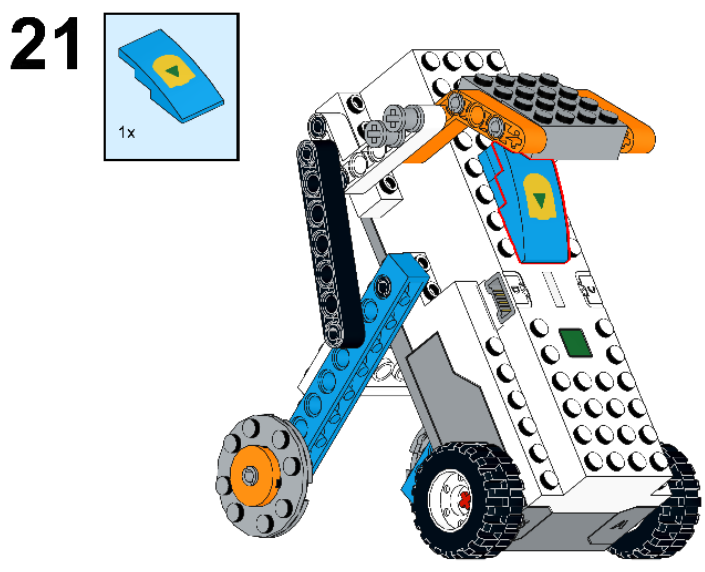


Figure 15.22

22. Now we are again making a sub-model as shown in the top-right corner of the following figure. For that, let's start by taking one 4x4 plate.

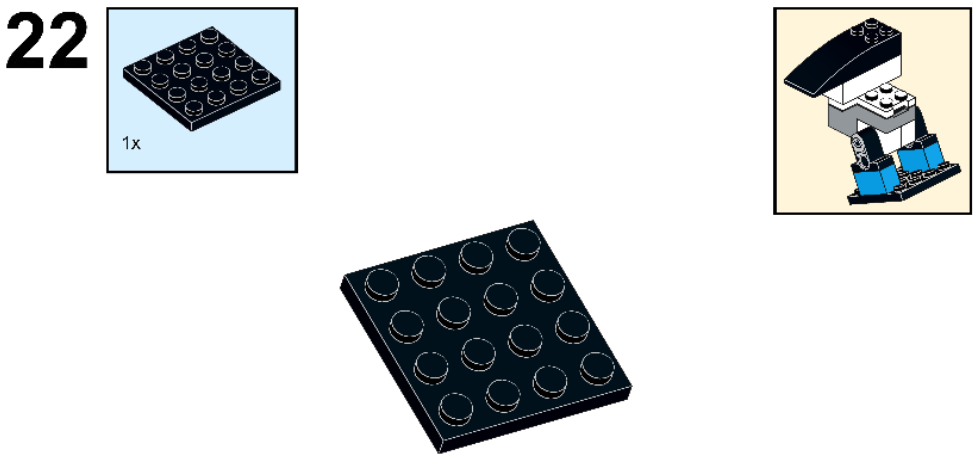


Figure 15.23

23. Take two 1x2 bricks and connect them to the plate as shown in the following figure:

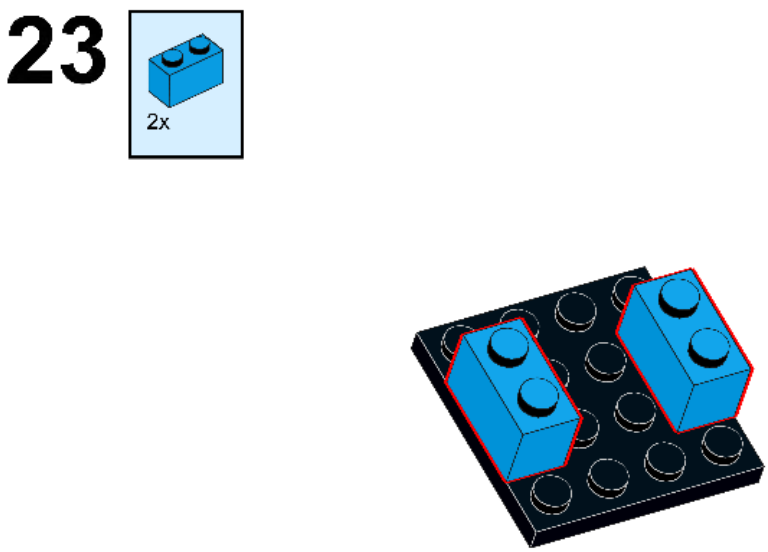
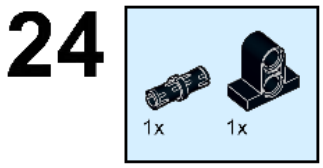


Figure 15.24

24. Take one 1x2 T-beam with a plate with a tube and attach it to a brick. Then, take one connector peg and connect it to the T-beam.



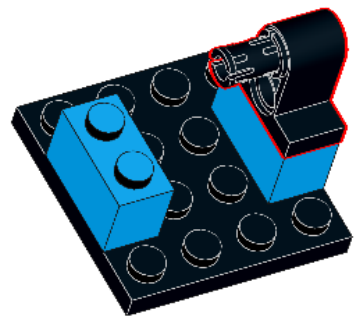
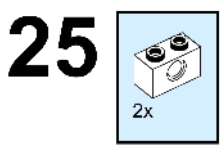


Figure 15.25

25. Take two 1x2 bricks and connect them as shown in the following figure:



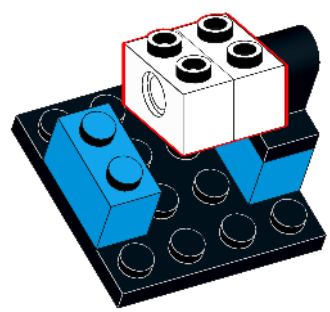
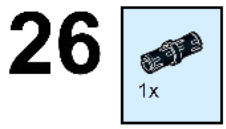


Figure 15.26

26. Take one connector peg and connect it to a brick.



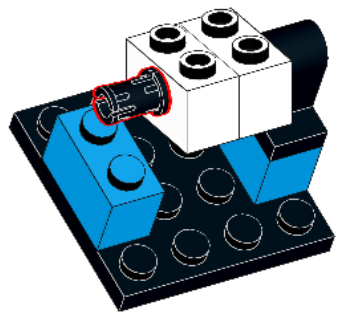
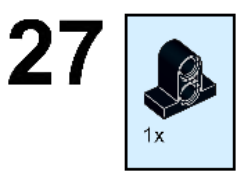


Figure 15.27

27. Take one 1x2 T-beam with a plate and tube and attach it as shown in the following figure:



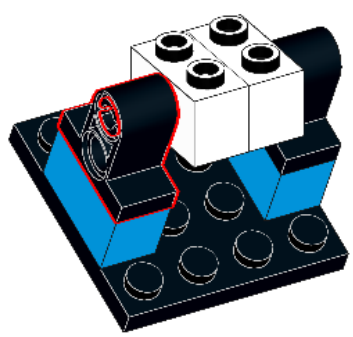


Figure 15.28

28. Now, connect the color sensor to the bricks, as shown in the following figure:

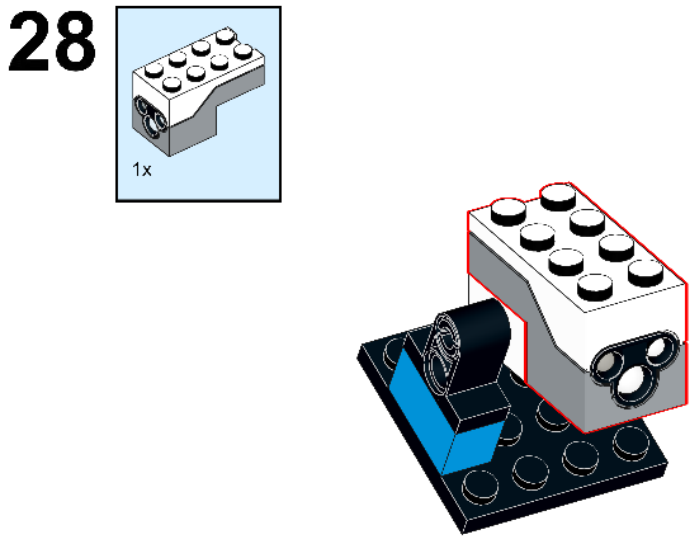


Figure 15.29

29. Take one 2x4 brick and connect it to the top of the color sensor and attach one 2x6 brick with a bow to it.

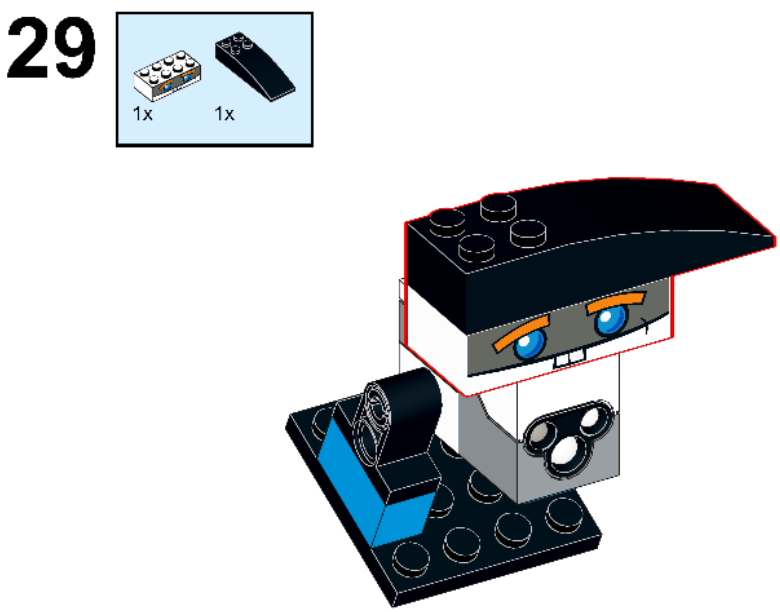


Figure 15.30

30. Now attach this sub-model to a 2x4 bearing element, as shown in the following figure:

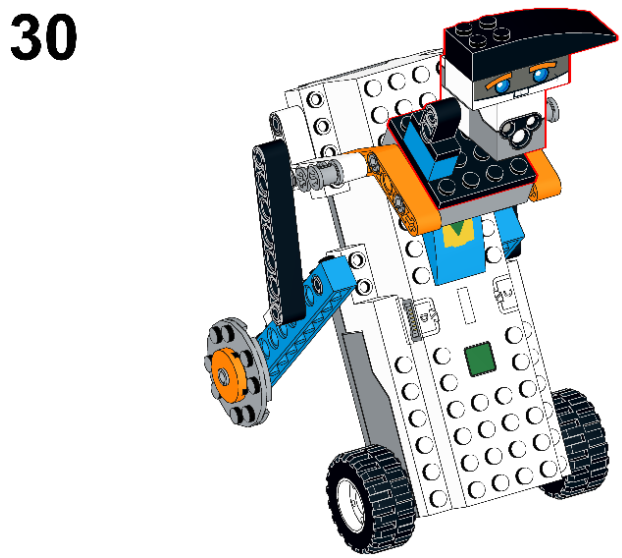


Figure 15.31

31. Now, take two 4x6 bricks and connect them to two sides of the hub.

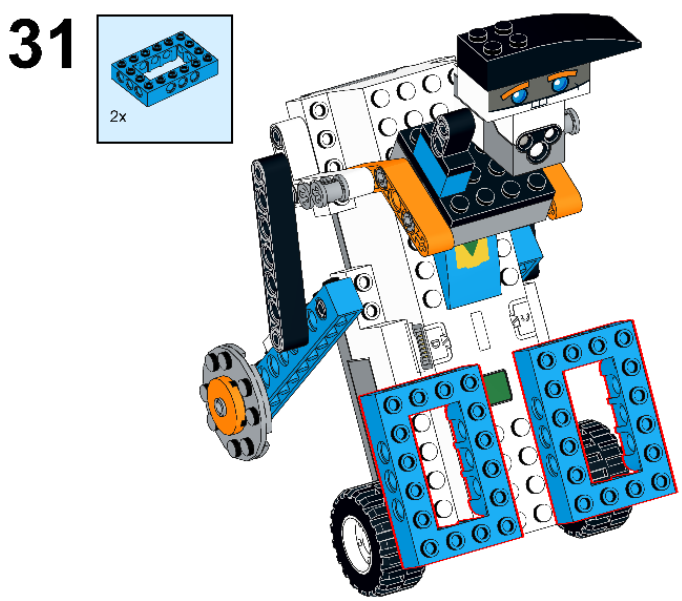


Figure 15.32

32. Take one 2x6 brick with a bow and attach it to the 4x6 brick is on the right-hand side. Also attach a 1x6 brick to the bow on that brick.

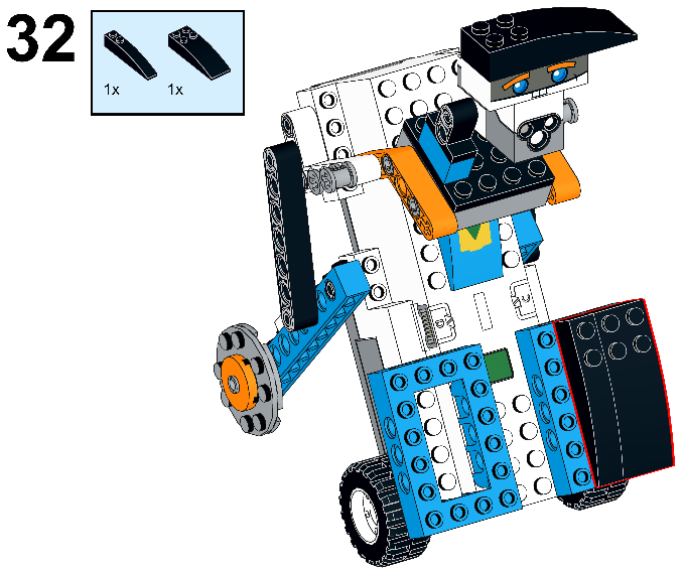


Figure 15.33

33. Take one 4x4 plate and attach it to both sides of the 4x6 brick as shown in the following figure. Then, attach a 1x4 flat tile to it.

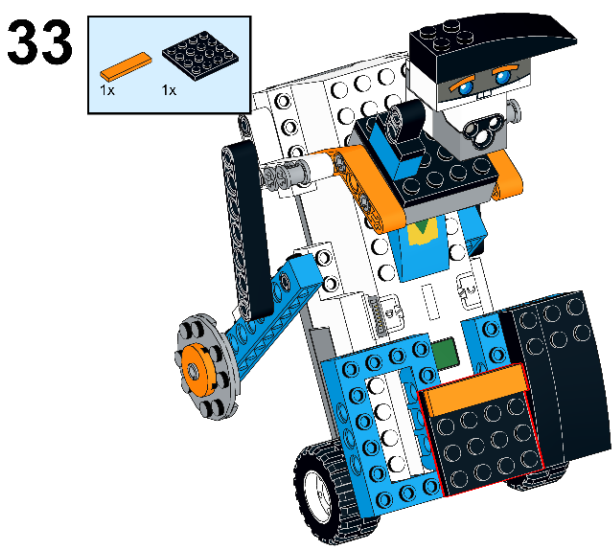


Figure 15.34

34. Attach one 3x4x2 plate with a bow to the 4x4 plate and then attach a 1x2 flat tile to it.

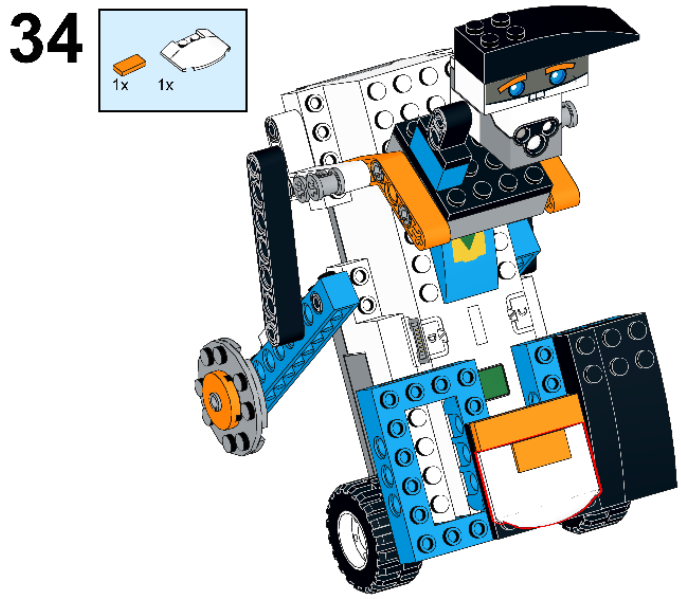


Figure 15.35

35. Take one 2x6 brick with a bow and attach a 1x6 brick with a bow to the other side.

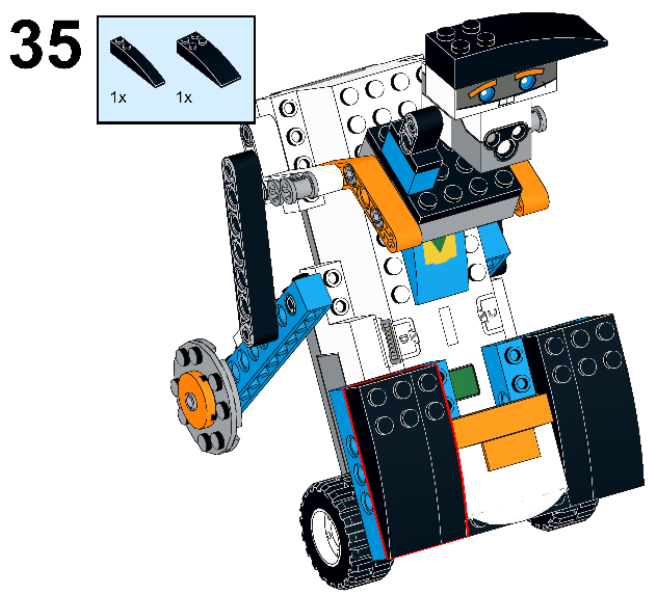


Figure 15.36

36. Take two 1x2 plates and connect them to both of the 1x6 bricks.

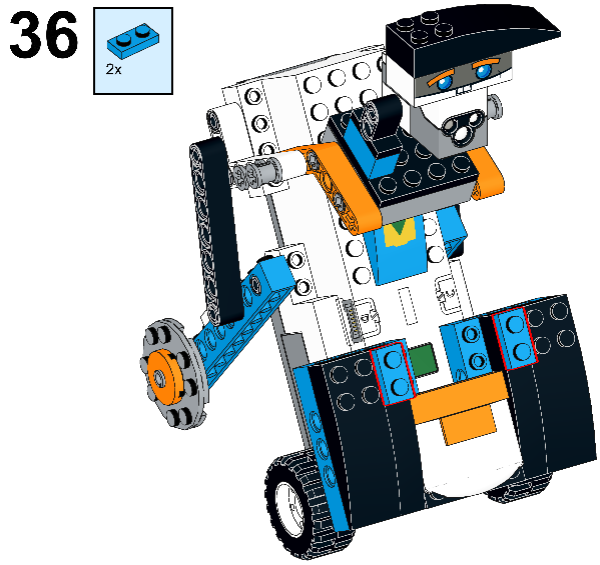


Figure 15.37

37. Take two 2x4 bricks with bows and connect them as shown in the following figure:

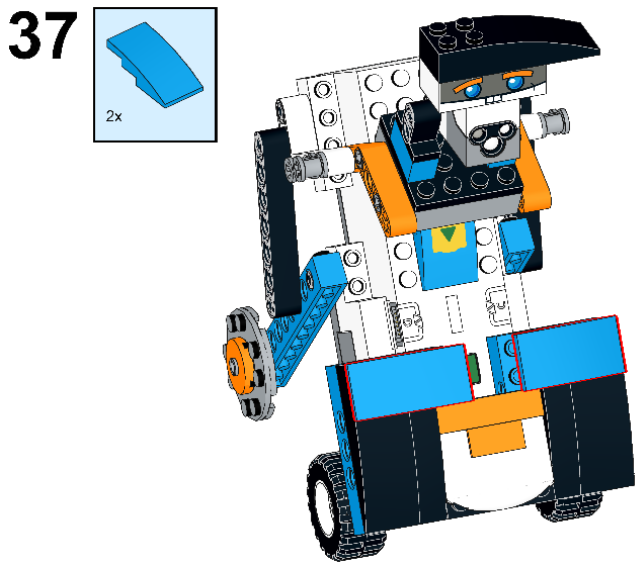


Figure 15.38

Great! Now we are done with our obstacle avoidance robot.

Compare your robot with the following figure:

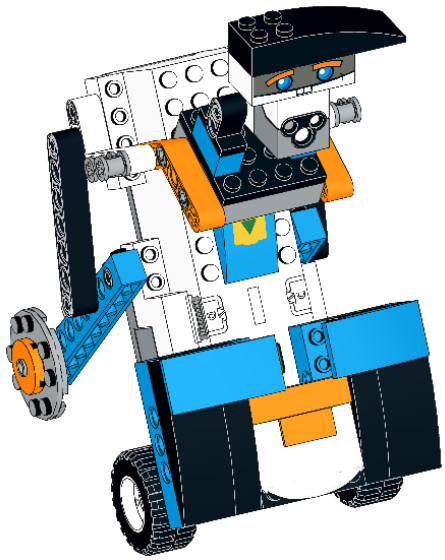
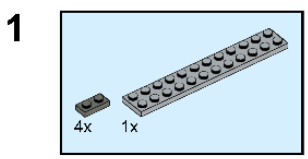


Figure 15.39

Since the robot is now ready, let's learn how to write a program for sensors and solve interesting challenges.

Let's start by building a tower, and then build a pole that can be used by the robot to detect various colors and act accordingly.

1. Take four 1x2 plates and one 2x12 plate. Connect the 1x2 plates to the 2x12 plate as shown:



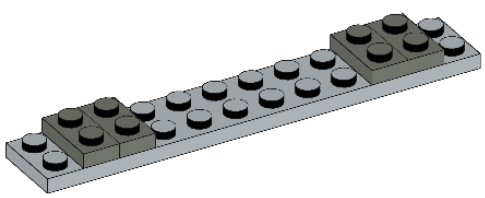


Figure 15.40

2. Now, take one 2x2 plate and one 2x2 round brick with a hole. Connect the 2x2 round brick to the 2x2 plate.

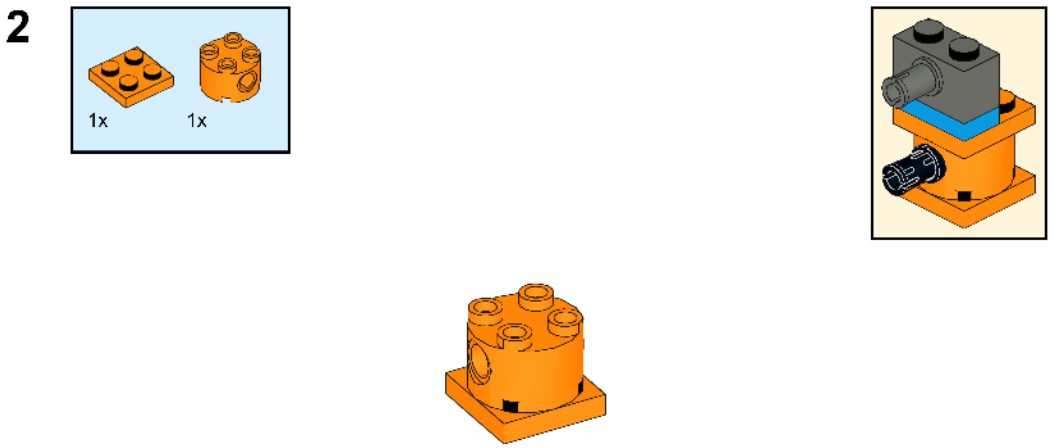


Figure 15.41

3. Take one 1x2 plate and one 2x2 plate and connect the 2x2 plate to the 2x2 round brick with a hole, and the 1x2 plate to the 2x2 plate.

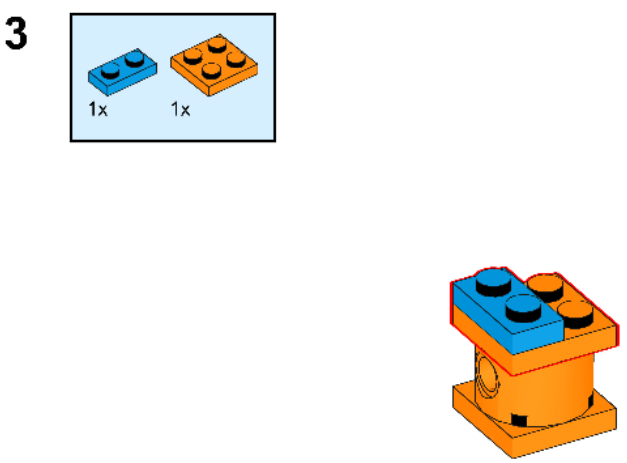


Figure 15.42

4. Now, take one connector peg and one 1x2 brick with a snap. Connect one connector peg to the 2x2 round brick with a hole, and the 1x2 brick with a snap to the 1x2 plate.

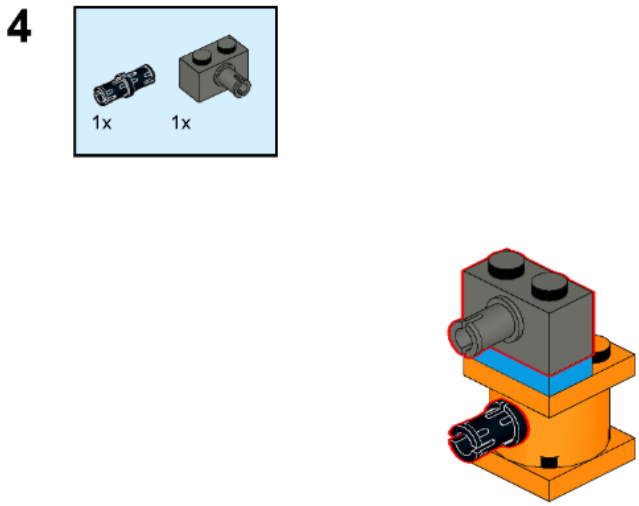


Figure 15.43

5. Now, connect the entire part to the two recently attached 1x2 plates, as shown in the following figure:

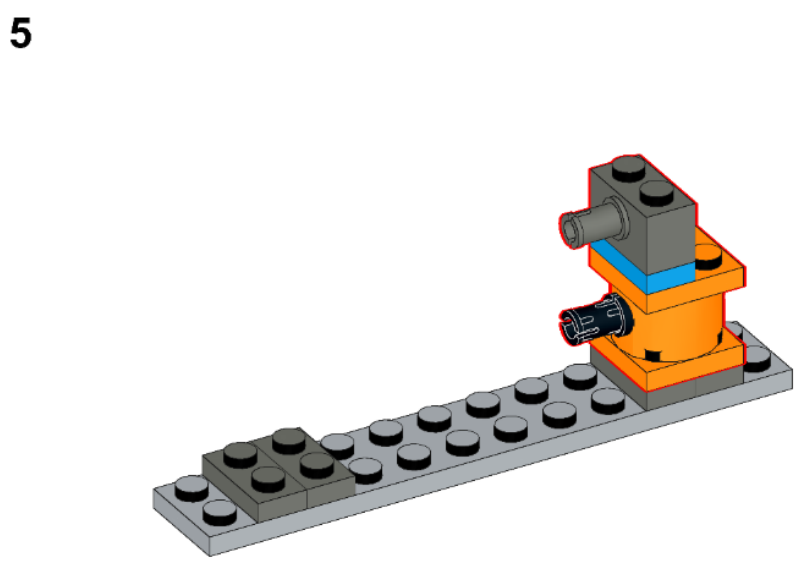


Figure 15.44

6. Now, take one 2x2 brick with a snap and one 1x16 Technic brick. Connect the 1x16 Technic brick to the connector peg and the 1x2 brick with a snap, and then connect a 2x2 brick with a snap to the 1x16 Technic brick, as shown in the following figure:

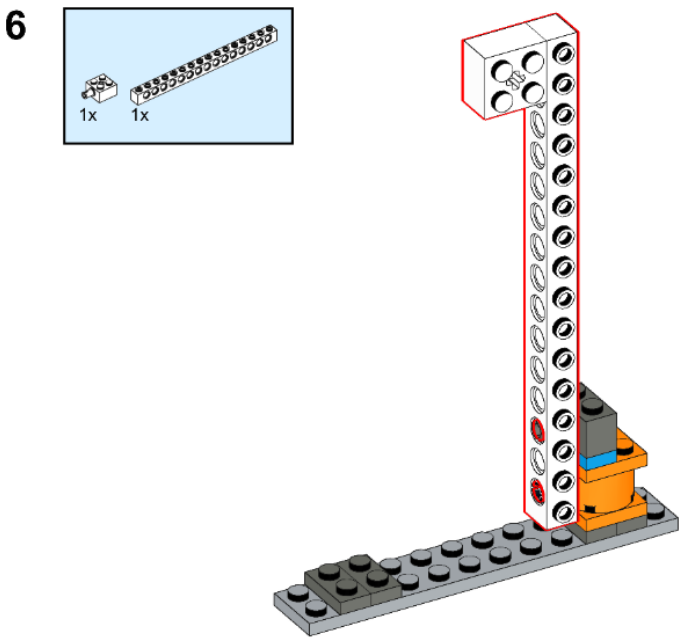


Figure 15.45

7. Now, take one 2x2 plate and one 2x2 round brick with a hole. Connect the 2x2 round brick to the 2x2 plate.

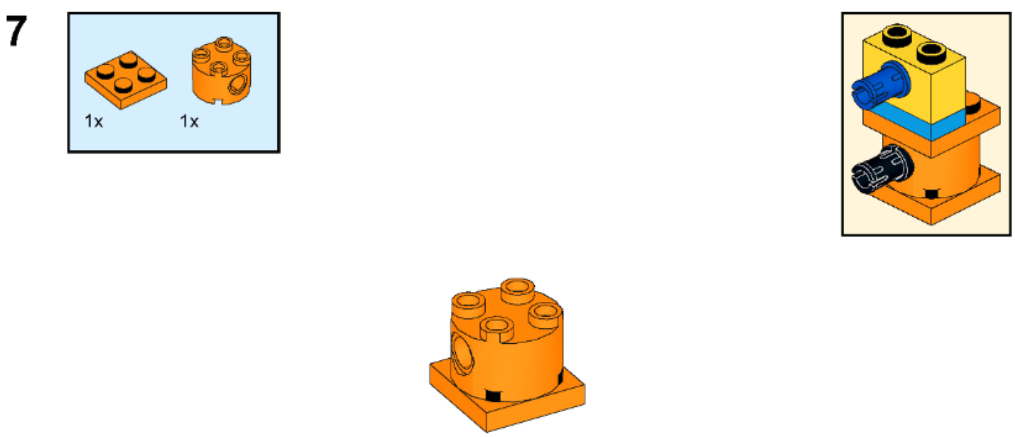


Figure 15.46

8. Take one 1x2 plate, one 2x2 plate, and one 1x2 brick with a cross hole. Connect the 2x2 plate to the 2x2 round brick with a hole, the 1x2 plate to the 2x2 plate, and then the 1x2 brick to the 1x2 plate.

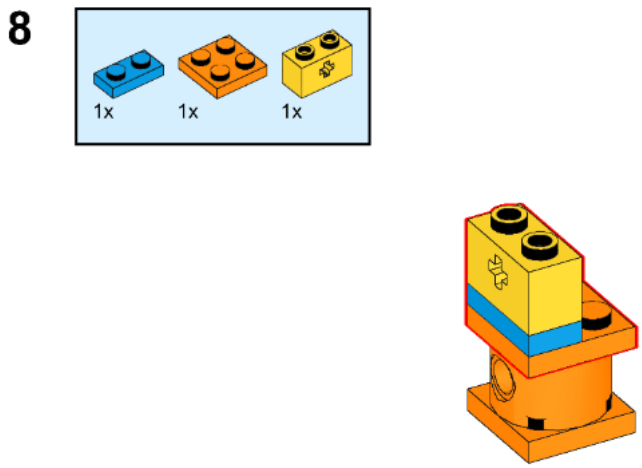


Figure 15.47

9. Now, take one connector peg and one connector with a bush/cross axle. Connect the connector peg to the 2x2 round brick with a hole, and the 1x2 connector with a bush/cross axle to the 1x2 brick with a cross hole.

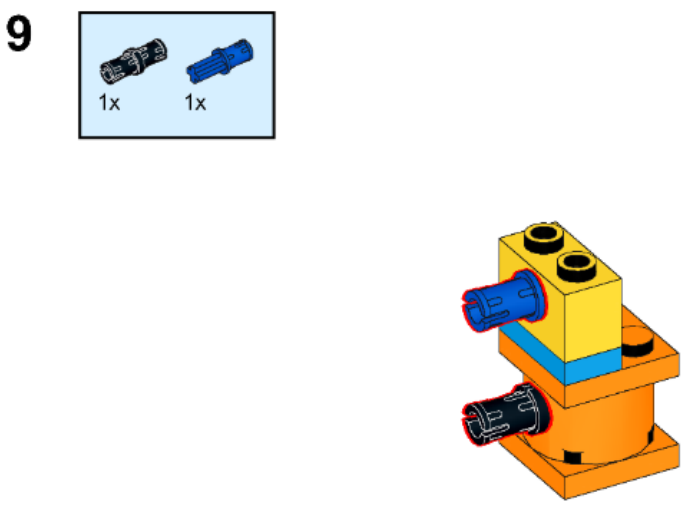


Figure 15.48

10. Now, connect the entire part to the two recently attached 1x2 plates, as shown in the following figure:

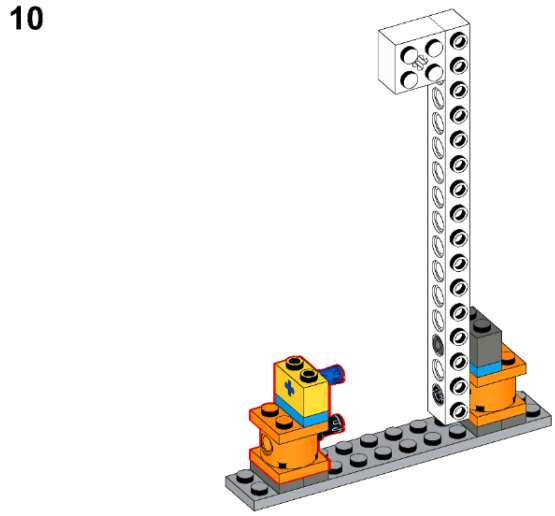


Figure 15.49

11. Now, take one 2x2 brick with a snap and one 1x16 Technic brick. Connect the 1x16 Technic brick to the one connector peg and one connector with a bush/cross axle, and then connect a 2x2 brick with a snap to the 1x16 Technic brick, as shown in the following figure:

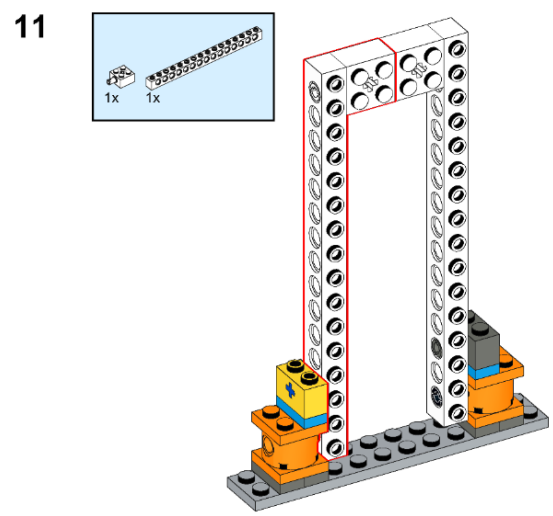


Figure 15.50

12. Take two 1x2 angle plates and connect them to the 1x2 brick with a snap, as shown in the following figure:

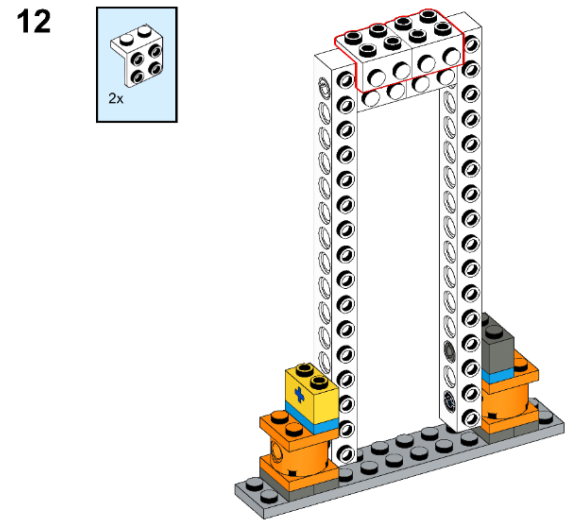


Figure 15.51

13. Take two 1x1 plates, one 1x6 plate, and one 2x6 plate. Connect the 1x1 plates to the 1x16 Technic bricks, the 1x6 plate to the second stud of the 1x16 Technic bricks, and a 2x6 brick to the bottom of the Technic bricks, as shown in the following figure:

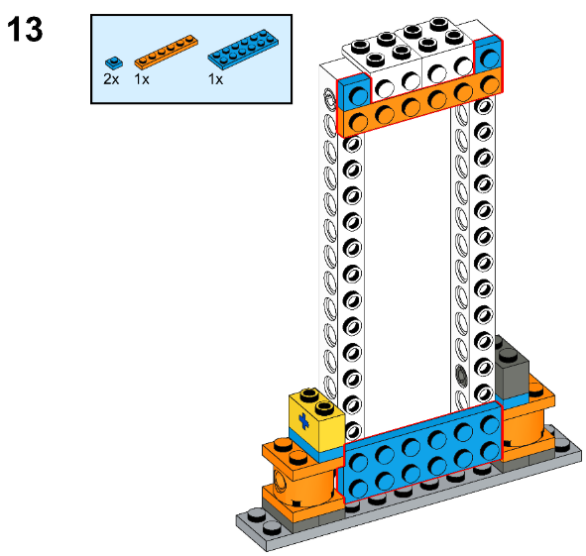


Figure 15.52

14. Now, take two 1x2 plates and connect them to the rear of the 1x16 Technic bricks.

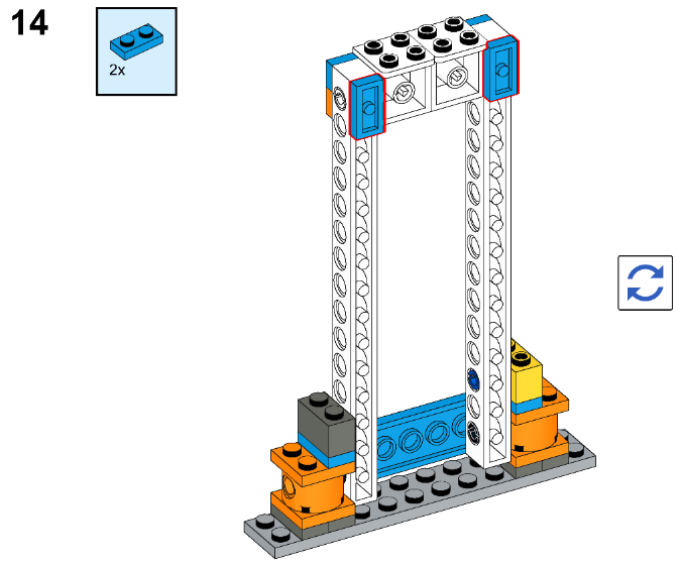


Figure 15.53

15. Now, take one 2x6 plate and one 2x8 plate. Connect the 2x8 plate to the recently attached 1x2 plate, and the 2x6 plate to the bottom of the 1x16 Technic bricks.

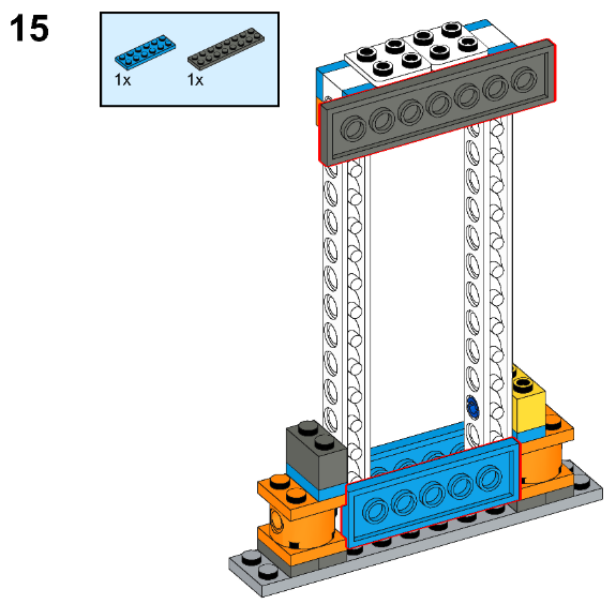


Figure 15.54

16. Now take two 1x2 flat tiles and two 1x4 flat tiles. Connect the flat tiles as shown in the following figure:

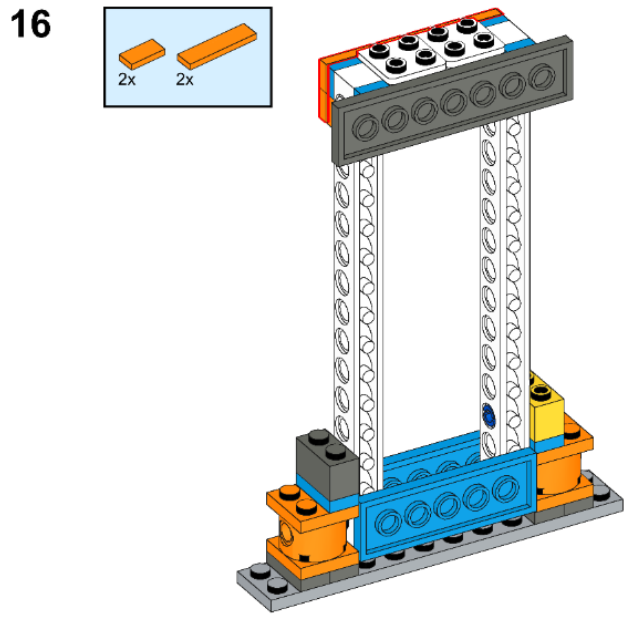


Figure 15.55

17. Take one 2x4 plate with a hole and one 2x4 brick. Connect the 2x4 brick to the 2x4 plate with a hole.

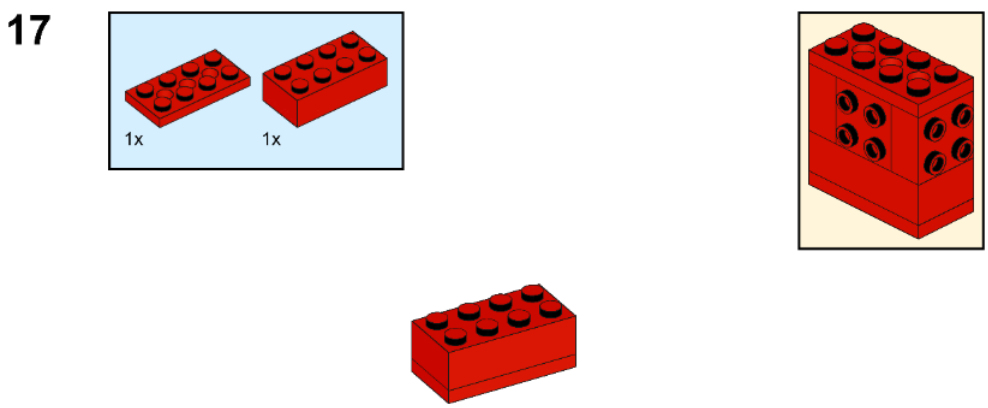


Figure 15.56

18. Take four 1x2x1 bricks with knobs and connect one 1x2x1 brick to the 2x4 brick, as shown in the following figure:

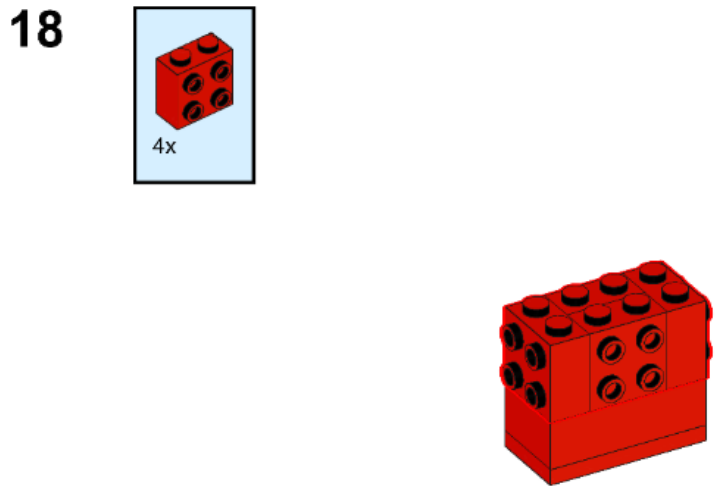


Figure 15.57

19. Take one 2x4 plate and connect this 2x4 plate to the 1x2x1 brick with knobs.

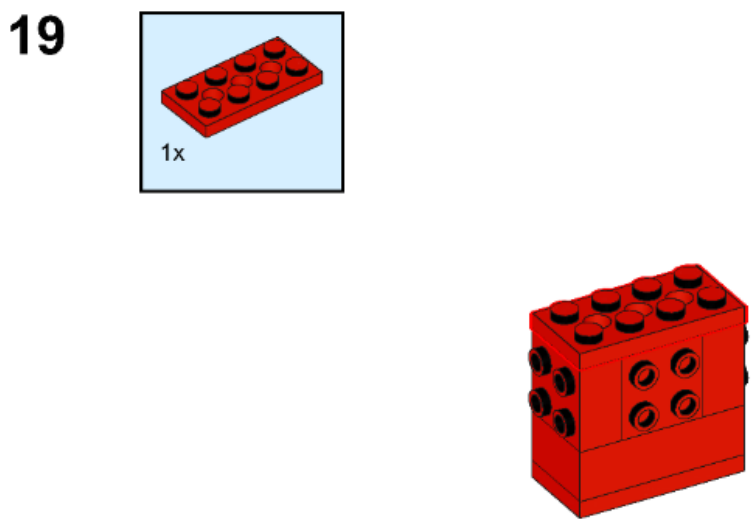


Figure 15.58

20. Now, connect the recently made part to the 1x2 angle plate.

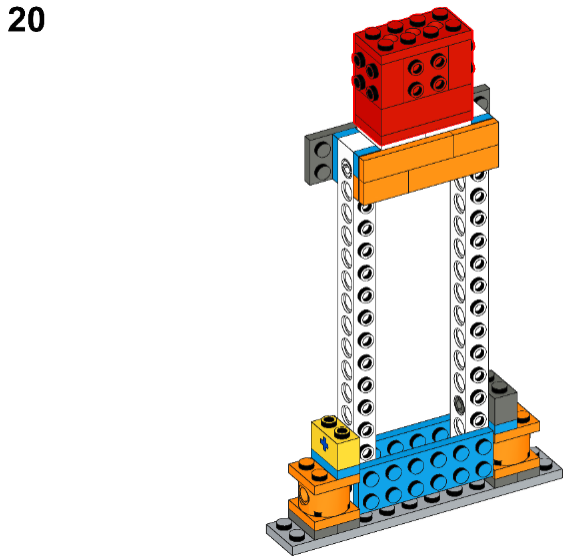
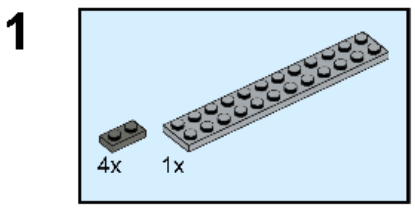


Figure 15.59

21. Now, let's build the second pole. Take four 1x2 plates and one 2x12 plate. Connect the 1x2 plates to the 2x12 plate, as shown here:



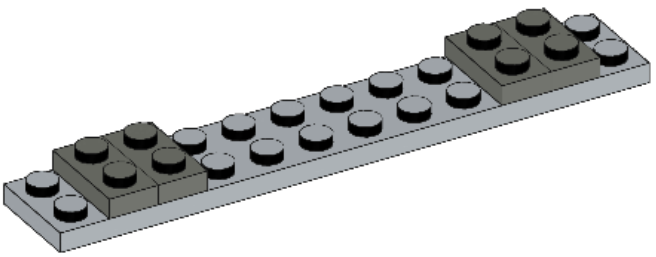


Figure 15.60

22. Now, take one 2x2 plate and one 2x2 round brick with a hole. Connect the 2x2 round brick to the 2x2 plate.

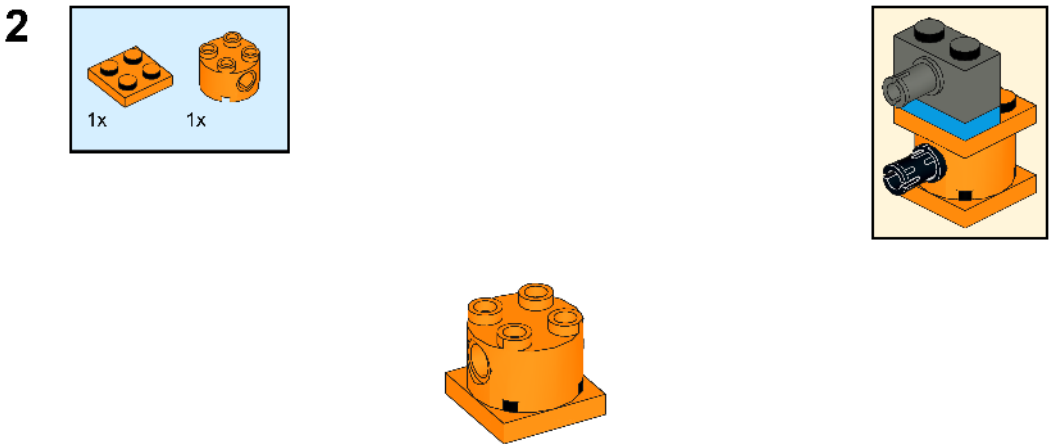


Figure 15.61

23. Take one 1x2 plate and one 2x2 plate and connect the 2x2 plate to the 2x2 round brick with a hole, and the 1x2 plate to the 2x2 plate.

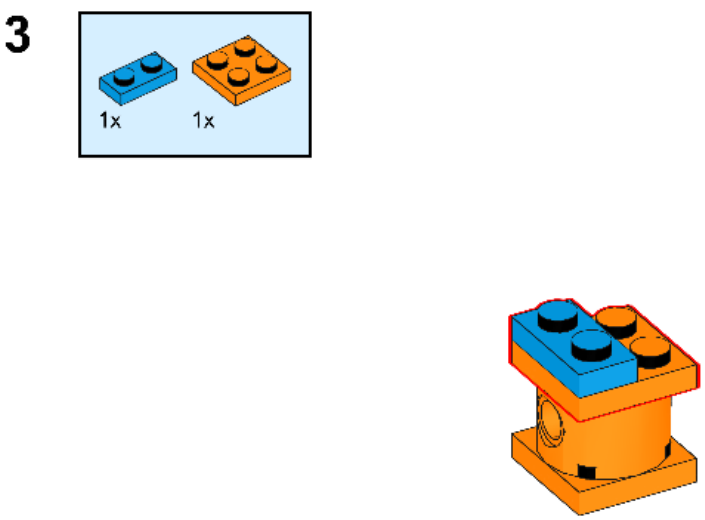


Figure 15.62

24. Now, take one connector peg and one 1x2 brick with a snap. Connect the connector peg to the 2x2 round brick with a hole and the 1x2 brick with a snap to the 1x2 plate.

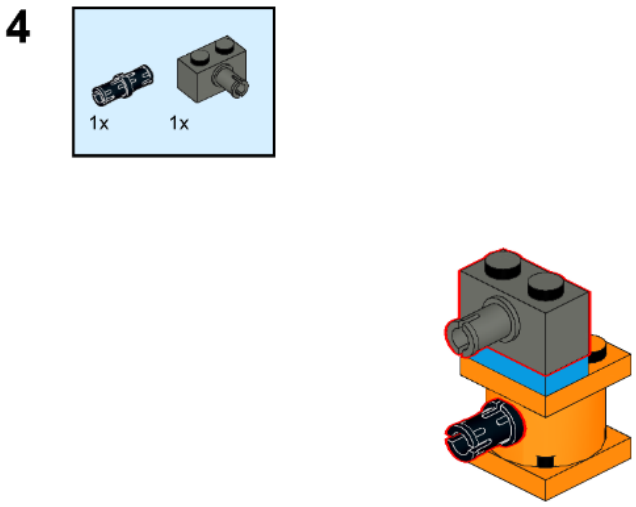


Figure 15.63

25. Now, connect the entire part to the two recently attached 1x2 plates, as shown in the following figure:

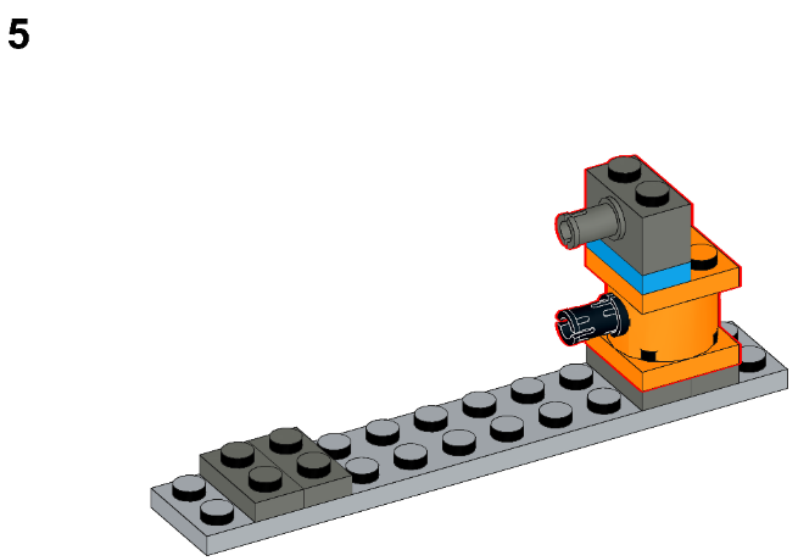


Figure 15.64

26. Now, take two connector pegs and one 1x16 Technic brick. Connect the 1x16 Technic brick to one connector peg and a 1x2 brick with a snap, and then connect the other connector peg to it, as shown in the following figure:

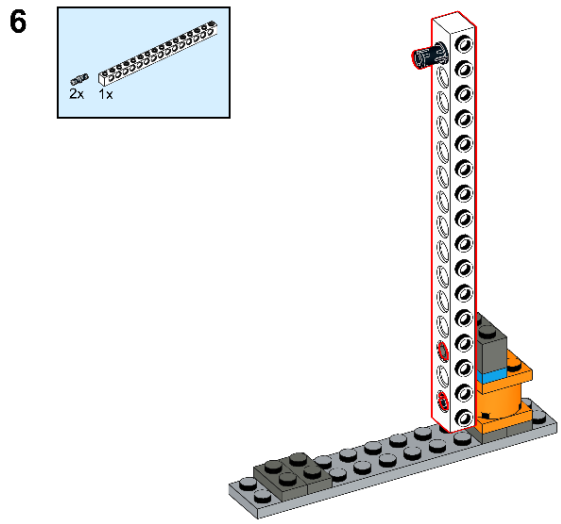


Figure 15.65

27. Now, take two connector pegs and one 2x2 brick with a snap. Connect the 2x2 brick to the Technic brick using one connector peg and then connect the new connector peg to the 2x2 brick.

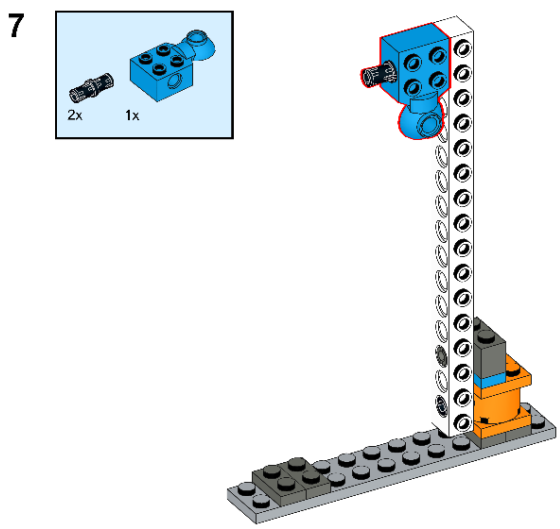


Figure 15.66

28. Now, take one connector peg and one 2x2 brick with a snap. Connect the 2x2 brick to the existing connector peg on the previously attached 2x2 brick, and then connect the new connector peg to it.

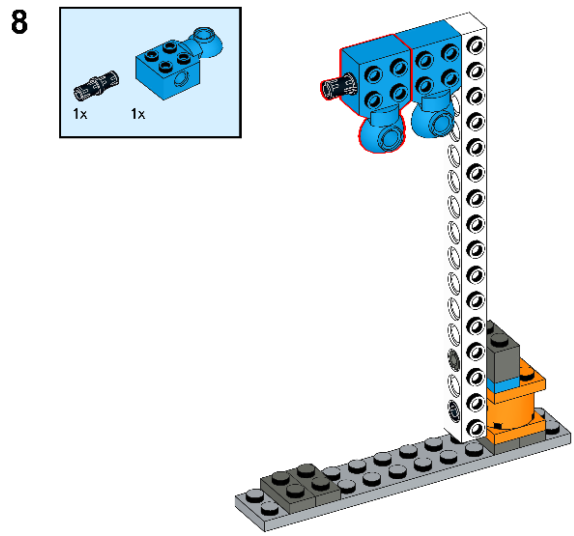


Figure 15.67

29. Now, take one 1x16 Technic brick and connect it to the recently attached connector peg.

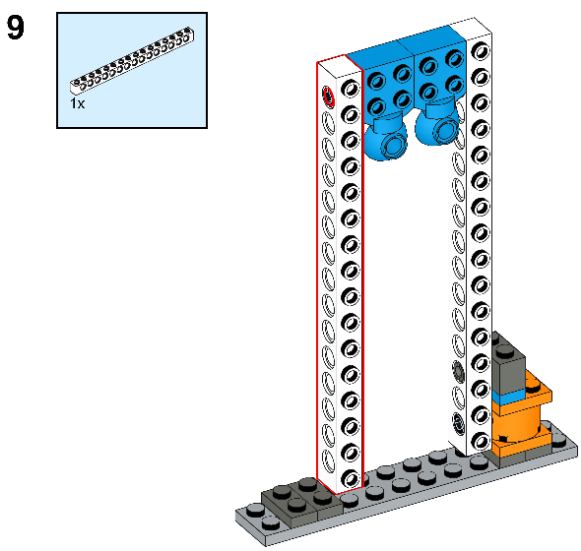


Figure 15.68

30. Now, take one 2x2 plate and one 2x2 round brick with a hole. Connect the 2x2 round brick to the 2x2 plate.

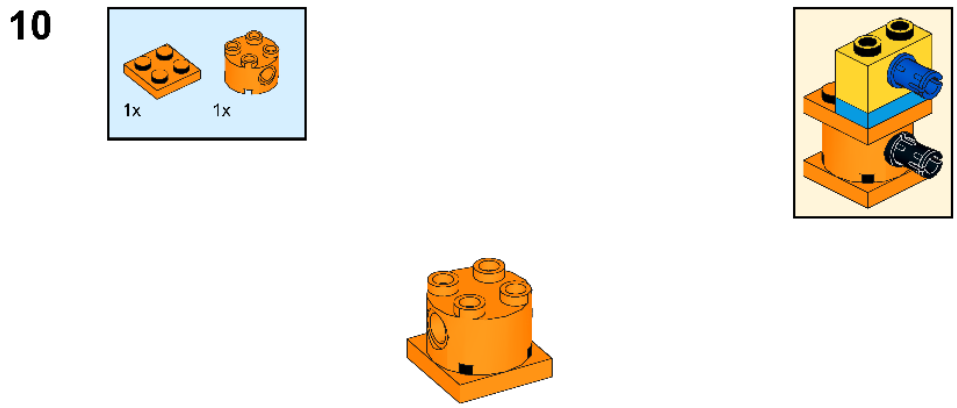


Figure 15.69

31. Take one 1x2 plate, one 2x2 plate, and one 1x2 brick with a cross hole. Connect the 2x2 plate to the 2x2 round brick with a hole, the 1x2 plate to the 2x2 plate, and then the 1x2 brick to the 1x2 plate.

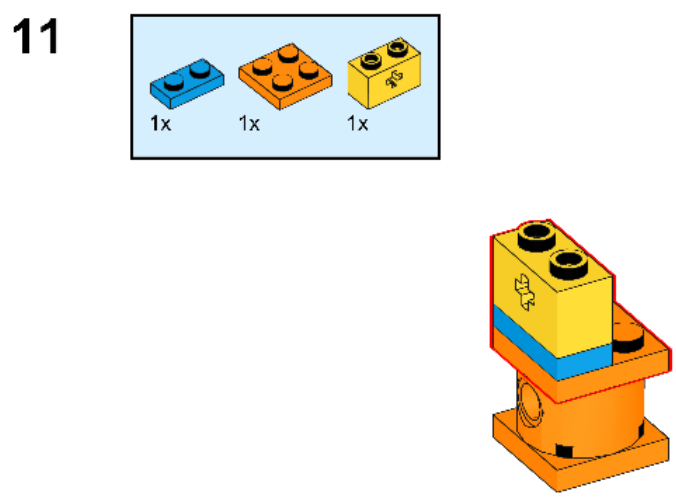


Figure 15.70

32. Now, take one connector peg and one connector with a bush/cross axle. Connect one connector peg to the 2x2 round brick with a hole, and the 1x2 connector with a bush/cross axle to the 1x2 brick with a cross hole.

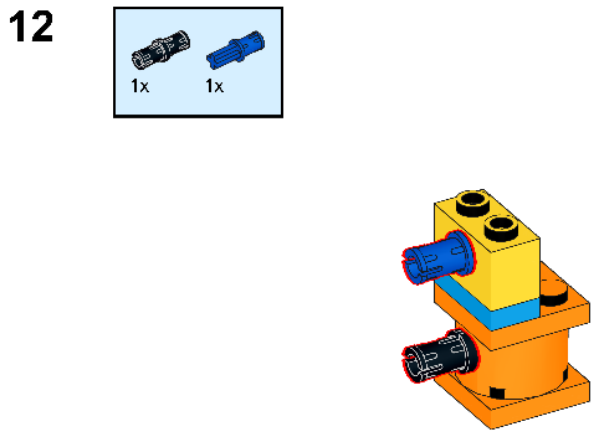


Figure 15.71

33. Now, connect the entire part to the two recently attached 1x2 plates, as shown in the following figure:

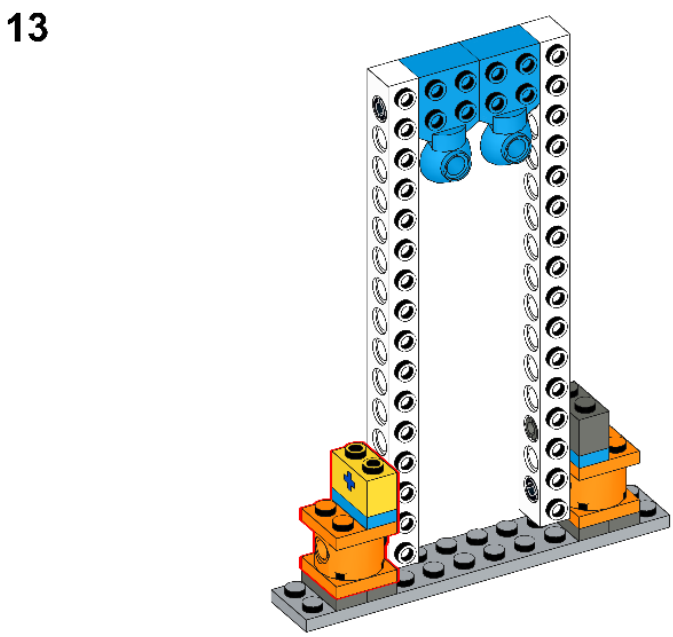


Figure 15.72

34. Now, take two 1x1 plates and two 2x2 angle plates. Connect a 1x1 plate to the 1x16 Technic brick, and a 2x2 angle plate to the 2x2 Technic brick with a snap, as shown in the following figure:

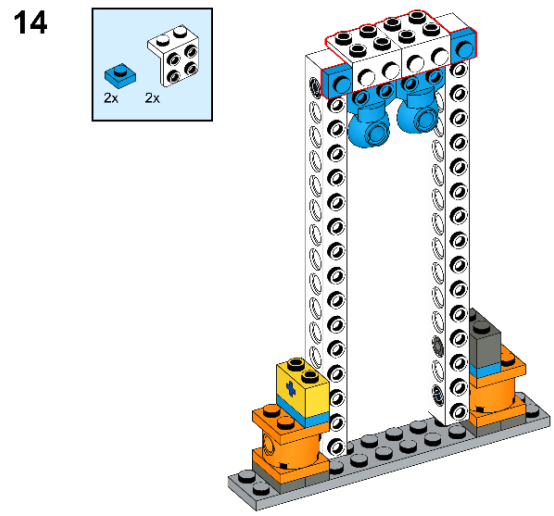


Figure 15.73

35. Now, take one 1x6 plate and one 2x6 plate. Connect the 1x6 plate to the 1x16 Technic brick, and the 2x6 plate to the bottom side of the Technic brick.

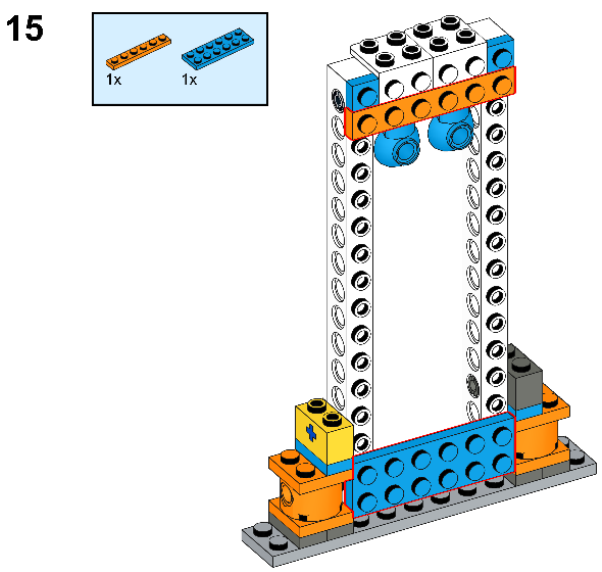


Figure 15.74

36. Now, take two 1x2 flat tiles and two 1x4 flat tiles. Connect these to the Technic brick as shown in the following figure.

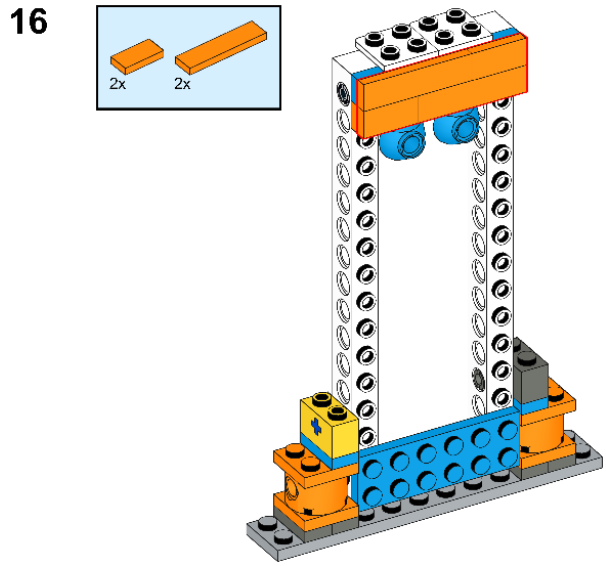


Figure 15.75

37. Take two 1x4 plates and one 2x4 plate. Connect the 1x4 plate to the rear of the Technic brick, and the 2x4 plate to the rear of the 2x2 brick with a snap.

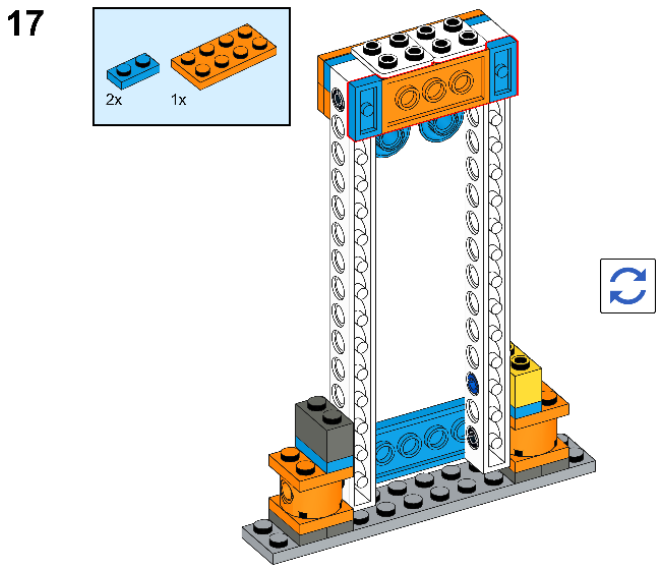


Figure 15.76

38. Take one 2x6 plate and one 2x8 plate. Connect the 2x8 plate to the rear of the Technic brick, and the 2x6 plate to the bottom side of the 1x16 Technic brick.

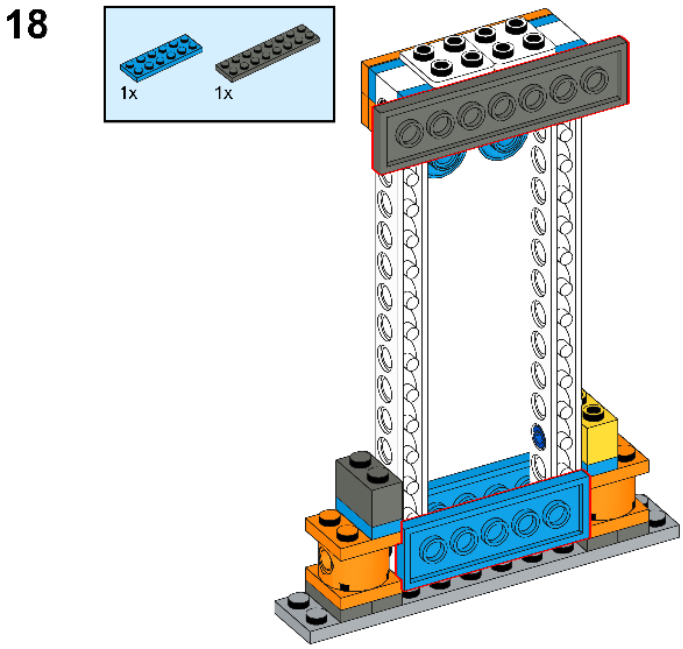


Figure 15.77

39. Take four 1x2 bricks and connect them as shown in the following figure (the figure on the right-hand side represents the sub-model we'll be building):

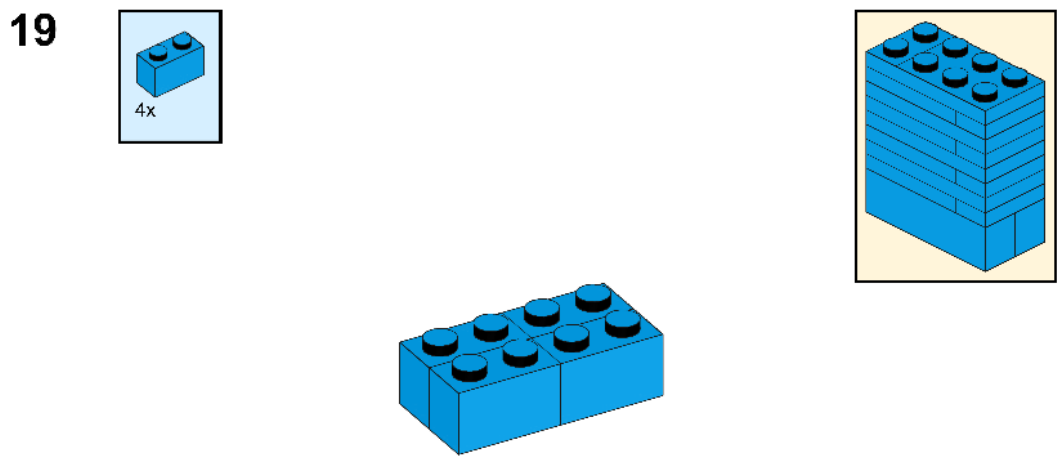


Figure 15.78

40. Now, take one 1x2 plate and one 1x3 plate. Connect both plates to the four 1x2 bricks as shown in the following figure:

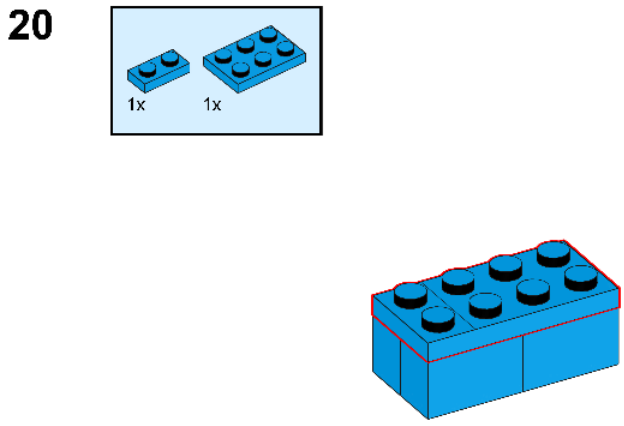


Figure 15.79

41. Now, again take one 1x2 plate and one 1x3 plate and connect them to the recently attached 1x2 plate and 1x3 plate, as shown:

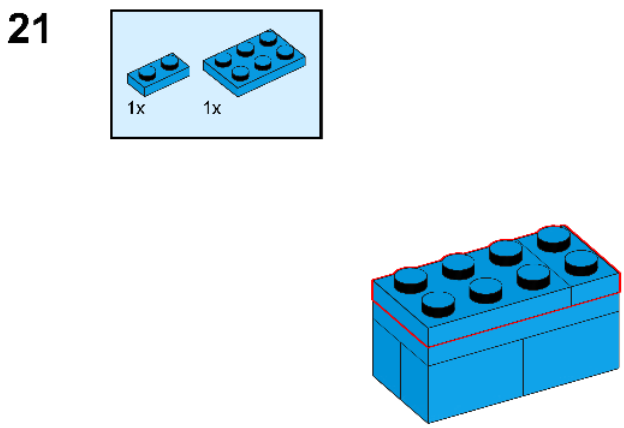


Figure 15.80

42. Now, take six 1x2 plates and six 1x3 plates and connect them to the 1x2 plate and 1x3 plate as shown in the following figure:

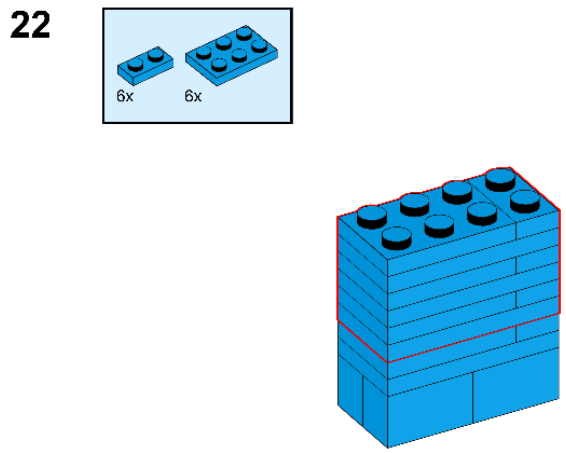


Figure 15.81

43. Now, connect the entire part to the recently connected 1x2 angle plate as shown in the following figure:

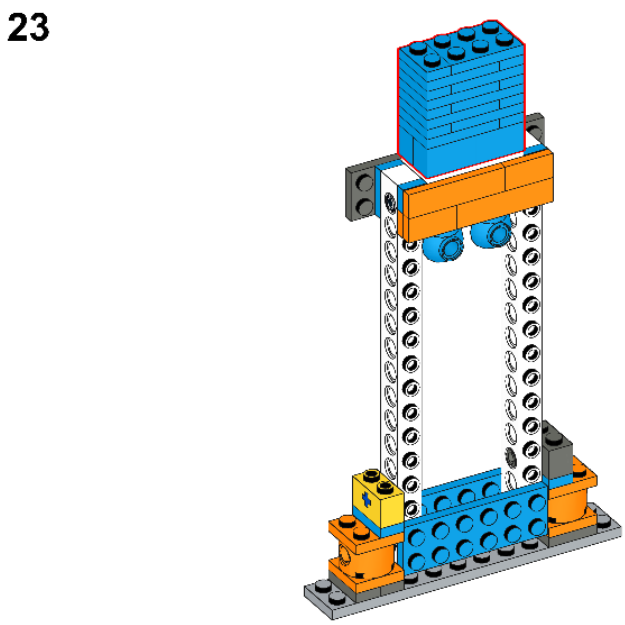


Figure 15.82

Let's now move on to the coding section and learn about sensor-based programming.