

# The MazeRunner

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This robot is constructed for solving the maze. It is very compact, which allows it to turn in tight spaces. It comes equipped with two light sensors for detecting guide lines on the floor and an ultrasonic sensor placed on a rotating axle - so that the robot can check for walls ahead, to the left, and to the right.

It is best used in a maze where the width of passages is at least 12 inches, and height of walls is at least 4 inches.

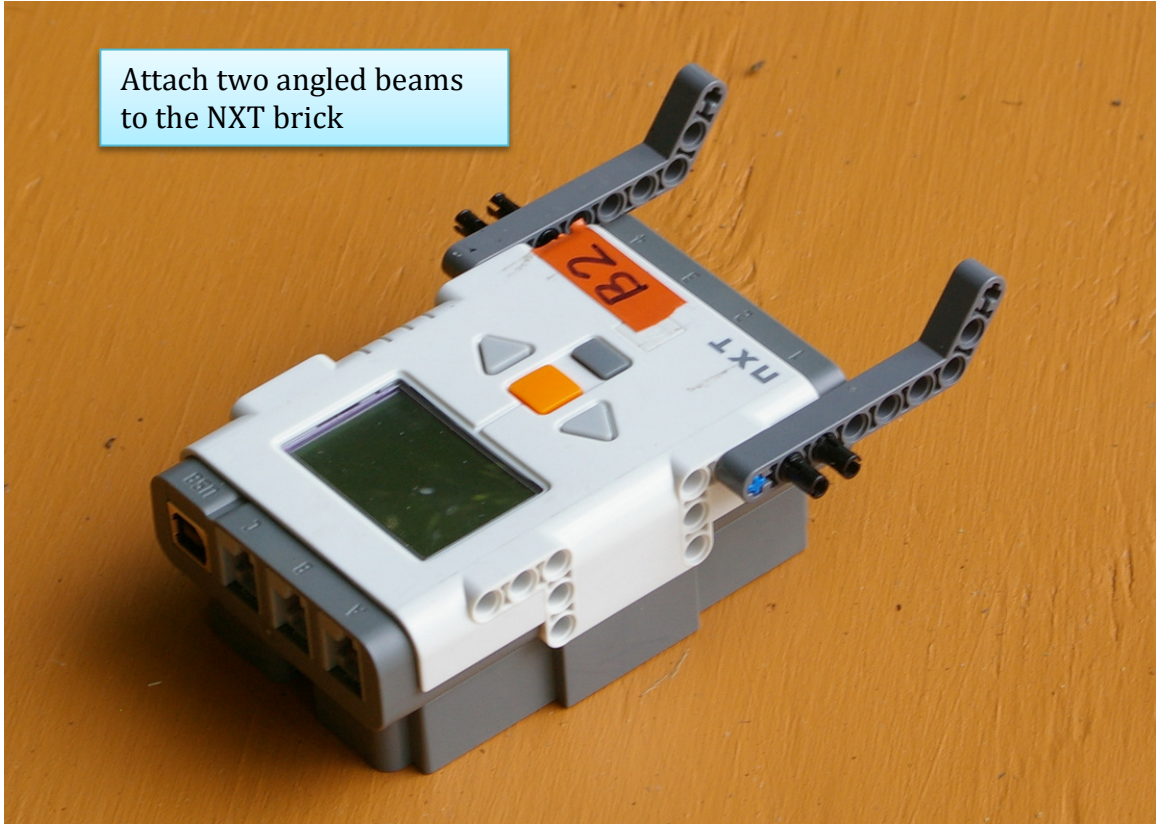
It uses only the pieces included in NXT 1.0 set, with the following additions:

- It uses two light sensors instead of one
- Step 9 uses two small round pieces for front support. They are quite common and can be easily bought online for pennies, or you could improvise and replace with something else - as long as the friction with the floor is small.

If you are using NXT 2.0 set, you can easily replace light sensors by color sensors, but you will need to make adjustments since the wheels of 2.0 set have a different radius than the wheels of NXT 1.0

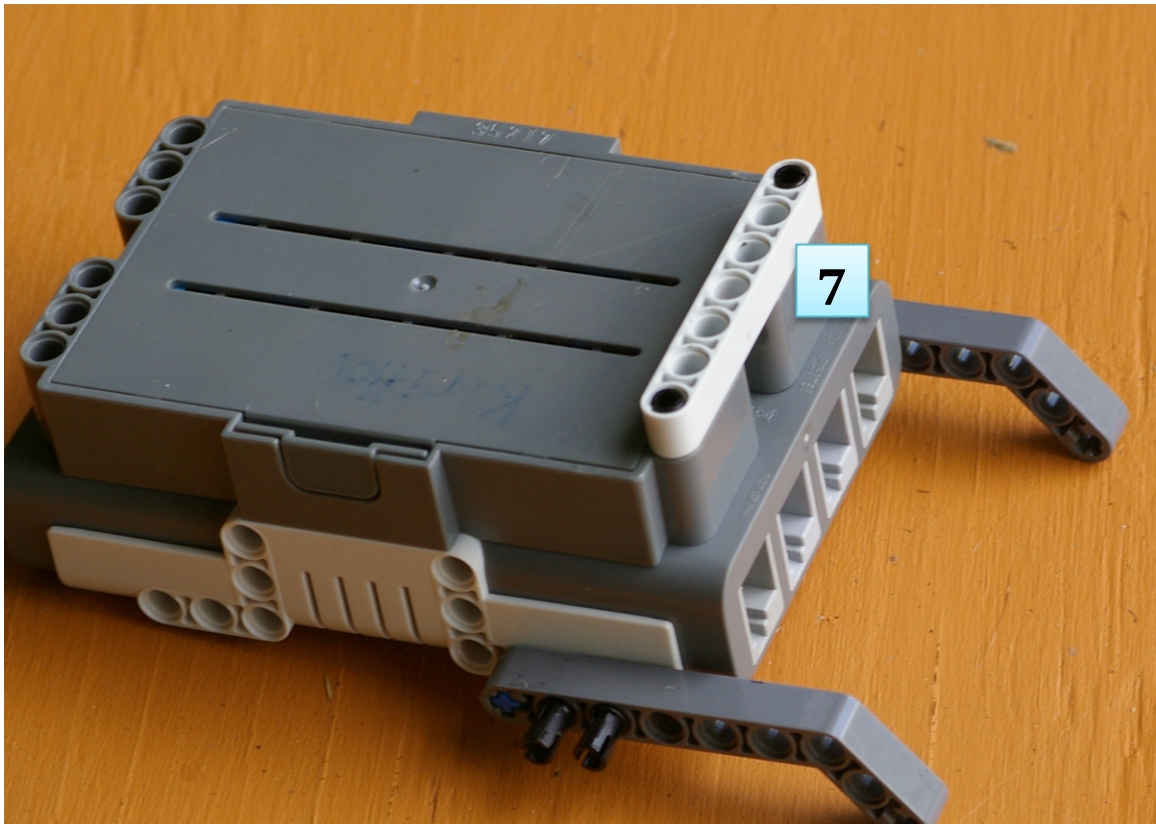
1

Attach two angled beams  
to the NXT brick



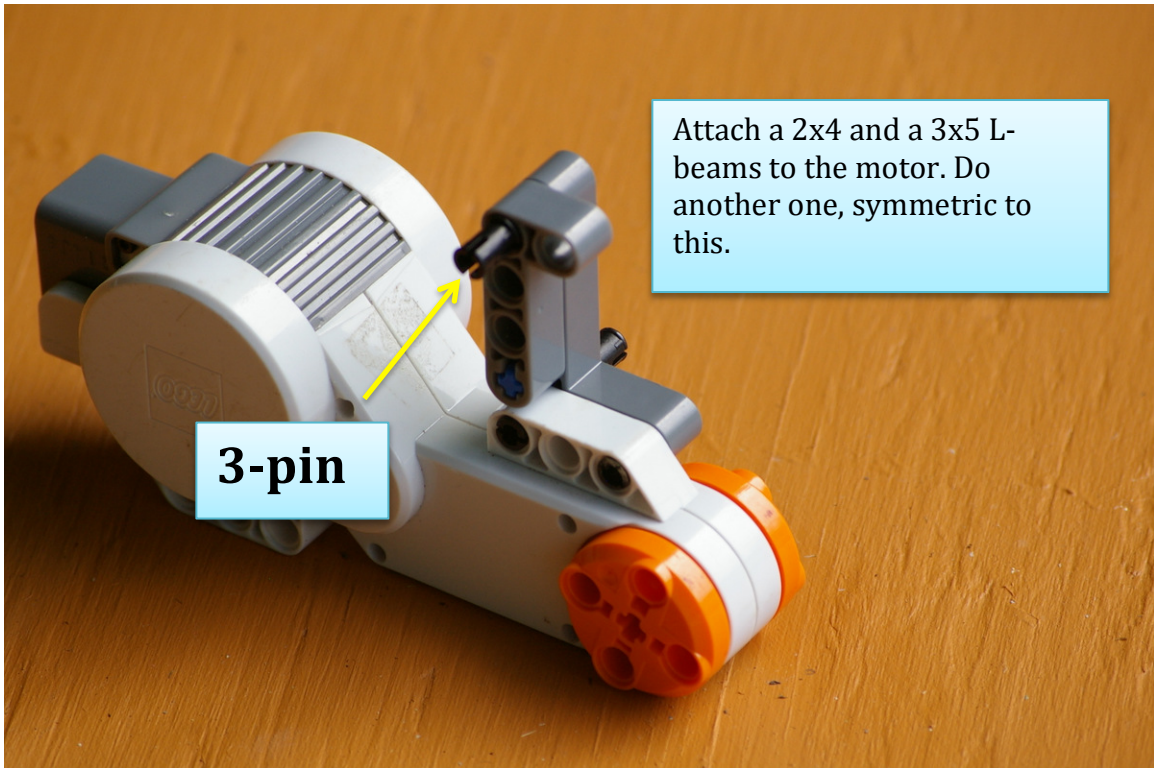
2

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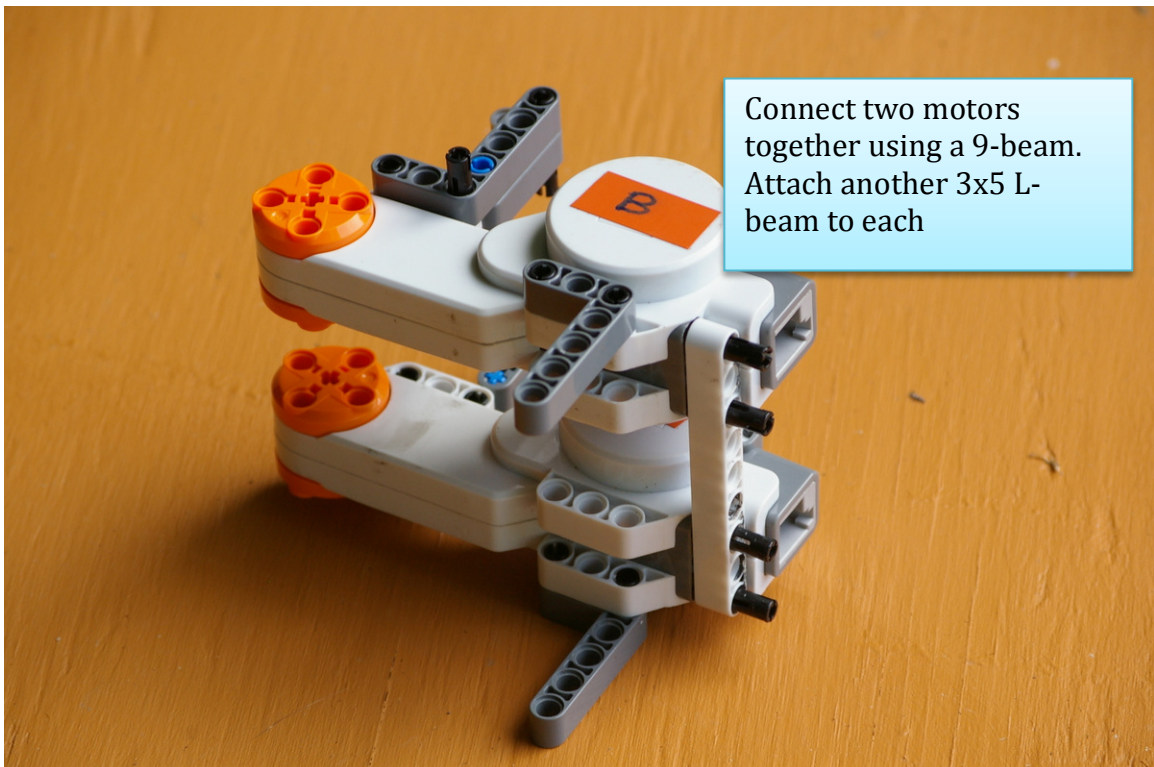




3



4





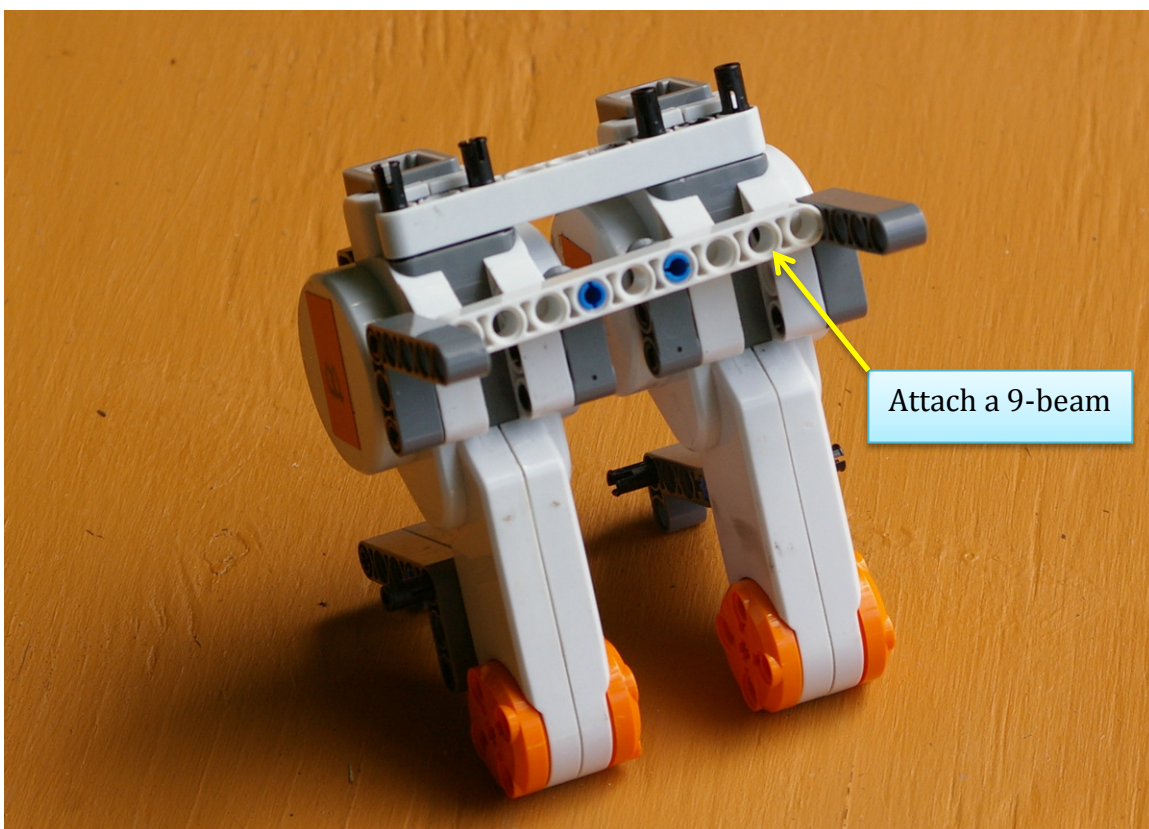
5

Attach a connector to each motor



6

Attach a 9-beam





7

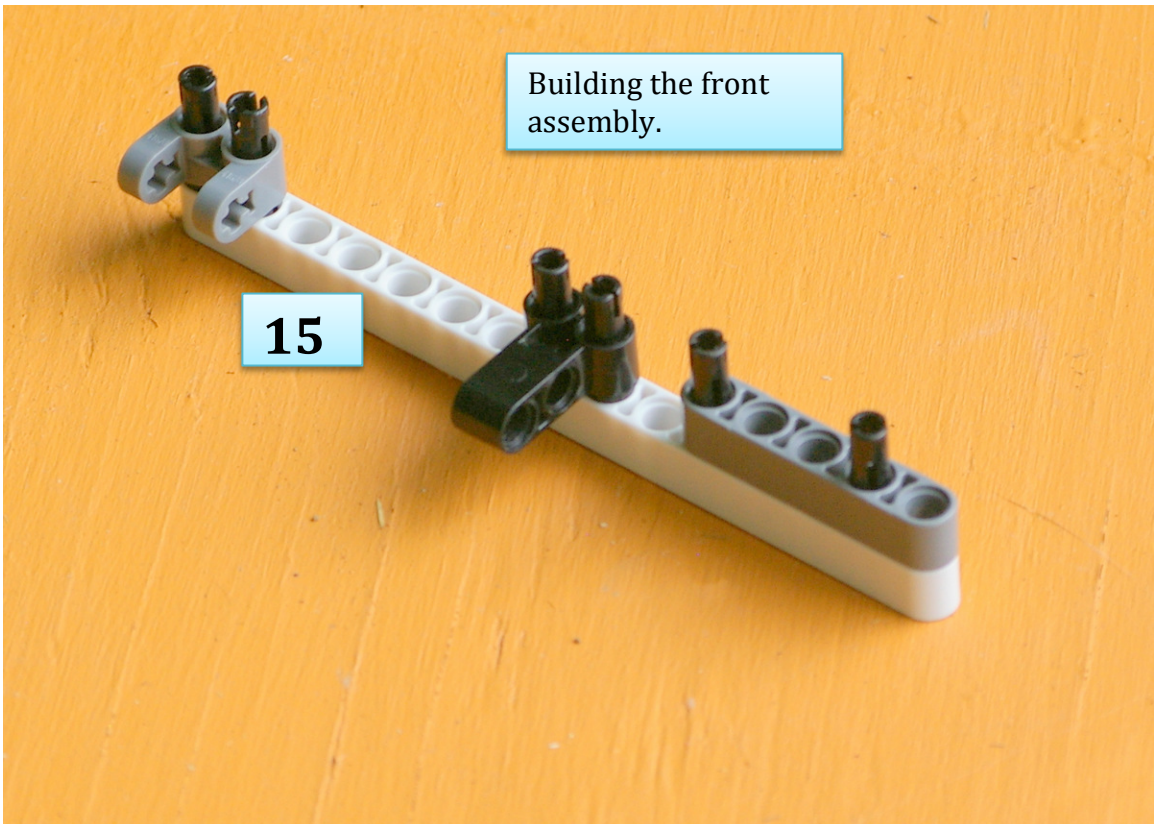
Attach the NXT brick to motor assembly. It is still wobbly at this point - this is OK.



8

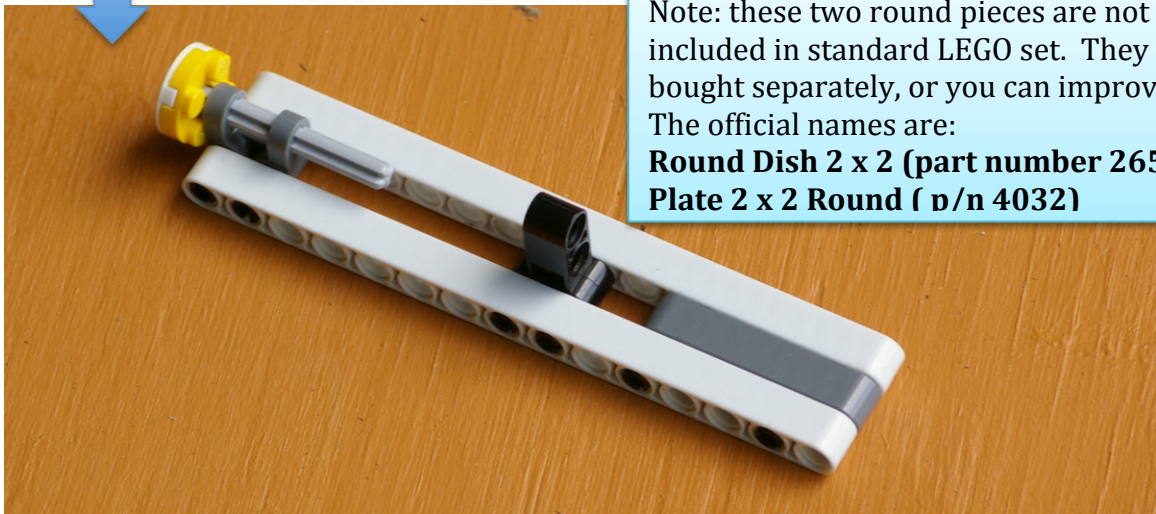
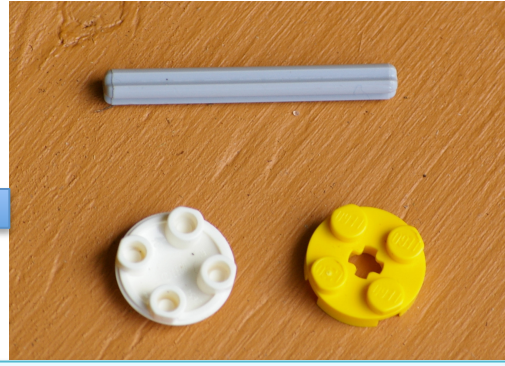
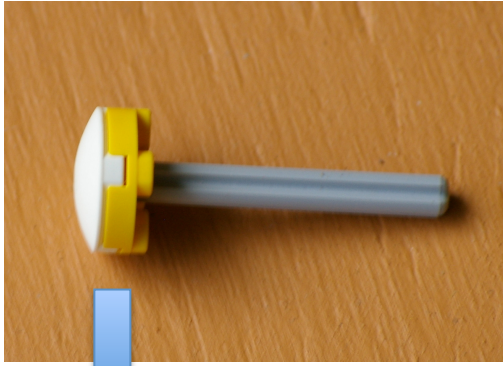
Building the front assembly.

15





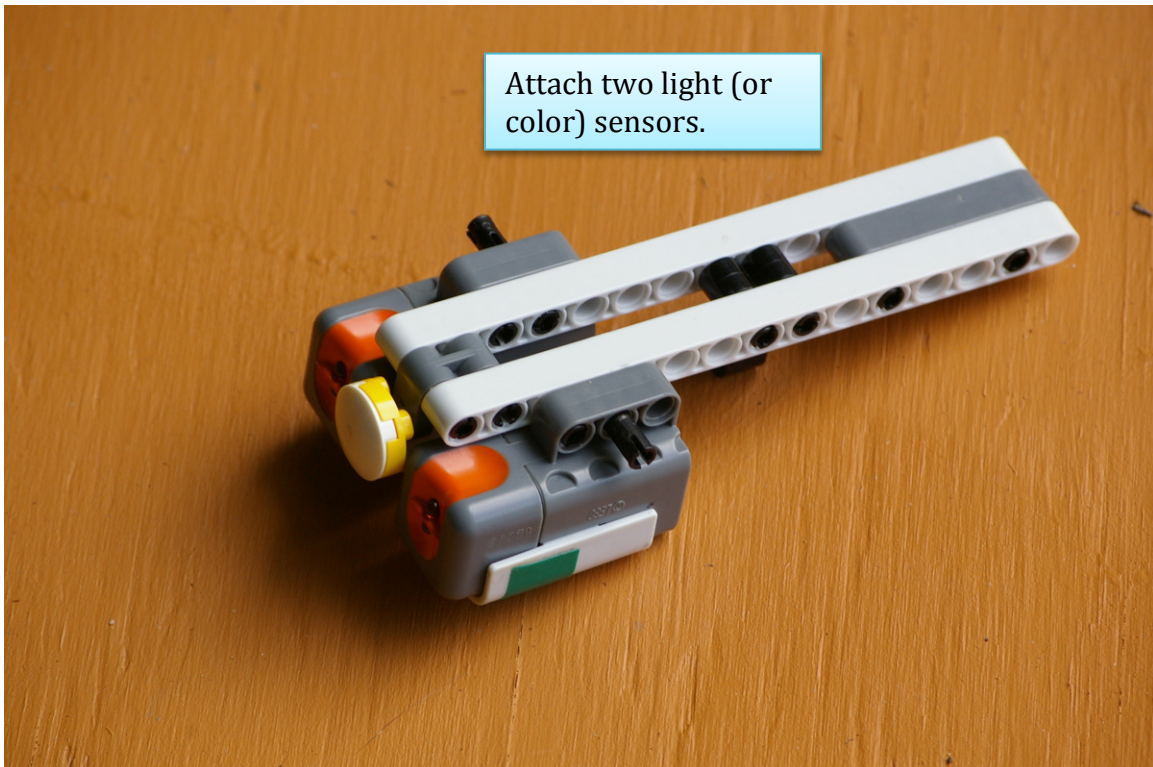
9



Note: these two round pieces are not included in standard LEGO set. They can be bought separately, or you can improvise. The official names are:  
**Round Dish 2 x 2 (part number 2654)**  
**Plate 2 x 2 Round (p/n 4032)**

10

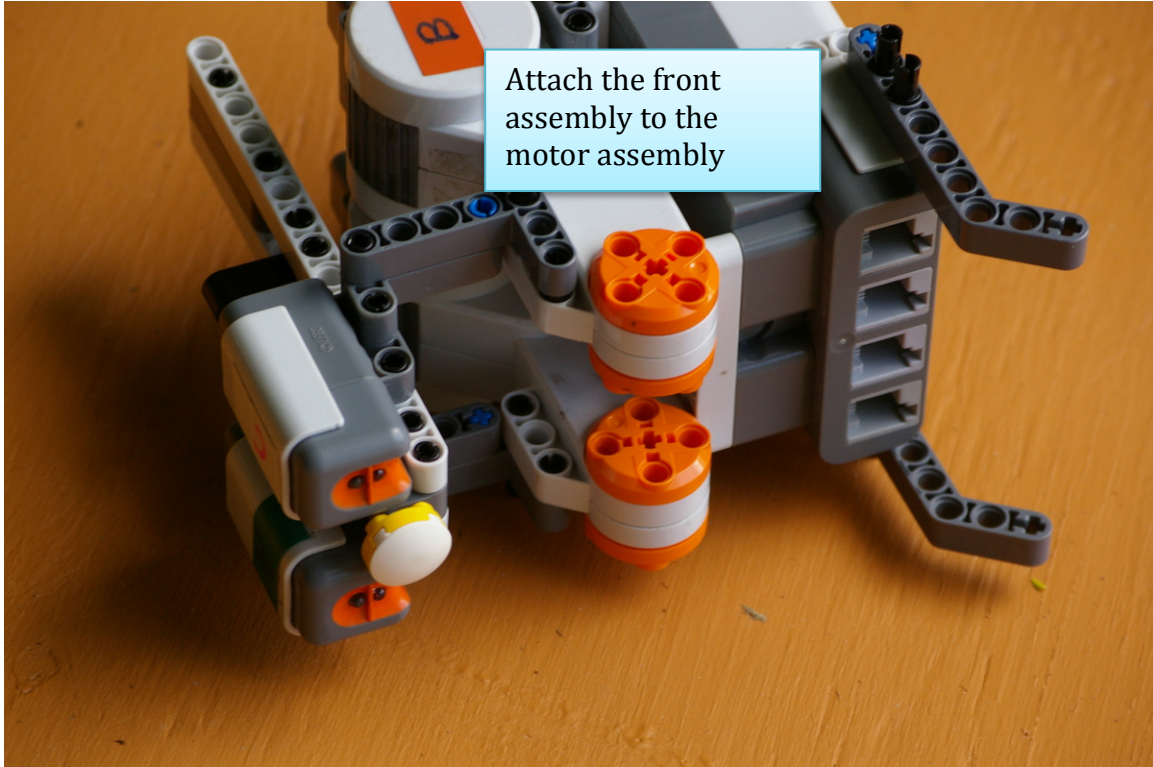
Attach two light (or color) sensors.





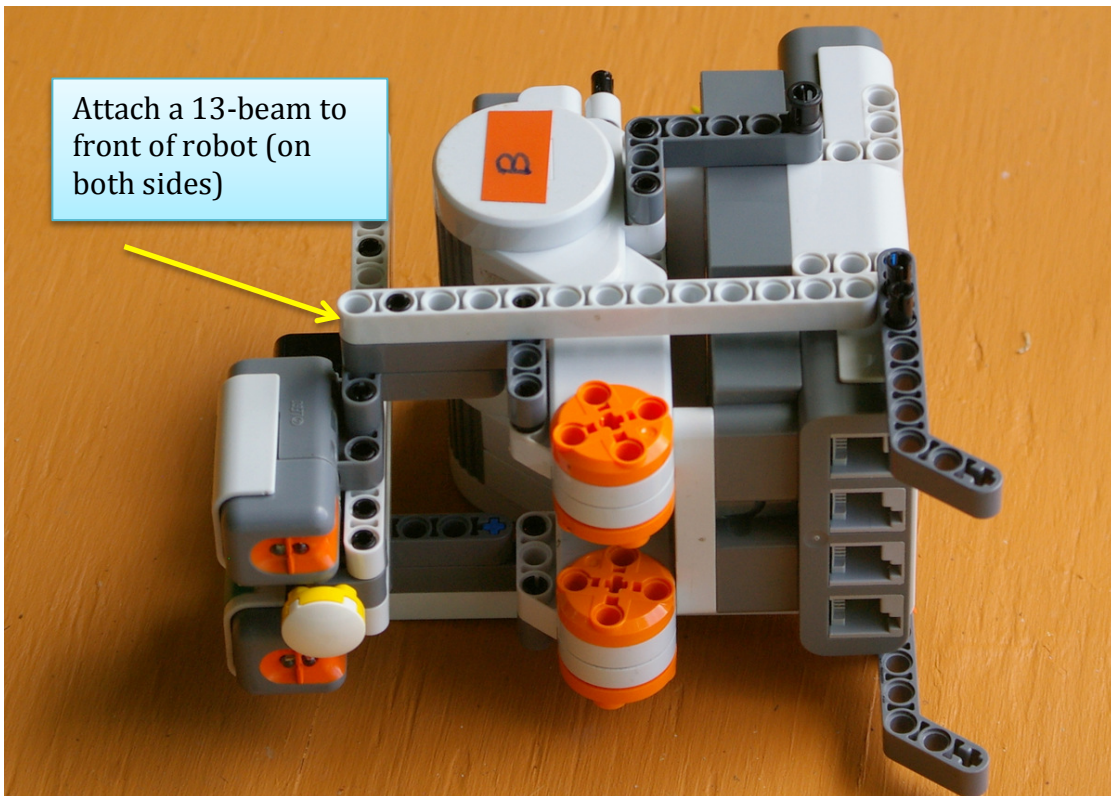
11

Attach the front assembly to the motor assembly



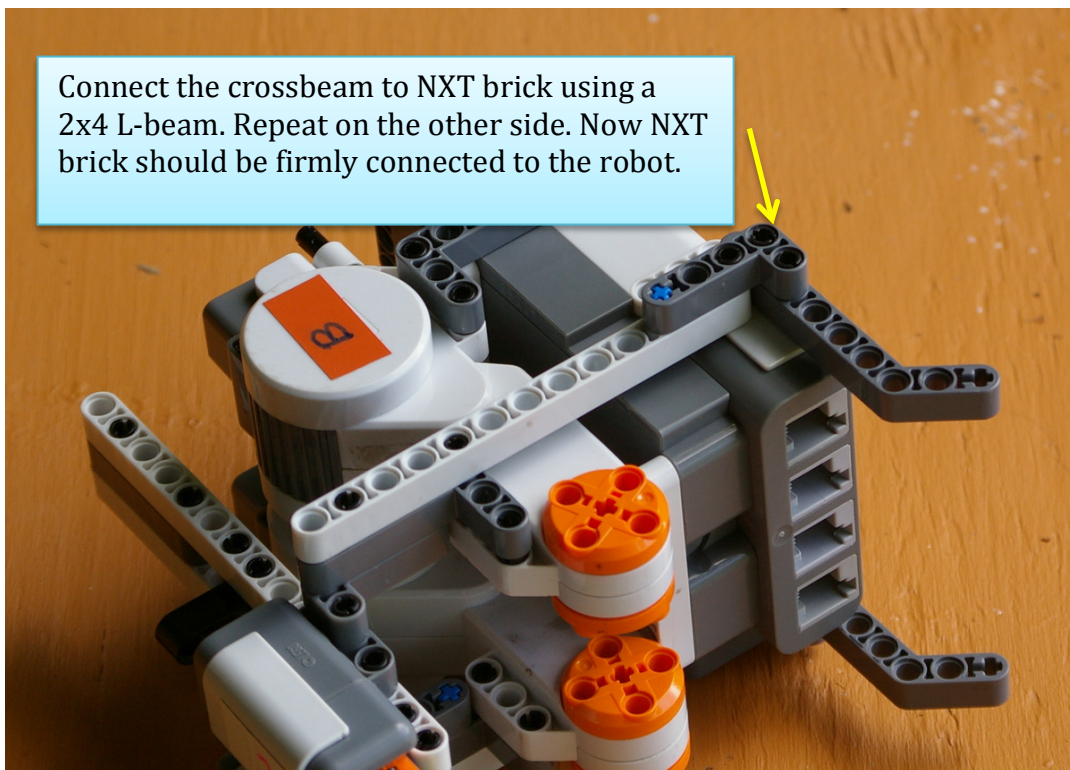
12

Attach a 13-beam to front of robot (on both sides)



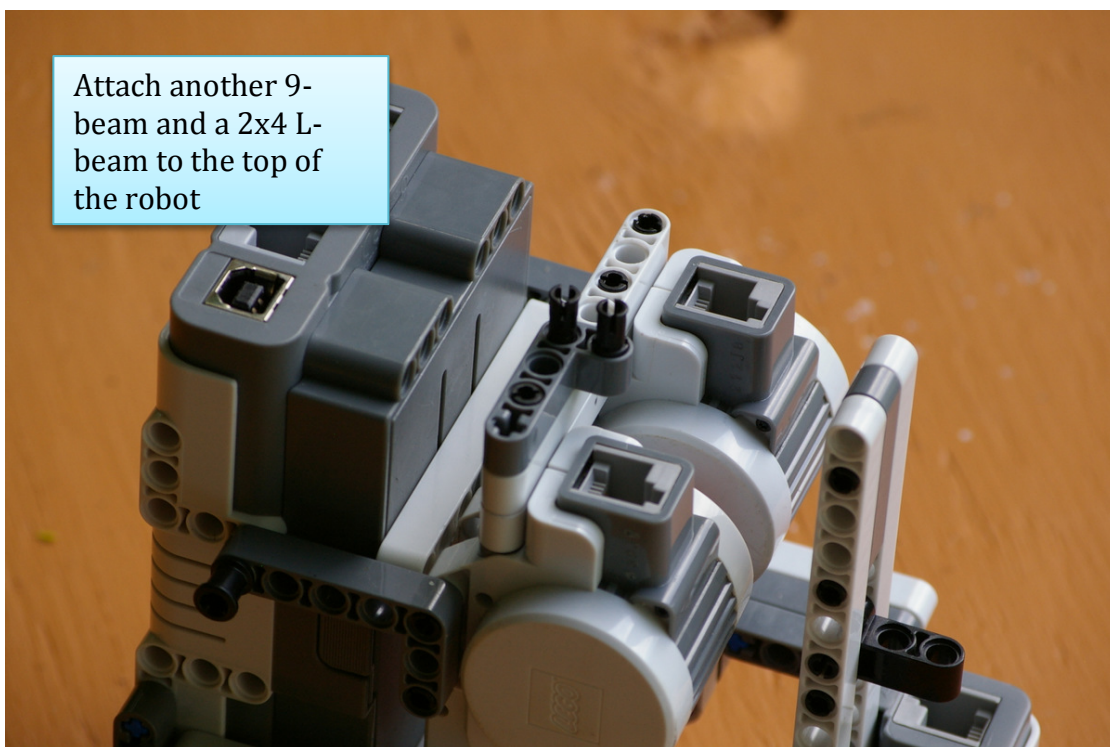
13

Connect the crossbeam to NXT brick using a 2x4 L-beam. Repeat on the other side. Now NXT brick should be firmly connected to the robot.



14

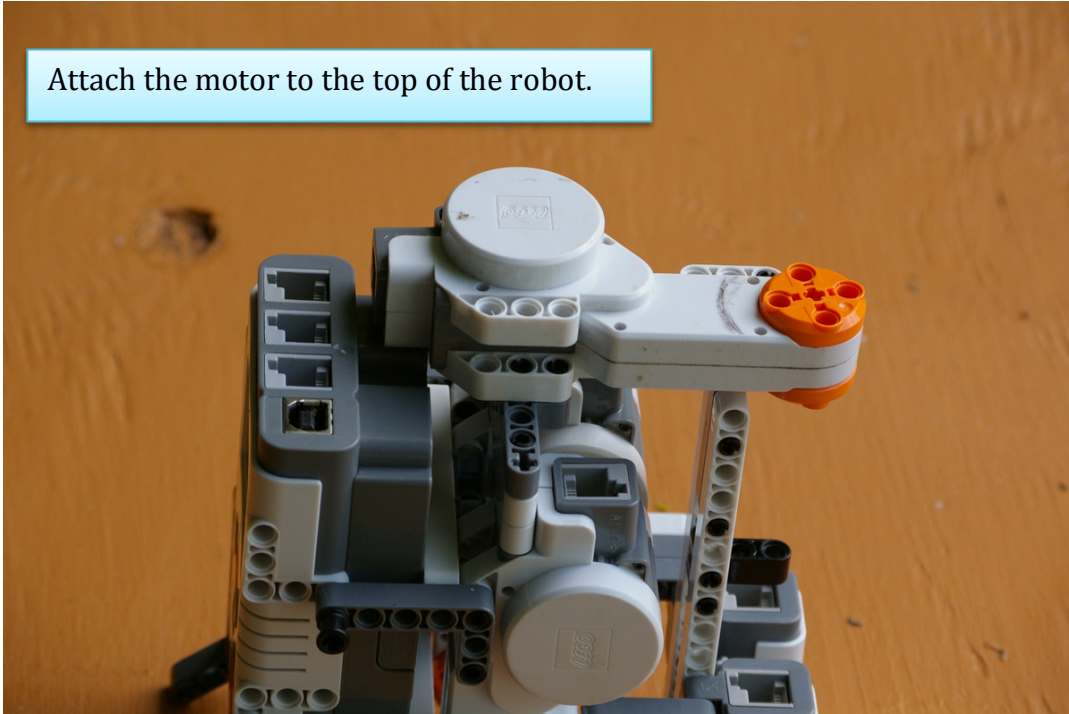
Attach another 9-beam and a 2x4 L-beam to the top of the robot





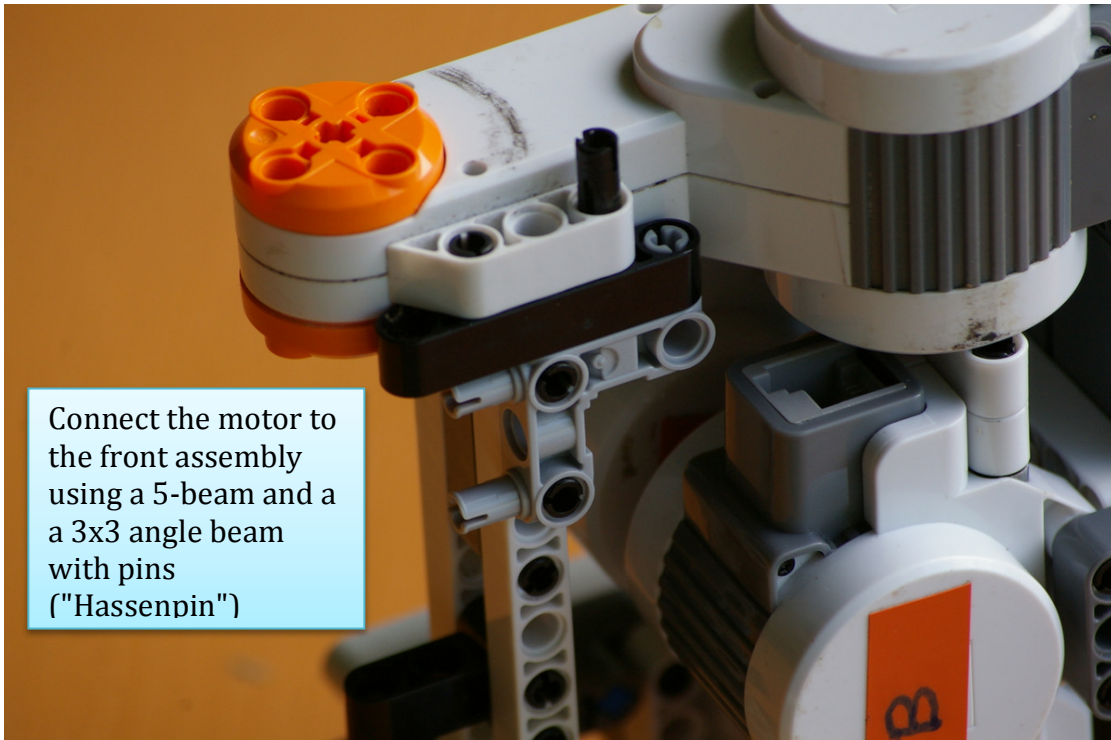
15

Attach the motor to the top of the robot.



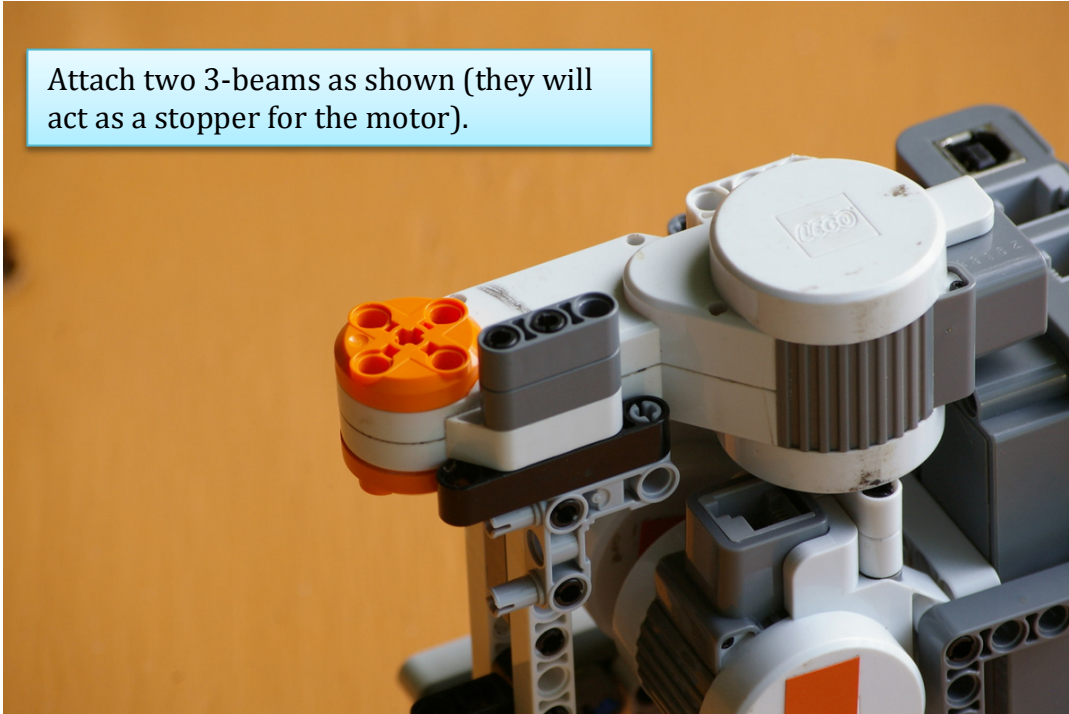
16

Connect the motor to the front assembly using a 5-beam and a 3x3 angle beam with pins ("Hassenpin")



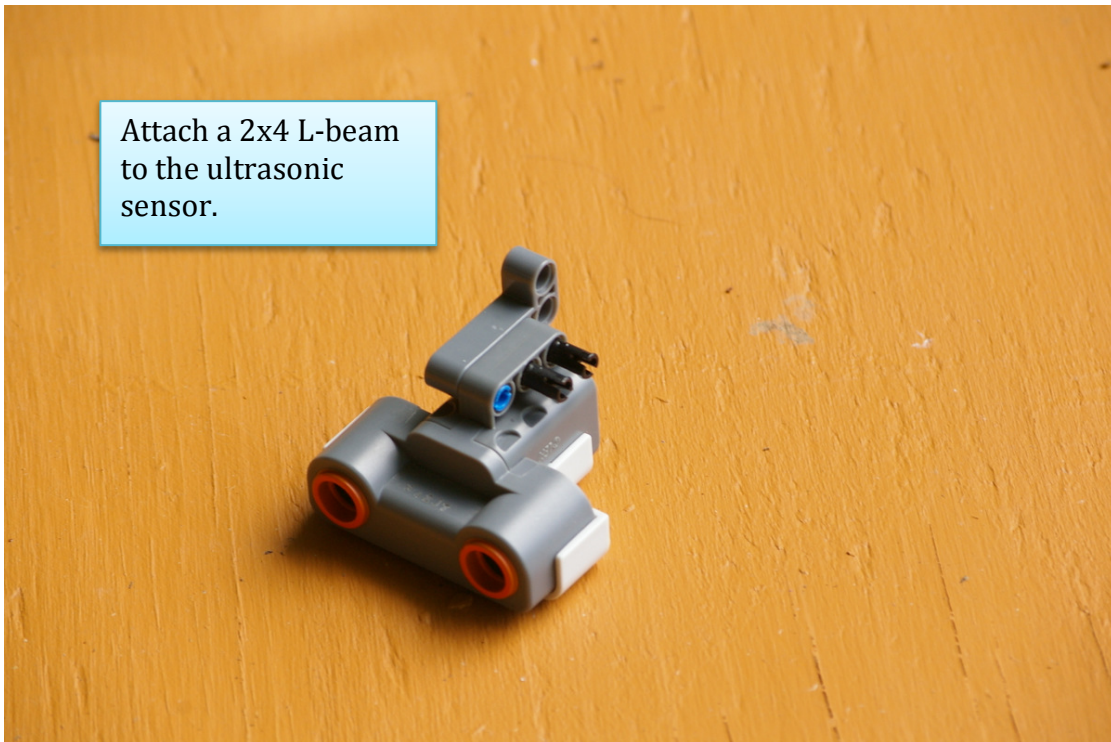
17

Attach two 3-beams as shown (they will act as a stopper for the motor).



18

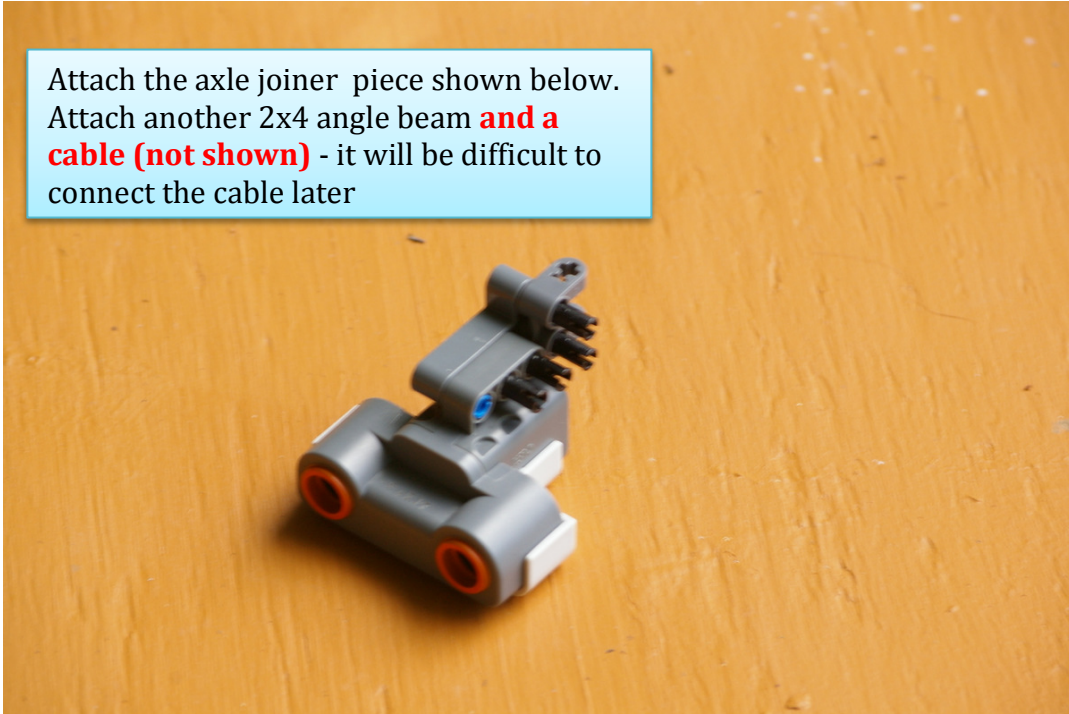
Attach a 2x4 L-beam to the ultrasonic sensor.





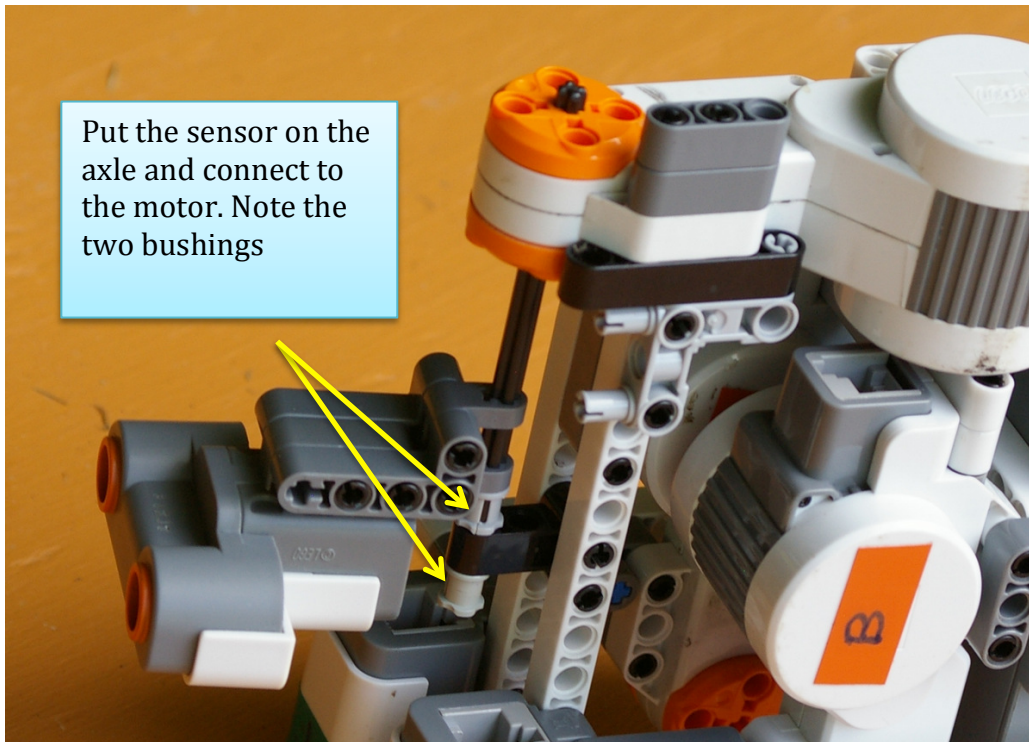
19

Attach the axle joiner piece shown below. Attach another 2x4 angle beam **and a cable (not shown)** - it will be difficult to connect the cable later

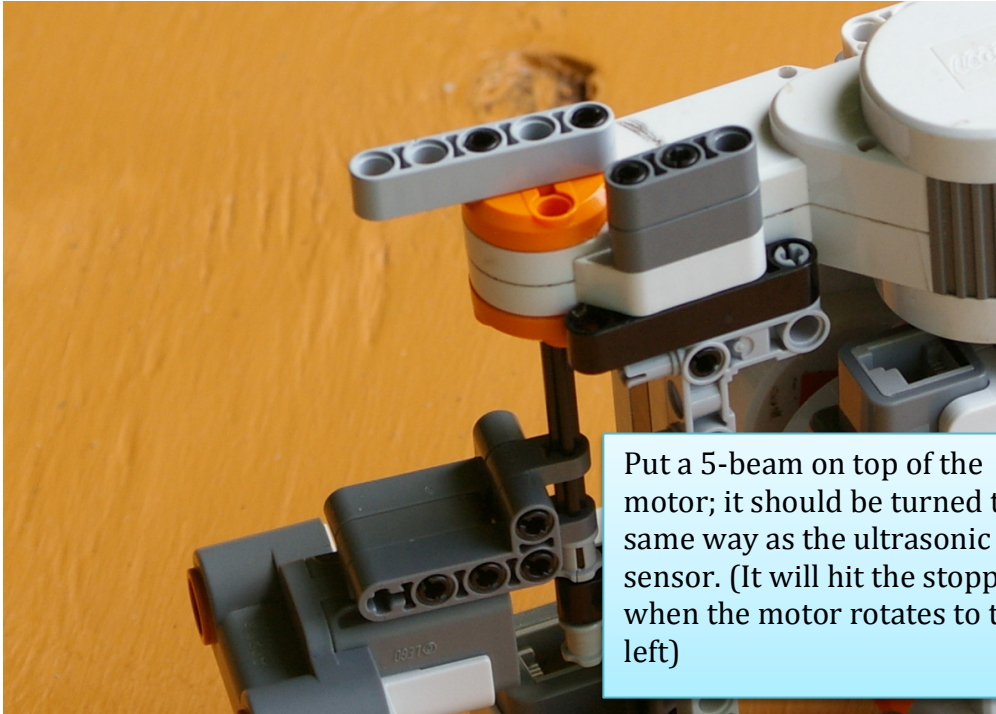


20

Put the sensor on the axle and connect to the motor. Note the two bushings



21



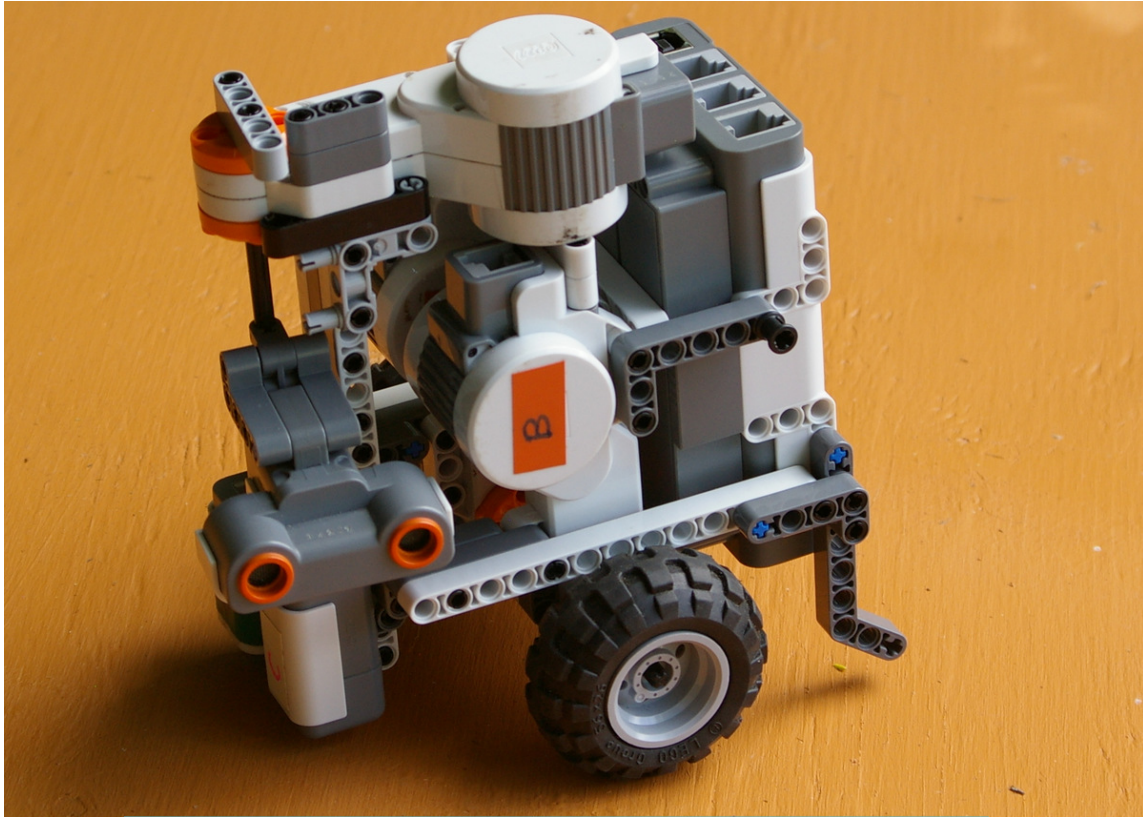
Put a 5-beam on top of the motor; it should be turned the same way as the ultrasonic sensor. (It will hit the stopper when the motor rotates to the left)

22



Attach the wheels. Put a full bushing and half-bushing between the wheel and the motor





The robot is complete. Attach the cables as follows:  
left and right drive motors - ports B and C  
Ultrasonic sensor motor - port A  
Left and right light (or color) sensors - ports 1 and 2  
Ultrasonic sensor - port4

If everything was done correctly, the robot should be almost perfectly balanced: almost all the weight is on the wheels, and very little on the front support.

Note that the wheels of NXT 2.0 set are different diameter, so you would need to make some changes to this design if using them.