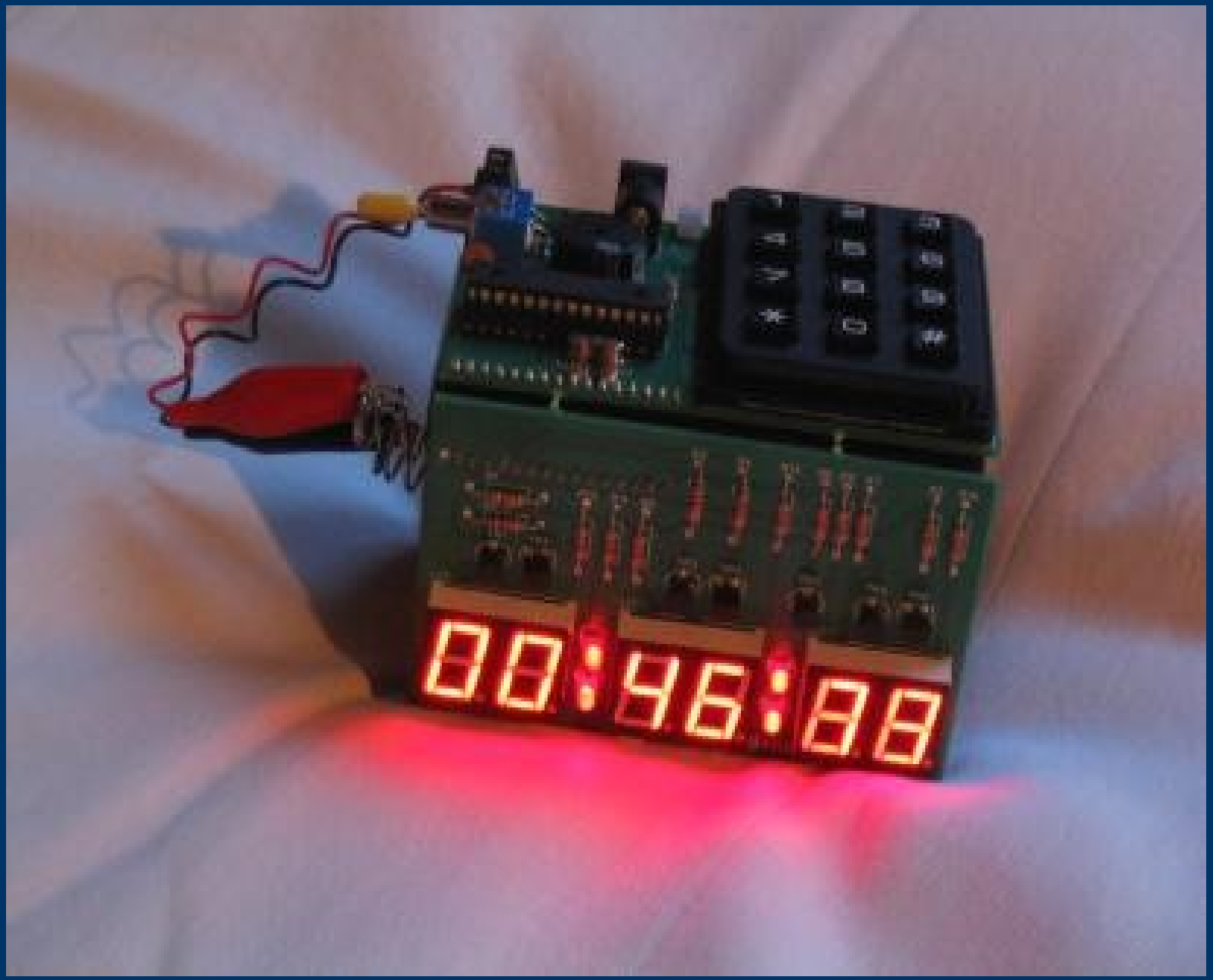
The Denkimono Clock Kit

A retrospective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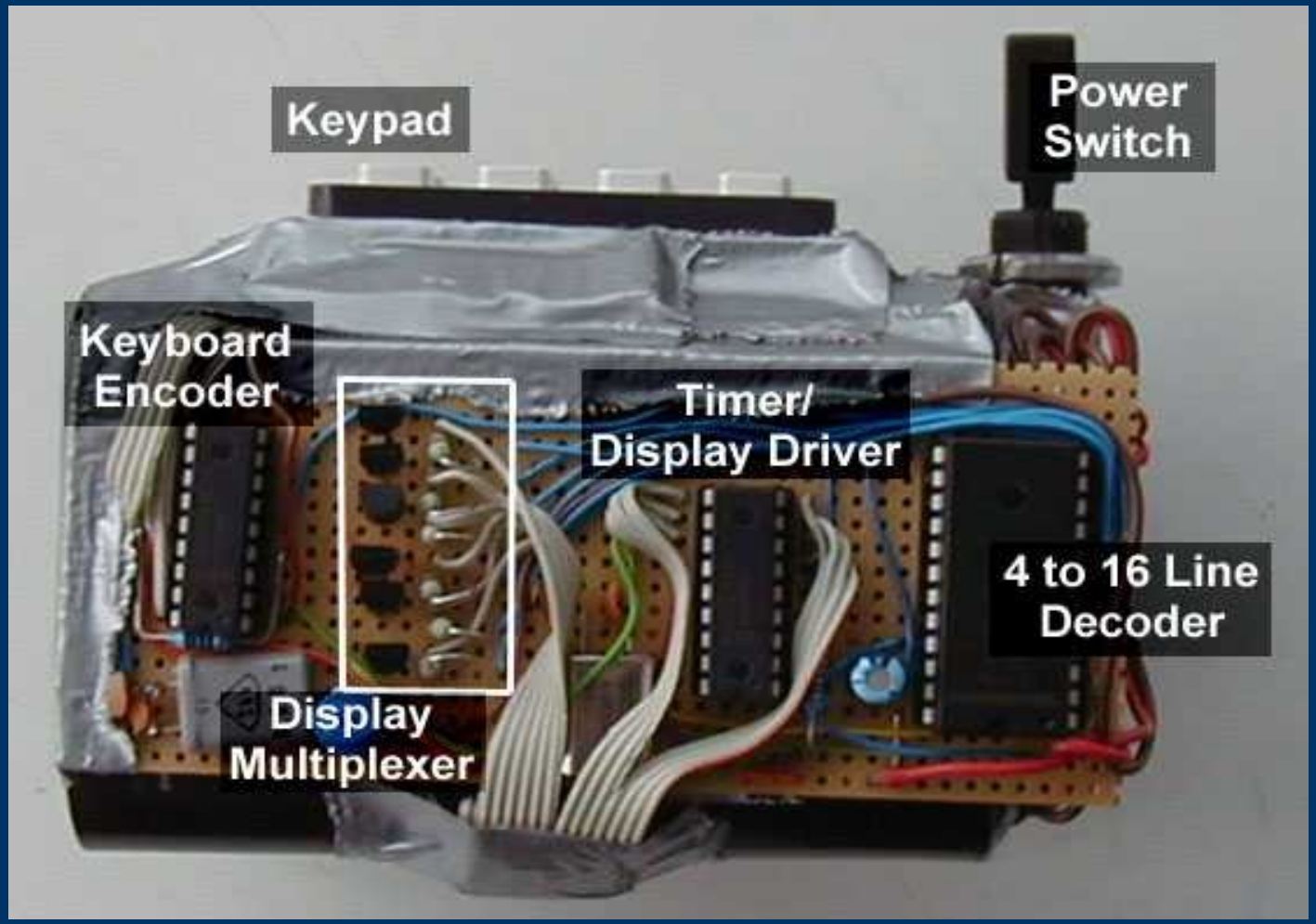
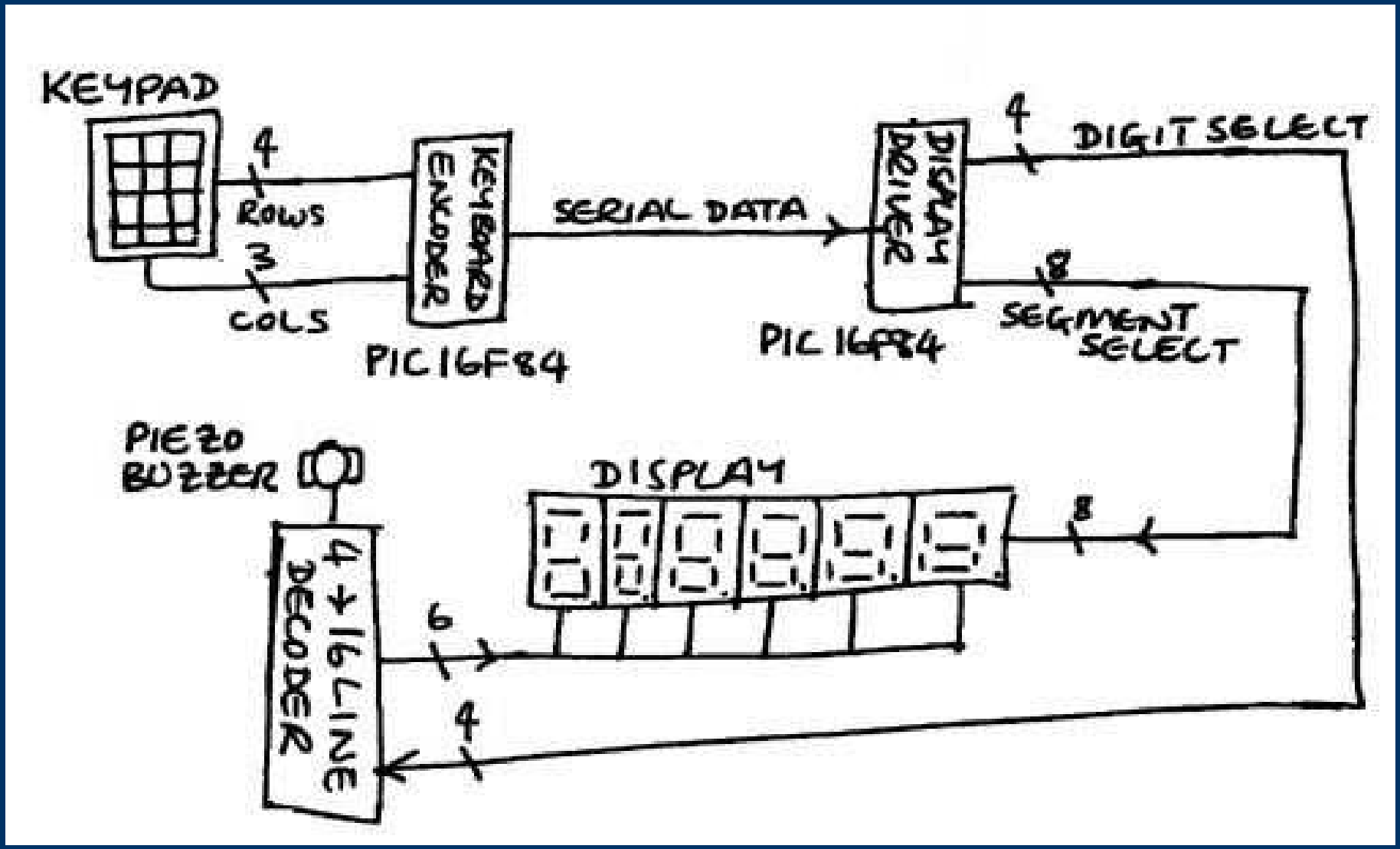
Inspiration

Octopussy (1983)

Proto-prototype



Comprehensively documented...

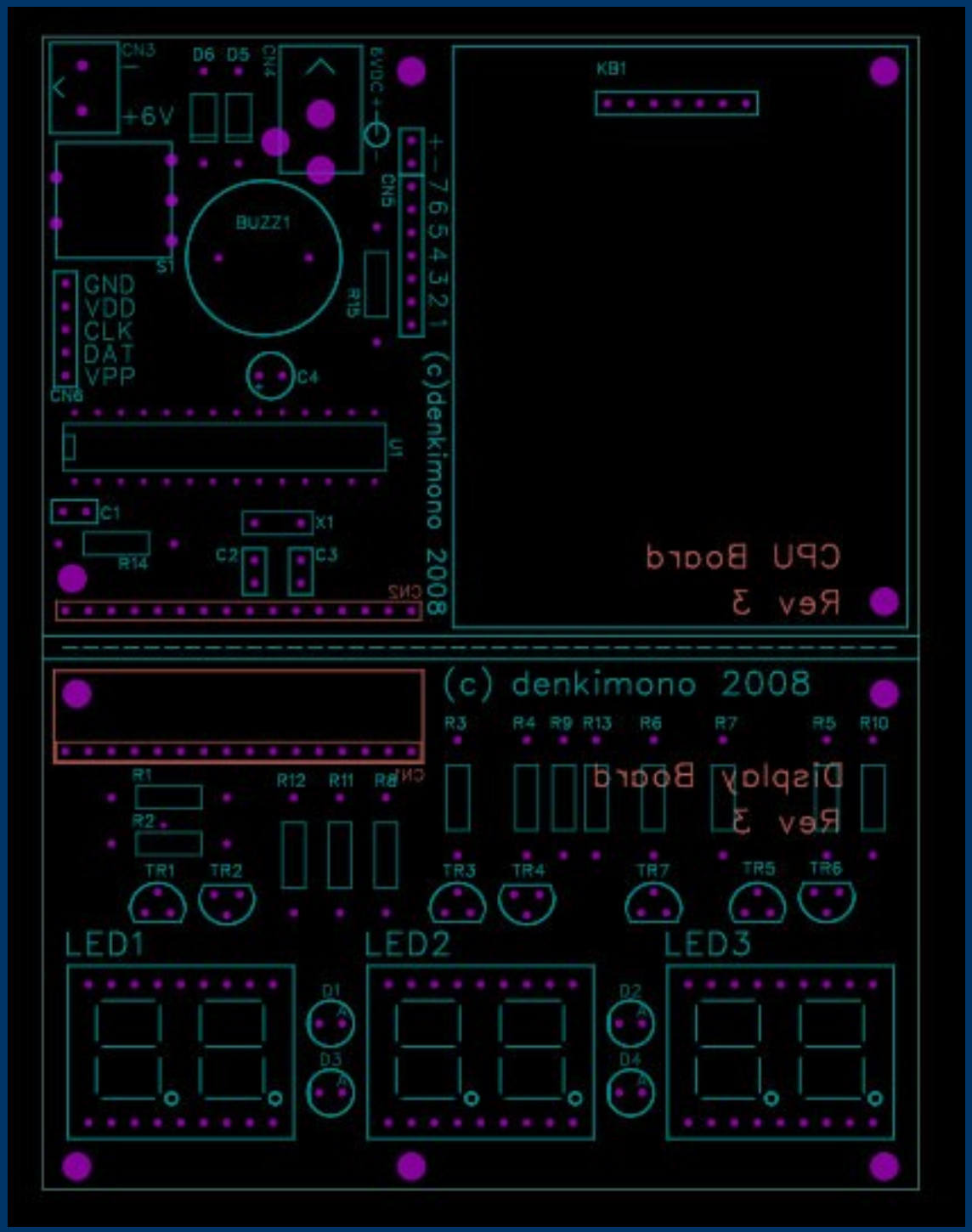


Design limitations

- Had to use through-hole components for home construction
  - limits choice of components that can be used, lots of exciting sensors/displays are only SMD
- Low component count for cost/simplicity
- Small board size for cost

Development

- Design circuit / production prototype
- Write firmware
- Schematic capture (TinyCAD on SourceForge)
- Design PCB (www.freepcb.com)


CN3
D6 D5
CN4
+6V
6VDC
KB1
CN5
BUZZ1
S1
GND
VDD
CLK
DAT
VPP
CN6
R15
C4
U1
(c)denkimono 2008
C1
X1
R14
C2
C3
CN2
CPU Board
Rev 3
(c) denkimono 2008
R3 R4 R9 R13 R6 R7 R5 R10
R1
R2
R12 R11 R8
CN1
Display Board
Rev 3
TR1 TR2 TR3 TR4 TR7 TR5 TR6
LED1
LED2
LED3
D1
D2
D3
D4

Development

- Design circuit / prototype
- Write firmware
- Schematic capture (TinyCAD on SourceForge)
- Design PCB (www.freepcb.com)
- Prototype PCB (www.pcbtrain.co.uk)
- Source parts and create BoM
- Create assembly instructions
- Create operating instructions
- Create website + storefront

Fun phase!

Sales and marketing

- Inventory
  - Rapid and Farnell are expensive but reliable
  - Futurlec (Thailand) are cheap but flaky
  - Some components had no alternative supplier
- Stuff bags
  - Really tedious after the first 50
- Print postage
- Handle support
  - (90% of supports calls from 10% of the people)

Dull phase

- Initially closed sourced, sold as kits or ready built
  - Premium for ready built not enough to justify the effort
  - People who buy ready made expect Sony quality and support so end up dissatisfied
- Closed design meant support was difficult
  - Publishing circuit diagram helped people support themselves
  - Publishing code was hoped to stimulate people to develop their own applications (but it didn't happen)

Why not open source?

- Design might be stolen!
  - But no one did
  - It's a really simple circuit
  - There's no IP, easy to copy
  - If there was a global market then a factory in China would be making them for the world
  - Probably means this won't scale to 1000's
- Even with the designs and source there's still a barrier to entry
  - Need to source parts
  - One off PCB is expensive

Why open source?

- People can fix their own problems
- People can learn (everything I learned I learned from the internet)
- People can modify and extend

Why release at all?

- Forces you to make a thorough job of it
  - Well designed circuit
  - Fully featured software
  - Well documented
- People find applications you never imagined
  - rally timer
  - astro photo timer (red colour is good for night vision)
  - paintball 'capture the flag' timer
  - featured in 2 movies

Flikken Maastricht (2008)

Personality Plus (2009)

Sales

- Nearly 60% of customers from the USA
- 20% from Euronordic countries
- 15% from the UK
- Rest from Australia/NZ/Far East

Links

Prototype website: www.frisnit.com
Kit website: www.denkimono.com

'denkimono' = denki (□□) + mono (□□ = □ 'electric thing' (maybe)