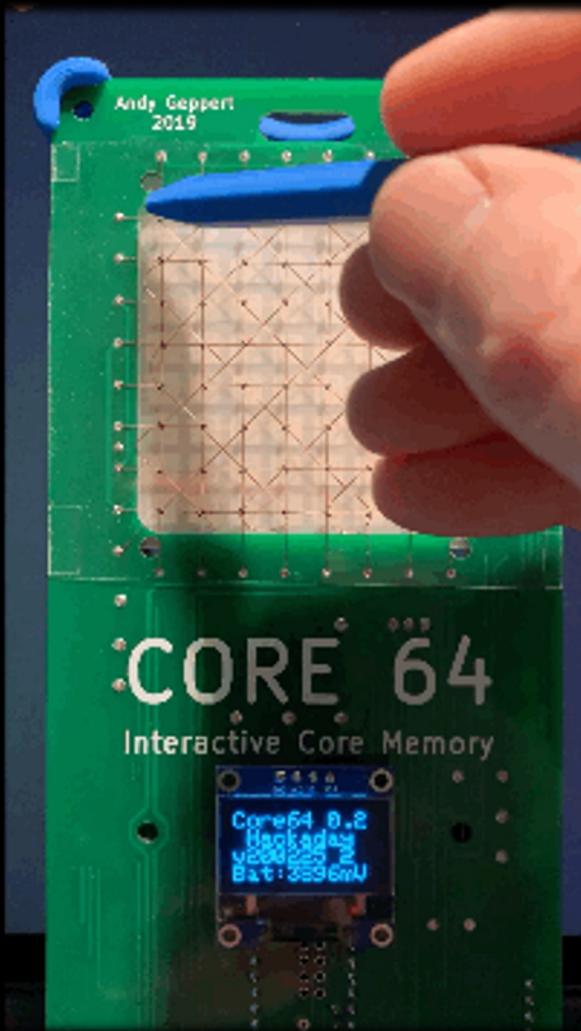


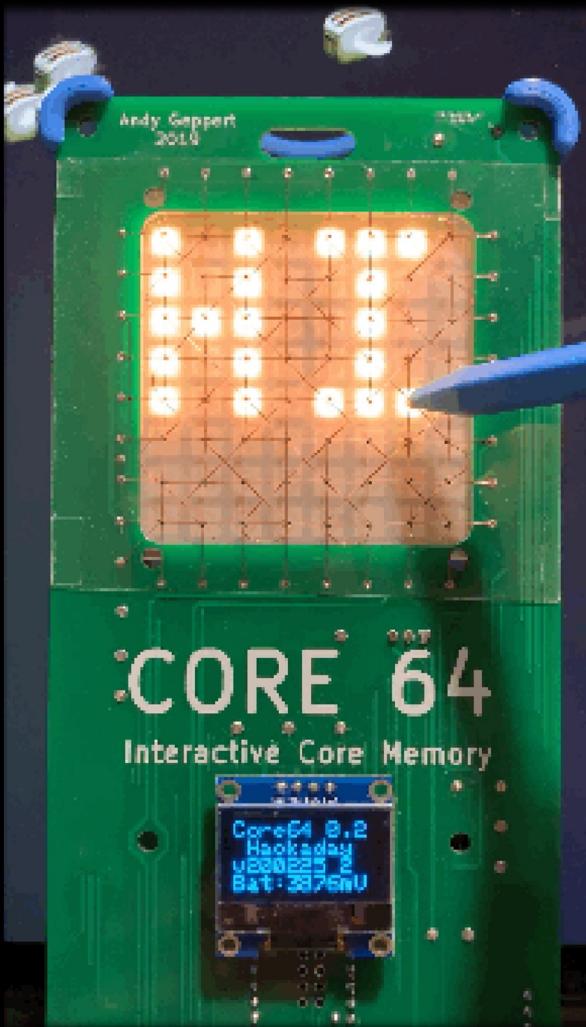
Interactive Core Memory



Intro What How Demo Q&A Future

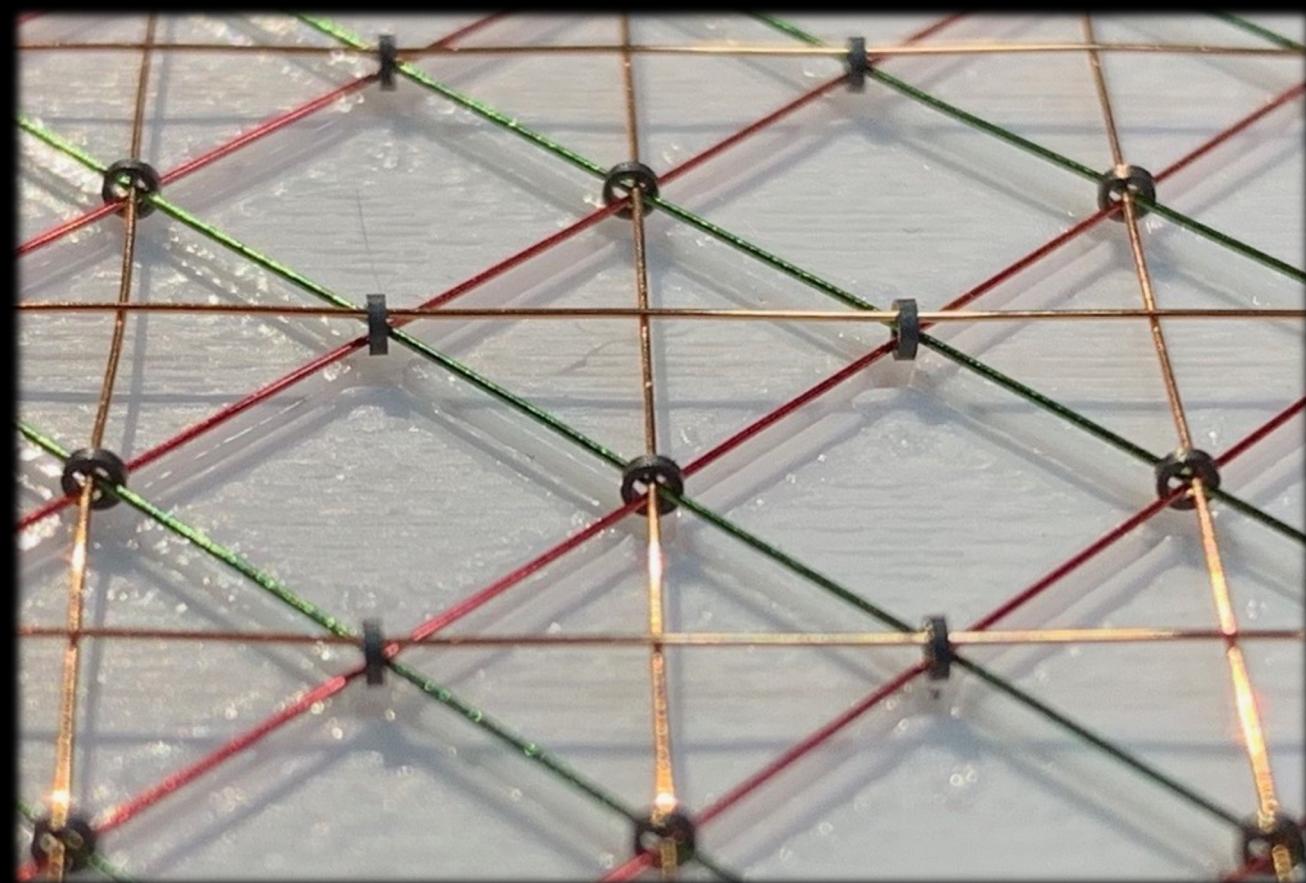
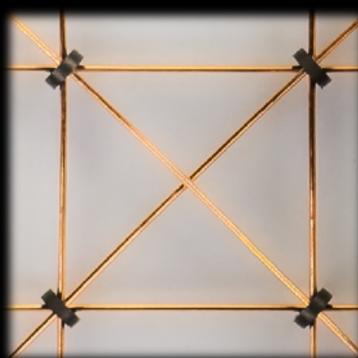


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Intro What How Demo Q&A Future

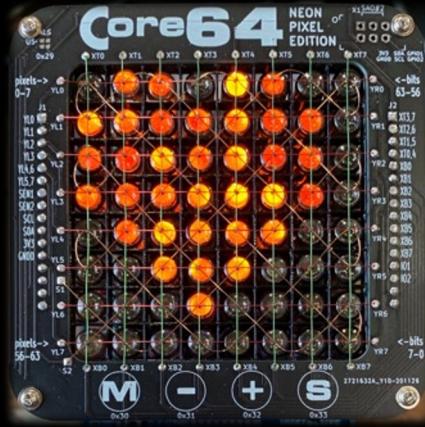
is Core Memory?



- Magnetic memory
- Small ring, ferrite, magnetizable
- One ring = one core = one bit of RAM
- Core magnetized CW or CCW
- CW or CCW = logic 0 or 1
- X and Y drive wires (write)
- Diagonal Sense Wire (read)

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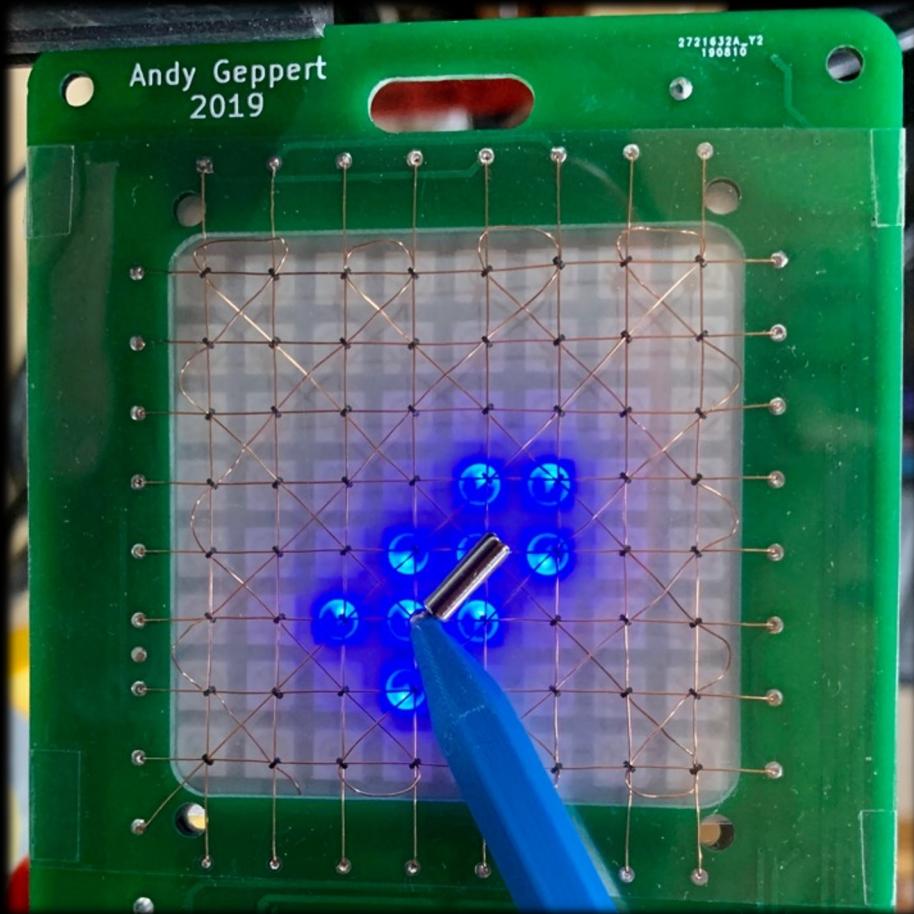
is so cool about Core Memory?



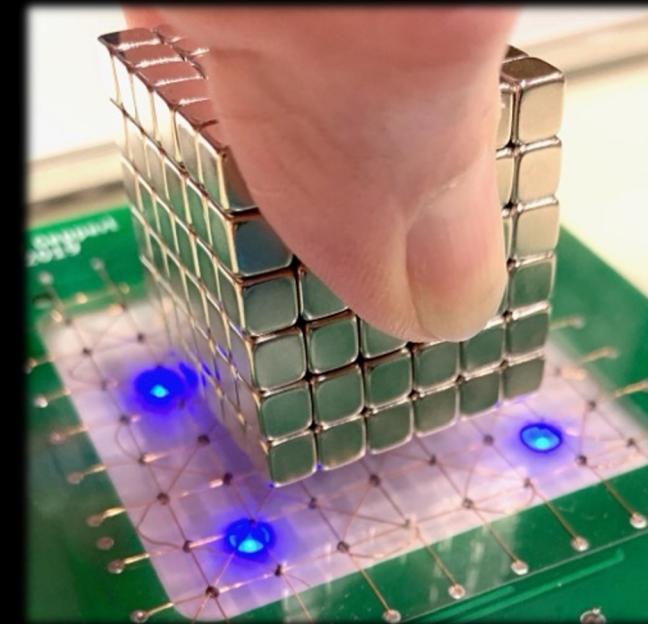
- Individual, tangible bits of memory
- Fundamental to computers
- Woven
- Non-Volatile, but uses destructive read
- Historical, popular in the 60's/70's
- Apollo Guidance Computer RAM & ROM
- Magnetism

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is *Interactive Core Memory*?



- 64 Cores = 64 bits of Core Memory
- + 64 LEDs = Visualized Core Memory
- + Magnet = Interactive Core Memory



Intro What How Demo Q&A Future

was this project inspired?

Magnetic core memory reborn

Ben North, Oliver Nash

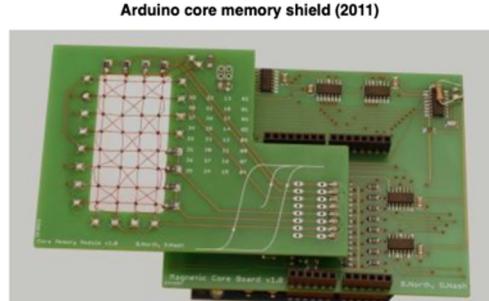
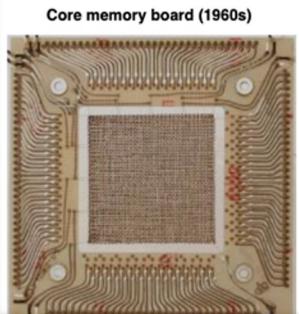
May 9, 2011

Abstract

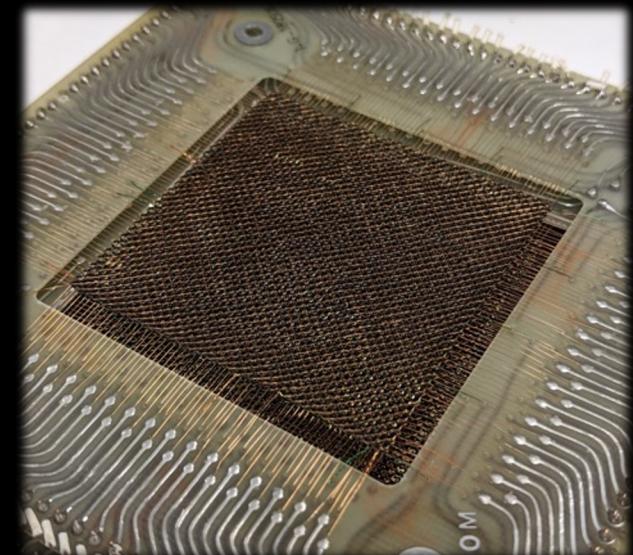
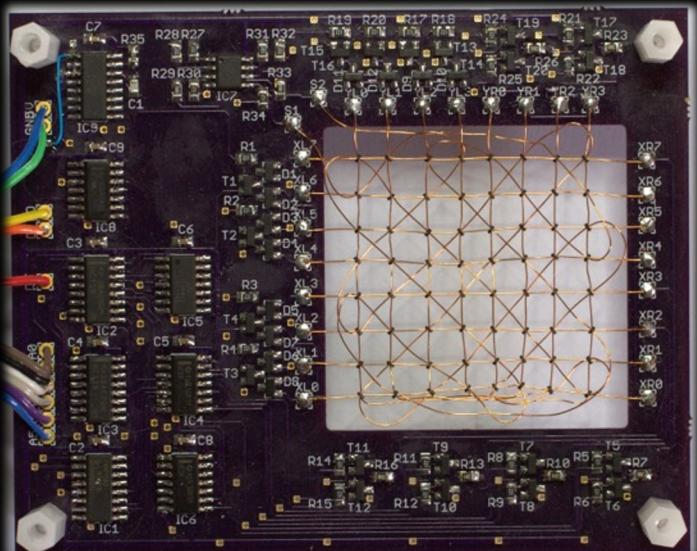
We outline the theory of magnetic core memory, and describe the design and fabrication of a core memory Arduino shield.

Magnetic core memory reborn

Ben North
Oliver Nash



- Core Memory Exhibits (CHM, LCM+L)
- Paper by North & Nash www.corememoryshield.com
- 8x8 by Rolfe Bozier www.rolfebozier.com/archives/113
- Hasn't someone made a kit yet?

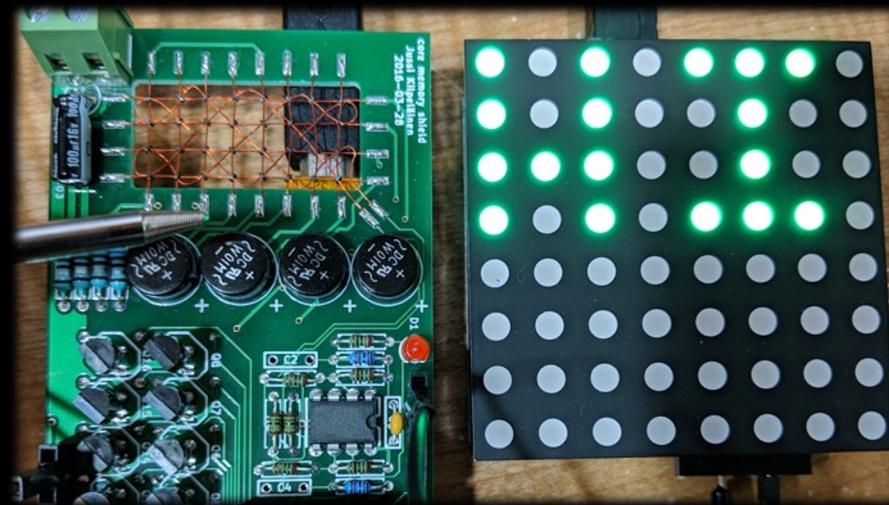


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did I stumble into this project?

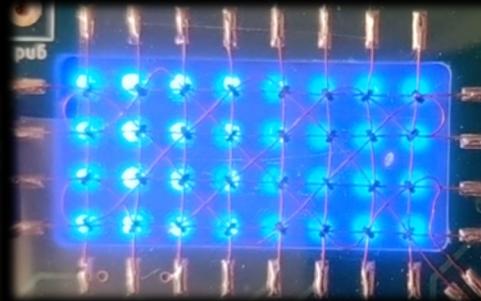
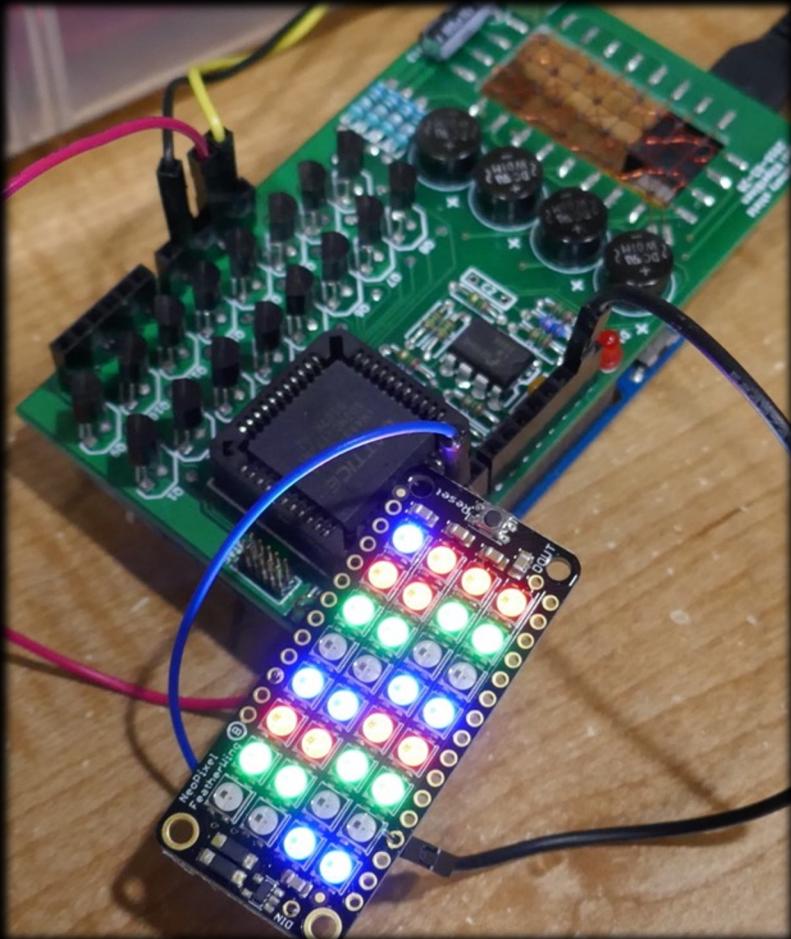
The screenshot shows a product page for the "Core Memory Shield for Arduino" on the Tindie website. The main image displays the green printed circuit board (PCB) with a grid of ferrite cores. The price is listed as \$39.90. Below the main image are three smaller thumbnail images showing different angles of the shield. A brief description states: "A retro 32-bit memory for Arduino using ferrite cores." The seller is listed as "Designed by Jussi Kilpelainen in Finland". The page includes standard e-commerce features like a quantity selector, an "Add to Cart" button, and social sharing links.

- Jussi's Core Memory Shield Kit on Tindie
- First time weaving core memory - now what?
- What if I could see the states of the cores?
- What happens with a magnet near the cores?
- I can draw in core memory!

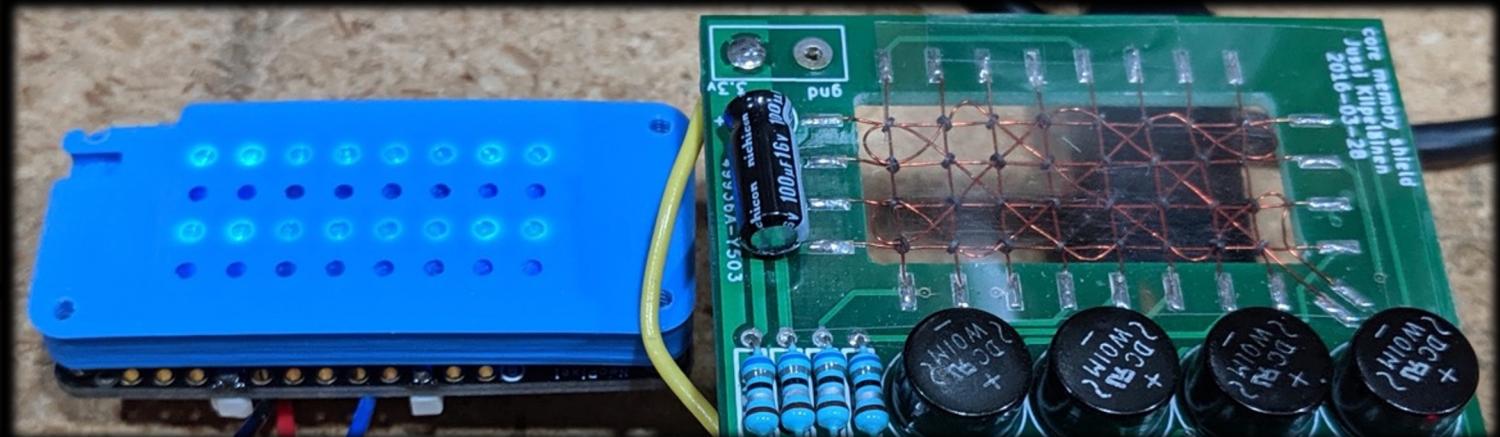


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interested are others?

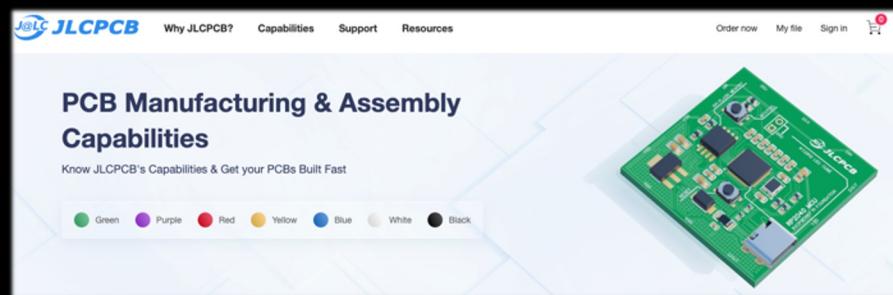


- Hasn't this been done before?
- Maker Faire, CHM, Share-a-Hack
- HDDG, 3H
- Heroes of Hardware Hack Night @CircuitLaunch
- Element14 Magnetism Contest
- Hackaday Contest, Hackaday.io
- "Please make this kit! I want one!"

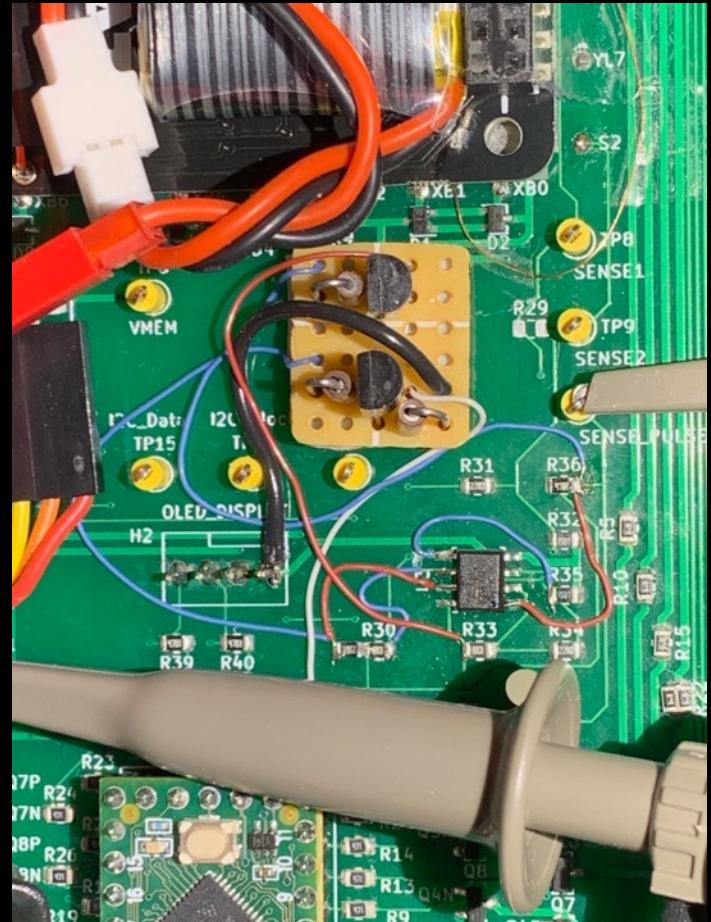


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did I make it?

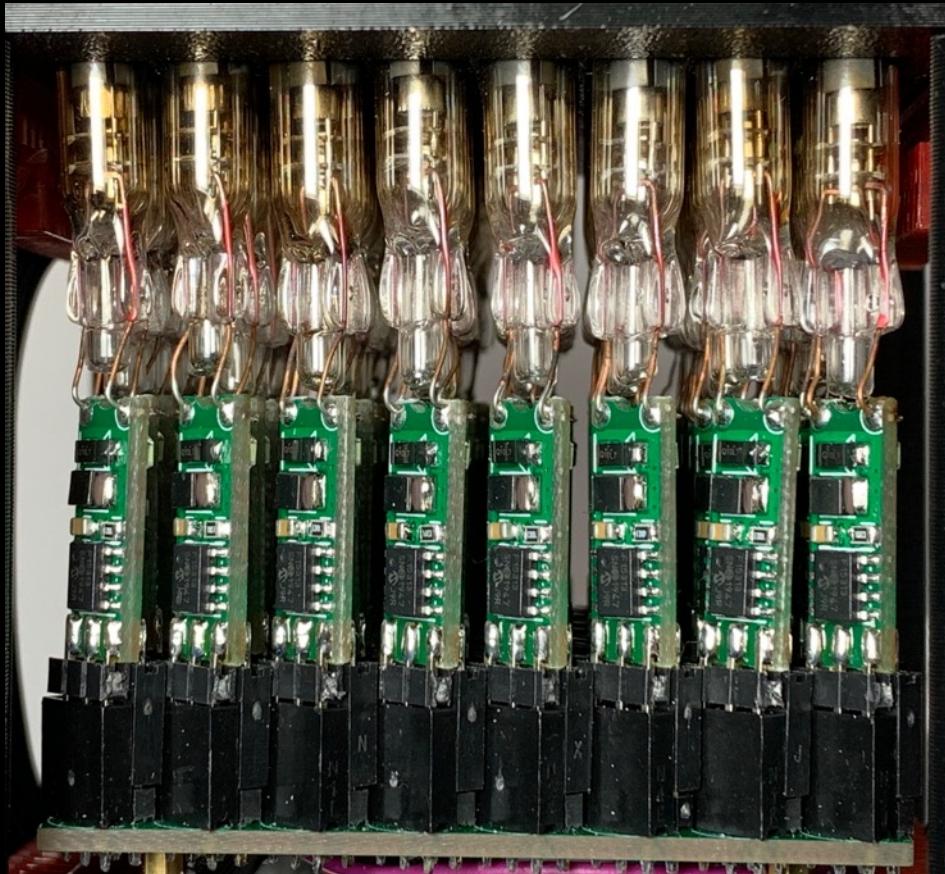


- Learn to design a PCB (or four!)
- Shawn Hymel / Digi-Key
- Chris Gammell / Contextual Electronics
- Get boards quickly - JLCPCB
- Discover mistakes...
- ...and learn some more!



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Neon Pixels + Core Memory



<https://hackaday.io/project/173636-neon-pixels>

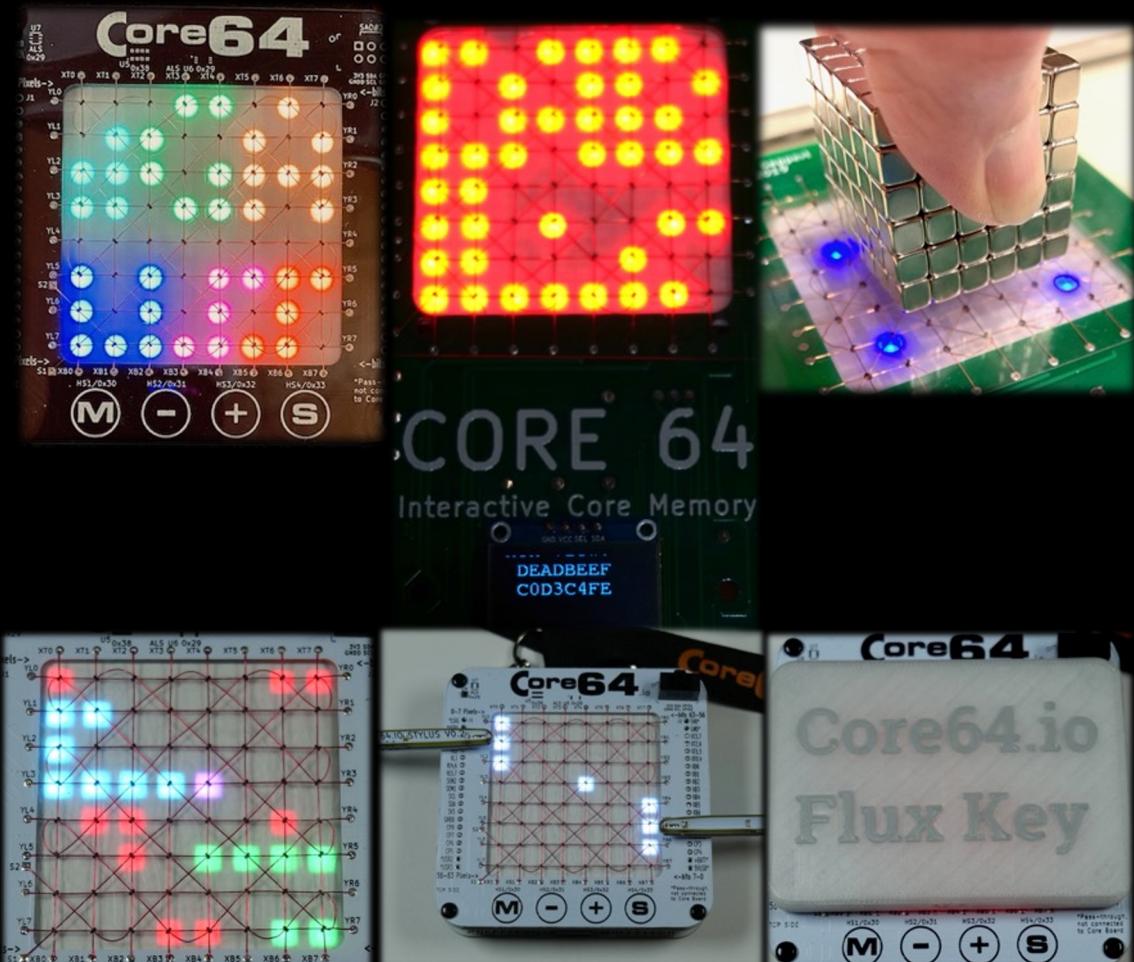


- Two HACKADAY.io projects united!
- 64 Neon Pixels by [Muth] in France
- Individually addressable Neon Tubes
- Drawing in core memory with a magnet and INS-1 Neon Tubes
- Find me after this talk to try it yourself



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built-in



Interactive Core Memory - Core64.io

HACKADAY SUPERCON 2022

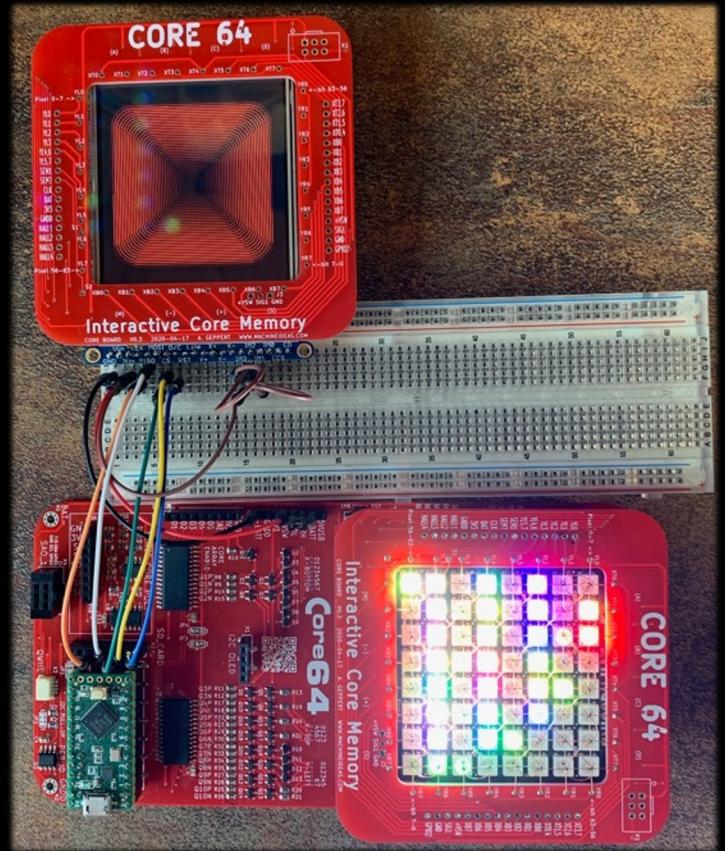
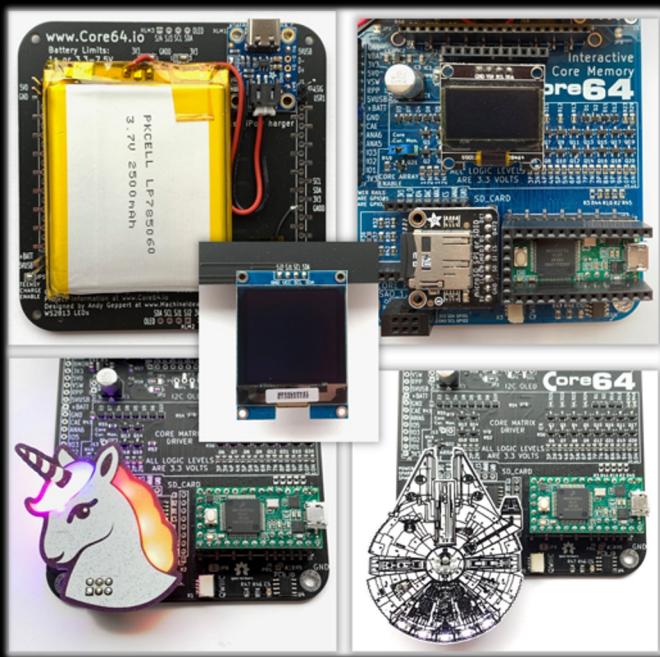
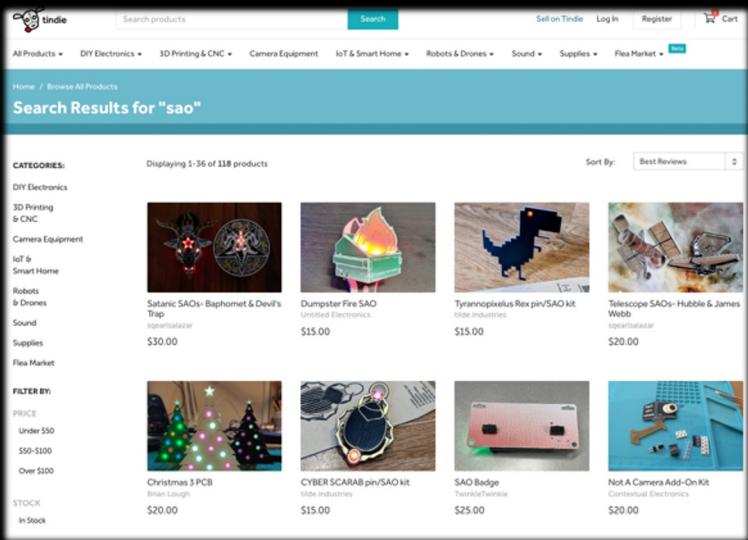
Andy Geppert

- Badge form factor (full-size and compact)
- Magnetic touch screen and two styli
- 64 Parallel Bit Flux Key
- 64 addressable RGB LEDs (aka NeoPixels)
- 64 bits of weave-it-yourself Authentic core memory
- Soft Buttons with magnetic Hall sensors
- dGauss Menu
- Drawing and binary to Hex converter
- Flux Detector
- Games
- Designed for learning and hacking
- Open Source
- Find one of us wearing a Core64 badge and try it out!

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BYO expansion boards

- SAO
- I2C
- QWIIC
- SPI
- GPIO
- Analog In
- OLED
- TFT LCD
- SD Card Adapter
- RTC
- LiPO and Charger



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Interactive!

What is the kit? Four PCBs, connectors, cores, wire, lanyard, MCU, "AAA" batteries.

Core64



How long does it take to build? 6-12 hours. Surface mount is all done. Solder thru-hole headers, weaving the core memory – the most challenging and rewarding part.

How to program? VSCode and PlatformIO – Arduino and Circuit Python Compatible.

Want one? I have some with me. Find me or order at: Core64.io

Core64c

Core64c (compact version) is in stock. More Core64 (full-size) coming early 2023.

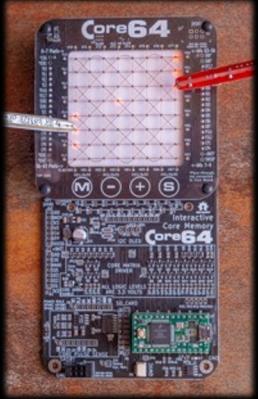
Yes. The Core64 logo is inspired by my favorite computer!

Project Page is www.hackaday.io/project/166155-core-64-interactive-core-memory-badge



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What's the difference?



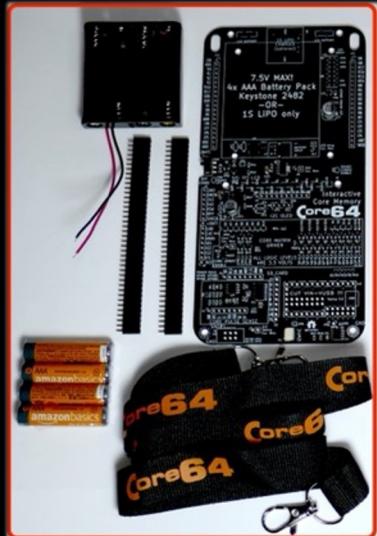
Core64

- Logic Board components accessible on front for probing/learning
- Teensy 3.2
- Core wire drive with discrete IO



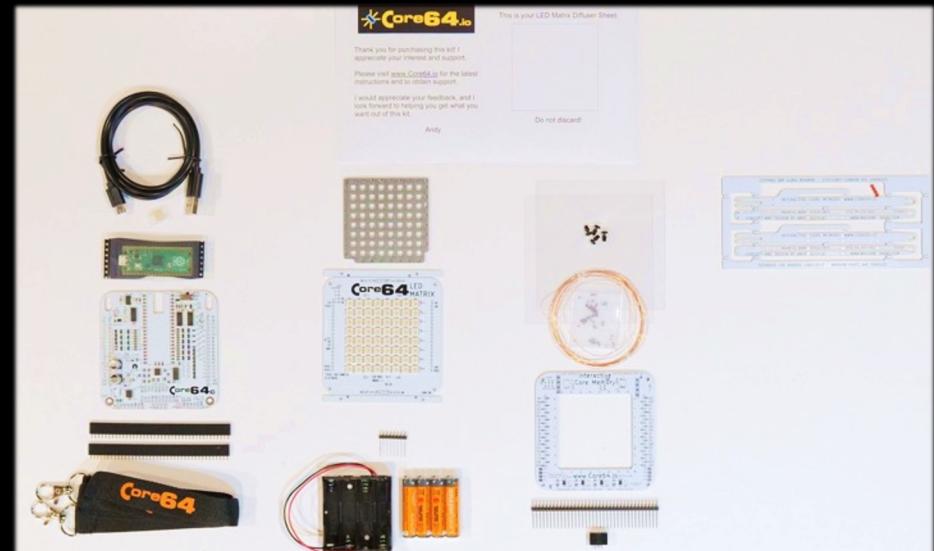
Core64c

- Same functionality, smaller
- Logic Board behind Core Board
- Raspberry Pi Pico (less IO)
- Core wire drive with shift registers



Core64.io

V0.5
2021-04-14
Andy Geppert



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TODO and help

Want to help?

- Magnetic inter-badge communication (NFMI, NFC...)
- Writing (Assembly Guide, User Guide, Learning Guide)
- Manufacturing scale-up (Turn-key!)
- Firmware clean-up (Align all source to app/HAL/driver structure)
- Join this project at www.hackaday.io/project/166155-core-64-interactive-core-memory-badge

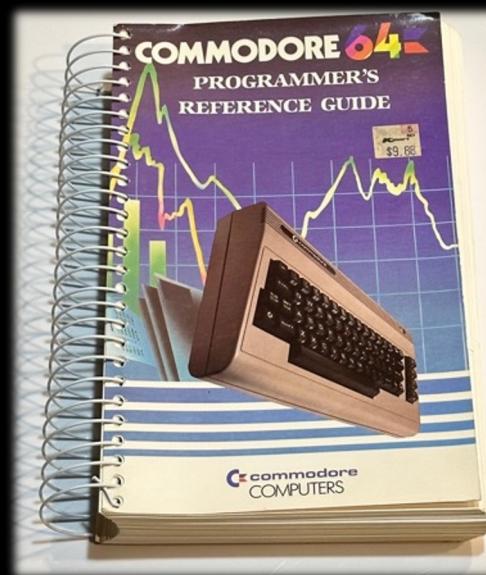


PN532

SCIOSENSE AS3933

Infineon 2GO

NXP NXH2261



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Thank you for listening!