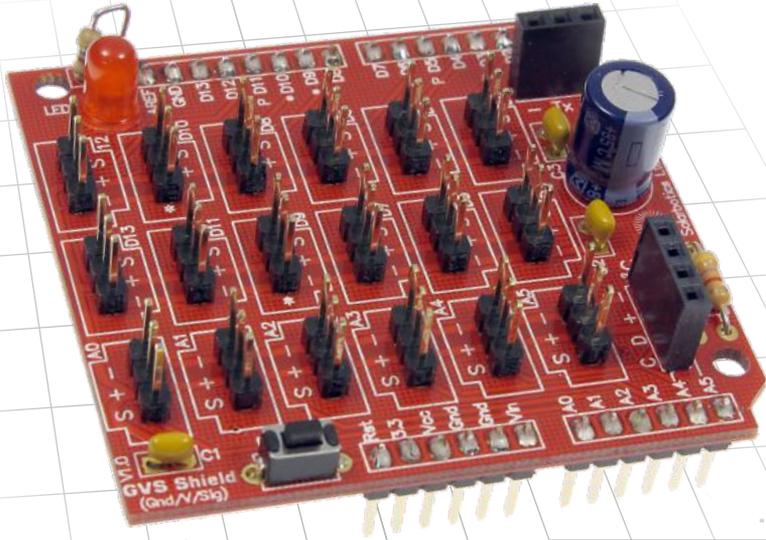# SB-GVS Shield v1.0

## Arduino™-Compatible Sensor Interface

Connect up 18 peripherals to the popular Ground/Voltage/Signal interface. Got more? Use the I2C-interface too!

Build Time: 20mins
Skill Level: Beginner (2/5)

- Ideal for servo & sensor accessories (Phidgets, Seeed Bricks)
- Full break-out for all 12 digital lines & 6 analog lines
- BlinkM-style I^{2}C port
- Power filtering & bypass capacitors
- Pin13 LED indicator
- Reset line brought up from Arduino
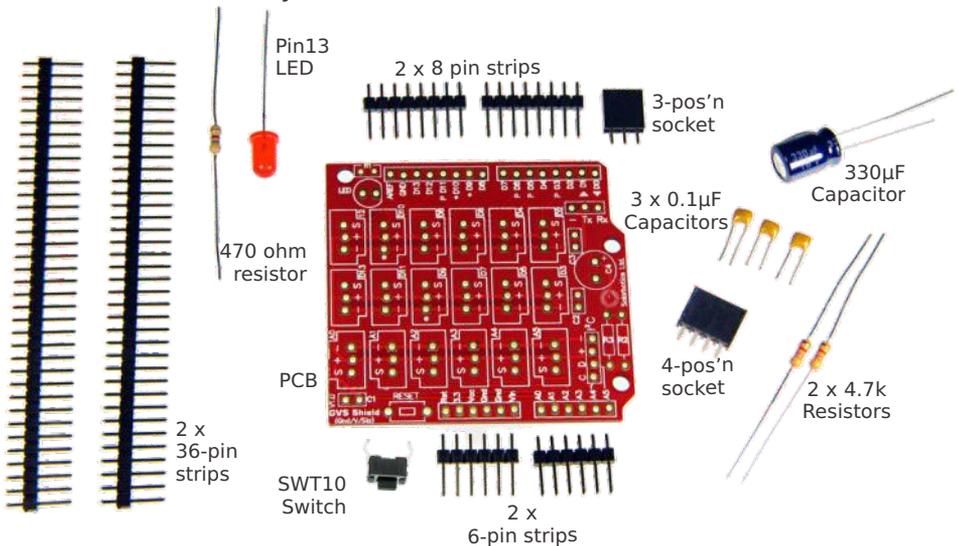- Optional lock-tab sockets available for secure wiring
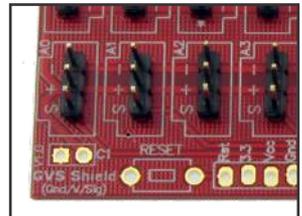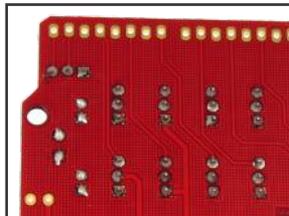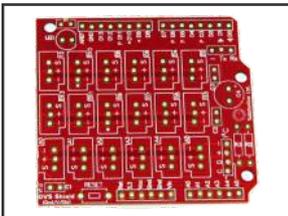
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Y'know, for notes and pretty pictures and the like.

Parts List

□ Printed Circuit Board (PCB)
□ 1 x LED (Pin 13 indicator)
□ 1 x 470 ohm resistors (Yellow / Purple / Brown)
□ 1 x SWT10 Switch (reset)
□ 3 x 0.1µF Ceramic Capacitors
□ 1 x 330µF Electrolytic Capacitor
□ 2 x 4.7k resistors (Yellow / Purple / Red - for I2C network)
□ 1 x FPin3 3-position Female Header Socket Strip (Serial comm.)
□ 1 x FPin4 4-position Female Header Socket Strip (I2C port)
□ 2 x MPin36 36-pin Male Header Pin Strips (for snapping into 3's) *or*
 the optional 18 locking 3-position connectors (Part: *MPin3-Lock*)
□ 2 x MPin6 6-pin Male Header Pin Strips for Arduino mounting
□ 2 x MPin8 8-pin Male Header Pin Strips for Arduino mounting
□
Note: You will need your own Freeduino-SB or Arduino

Pin13 LED
2 x 8 pin strips
3-pos'n socket
330µF Capacitor
3 x 0.1µF Capacitors
470 ohm resistor
PCB
4-pos'n socket
2 x 4.7k Resistors
2 x 36-pin strips
SWT10 Switch
2 x 6-pin strips

We strongly suggest you count the parts in your kit to make sure you have all the parts listed (c'mon - there's barely a handful of parts, so count them!). If anything is missing, contact Solarbotics Ltd. for replacement parts information.

Disclaimer of Liability

Construction!

You have an Arduino that wants sensors, so let's get to it!

Step 1 - Making the 3-Pin Headers: If you have decided to go with locking connectors, you can pocket the two sets of 36-pin strips and save them for a later project. You can *always* use more pin strips.

Count off pins in sets of 3 and snip them apart until you have 18 sets. If you are brave, snap them apart in your fingers, but it's easy to make a set of 2 or 4 instead of 3. You've been warned! There are more than enough pins in the strips to fix a mistake or two.
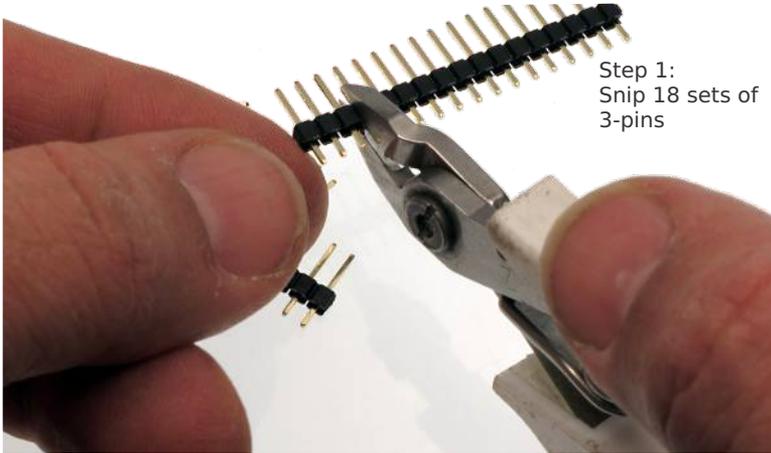
Step 1:
Snip 18 sets of
3-pins

Step 2 - Mounting the Sensor Pins: If you have the locking connectors, simply insert them according to the outlines. You'll notice that we reversed the orientation of the analog lines versus the digital lines for easier identification.

After you have the pins / locking connectors inserted in the holes, place a flat plate/book/CD case on top. Flip the whole mess upside-down so you can solder them in as a set instead of 1-by-1 (tedious!).
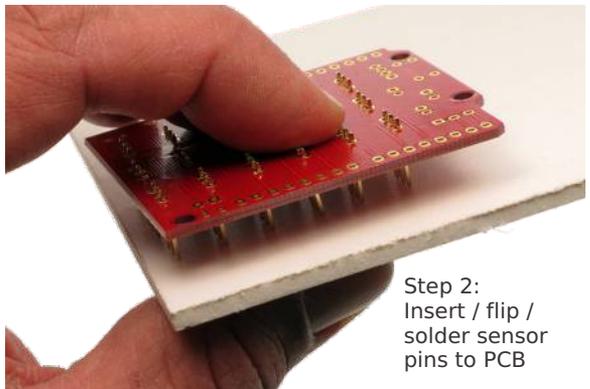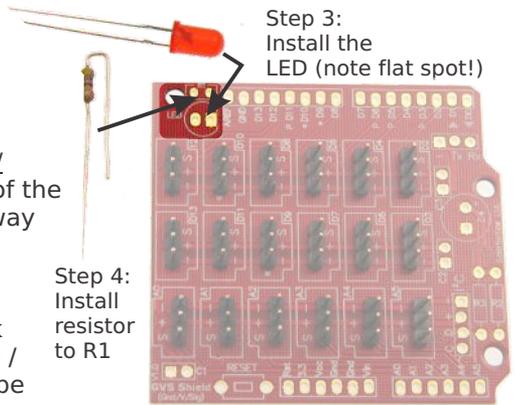

Step 2:
Insert / flip /
solder sensor
pins to PCB

Construction!

Step 3 - Install the Pin13 LED: What good is the Pin13 LED on the Arduino board if you can't see it? Exactly. That's why we're putting one here too.

Start with the LED. Match the flat-spot on the LED to the flat printed on the printed circuit board (or insert the *short* LED leg into the *square* pad).

Step 4 - 470 ohm Resistor (Yellow / Violet / Brown): Fold over one leg of the resistor so it's pointing the same way as the other lead, and install it to position R1.

Don't get it confused with the 4.7k resistors which look similar (Yellow / Violet / Red). You want the 3rd stripe to be brown.

Step 3: Install the LED (note flat spot!)

Step 4: Install resistor to R1

Step 5 - Install the 0.1µF Filter Capacitor: These capacitors help filter the power going to the sensors. Plug it in, flip it over, and solder it down!

Step 6 - Install Reset Switch: This is pretty simple - stick the reset switch into position "RESET", and solder it in! (Works best if installed top-side...)

Step 5: Install 0.1µF Capacitor

Step 6: Install Reset Switch
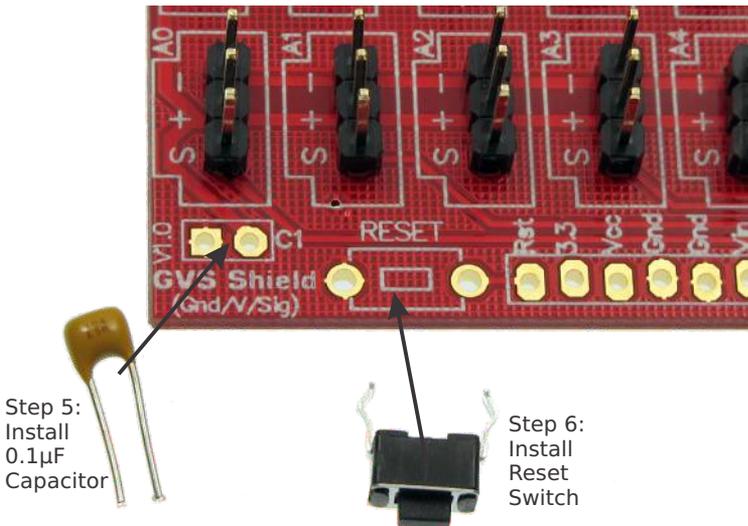
Construction!

Step 9 - Install the C2 & C3 0.1µF Capacitors: Just like C1, these are used to help filter power on the sensor power lines.

Step 10 - Install C4 330µF Electrolytic Capacitor: Unlike C1, C2 and C3, this one need to go the right way in. Put the short lead (the one near the white stripe on the capacitor's body) into the *square* pad at position 'C4'
Just so you know, the long lead is positive, short lead negative.

Step 11 - Install the 4-position Socket Strip: This will be useful when you're plugging in I²C accessories, like a BlinkM Smart LED.
Note: Using the I²C port means you can't use A4 or A5 pins. A4 and A5 share their pins with the I²C feature, and they can't be used at the same time.

Step 12 - Install the 4.7k (Yellow / Violet / Red) I²C Pull-up resistors: These are *not usually* required, but some I²C peripherals will behave better with these installed. It won't hurt to put them in now, so why not? Install them to locations 'R2' & 'R3'.
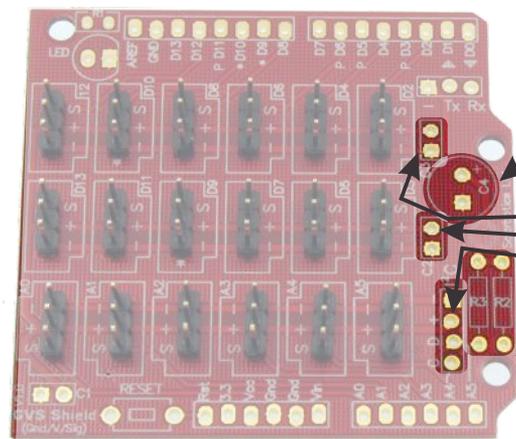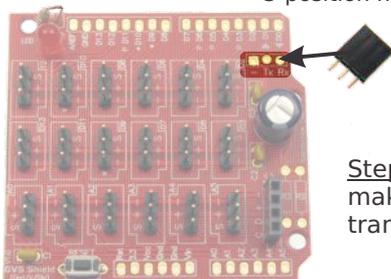
Step 10:
Install 330µF
Power Filter Capacitor
to 'C4' (short lead goes to square pad)

Step 9:
Install 2 x 0.1µF capacitors
to positions 'C2' & 'C3'

Step 11:
Install strip
to 'I²C'

Step 13:
3-position header

Step 12:
Install 4.7k
resistors to
'R2' & 'R3'

Step 13 - 3-Position Header: This header makes it convenient to tap the serial transmit/receive lines to the Arduino

Construction!

Step 14 - Install the 6 & 8 Pin Male Header Pins: There are a few ways to install the mating pins. One is to put the male pins into the mating sockets of your host microcontroller, then put the shield on top and solder it in. **We only recommend this method if you're good at soldering!** Too much heat, and you'll melt the Arduino sockets!

We suggest you tack solder *one* pin, manually tweak the alignment so it's straight up and down, and then solder in the rest of the pins (It's how we recommend you do it in the Freeduino-SB assembly documentation).

Step 14: 8-Pin strips go to the upper pads, and the 6-pin strips go to the lower.
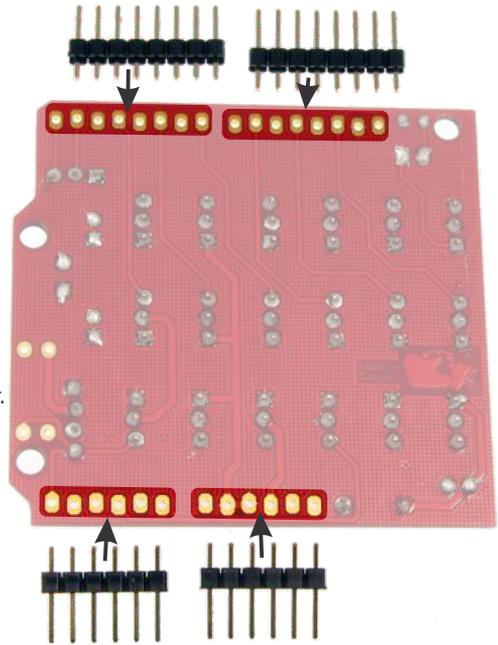
You are finished! Plug your SB-GVS shield into your Arduino / Freeduino, and you'll have a whole board to attach sensors to! We have tutorials and sample code on Solarbotics.com for this shield, so check if you are not sure what to do with it, check out our examples!

The SB-GVS Shield for the Arduino / Freeduino

What's a Shield?

If you're talking about fighting, it's an beefed-up garbage can lid. In regards to *Arduino*, it's a plug-in board that offers extra features to the main microcontroller board.

Ok, so what's a SB-GVS Shield?

You know servos? They have 3-wire connections: Ground / Voltage / Signal. This standard has been adopted by *many* manufacturers for their peripherals and sensors. Look specifically at Phidget sensor modules and Seeed Studios "Brick" sensor units. And practically *any* hobby-servo on the market.

The SB-GVS Shield offers:

- Breakout points to all 12 Arduino digital I/O
- Breakout points to all 6 Arduino analog I/O
- Convenient BlinkM compatible I^2C port
- Tx/Rx/Gnd serial communication port
- Arduino Pin 13 LED & Reset button are brought up to the shield
- Power filtration capacitors for smooth accessory operation

Options!

Don't forget that if you like to have <u>secure</u> connections, get the locking plug pack (part *MPin3-Lock-GVS*), which has 16 locking sockets for lock-tab plugs.

If you like to extend the functionality of your shield by stacking, or you want to have another tap-point for the Arduino I/O lines, you'll like the 6-pin and 8-pin long-plug/pin sets (parts *FPin6L-413* / *FPin8L-413*).

SB-GVS Shield on Arduino

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