

# *GNU GPL LED Display*

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## Who am I?

- Hacker around GNU, Linux, ...
- Chairman of FSIJ (Since 2002)
- Researcher at: National Institute of AIST, Japan  
...who hacks embedded kernel technology
- (1999) Founder of GNU/Linux on SuperH Project
- (2001-2002) Project Manager of “Exploratory Software”
- (2003-2004) Councillor of IPA for “Open Source Project”
- Debian developer



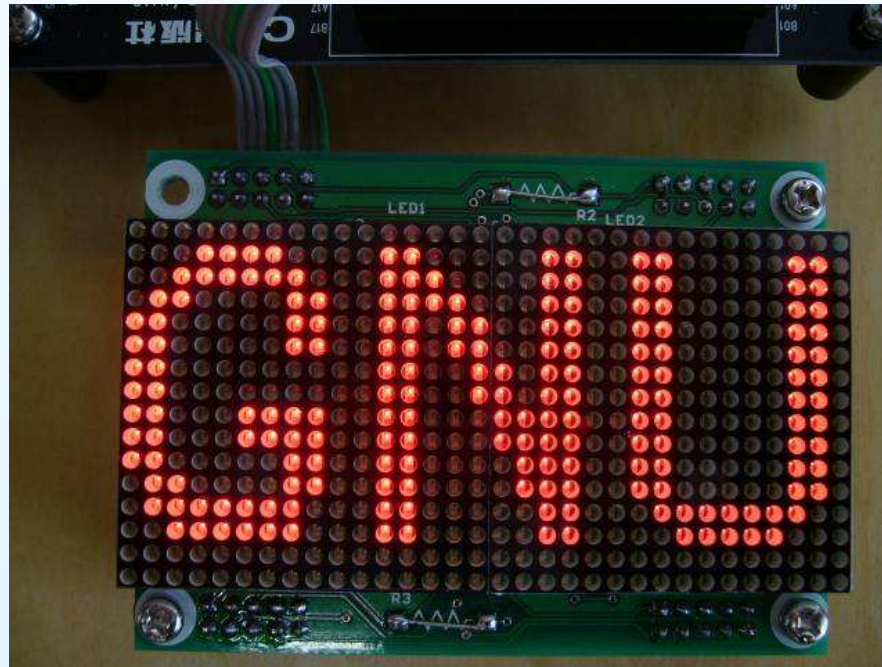
# Free Software in Japan

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- Japanese Government, METI, supports “Open Source Software”
- Free Software Developments are “OK”, nowadays
  - We have a niche
- GNU/Linux in Japan
  - Not popular for Desktop, but...
  - Becoming popular for Server and Embedded systems
- DRM...
  - Engineer tends to like new technology...

# Promote GPLv3! Promote Free Software!

- GPLv3 *is* important, but for Japanese...
  - Reluctant/hesitate to join the process
  - There is language barrier
  - Most Japanese misunderstood it's "read-only"
- Let's read it, everyone!



# GNU GPL LED Display (1)

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- Summer of “Hard” Project
- Purpose
  - Promote GPLv3
  - Promote Free Software
  - Consider Copyright and License
  - Happy Hacking (even on Hardware)!

## GNU GPL LED Display (2)

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- Implementations
  - FPGA implementation (“GNU”)
  - Experimental CPLD implementation (“GNU”)
  - Initial implementaiton (GPLv3 preamble)
    - Text:  $\simeq$  3100byte
    - 50400 columns of 16-dot

## GNU GPL LED Display (3)

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- Technology
  - LED Matrix
    - Akizuki's 32x16 LED matrix kit
  - CPLD (Complex Programmable Logic Device)
    - MAX II (EPM240T100CS)
    - 240 logic elements
    - $\simeq$  4200 gates
  - Verilog
    - Hardware description language

# GNU GPL LED Display (4)

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- Components
  - LED Matrix board (Akizuki)
  - CPLD board (Transistor GIJUTSU 2006-04)
  - RAM+ROM board (2114, 24C512)

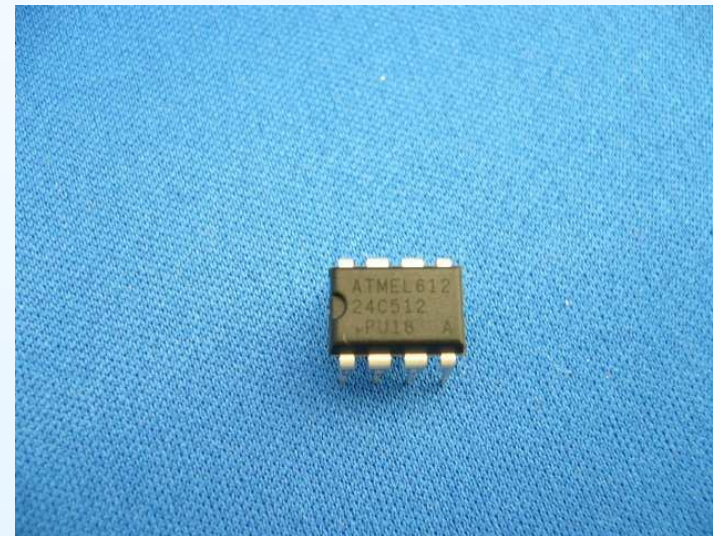
## GNU GPL LED Display (5)

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- Code in Verilog ( $\simeq$  300 lines)
  - Divider
  - Matrix Driver
  - Serial EEPROM driver
  - RAM driver
  - main module
- 16-dot at a time
- $\simeq$  180 logic elements

## GNU GPL LED Display (6)

- Copyright
  - to display publicly
  - Permission by Free Software Foundation, Inc.
- “Copy”



- GPLv3 preamble on a chip

# Future

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- Entire GPLv3 on 24C512
  - Character generator
- USB device implementation?
- More freedom around hardware development

## References

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1. Gniibe on the web  
<http://www.gniibe.org/>
2. GNU/Linux on M32R Project  
<http://www.linux-m32r.org/>
3. Codeblog (in Japanese)  
<https://www.codeblog.org/>