"144 pixels ought to be enough for anybody"

Version	0.1.X	German	Christoph Hintermüller
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Version	0.3.x	German	Christoph Hintermüller
Version	0.3.x	English	Christoph Hintermüller

Contents

The BlinkenArea

The "BlinkenArea" is a meta-project with the objective to promote and strengthen the cooperation between manufacturers and operators of blinking objects. Anybody who is interested in blinking objects and who wants to contribute to it either with hard- or software is welcome. The "BlinkenArea" developed from the very successful area of the "Art & Beauty"-Village at the 2nd Chaos Communication Camp. There some people met who were working on ten different light-projects.

In the following every project of the "BlinkenArea" and its slogan

"144 pixels ought to be enough for anybody"

will be introduced. The slogan developed from the mostly full-scale reproductions of the blinkenlights-project which was the kick off for all our activities. However this does not keep us from sketching and building projects with more or less blinking elements.

History

In 2001 to its 20th anniversary, the Chaos Computer Club gave a giant light installation to itself and the city of Berlin as a present: Blinkenlights. The Group "Project Blinkenlights" converted the "Haus des Lehrers" located next to the Alexanderplatz into an interactive display of 18 by 8 pixels. At this time the house was empty and needed reconstruction. Each of the 144 windows was painted white and illuminated by a computer controlled flood-light. The display was able to show movies sent via email. One was able to call the house and play Ping Pong or recall movies sent via email. Many people used this feature to sent a very special love letter to their beloved.

One year later the "Project Blinkenlights" used the Bibliothèque nationale de France for the installation "Blinkenlights Arcade". In contrast to "Blinkenlights" it consisted of 26 x 20 Pixel and was able to display grayscales. This allowed to use more advanced effects for the movies. Further new games were added. Besides Tetris and Pong you could now play Breakout and Pacman, thanks to a member of the BlinkenArea. For the 20th Chaos Communications Congress the hardware from Paris was used for the installation "Blinkenlights Reloaded" at the "Haus des Lehrers" in Berlin.

ARCADEmaxi
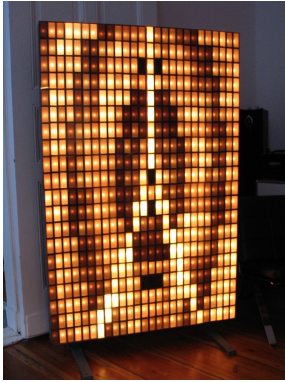
Size:	75 x 150 cm
Light:	light bulbs
Resolution:	26 x 20 pixels
Colors:	grayscales
Technology:	matrix, latches, standalone with PC connection
Conact:	BlinkenArea

Links:

http://wiki.blinkenarea.org/bin/view/Blinkenarea/ArcadeMaxiEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/ArcadeMaxiEnglish

ARCADEmaxi is the big brother of ARCADEmini and thus a replica of the installation Blinkenlights-Arcade by "Project Blinkenlights" at the Bibliothèque nationale de France in Paris. During the BlinkenArea meeting in June 2004, ARCADEmaxi was built by the participating BlinkenArea members, using 520 little light bulbs and a lot of chips. An ARCADEmini board was used as the core part and 8 additional boards with latches and transistors to drive the light bulbs. The way to control ARCADEmaxi and thus the software is equal to ARCADEmini. Thus aside from standalone operation playing movies and games stored on a compact-flash card, it is possible to use the USB port to connect to PC.

ARCADEmini
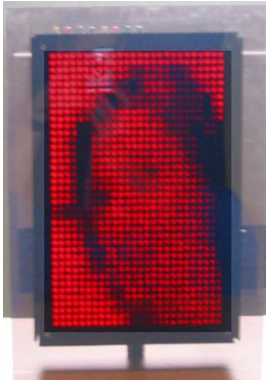
Size:	25 x 35 cm
Light:	low-current LEDs
Resolution:	26 x 20 pixels
Colors:	grayscales
Technology:	matrix, standalone with PC connection
Conact:	sphaera & 1stein (BlinkenArea)

Links:

http://arcademini.schuermans.info/
https://arcademini.schuermans.info/

ARCADEmini is a replica of the installation Blinkenlights-Arcade at the Bibliothèque nationale de France in Paris, which was built by the group "Project Blinkenlights" within the scope of the "Nuit Blanche" in the end of September 2002. The aspect ratio of the 520 windows was indicated by two red low-current LEDs. In order to keep wiring simple, the 520 LED pairs are interconnected by a grid. The cathodes of the LED pairs are connected row by row and the anodes column by column. To control the display matrix via driver-chips a Microchips PIC18 series micro-controller is used. The micro-controller reads the movie data from a Compact Flash card allowing to operate ARCADEmini disconnected from a PC. Additionally it can be connected to a Windows- or Linux-PC via USB.

Besides playing movies, ARCADEmini offers the possibility to play the games, known from Blinkenlights-Arcade. The corresponding programs are loaded by the micro-controller from the

Compact Flash card, and can be controlled by the 8 integrated buttons or by up to two SNES pads, if connected. The core part of this replica is the ARCADEmini circuit board. It contains the whole electronics except the LEDs, the Compact Flash card and the buttons. During 21C3 this board war offered together with the required LEDs as a kit by BlinkenArea.

BLINKENmini

Size:	75 x 50 cm
Light:	super bright LEDs
Resolution:	18 x 8 pixels
Colors:	grayscales
Technology:	shift registers, PC based
Conact:	sphaera & 1stein (BlinkenArea)

Links:

http://blinkenmini.schuermans.info/
https://blinkenmini.schuermans.info/

BLINKENmini is one of the first replicas of the Blinkenkenlights installation by "Project Blinkenlights" at the Haus des Lehrers in Berlin. The main part is a wooden box containing 144 super bright yellow LEDs, separated by a lattice forming the display of 18 x 8 pixels. The LEDs are connected to the parallel port of a PC using amplifier chips and shift registers and are controlled by a Linux kernel module. This project is capable of displaying grayscales values, although the original installation did not support that. The kernel module generates the grayscales by switching the LEDs on and off very fast. The timing is controlled by an external clock generator activating the hardware interrupt of the parallel port. Because Blinkenlights-Reloaded, the second installation by "Project Blinkenlights" in Berlin, was capable of displaying grayscales, BLINKENmini may be announced as a replica of Blinkenlights-Reloaded.

BlinkenLEDs

Resolution:	18 x 8 pixels
Colors:	grayscales: only BLEDpro
Technology:	shifting registers controlled via parallel port
Special:	construction manual
Conact:	Hoo Mair, 1Stein & STephan Kambor (BlinkenArea)

Links:

http://www.blinkenleds.de
http://wiki.blinkenarea.org/bin/view/Blinkenarea/BlinkenLEDsEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/BlinkenLEDsEnglish

BlinkenLEDs project (hardware and player for Windows) from Hoo Mair was one of the first replicas of the Blinkenlights installation by "Project-Blinkenlights". The idea was born during a thread on the jaLCDs board, where they actually talked about blinking keyboard-LEDs. One thing was certain, the set up of the hardware: 144 Low-Current-LEDs should be controlled by shift registers hooked up to the parallel port. Very soon a tutorial was available at `www.blinkenleds.de` and some people started, to build a BlinkenLEDs, too. Later on some etch templates and new software like BlinkenPlayerExxtreme or BlinkenTool were attached. Grayscales are not implemented, but can be simulated in connection with GeM.

GeM
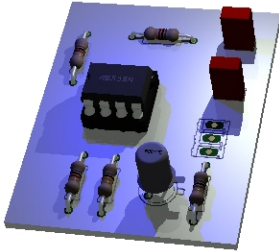
Colors:	grayscales
Technology:	grayscales simulated by kernel, parallel-port interrupts
Special:	Linux only
Conact:	1stein & STephan Kambor (BlinkenArea)

Links:

GeM allows to upgrade BlinkenLEDs based projects to display grayscales. It generates a 2 kHz pulse, which is hooked up to the ACK Pin (Pin 10) of the parallel port. The corresponding hardware interrupts are interpreted by a Linux kernel module, which emulates the grayscales by switching the LEDs on and of at a high rate. There is no need to change the BlinkenLEDs hardware itself. A Windows version is not available at the moment and there are no plans to release one. If there is someone out there knowing how to program windows drivers, we are looking forward to hear about an implementation by you. LittleLights is running reliably since its conversion at the EasterHack 2004.

There is a tradition at BlinkenArea to name circuit boards along parts and software of legendary computers like Atari and Amiga. Thus, this board got its name from the Atari scene. GEM is short for Graphics Environment Manager which denominated the graphical user interface of the Atari operating system TOS.

Bauschild
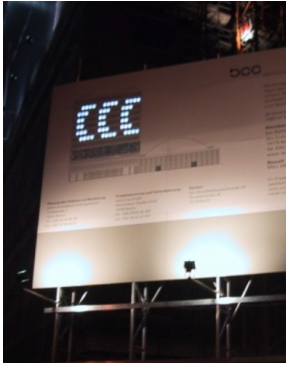
Light:	4 bright LEDs each
Resolution:	18 x 18 pixel
Colors:	grayscales
Special:	games, callable
Conact:	Project Blinkenlights

Links:

Bauschild is a replica of the Blinkenlights installation by "Project Blinkenlights". Aside the fact that this project was built by "Project Blinkenlights" it was mounted on the construction site sign during the redevelopment of the "Das Haus des Lehrers" (2002-2004).

In contrast to the first Blinkenlights installation the Bauschild displays grayscales. Thus, it can be considered a replica of the Blinkenlighs-Reloaded project. During 20th Chaos Communication Congress both were setup aside each other. Everybody passing by the construction site could check and prove that that the Bauschild supports the same features as Blinkenlights-Reloaded, such as Love Letter and games like pong.

BlinkStroemAdvanced

Resolution:	18 x 8 pixel
Colors:	8 grayscales
Technology:	micro controller Atmega16;
	pulse width modulation
Special:	SD/MMC slot; FAT16
Conact:	Kai Gossner (BlinkenArea)

Links:

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http://wiki.blinkenarea.org/view/Blinkenarea/BlinkstroemAdvancedEnglish
https://wiki.blinkenarea.org/view/Blinkenarea/BlinkstroemAdvancedEnglish
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BlinkStroemAdvanced   BlinkstroemAdvanced consists of a single board, supporting all components: power supply, micro-controller (Atmega16), SD/MMC slot and 144 LEDs. In contrast to the first version (BlinkStroem) SD- and MMC cards are used to store the data. To facilitate movie updates, the image data are directly loaded from a FAT16 file system, installed on the card.

The grayscales are generated by pulse width modulation. Because the brightness of the LEDs is nonlinear to the tentative ratio, the pulse width is nonlinear adjusted. This ensures an evenly distributed light intensity at the expense of only 8 grayscales. Sadly only a few grayscales movies encoded in Blinkenlights-Reloaded format are available.

BlinkStroem
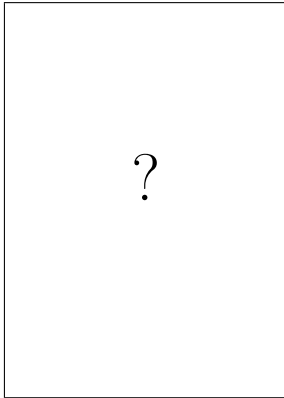
Resolution:	18 x 8 pixel
Colors:	8 grayscales
Technology:	micro controller Atmega103
Special:	external clock
Conact:	Kai Gossner (BlinkenArea)

?

Links:

http://wiki.blinkenarea.org/view/Blinkenarea/BlinkStroemEnglish
https://wiki.blinkenarea.org/view/Blinkenarea/BlinkStroemEnglish

BlinkStroem is the predecessor of BlinkstroemAdvanced. It consists of 2 boards, the first, a simple experimental board, carries the LED-matrix and the second a microchip (Atmega103) and an external clock circuitry. It can only play black-and-white movies from internal Flash-memory.

LittleLights

Light:	36 V small sized light bulbs
Resolution:	18 x 8 pixels
Technology:	18 x 8 Bit shifting register, PC, amplifier
Conact:	STephan Kambor

Links:

LittleLights is a replica of Blinkenlights at a scale of 1:42. It was designed to display the original Blinkenlights movies and offers the same features and functions as Blinkelights You can call it by phone to play pong against the computer or a second caller. The love-letter allows to start a love-letter movie which was uploaded by mail or web by phone. It is can operate as a Winamp analyzer and display news, status messages and many more.

The basic hardware is equal to BlinkenLEDs where 144 low-current LEDs are connected via 18 8bit shift-registers to a standard PC with centronics-port. The LittleLights-hardware is controlled in exactly the same way, except that an amplifier-PCB drives 144 small lamps. The miniature-house is 115 cm high and contains the hardware (PC, PCBs, power-supply, ...). The project consists of a little heterogeneous network of 4 computers, which provide a lot of functions and services.

RotArcade

Size:	360°, R=6.5 cm
Light:	20 LEDs
Resolution:	512 x 20 pixels
Colors:	8 grayscales
Technology:	rotating LED array
Special:	Flash memory, IR port
Conact:	Kai Gossner (BlinkenArea)

Links:

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http://wiki.blinkenarea.org/viw/Blinkenarea/RotArcadeEnglish
https://wiki.blinkenarea.org/viw/Blinkenarea/RotArcadeEnglish
```

RotArcade   is a combination of the propelling clock and Arcade. An illusion of a stationary 360 ° screen displaying 512 x 20 pixels is generated by 20 LEDs spinning at about 3000 rpm. Fast pulse width modulation (PWM) is used to create 8 grayscales. RotArcade can be controlled by a computer using a simple infrared link. Alternatively BlinkenLights and Arcade movies stored on the internal 128 kB flash memory can be displayed, in case no connection to a computer is available.

XMasLights
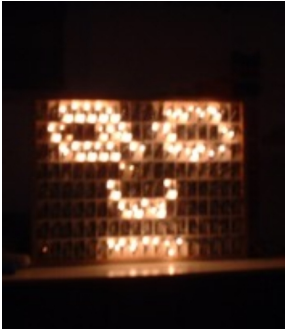
Light:	fairy lights
Resolution:	18 x 18 pixes a 2 lamps
Technology:	shifting registers, PC with RS232 at 9600 Baud
Conact:	Kai Gossner

Links:

http://www.elektronikseiten.de/anderes/blinkenlights/
http://wiki.blinkenarea.org/bin/view/Blinkenarea/XMasLightsEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/XMasLightsEnglish

XMasLights is a BlinkenLights replica made of 288 lamps from fairy lights which are controlled via the serial port. The lights are turned on and of by a simple terminal program or a Blinken-PlayerExxterne plugin, driving the serial port at 9600 Baud in 8N1 mode.

In future movies will be read from a 512 KByte flash chip and an infrared remote will be used to play Pong against the computer. Directly storing the byte sequences on the flash chip instead of the text based BLM files combined with a basic RLE leaves enough space for a large number of films.

BlinkenNums

Size:	19 x 11 cm
Light:	LED 7-segment 1.5-digit displays
Resolution:	4 x 4 displays, 10 segments each = 160 segments
Colors:	red & green
Technology:	Number-/Text-Display, controlled by the PC's parallel port
Special:	Not pixel-based
Conact:	Arne Rossius (BlinkenArea)
Links:	

http://wiki.blinkenarea.org/bin/view/Blinkenarea/BlinkenNumsEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/BlinkenNumsEnglish

BlinkenNums was built from spare 1.5-digit LED displays for which I couldn't think of any other use. Using red and green displays allowed to use as much as possible. At first I only aimed at displaying random numbers, but while experimenting with the new display the idea to display text arose. The low number of segments per display, reduces readability of some letters especially K, M, V, W and X.

The 40 segments of each display line are controled by 5 8 bit shifting registers. This allows to drive of the LEDs in static mode (while on, current is flowing through the LEDs all the time). This ensures that the LEDs reach their maximum brightness and the display doesn't flicker. The shiftng registers are ICs from the 74HC-series and provide up to 25 mA per output. Thus BlinkenNums, which uses 5 mA, doesn't need any additional driver chips.

C64Lights
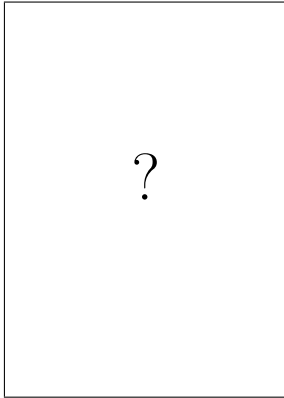
Resolution:	8 x 8 Pixels
Technology:	Circuit board controlled by C64, datasette storing movies
Special:	grayscales (freeze)
Conact:	Rene Schickbauer (BlinkenArea)
Links:	

http://wiki.blinkenarea.org/bin/view/Blinkenarea/C64LightsEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/C64LightsEnglish

C64Lights is a 8 x 8 pixel project for the CbC2004 with the legendary C64. The Commodore 64 was sold 30 million times, Thus it is the most sold computer - even nowadays. As a consequence it is listed in the Guinness Book of Records. Movies and software is stored on a datasette - one of the most slowest mass storage devices ever built. A standard TV set can be used to control the C64Lights.

GroggyClock

Size:	approx 35 x 35 cm
Light:	LEDs
Colors:	red, blue
Technology:	PiC16F84, shifting register
Conact:	Sascha Ludwig

Links:

http://wiki.blinkenarea.org/bin/view/Blinkenarea/GroggyClockEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/GroggyClockEnglish

GroggyClock uses the PIC PiC16F84 to drive the seven segment displays used to display the hour and minute and the 72LEDs indicating the seconds elapsed. The name of this project derived from the clocks built by Groggy-Timing.

The clock is synchronized via the DCF77 radio signal transmitting the reference time. The final model should allow to control various timer functions via RS232 serial port. Further the built in temperature sensor and other clock settings should be accessible via RS232.

In order to be able to use LEDs with different color and brightness, the different parts of the clock's display are connected to different output ports of the PIC. The brightness of the LEDs is set via pulse width modulation.

PapierPixel
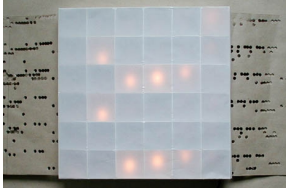
Light:	two 12 V, 1.2 W ferry lights, 18 lamps each
Resolution:	6 x 6 pixels
Technology:	punchcard
Special:	programmed frame by frame
Conact:	Aram Bartholl

Links:

PapierPixel

PaperPixels is a manually controlled black and white display with a resolution of 6 x 6 pixels. Each of the 36 pixels is 4 cm square and is illuminated from behind by white fairy lights. The individual pixels can be controlled by holes punched into slips of paper as in pianolas or punchcard computers. In contrast to the computer punchcards of the 1960s, Paper Pixels converts the information represented by the holes along the 36 tracks on the paper strip directly into light. This allows to control each pixel individually. PapierPixel is a retrospection of a display technology never built.

The light source has a size of 29 x 29 x 2 cm and contains two fairy lights with 18 lamps each. Its built from cardboard of 1 mm thickness and covered by tracing paper providing a better dispersion of the light. It further ensures that the punchcard smoothly

glide through the PapierPixel device. The special mounting of the lamps ensures that there is one lamp per track.

The pixel box has a size of 29 x 29 x 3 cm and contains a grid made from cardboard stripes. This grid forms the pixel matrix and is again covered by tracing paper to enhance the light dispersion. In between the light source and the pixel-box there is a gap only a view millimeters wide provided for the punchcards.

The data medium is a thick paper punch card 29 cm wide and can be any length larger than 29 cm. The punch card is programmed with a computer developed specifically for it in the form of a pantograph consisting of two oblong wooden plates. One of the plates carries 36 sharp metal pens on springs, positioned to correspond exactly with the pixel holes in the light unit. The punch card is placed between the two plates and the metal pens are punched through the paper manually The springs ensure that the pens return to their original positions. This 36 pen perforator allows to program the movies on a per pixel basis, by pulling the punchcard frame for frame through the pantograph. Errors can be corrected by occluding single "bits" or holes with opaque adhesive tape.

ProjectBlinky
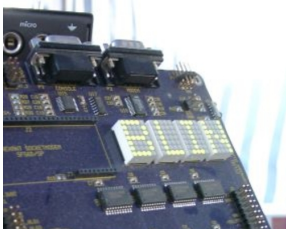
Light:	5 x 7 LED matrix
Resolution:	20 x 7 pixels
Technology:	Zilog development board
Conact:	Rene Schickbauer (BlinkenArea)

Links:

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http://wiki.blinkenarea.org/bin/view/Blinkenarea/ProjektBlinkyEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/ProjektBlinkyEnglish
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ProjectBlinky Blinky was a little project just for testing my Zilog Development-Board. It was planed to develop BlinkenKnees base on this board till the congress 2003. Actually I brought it with to the camp just for fun, but then Blinky turned out to be a real little attraction. The Zilog Development Board is a really nice thing. At the Camp I used for powering ProjectBlinky. But actually the Z80-processor is totally over-powered for such a simple application (99.99 % of the clock cycles were wait states). Thus, I decided to use the board for building BlinkenKnees.

TroiaPrototyp

Size:	1,20x2,70m
Light:	SMD LED's (LW T673)
Resolution:	18 x 8 pixels a 5 LEDs
Colors:	128 grayscales
Technology:	pulse width modulation, pixel drivers, splitters, PC with USB 2.0 port
Conact:	BlinkenArea & BBM (http://www.bbm.de)
Links:	

```
                    http://www.bbm.de/troia/troia.html
  http://wiki.blinkenarea.org/bin/view/Blinkenarea/TroiaPrototypEnglish
  https://wiki.blinkenarea.org/bin/view/Blinkenarea/TroiaPrototypEnglish
```

TroiaPrototyp is a case study which was built in cooperation with the BBM group. The goal was to develop a technology for the Project Troia, which allows to build a room where 20.000 pixels are installed and use them to display 128 grayscales. To test the feasibility of our project, we built a prototype with 144 pixels. We chose 144 pixels to be able to reuse the already existing Blinkenlights movies and games, as well as parts of the software which is used to control other available projects. The system designed is based upon modules allowing to start with a small prototype. In case it is working with 144 pixels, it can be extended to control more pixels.

Each pixel consists of 5 very bright,serially connected white SMD LEDs. To generate the 128 grayscales pulse width modulation (PWM) is used to switch the LEDs on and off at a rate of 100Hz. The human eye is not able to detect the flickering of the pixel.

Because a single PC is not able to generate the PMW-signals for 20.000 pixels, this is done by the Troia pixel boxes controlling up to 32 pixels. For the prototype only 24 pixels were connected to each of the 6 modules. The data displayed are serially transferred via a 10 mA Current Loop (galvanically decoupled by an opto-coupler) operating at a rate of 38400 bps.

To be able to easily increase the number of pixels connected to a single PC, we developed the Troia splitting modules. These are able to generate the serial data for up to 32 pixel modules. Thus each splitter controls up to 1024 pixels. Via USB 2.0 then 20 splitters (or more) can be connected to a Linux PC.

MegaClock

Size:	95 x 28 x 7.5 cm
Light:	201 fairy light light bulbs
Resolution:	4 digits, colon, hyphen
Colors:	white
Technology:	7-segment displays
Special:	No pixel-based project
Conact:	Arne Rossius (BlinkenArea)

Links:

http://wiki.blinkenarea.org/bin/view/Blinkenarea/MegaClockEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/MegaClockEnglish

MegaClock is a huge clock with four 25 cm high digits consisting of 201 fairy light bulbs. Several 100 bulb fairy lights were cut into pieces of 7 lamps each. They are powered by two transformers providing 18 V AC at 2.2 A each. An AVR microcontroller controls the displays and receives the german DCF77 signal to synchronize the time. After the software will be finished, the clock can be used as a normal clock with date display, as an alarm clock or as a fully programmable countdown. Setting the alarm timer or switching between the different clock modes, will be done using an infrared remote control. In addition, a small speaker is built into the clock which is directly connected to the controller. Thus it is possible to play all kinds of sounds and even small melodies.

Each display segment is connected to a single shifting register switching each segment on and off through transistors. In order to ensure that the two dots forming the colon and the hyphen

can be powered by the same voltage as the fairy lights resistors are used. The current from the transformers is just rectified but not smoothed as the lamps are to slow to flicker that fast. One transformer is used for each half of the display. For the circuitry the current is smoothed and stabilized so no additional power supply is needed. However, because of the big difference between $18\,\mathrm{V}$ and $5\,\mathrm{V}$, a large amount of heat is produced by the voltage regulator. Thus one has to pay attention to a proper cooling.

Blinkopeutic products

We a sorry for littering this press kit with blinkopeutic commercials but we too need funding. It has to be noted that all blinkopeutic products listed here may only be made available via BlinkenArea. They have to be prescribed by your blinkopeutic doctor.

Warning: In case of questions concerning side effects an application ask your blincopeutic doctor, BlinkenArea or read the package insert.

KippenLights

Size:	cigarette packet
Light:	LEDs
Resolution:	heart shape of 18 LEDs
Special:	relieves withdrawal syndrome
Conact:	Rene Schickbauer

Links:

http://wiki.blinkenarea.org/bin/view/Blinkenarea/KippenLightsEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/KippenLightsEnglish

KippenLights is a flashing heart mounded inside a cigarette packet. It helps reducing the withdrawal syndrome in case of severe Blinkoholism, especially when it is not possible to use normal sized projects.

Warning: KippenLights is used as a blinkopeutic substitution device and thus may only be made available via BlinkenArea.

AntiKippenLights
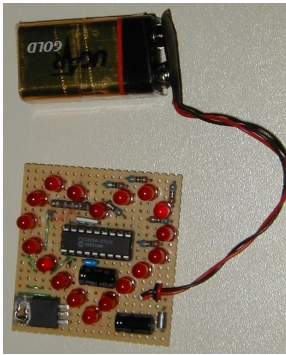
Size:	cigarette packet
Light:	LEDs
Resolution:	heart shape of 18 LEDs
Colors:	grayscales
Technology:	PIC-Micro-controller
Special:	random number generator (seed generated by electromagnetic pollution)
Conact:	1Stein (BlinkenArea)
Links:	

http://wiki.blinkenarea.org/bin/view/Blinkenarea/AntiKippenLightsEnglish
https://wiki.blinkenarea.org/bin/view/Blinkenarea/AntiKippenLightsEnglish

AntiKippenLights also called KippenLightsSpecial, is the successor of KippenLights and was presented to the public on 21C3. It is based on a PIC-Micro-controller which is capable of driving each LED separately. This allows to display several different flashing light effects, some of them even use grayscales. The order of the sequences is selected by a random number generator, coupled to an electromagnetic pollution detector[1].

Due to the special technique[1] used for electromagnetic pollution detection, AntiKippenLights was officially announced to be a therapeutic device in electromagnetic-pollution-feedback-therapy. Studies proove that patients suffering from electromagnetic pollution complain a lot less about insomnia and stress and feel even-tempered and calm after using AntiKippenLights.

Warning: AntiKippenLights is used in electromagnetic-pollution-feedback and blinkopeutic substitution therapy. In addition to the side effects known from KippenLights, AntiKippenLights did provoke the acute Me-Too-Must-Have-Syndrome. There is not a single case known that this did not happen.

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[1]The antenna my friend is blowing in the wind

LogoLights
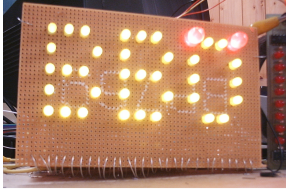
Light:	LEDs
Technology:	shifting register, clock generator
Conact:	Rene Schickbauer

Links:

LogoLights

is a suitable for treating boredom, as proved by the following
case:

```
"[...]
 Blinkoholic about LogoLights:
   I was not bored, i just wanted to construct something
   which does NOT need ANY software. Lucky me, my
   favourite electronic parts dealer just had announced
   Christmas sale ...
   (silence)
   OK, OK, i admit, i was bored.
 [...]"
```

Warning: It is proved that blinking projects cause blinkoholism, thus they may
only be applied when supervised by a medical doctor.

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