

LEGO Mindstorms NXT: Balancing-Bot

Assembly

Concept 1: Assemble the Robot

Step 1-1: Motors – use the following photos to gather parts

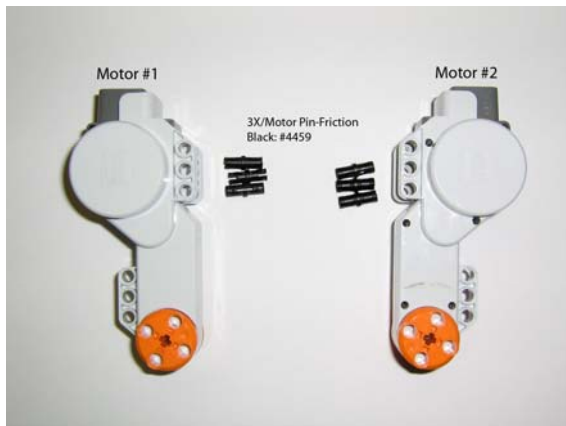


Figure 1A: 2 Motors & 3x/Motor Pin



Figure 1B: Attach Pins to Motor

Step 1-2: Motors & Base Assembly



Figure 2A: Motor mount components



Figure 2B: Attach Pins to Arms



Figure 2C: Attach Arms to Motors



Figure 2D: Attach Motors to NXT Brick



Figure 2E: Base Assembly from Step 2

Step 1-3: Wheels



Figure 3A: Wheel Components



Figure 3B: Attach Wheel to Axle



Figure 3C: Alternative View



Figure 3D: Make 2 wheels w/ opposite axle directions



Figure 3E: Attach Wheel/Axle to Motors

Step 1-4: Front Bracket

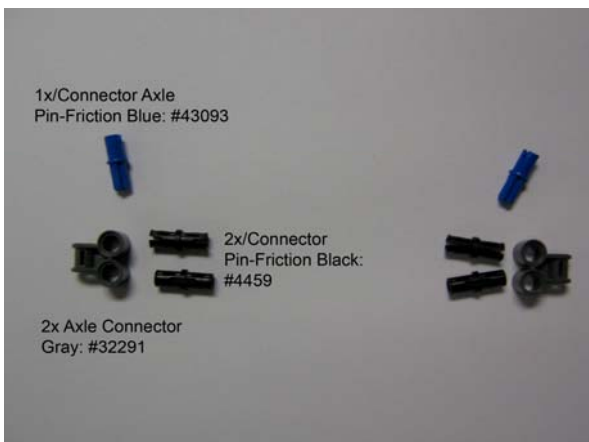


Figure 4A: Front bracket mount components



Figure 4B: Connect pins to axle connector



Figure 4C: Arm Components



Figure 4D: Connect pins to arms



Figure 4E: Connect 2 Arms from 4D using a liftarm



Figure 4F: Add another liftarm and connect with pins



Figure 4G: Connect pin and arm



Figure 4H: Assembled front bracket



Figure 4I: Add the side connector from part 4B to bracket



Figure 4J: Attach bracket to front of motor

Step 1-5: Rear Bracket



Figure 5A: Rear bracket components

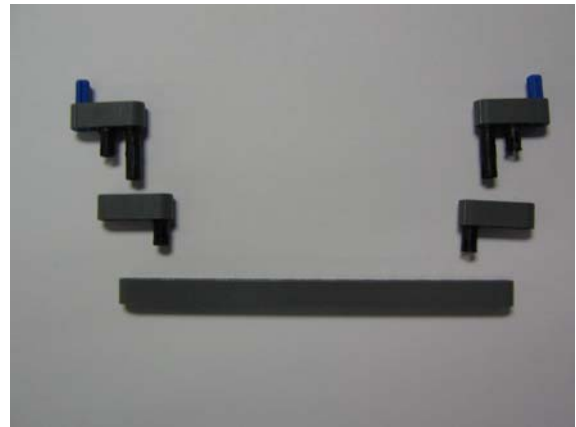


Figure 5B: Attach pins from 5A to respective arms



Figure 5C: Attach arm from 5A to 5B

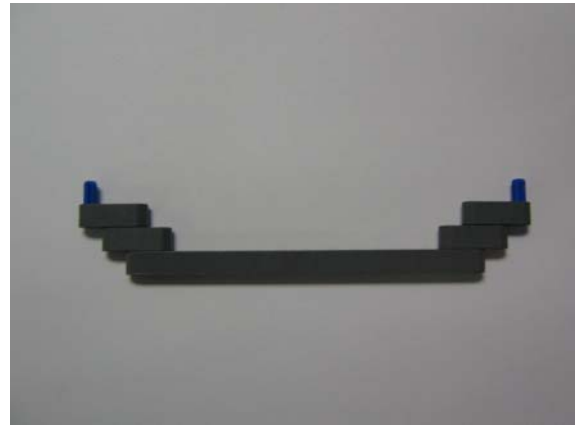


Figure 5D: Attach arms together



Figure 5E: Rear bracket mount components

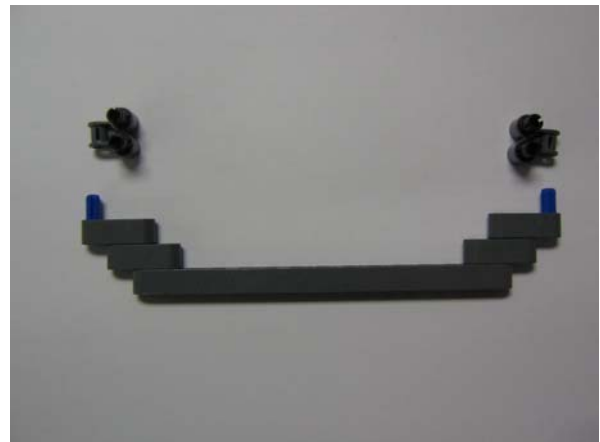


Figure 5F: Attach pins to axle connector



Figure 5H: Attach axle connector from 5F to rear of motors

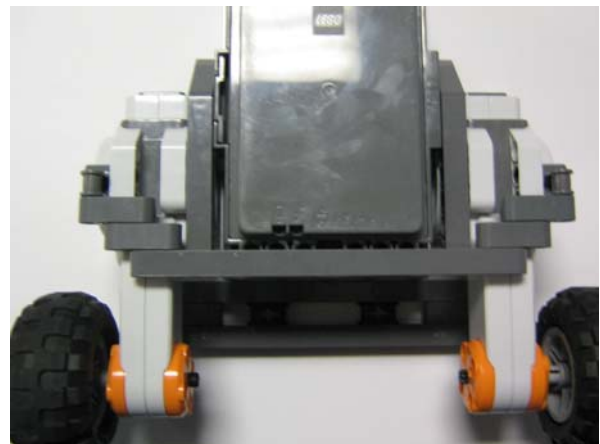


Figure 5I: Attach bracket to the connector

Step 1-6: Ultrasound Sensor/Mount



Figure 6A: Ultrasound sensor mounting bracket



Figure 6B: Attach pins to liftarm



Figure 6C: Ultrasound Sensor components



Figure 6D: Attach pin to end slot of sensor



Figure 6E: Attach arms to pin



Figure 6F: Mount components



Figure 6G: Attach pins to ends of arm



Figure 6H: Attach the axle joiners to the ends of the pins



Figure 6I: Place the part from 6H on to 6E.



Figure 6J: From the side insert the two axles to suspend the sensor into place



Figure 6K: Alternative view



Figure 6L: Attach mounting bracket from 6B to 6K



Figure 6M: Attach ultrasound mount to rear of NXT Brick

Step 1-7: Gyro Sensor



Figure 7A: Gyro mount components



Figure 7B: Attach pins to connector



Figure 7C: Attach connector to gyro



Figure 7D: Attach gyro to the left side of
NXT Brick

Step 1-8: Final Wiring



Figure 8A: Wire Left motor to Motor Port B &
Right motor to Motor Port C



Figure 8B: Wire Gyro to Sensor Port 2



Figure 8D: Final Wiring

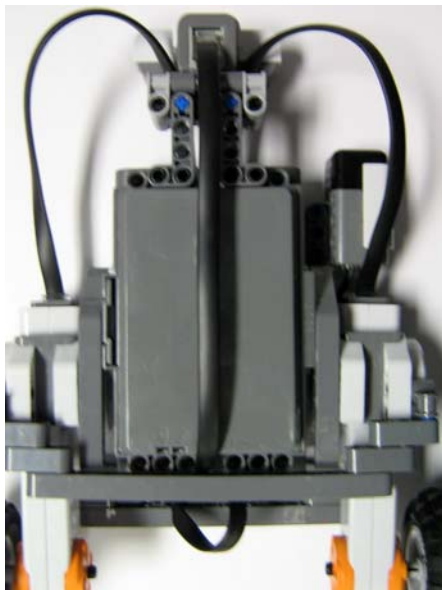


Figure 8C: Wire Ultrasound to Sensor Port 3



Figure 8E: Completed Balancing-Bot

This concludes the instruction. Some of these parts can be replaced with others so that the structure is sturdier. More brackets can be added to the front and rear such that the motors are more securely fastened to the NXT brick. Note: that any changes to the physical dimensions of the balancing-bot will require re-tuning of the gain parameters to allow balancing, this especially includes type of wheels used on the bot.