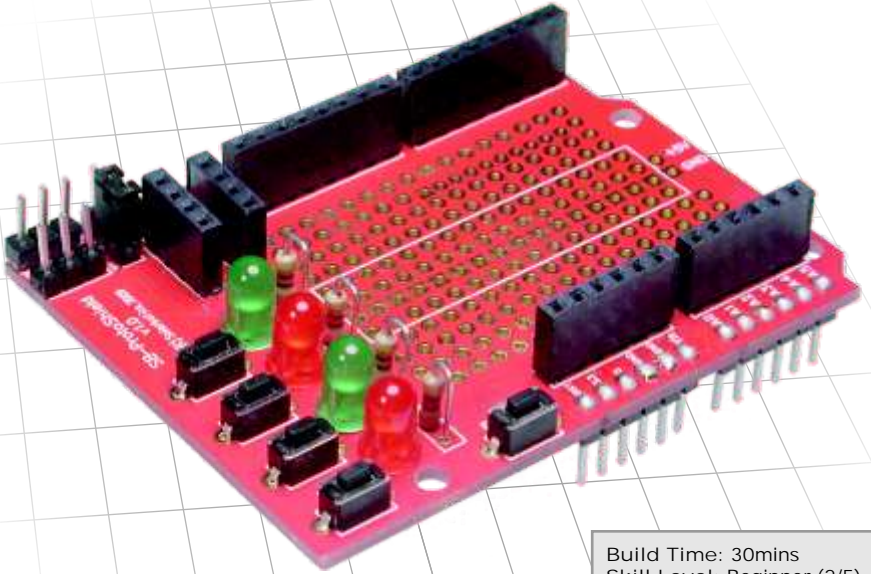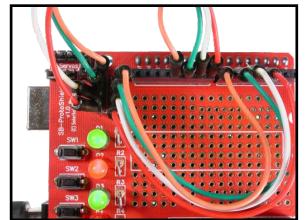# SB Protoshield v1.0

## Arduino™-Compatible Prototyping & Breadboard Shield

Design and build your own interface for your Arduino-compatible microcontroller!



Build Time: 30mins
Skill Level: Beginner (2/5)

The ProtoShield features:
- Easy access to 4 indicator LEDs
- Easy access to 4 switches
- Two Servo headers with selectable power feed
- Convenient +5 / Gnd rails down middle of protospace
- Space for 170-point mini-breadboard
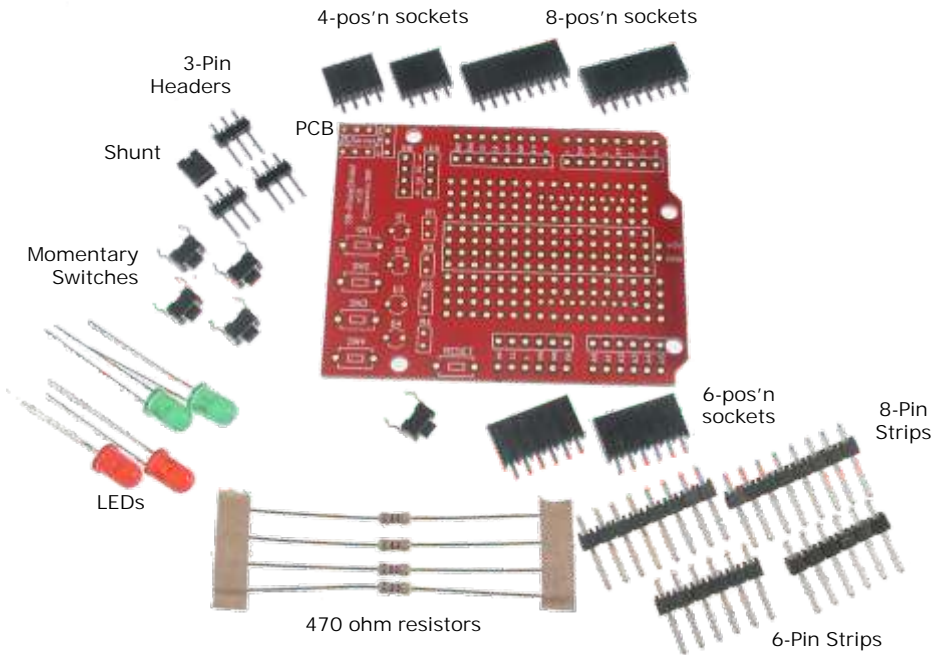- XBee™ Compatible footprint

This is an intentionally blank page.
Y'know, for notes and pretty pictures and the like.

# Parts List

□ Printed Circuit Board (PCB)
□ 4 x LEDs
□ 4 x 470 ohm resistors (Yellow / Purple / Brown)
□ 5 x SWT10 Momentary Switches
□ 1 x JShunt Jumper Shunt
□ 3 x MPin3 3-pin Male Header Pin Strips
□ 2 x MPin6 6-pin Male Header Pin Strips
□ 2 x MPin8 8-pin Male Header Pin Strips
□ 2 x FPin4 4-position Female Header Socket Strips
□ 2 x FPin6 6-position Female Header Socket Strips
□ 2 x FPin8 8-position Female Header Socket Strips
Note: You will need your own Freeduino-SB or Arduino



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.
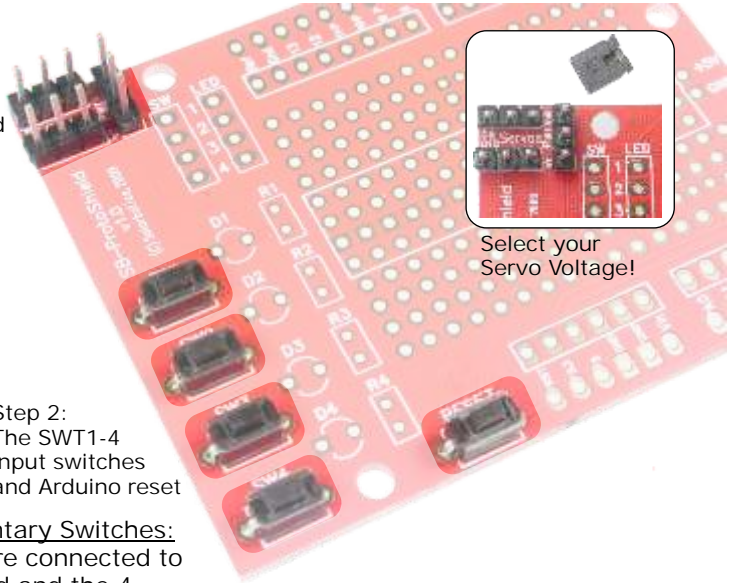
## Disclaimer of Liability

You've got a project to build, so let's get to it!

Step 1 - 3-Pin Headers: Two of these are connected to the D9 & D10 hardware "PWM" lines on the Arduino for precise servo control. The last one lets you select between using *regulated* voltage or *input* voltage for driving your servos. Select one with the jumper shunt (see pin labels on PCB).

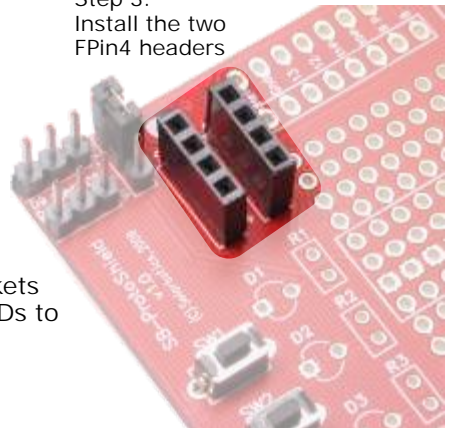Step 1:
3-Pin headers
for servos and
servo power
selection

Select your
Servo Voltage!

Step 2:
The SWT1-4
input switches
and Arduino reset

Step 2 - Momentary Switches:
Four of these are connected to
between ground and the 4-
position header marked "SW" (1
to 4). These make great selector
input switches to your Arduino
inputs. The last is connected to
the Arduino reset line.

Step 3:
Install the two
FPin4 headers

Step 3 - FPin4 Switch & LED Headers:
The two sets of female pin header sockets
let you easily wire the switches and LEDs to
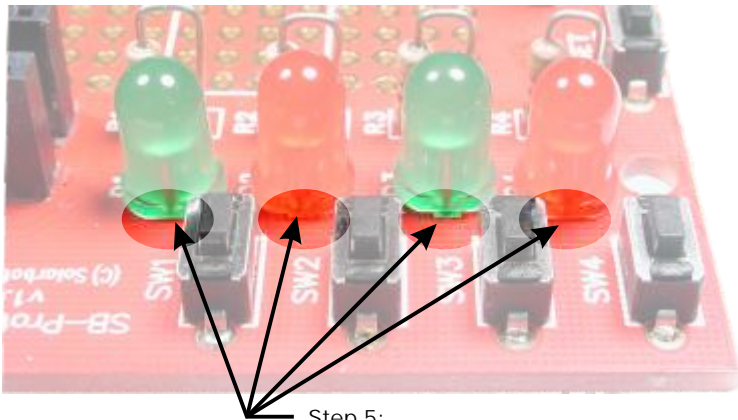parts of your circuit.

**Step 4 - Install 470 ohm Resistors:**
The resistors have to be folded so they "stand up" on the PCB. Simply bend one lead over 180°. We use some needle-nose pliers to make these tidy little bends. It makes your board look all geeky/techno-like. Solder these in locations R1 through R4.

Step 4:
Form the resistor by bending a lead 180° over

**Step 5 - Install LEDs:** Install the LEDs as shown. *Be careful*, as LEDs only work the right-way around. Make sure the *shorter* lead goes into the *square* hole. Or check to see that the flat spot on the shoulder of the LED matches the flat printed on the PCB.
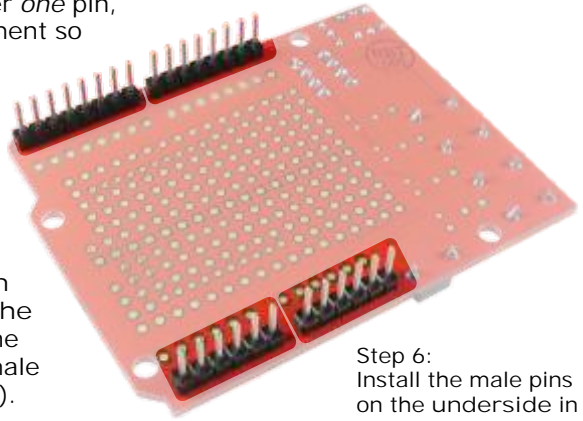
Step 5:
Install the LEDs with the flat side matching the line on the Printed Circuit Board

# Construction!

Step 6 - Install the 6 & 8 Pin Male Header Pins: There are a few ways to install the pins you'll be using to connect your SB-Protoboard to your Freeduino/Arduino. One is to put the male pins into the mating sockets of your host microcontroller, then put the Protoboard 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!
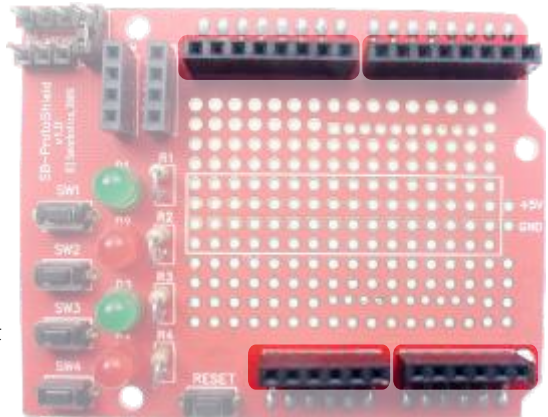
We suggest you tack solder *one* pin, manually tweak the alignment so it's straight up and down, and then solder in the rest of the pins. It's how we recommend you do it in the Freeduino-SB assembly documentation.

Note: Mount the pins on the underside, and on the outside sets of holes (the inside rows are for the female headers installed in step 7).

Step 6:
Install the male pins on the underside in the holes nearest the PCB edge

Step 7:
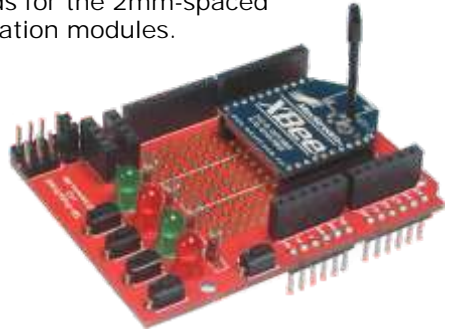Install the Female Socket Headers in the positions shown

Step 7 - Install the 6 & 8 Pin Female Header Sockets: These are only really of interest to you if you'll be using the mini-breadboard (which is most applications). These headers make it really easy to quick-prototype up a new idea. Use the same technique as in Step 6.
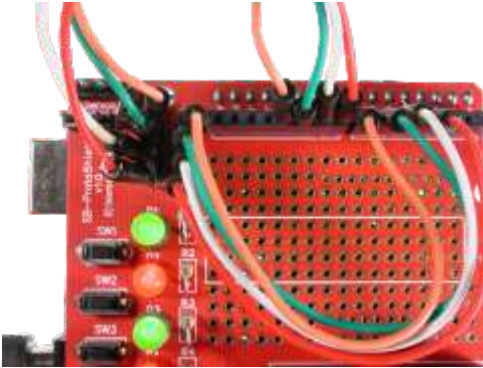
We've added convenient mounting pads for the 2mm-spaced pins found on XBee-type RF communication modules.

Throw a set of pins in these sockets (like our part 17450), and you'll automatically have power and ground connections pre-routed to your XBee!

(XBee and Pins sold separately)

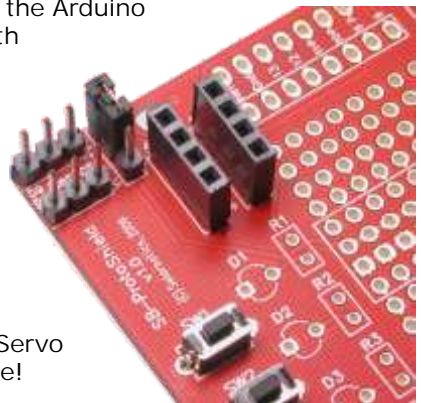You have switches; you have LEDs. Of course, you'll want one to control the other!

Hook up your protoboard like this, download our sample code (from http://bit.ly/SB_16090_Code), and feed it to your Arduino. Press to turn on, press to turn off!

Driving a servo can be done with *any* of the Arduino pins, but it's best left to the two pins with hardware timers (less jitter / more resolution). That's pins D9 & D10. Connect the servo to either header. The pins are Gnd/V/Signal (Gnd being closest to the left edge).

Select if you want *regulated* 5V or unregulated V(raw) power sent to your servo with the jumper header.

Plug in your servo, load up the Arduino Servo sample code, and make something move!

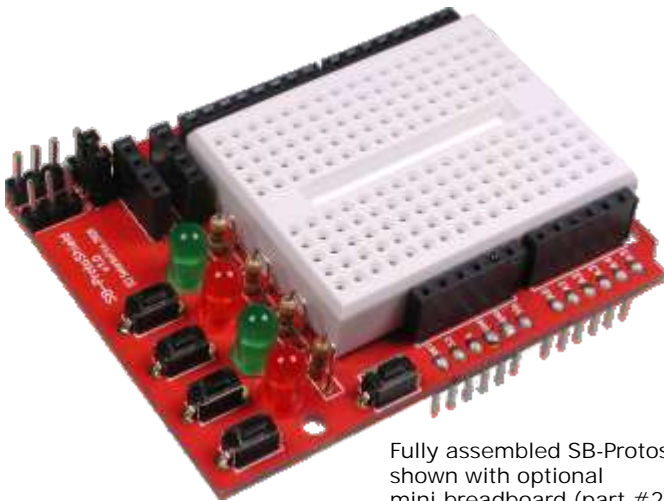# The SB-ProtoShield for the Arduino / Freeduino

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-ProtoShield?
It's our version of a prototyping shield that lets you develop your own circuits and experiments.

The SB-Protoshield offers the following features:
- 4 LEDs (handy indicators)
- 4 momentary touch switches (for sending signals into the Arduino)
- 2 Servo headers (for making hobby servos move)
- XBee-compatible footprint (for adding an XBee wireless comm. module)
- Breadboarding space (for soldering your own custom circuitry, including a 5V and Ground rail running down the middle.
- Space to mount a small 170-pin breadboard (for temporary circuits)



Fully assembled SB-Protoshield shown with optional mini-breadboard (part #21380)

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## www.solarbotics.com