

SMT Prototyping

An introduction to surface mount technology and soldering

Guest Speakers

Nathan Seidle

Founder and CEO of Spark Fun Electronics

Matt Bolton

Director of Manufacturing, Spark Fun Electronics

Overview

1. Listen to overview presentation
2. Review Simon parts kit contents
3. Read SMT notes and instructions (see assembly videos on Spark Fun web site)
4. Solder components on board, following assembly instructions
5. Program Atmel ATmega8 (AVR) microprocessor firmware
6. Test functionality
7. Rework, if necessary
8. Show final result to Prof. McClure
9. Return tools/supplies

Terminology

SMT = Surface Mount Technology

SMD = Surface Mount Device

PCB = Printed Circuit board

Pads = Metalized area of PCB where components are soldered to the PCB

Wick = Solder wick, also known as desoldering braid – used to remove solder

References

There are many good soldering/desoldering videos available on <http://www.youtube.com>

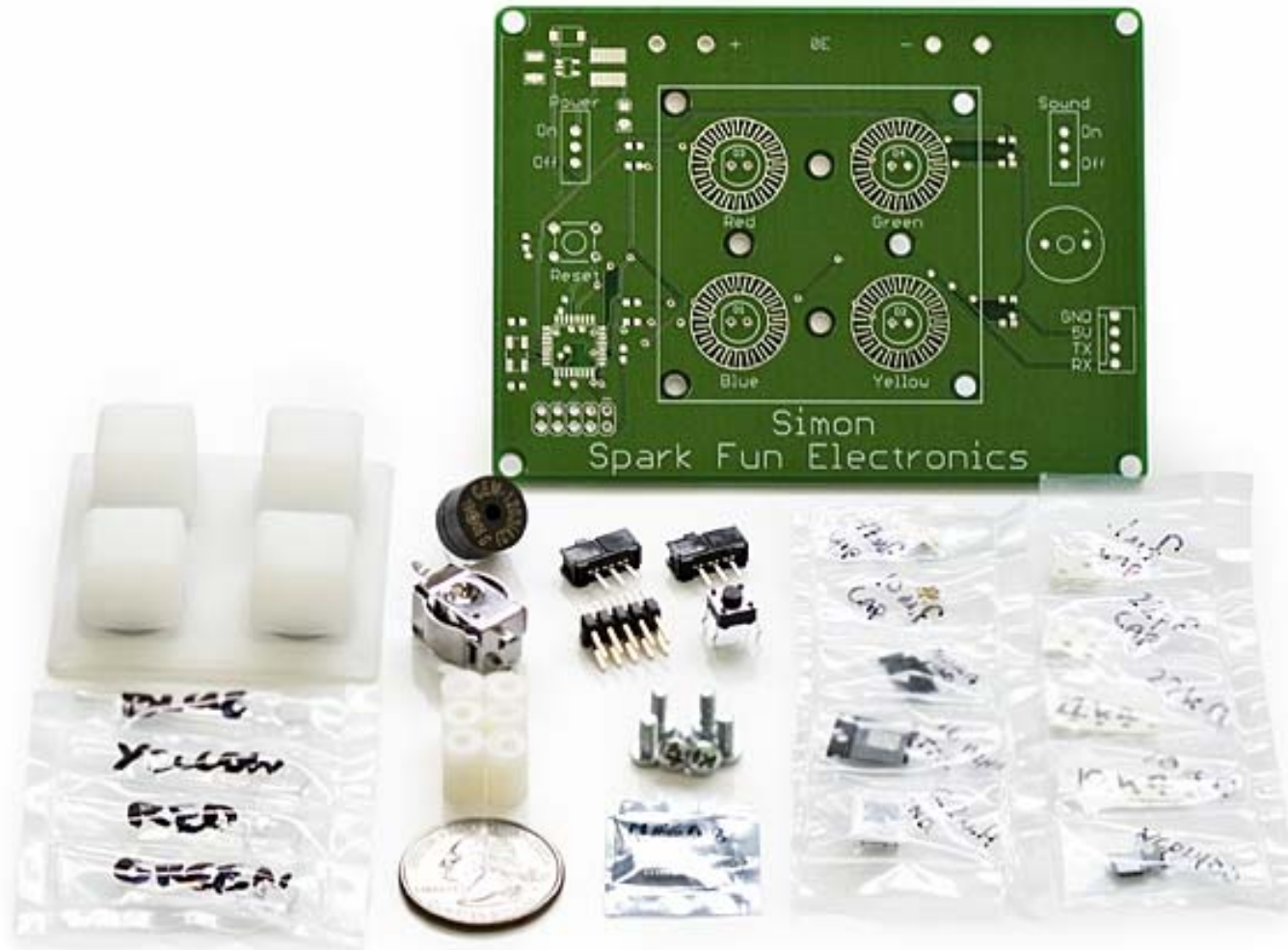
Basic Soldering: http://www.youtube.com/watch?v=l_NU2ruzyc4

Atmel ATmega8 Features

8-Kbyte self-programming Flash Program Memory, 1-Kbyte SRAM, 512 Byte EEPROM, 6 or 8 Channel 10-bit A/D-converter. Up to 16 MIPS throughput at 16 Mhz. 2.7 - 5.5 Volt operation.

<http://www.atmel.com/products/AVR/>

Simon Kit from Spark Fun Electronics



Product: http://www.sparkfun.com/commerce/product_info.php?products_id=8404#
Review <http://www.sparkfun.com/commerce/present.php?p=BEE-7-SMDSoldering> for detailed assembly steps, including videos.

Hot Air Rework Station and Soldering Iron



Hot Air Rework Station ↑
Hot air from tip melts solder quickly and without direct contact. Be careful not to blow small components off of the PCB.

Soldering Iron
Heated tip melts solder with direct contact. ↓



Images from www.sparkfun.com

Desoldering Braid (aka Solder Wick)

Solder wick is used to remove solder from component leads and the PCB. It is made of woven (braided) copper, which conducts heat well and provides great attachment for excess solder.

Place the end of the desoldering braid on the area containing excess solder. Then press a soldering iron tip on top of the braid. The excess solder is melted and wicked up into the solder braid.

If this technique is used on a row of SMT pins where excess solder is present, the excess solder is captured in the braid, while leaving solder where it should be, at the attachment point between the SMT component pin and the PCB pads.

Remember that excessive heat can damage components, so do not apply heat for too long.




























Spark Fun recommends Techspray brand size #2 wick.

Spark Fun solder wicking video:
<http://www.youtube.com/watch?v=rskIO0sM37g>



Note: Other methods of removing solder are typically used if you want to remove the component from the PCB. Those methods include a hot air rework station, a vacuum pump (solder sucker), or a desoldering iron.

SMT Packages

Pin	SOIC	SOP	SSOP	QSOP	TSSOP	VSSOP	TVSOP	SOT	BGA	QFN
5								DCK DBV		
6								DCK DBV		
8	 D	 PS	 DCT		 PW	 DCU				
14	 D	 NS	 DB		 PW		 DGV			 RGY
16	 D  DW	 NS	 DB	 DBQ	 PW		 DGV			 RGY
20	 DW	 NS	 DB	 DBQ	 PW		 DGV		 VF BGA ^{††}	 RGY

