K9 Bot Build Guide

Attach one LEGO® hard point connector to the 166 mm C channel.

Connect the LEGO® 9 hole straight beam to the hard point connecter with the two pegs.

Bolt the servo mount to the 166 mm C channel.

Assemble the baring package by connecting it to the servo mount.

Bolt a servo on to the servo mount.

Attach two 288mm C channels to the 166mm C channel.

A second 166mm C channel is added to the 288mm C channels.

The motor mounts are connected to the bottom of the 288mm C channels.

Bolt the 144mm L bracket to the 244mm C channels in front of the motor mounts. This will be used later to mount the 12V battery.

Attach the two 32mm C channels to the two 244mm C channels on the opposite side as the motor mounts. These will later be used to mount the axel assemblies.

Attach a 166mm C channel to the two 288mm C channels.

Attach another 166mm C channel to the 288mm C channels.

Use the two rounded L brackets when attaching the plate to the 166mm C channels.

Repeat last step to the other side of the robot.

Tighten a motor into motor mount so that the motor shaft is towards the top of the robot. (Robot is upside down in pictures.)

Attach the motor cable and secure it with a zip tie.

Repeat the last two steps to the other side of the robot.

OPTIONAL:

Read directions with encoders if you would like to install encoders onto your robot.

Mount the servo horn to the pivot bracket.

Use four of the smaller Tetrix® screws to attach the tube clamp to the top of the pivot bracket.

Insert the 88mm tube into the tube clamp and secure it using a bolt.

Attach the servo mount to the tube clamp with the rounded L bracket between them.

Insert the 88mm tube into the other tube clamp and secure it with a bolt.

Assemble the bearing package by connecting it to the servo mount.

Attach the servo to the servo mount.

Mount the servo horn to the pivot bracket.

Attach the servo horn onto the servo crown. Make sure the pivot bracket can move smoothly on the bearing.

Attach the flat bracket to the pivot bracket.

Mount a pivot bracket to the rounded L bracket.

Connect two rounded L brackets to the pivot bracket to complete the gripper.

Attach a rounded L bracket to the 166mm C channel next to the servo. This is only used as a mechanical stop so the arm does not swing too far back.

Attach the servo horn onto the servo crown. Make sure the pivot bracket can move smoothly on the bearing.

Use the set screws to lock the motor hubs onto the left and right motor shafts.

Use zip ties to secure the battery to the 144mm L bracket.

Use the LEGO® 3X5 beam to mount the LEGO® light sensor. Use the connecter pegs to lock the two 3X5 beams together.

Mount the Modern Robotics USB servo controller to the left side of the robot.

Mount the Modern Robotics USB motor controller to the right hand side of the robot.

Crimp on two Anderson Powerpole® connecters, of the corresponding colors, to the ends of the motor cables. Then attach them to the Modern Robotics motor controller. Slot one is for the left motor and slot two is for the right.

Plug the servo cables into the Modern Robotics servo controller. The bottom servo that controls the arm should go into channel one. The top servo that controls the claw should be plugged into channel six.

Bolt the rear wheels onto the motor hubs. 4 inch wheels are best if you have them but 3 inch wheels will work as well.

Build the axle assembly for both axles. Build them through the 32mm C channels using one axel, two bushings, one axle hub, and one axle collar for each assembly.

Attach the two omni wheels to the axle hubs from the last step. Use the same size wheel (either 3 or 4 inch) as you used for the back wheels.

Attach the Modern Robotics Core Power Distribution Module (power module) to the plates on the back of your robot. Not all of the holes on the power module will line up with the holes on your robot.

Using the pan head screws, attach the 144 mm L beam to the two rounded L brackets.

Bolt a second 144mm L beam on top of the other L beam. This will create a flat area to mount the Robot controller.

Make two cables using 16 AWG wire and Anderson Powerpole® connectors. The cables will supply power to the USB motor and servo controllers. Run one cable from the power module to each USB controller. Make sure the cables are long enough to not strain the power module or the controllers. Mine were each about 21 inches in length.

Attach a rounded L bracket to the 244mm C channel on the front, right hand side of the robot. This will be used to mount the IR seeker.

Bolt two stand offs to the rounded L bracket.

Attach the LEGO® IR seeker to the two stand offs.

Attach the Modern Robotics Legacy module to the two rounded L brackets. The Legacy module should have the USB port to left side of the robot.

Use the NXT style cables to connect the two sensors. The IR seeker should be in port 2 and the reflected light sensor should be in port 3. Note that ports are *zero-indexed.*

Use three USB cables to connect the power module to the Legacy module, the motor controller, and the servo controller. It does not matter which USB port you choose on the power module.

Secure the robot controller to the two 144mm L brackets. I used hook and loop.

Run the mini USB to micro USB OTG cable from the power module to the robot controller.

Use zip ties to strain relief your wires and cables. Also make sure all of the wires and cables are out of the way of the moving wheels and servos.

Launch the apps on both the robot controller and the driver station. While the robot controller is connected to the micro USB cable, press the scan button until the three modules are showing.

Press the servo controller button. Label the two servos in ports one and six. “servo_1” and “servo_6” These names need to be exact. Then press done.

Next, select the motor controller botton. Label the ports “motor_1” and “motor_2” These also need to be exact. Then press done.

To configure the Legacy module, chose IR_SEEKER for port 2 and LIGHT_SENSOR for port 3. Call them “ir_seeker” and “light_sensor” These names also need to be exact.

Press save configuration. Enter your file name. This does not need to be anything specific. I used “k9bot.”

On the driver station, press the three dots. Then select setting. Then select pair with robot controller. Next choose your robot controller by name. Lastly, press the back arrow at the bottom of the phone repeatedly until the screen is back to the main driver station page.

Plug your game pad into the driver station using the OTG adapter. Press the Start button and the A button at the same time to select controller 1. If you have a program for two game pads, Start and B buttons will access controller 2.

On the driver station, press select. Next choose K9TeleOp. This will bring you back to the main driver station screen. Press start and your robot will run the program.

To set the correct servo positions, remove the two servo horns from the servo crowns. Use the joystick to move the servos into the lowest and closed values (the A button and the X button). Replace the servo horns in the closed and down positions and secure them with the servo screw.

To run different program, press select on the driver station. Next choose your op mode. This will bring you back to the main driver station screen. Press start and your robot will run your program.

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6x

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1x

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