Budget Robotics
Servo Sensor Turret
For Ultrasonic and Infrared Modules

Assembly Instructions

The Budget Robotics Servo Turret provides a quick and inexpensive way to provide 160º-plus coverage of sensors. The turret is available to match the mounting requirements of several sensor types. The Servo Turret kit does not come with the sensor module, but does include the R/C servo and all hardware.

This document describes the servo turret designed for the Devantech SRF04 and SRF08 ultrasonic distance modules. These modules are available from a worldwide network of dealers and distributors. See the Sources section for more detail.

Parts List

(See errata sheet)

Assembly Steps

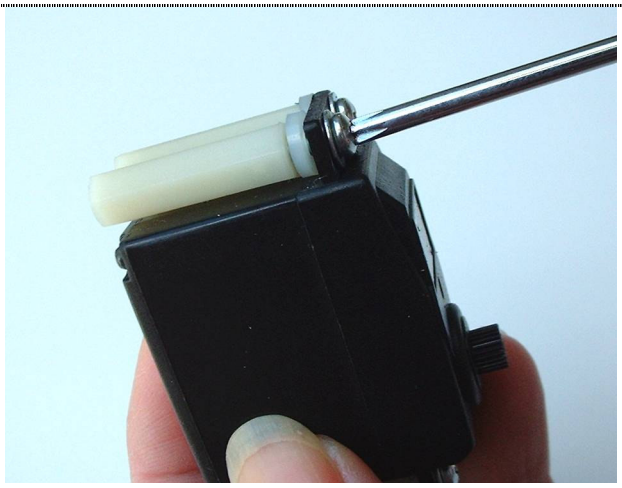
Step 1-Mount Standoffs (optional; purchased separately)

Use:

- (1) Servo
- (4) Nylon standoffs
- (4) Washers
- (4) 4-40 x 1/2" machine screws

Using 4-40 x 1/2" machine screws and washers, mount the nylon standoffs to the servo as shown. The washer goes against the standoff.

Finger-tighten the screws only at this point.



(For a less permanent mounting, use the strips of 3M Dual Lock fastener to attach the servo to your robot base.)

Step 2-Servo horn

Use:

- (1) Double-arm servo horn
- (1) Servo horn mounting plate
- (2) 4-40 x 5/16" screws
- (2) 4-40 hex nuts

Attach the double-arm servo horn to the servo mounting plate, using the supplied 4-40 hardware. Tighten the nuts securely.

(The horn should be mounted on the "smooth" side of the plastic mounting plate. The screw heads should be on the opposite side.)

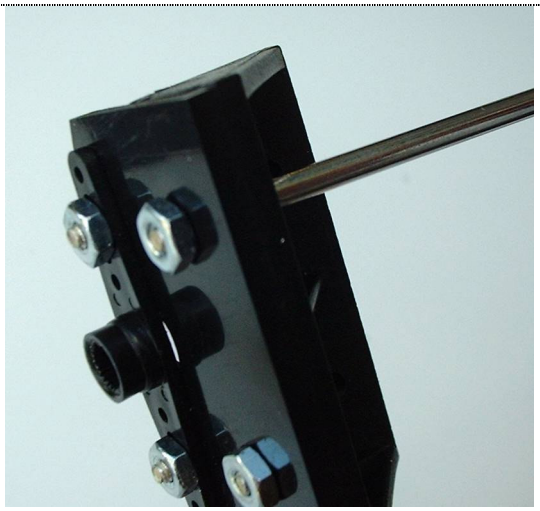
Step 3-Bracket

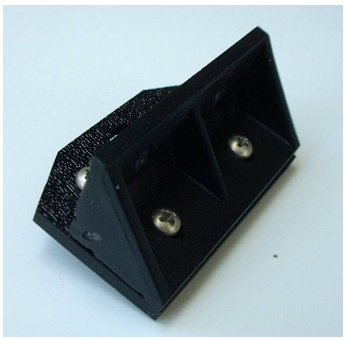
Use:

- Assembly from Step 2
- 2" gusseted plastic bracket
- (2) 4-40 x 5/16" machine screws
- (2) 4-40 hex nuts

Using 4-40 x 5/16" machine screws and 4-40 hex nuts, attach the plastic bracket to the assembled servo horn mount. Tighten the nuts securely.

Note the mounting of the bracket as shown in the photo. The edges of the bracket should be flush with the edges of the servo horn mounting plate.





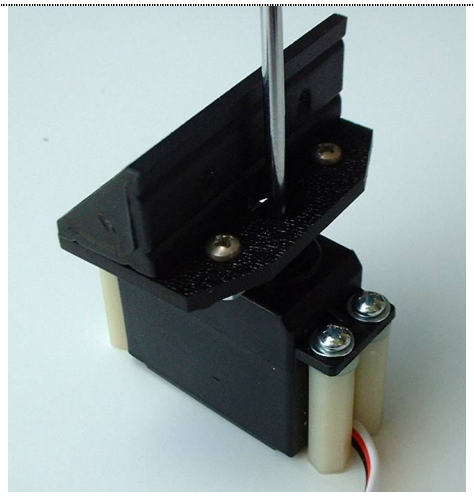
(Position the bracket this way. The screw heads should be on top.)

Step 4-Horn Assembly to Servo

Use:

- Servo from Step 1
- Horn assembly from Step 3
- (1) Servo horn mounting screw (small black oxide)

Set the servo to its midpoint rotation. You may do this by hand if you turn the servo shaft slowly. Using the small black servo horn mounting screw, attach the servo horn assembly from Step 3 to the servo. ***Do not over tighten!***



(Be sure the servo horn is firmly seated onto the servo shaft.)

Step 5-Sensor Module Mounting Plate

Use:

- Servo assembly from Step 4
- (1) Sensor module mounting plate
- (2) 4-40 x 5/16" machine screws
- (2) 4-40 hex nuts

Using 4-40 x 5/16" machine screws and nuts, attach the sensor module mounting plate to the horn assembly, as shown. Tighten the nuts securely.

(Smooth side of servo mounting plate on side facing the bracket.)

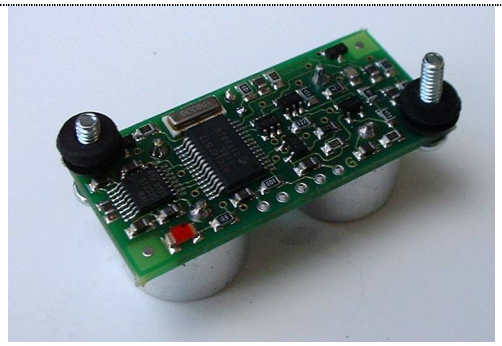
Step 6-Sensor Module

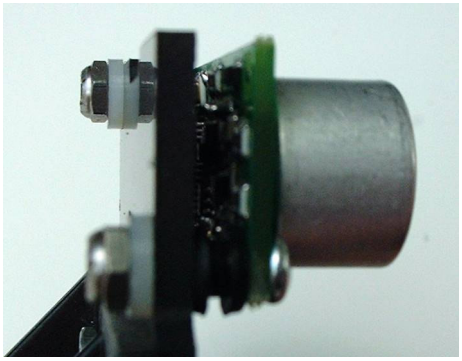
Use:

- Devantech ultrasonic sensor module (you supply)
- (2) Rubber grommets
- (2) 4-40 x 1/2" machine screws
- (2) Nylon washers
- (2) 4-40 locking hex nuts

As shown, place two screws through the available holes on the sensor module and place two rubber grommets over the screws.

Attach this assembly to the sensor module mounting plate, using two nylon washers and 4-40 locking hex nuts. Do not over-tighten the nuts.





Using mounting hardware (purchased separately):

- If using the nylon standoffs to mount the servo, cut out the paper drilling template provided, and lay it over the base of your robot. Use a ballpoint pen, nail, or other sharp object to mark the holes. Drill the holes in the base with a 3/32" drill bit. Once you have drilled the holes, mount the servo using (4) 4-40 x 1/2" screws. Align the standoffs, and tighten all screws.

- If using the Dual Lock fastener, clean the surfaces of the servo and base. Peel off the paper on one strip and apply it to the base as desired. Press tightly. On the other strip peel off the paper, and apply it to the bottom of the servo. Press tightly. Join the Dual Lock pieces. For best results, allow the press-on adhesive to cure for 6-12 hours for the strongest bond.

Sources

The Devantech SRF04 and SRF08 ultrasonic distance sensors are manufactured by Devantech Ltd, located in the UK. They are available from a network of dealers and distributors. A full list of dealers is provided on their Web site:

Devantech Ltd (manufacturer)
http://www.robot-electronics.co.uk/

North American dealers/distributors include the following. Prices vary.

Acroname
http://www.acroname.com/

Hobby Engineering
http://www.hobbyengineering.com/

Junun Robotics
http://www.junun.org/MarkIII/Store.jsp

Lynxmotion
http://www.lynxmotion.com/

Superdroid Robotics
http://www.superdroidrobots.com/

Wehali Engineering
http://wehali.com/

Zagros Robotics
http://www.zagrosrobotics.com/

Servo Control

The Servo Sensor Turret uses a standard-size radio control servo. The servo can be operated at 4.8-6.0 vdc. The plug is the "universal" type and will mate with Hitec/JR, Futaba-J, and Airtronics-Z style connectors. The wiring is color-coded:

- Black - Ground
- Red - +V
- White - Signal

The servo is controlled with a series of pulses on the Signal line. The pulses vary between 1.0 milliseconds (ms) and 2.0 ms. A 1.5 ms pulse will move the servo to its approximate center. A 1.0 ms or 2.0 ms pulse moves the servo to its normal clockwise or counter-clockwise position. The pulses are sent at approximately 50 Hz.

If you require a greater arc swing, you can supply pulses shorter than 1.0 ms, and longer than 2.0 ms. But exercise care so that the servo does not hit its internal stops. Damage will result to the servo if this condition is allowed to continue. When a full arc is needed trial and error is the best method for determining the absolute minimum and maximum settings for the servo.

As the programming requirements vary for each microcontroller, we recommend that you consult the documentation for the controller you are using for more information on using R/C servos.

The Servo Sensor Turret is available from:

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http://www.budgetrobotics.com/
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