

WORKSHOP

Saturday October 11th 2014, Wear It Festival in Berlin

In this workshop we will build our own segment displays and attach them to our bodies, turning ourselves into platforms for personal signage. What text would you like to display on yourself?

In order to build our own wearable segment displays we'll use an ATtiny microcontroller and the Charlieplexing ($n*(n-1)$) technique to control up to 20 individual LED lights from it's 5 i/o (in, out) pins. We will make a little breakout board for the ATtiny microcontroller so that we can sew the LED connections into fabric and then solder the surface mount (SMD) LEDs directly to the conductive thread.

CONTENTS

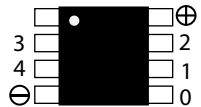
- ATtiny microcontroller
- 8-pin socket
- Red SMD LEDs
- Flexible breakout board
- Slide switch
- Red and black wire
- Neoprene
- Conductive fabric
- Fusible interfacing
- 3 x AAA batteries

CHARLIEPLEXING CIRCUIT

LED Light: LEDs (Light Emitting Diodes) are special diodes that emit coloured light when powered. The two legs must be connected the right way round for the LED to work.



ATtiny Microcontroller:



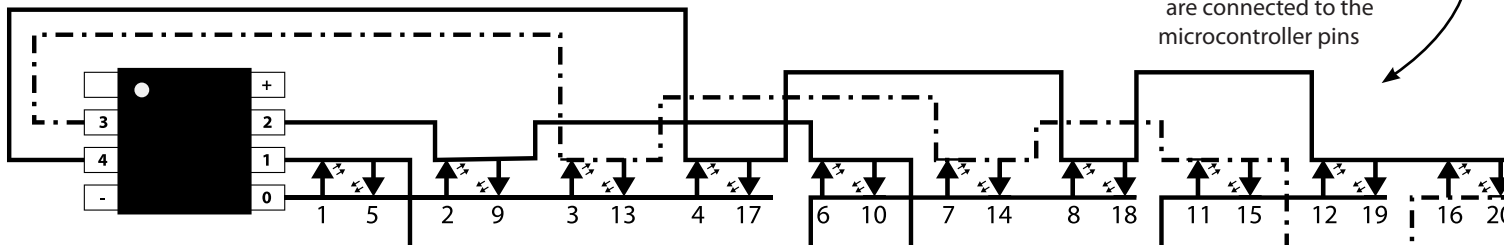
Based on the 5 pins of the microcontroller we use this chart maps all their possible combinations to segment numbers

Segment Chart:

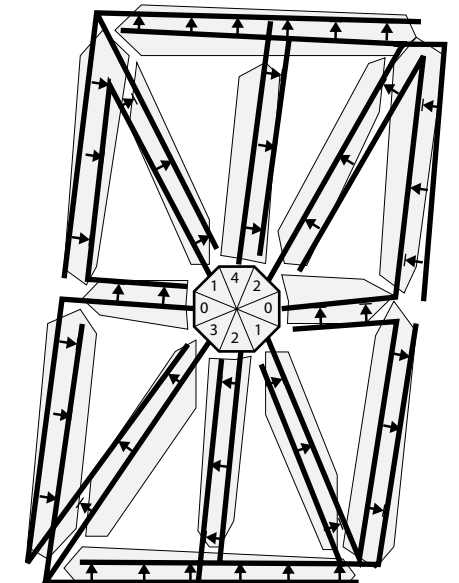
	0	1	2	3	4
0		s1	s2	s3	s4
1	s5		s6	s7	s8
2	s9	s10		s11	s12
3	s13	s14	s15		s16
4	s17	s18	s19	s20	

This is the circuit schematic that shows how all the LEDs are connected to the microcontroller pins

ATtiny circuit with 5 pins controlling 20 individual LED lights:



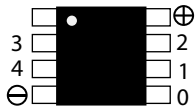
CHARLIEPLEXED 14-SEGMENTS



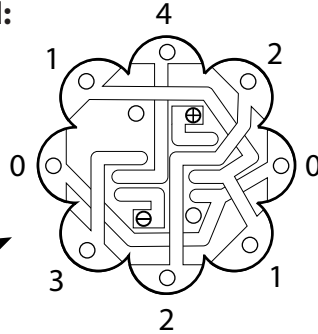
ATTiny BREAKOUT CIRCUITBOARD

Flexible Circuitboard:

ATTiny:



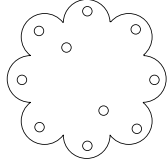
Make sure you place the ATtiny into the socket on the flexible circuitboard the right way around. The + pin of the chip should line up with + pin of the socket.



Layers:

The following illustrations show the various layers that the flexible circuitboard is made up of.

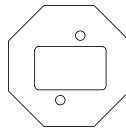
Flexible circuitboard (Kapton)



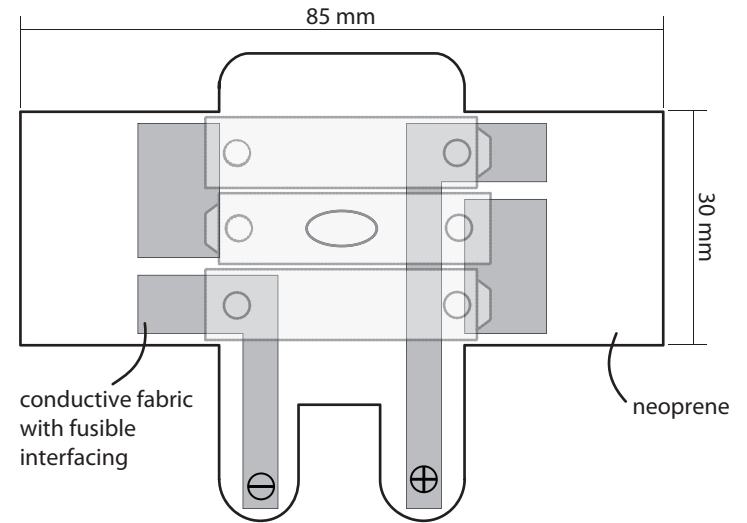
Copper Traces



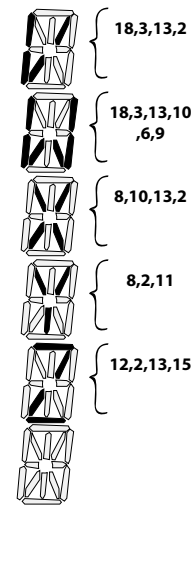
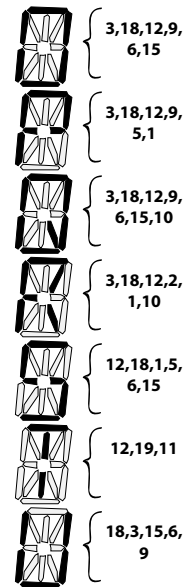
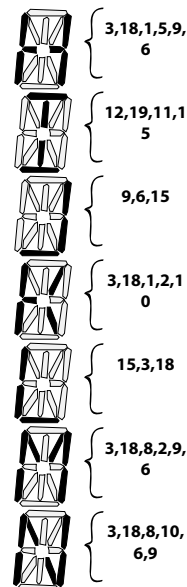
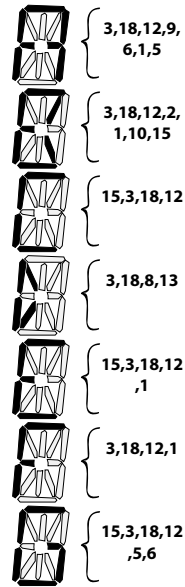
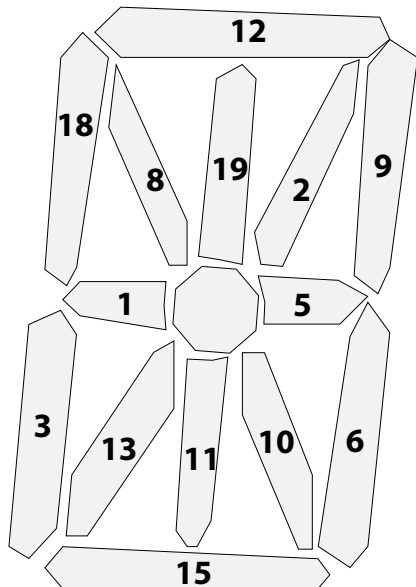
Soldermask (Kapton tape)



3 x AAA Battery Pouch (4.5V)



THE ALPHABET IN SEGMENTS



CONTACT

Hannah Perner-Wilson

hannah@plusea.at

www.plusea.at

www.kobakant.at

www.howtogetwhatyouwant.at

www.kit-of-no-parts.at

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