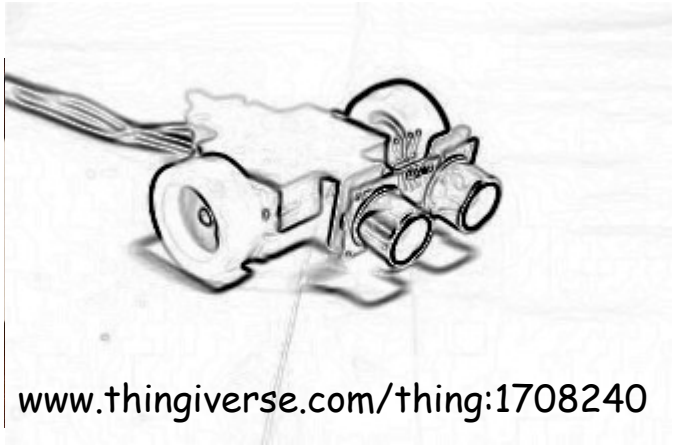

Build Your Bot!

Build a BabySCRU-FE Robot > rtheiss.com

Name:

Date:

School/Subject:

In this activity you will put together the chassis or base for your robot:

1. Step One – Print and Prep: Print out a body and a head (babySCRUFE2.stl and SCRU-FEv1USmount.stl) from the thingiverse link above in the color you want. Printing in PLA with a .3mm layer height works well for strength with 50% infill. Clean and drill out all the small holes with a 1.5mm or a 1/16" drill bit. If possible tap the holes with a M2 Tap.

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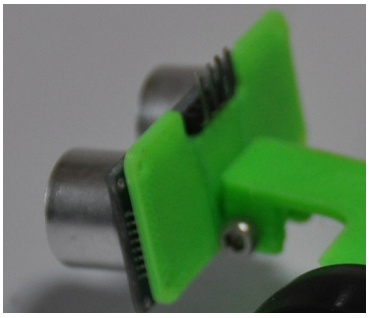
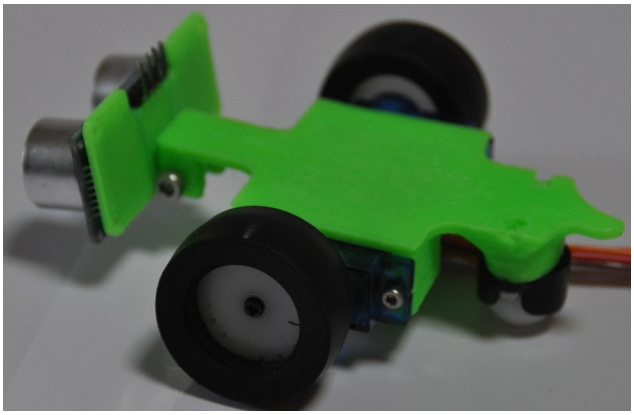
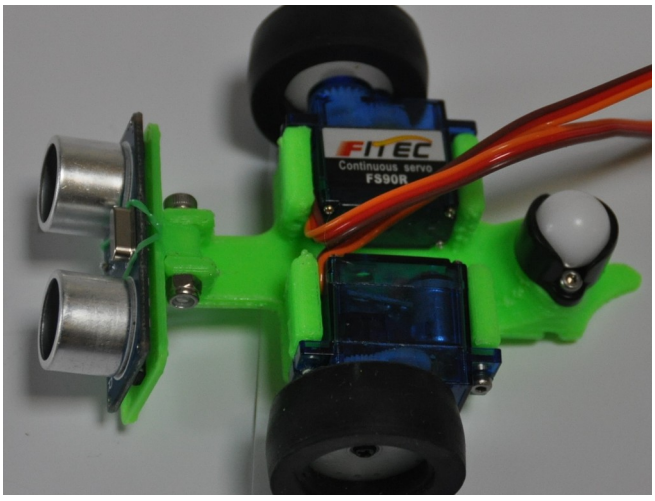
2. Step Two – Attach the Head: Attach the US Sensor mount to the body with a 6mm long M3 capscrew from each side. The size of the print allows the M3 screw to thread into the plastic to allow the angle of the sensor to be adjusted. If this doesn't seem to thread in you can drill out the holes with a 3mm or 1/8" drill bit and use a 15mm long M3 cap screw and locking nut to secure it instead. The sensor mount should be angled slightly downward. Attach the Ultra Sonic HC-SR04 Sensor with magnet wire at the four corners or as I like to with small rubber bands (the rubber bands will help keep the sensor from breaking from handling or a fall, but will have to be replaced regularly)

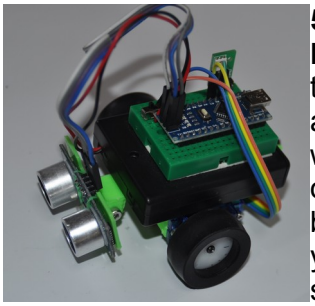


3. Step Three – Tail Caster Wheel: Attach the #952 ball caster with no spacers. Allow the M2 bolts for the caster to thread themselves into the plastic. If needed add M2 nuts in the nut keepers if your hole size it too large to lock the casters without them.

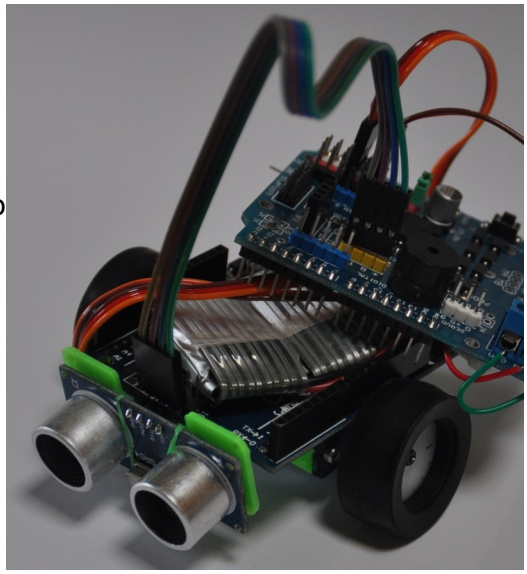
4. Step Four – Servo Wheels: Attach the continuous rotation servos being careful not to pinch the wires as you put them in, and direct the wires through the slots toward the front. Secure them with M2 x 10mm socket cap screws and washers (if you don't have them use four included shoulder screws). Attach the round servo horns with the two smaller headed screws and slip the treads from the solarbotics #1127 tires over them, they should be a secure fit.







5. Step Five – Attach the Battery Box: Using thick double sided tape, thick quick drying glue or hot glue: attach the battery box in a position where the switch will be down and out of the way (behind the head is found to be best). Depending on what board you are going to use, you may want to solder on a 2.1 x 5.5 mm male power jack that will fit into the female jack for an Arduino UNO R3.



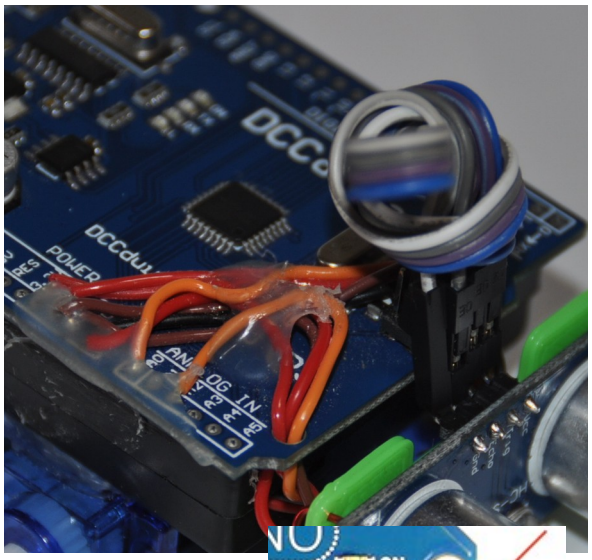
Of course you can use different battery options such as I have at times, two 3.7v LiPo quadcopter batteries between the board and sensor shield, just be sure not to exceed the power requirements of your Arduino Board.

6. Step Six – Attach the Arduino Board: Depending on what you want to do with your bot, you may want to change your board options. I always like to use an Arduino UNO R3 with a Keyes L298P Sheild since they are relatively inexpensive and have clearly labeled ports (ping, bluetooth, buzzer) and the option of a motor controller for future projects (FM90 DC gearmotors in 9g servo bodies).

You may opt for a Arduino Micro with a breadboard for more advanced options, or a inexpensive Arduino clone without headers for a clean soldered wire connection look.

I have a few pictures of each of the methods located in the Makes section of this robots thingiverse site. If you make a different varation please post it to the thingiverse site so we can see the full versatility of this platform.

Whichever board you choose, just secure it to the body or to the battery box with thick double sided tape, thick quick drying glue or hot glue. All Arduinos should work the same with the correct wiring and correct power requirements.



7. Step Seven – Wire it up: As my high school students say jokingly “don't cut the red wire” and tease me when I tell them they can't use anything over nine volts!

Wiring is of course different for each board, but I will discuss the wiring I have used for the most basic babySCRU-FE then the variation for the KeyesL298P Board.

Wire the power from the battery box to the “vin” socket and all of the brown wires from the servos and the black from the battery box to “gnd.” The red wires from the servos go to “5V” the Left sensor wire (orange) goes to A0 (pin 14) and the Right goes to A2 (pin 16).

The wires from the US Sensor go to the ICSP pins for a cleaner look. Trig to MOSI (pin 11) and Echo to MISO (pin 12).

The KeyesL298P is a little easier since it will directly take all the connections without soldering, however the code will have to be changed for the US Sensor where the Trigger pin is (pin 7) and the Echo Pin is (pin 8).