

QUEERCON 2018 1983

The future was yesterday

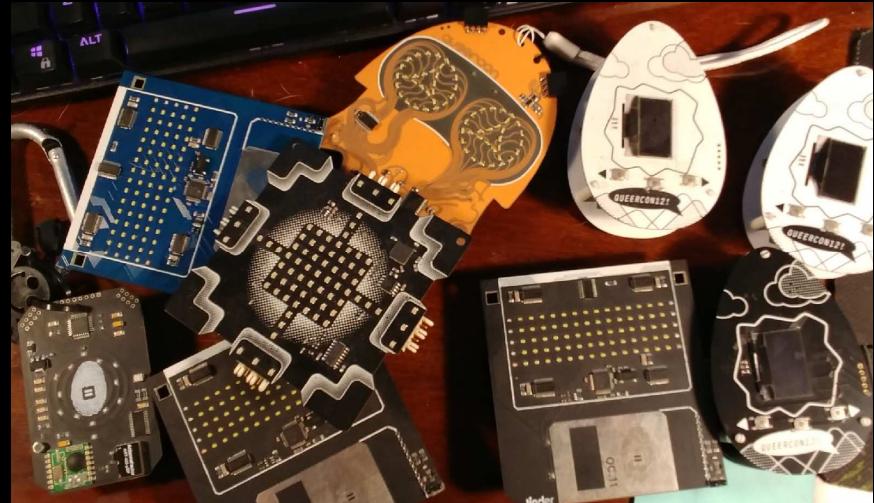
TEAM INTRO

- Jason Painter - @queercon - Money guy, chief cat herder, Queercon extraordinaire
- Evan Mackay - @AkioOhtori - Hardware guy
- George Louthan - @duplico - Software and Testing
- Jonathan Nelson - @eurotwelve - UI/ UX and game design
- With Special Guest Stars
 - Andrew Kongs (@six_volts) and Ali Maskus- Acrylic Specialists
 - Aaron - @mrtwinkletwink - Top board design
 - Thomas Littlejohn - @tommy_gunf0l - Base stations
 - Jake Viz - @?? - Base station and room TV
- Additional slave labor and other services by
 - Aaron Glenn, Brady Deetz, Kate Vahn, Andrew Harmon, Eric Kotz, Ron Hammond, Aaron Tebrink, and many others



QUEERCON BADGE HISTORY

- Started in 2012? because someone got drunk and thought it would be a good idea
- Same core team for the last 6 years, which is, frankly, astonishing
- Core mission has always been:
 - Social
 - Interactive
 - Blinky lights
 - Inclusive



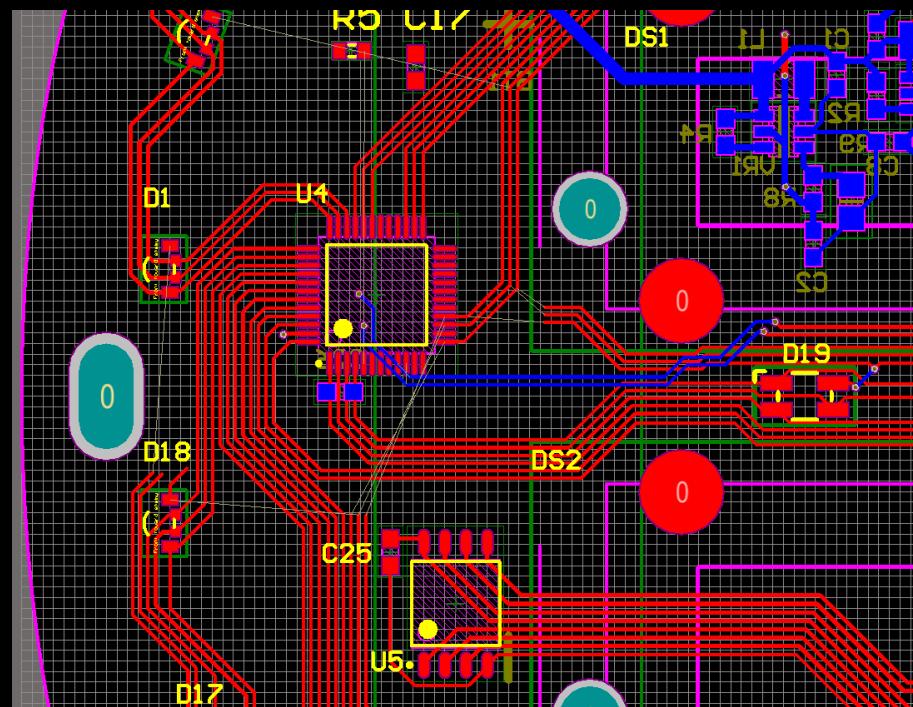
MEET SKIPPY

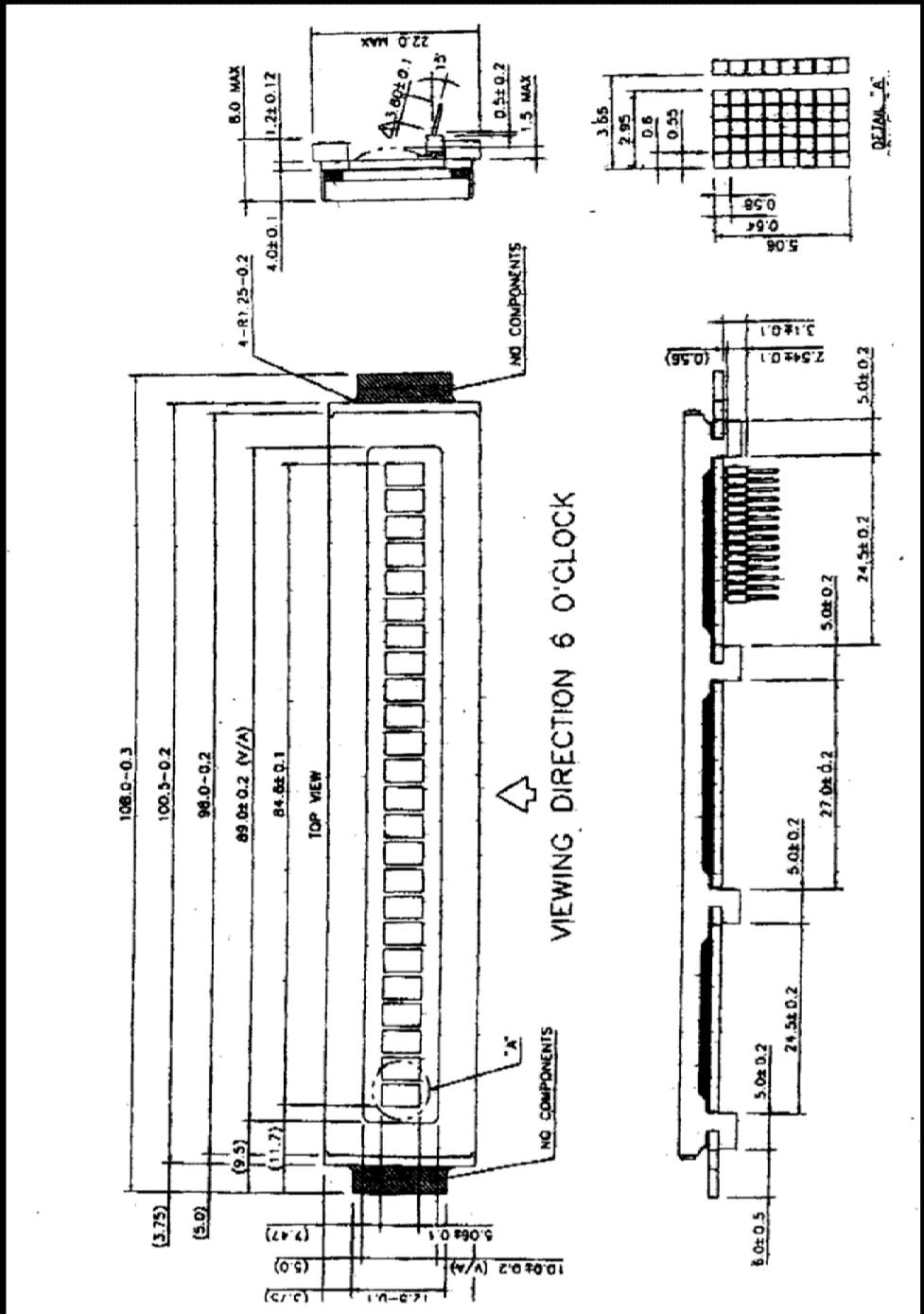
- Three layer design
 - Bottom Board – Bright bucket of brains and power
 - Middle Board – Substantial, transparent, keeps the top and bottom from hurting eachother
 - Top Board – Cheap, pretty, and dumb,
- Badge needed a personality, and boy did it find one
 - Pulled from Expeditionary Force series
 - Sort of like HAL, but more of a prick
 - The badge is an entity, attendee, not accessory
- As per the usual, bright and social
- Production run of 450 electronic badges and over 900 non-electronic



HARDWARE

- Usual Cast of characters
 - Main CPU - TI MSP430FR2422
 - Game CPU - TI MSP430FR5972IPMR
 - Radio - HopeRF RFM75
 - LED Controller - Holtek HT16D35B
- LEDs
 - Sideview Harvatek HQI2-2353RGBC - 5mA
 - Top view Harvatek HQ67-2302RGBC - 20mA
- Displays
 - Cheap overstock of some 80s crap
 - WD-C2401P-1GNN





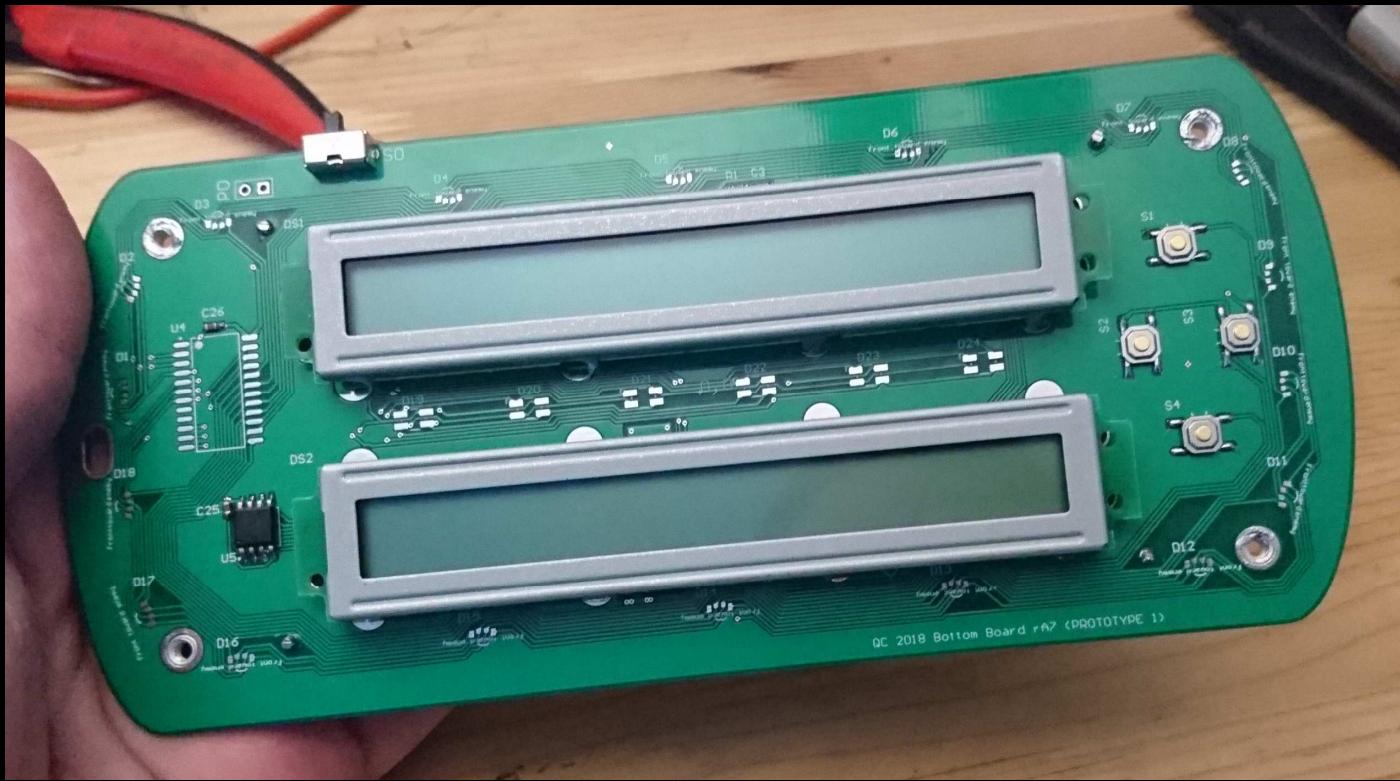
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3. Module Classification Information

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A-L-SMT, M-WCCB (except U/F-LCDs, F-
LCDs, G-LCDs, H-LCDs, I-LCDs, J-LCDs,
K-LCDs, L-LCDs, M-LCDs, N-LCDs, P-LCDs,
Q-LCDs, R-LCDs, S-LCDs, T-LCDs, V-LCDs,
W-LCDs, X-LCDs, Y-LCDs, Z-LCDs)
Display Function:
Segment number/Characters lines/row and column data.
Display Type:
S: Segment, C: Character, G:
Graphic
LCD Type:
M: Standard LCD, D: Customer's Design LCD
Brand: Wintek Corp.

BOTTOM BOARD



TOP BOARDS



MID "BOARD"

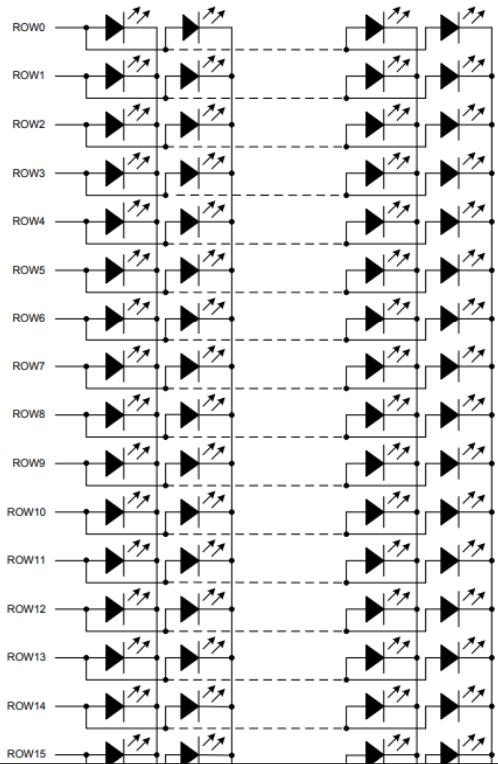


LED DRIVER ICs



HT16K33

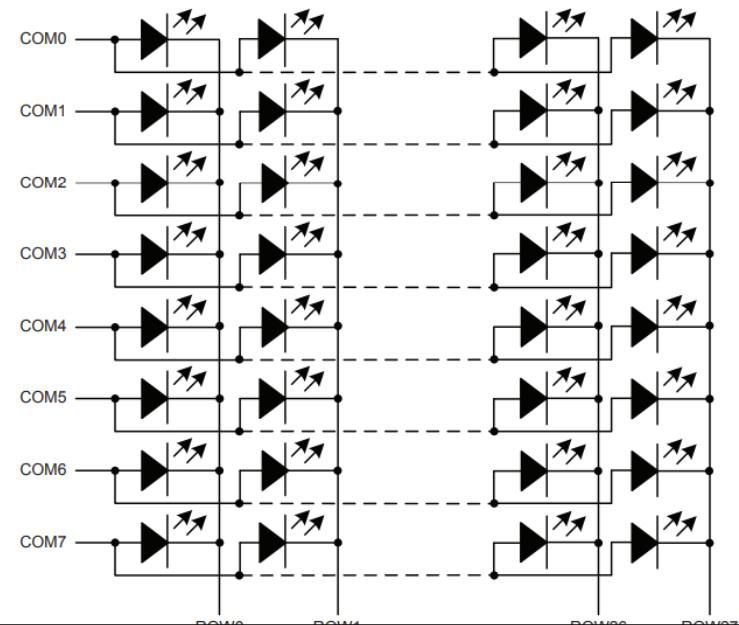
LED Matrix Circuit

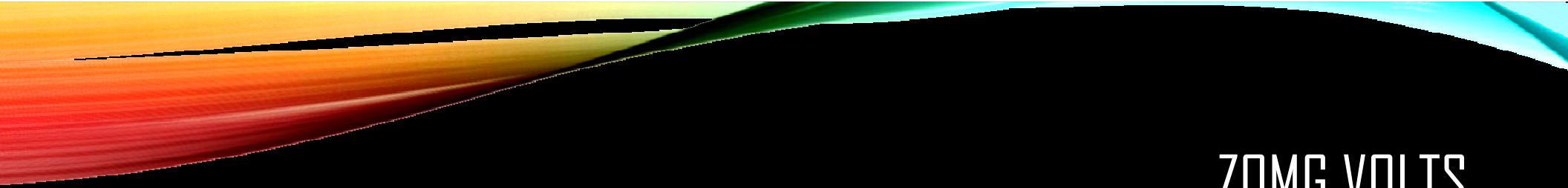


HT16D35A/H

Application Circuits

LED Matrix Circuit





ZOMG VOLTS

- See if you can find a screen cap of this



UI/UX

How to make a Skippy

IDEAS

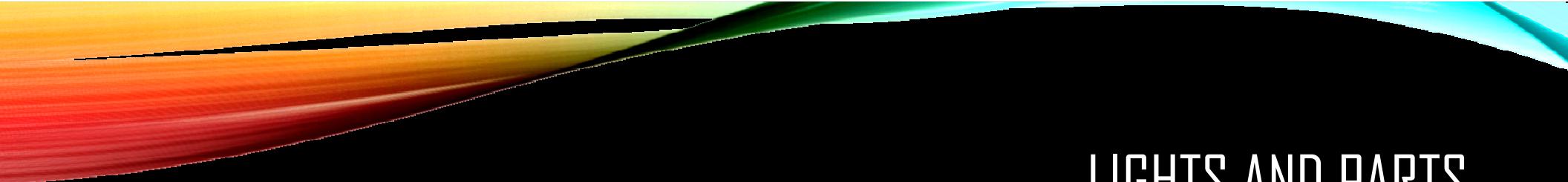
- Wanted to work with "1983" direction of Defcon
- Cheap text screens == text-based adventure game!
- Last year's icon map spawned a new goal
 - Everyone works towards a common goal
- Hackers = crypto shit = cracking a file

EXECUTION

- Your badge "Skippy" is hyper-intelligent and knows it
- Skippy forgot (but slowly remembers) his goal
 - Is guardian of 1/16th of a master file
 - File is encrypted and the decryption key is lost
 - By comparing data with other Skippys, can brute-force it
- You are the monkey who helps it

CONNECTING AND CRACKING

- Skippy can see badges in range
- Connecting requires both to be online (must talk to each other)
- Some radio... fiddliness here



LIGHTS AND PARTS

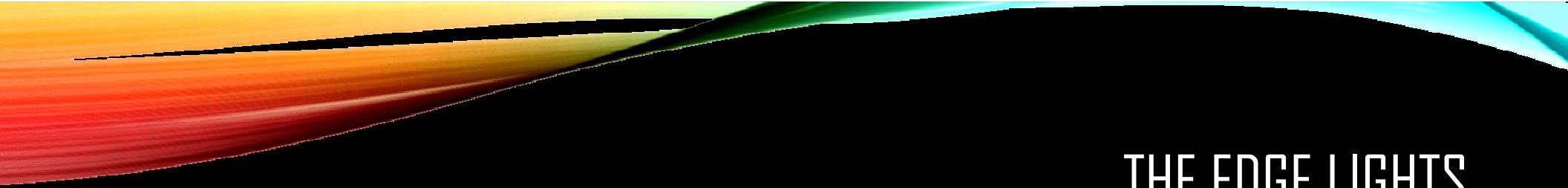
- Your badge has 280 characters; 1/16th the total
- Divided into 6 parts, represented by LEDs
- Lights are cracked by:
 - Connecting to others
 - Connecting to others with your file segment (how?)
 - Attending events
 - Connecting to staff and handlers
- Each light fluctuates around a single color. More cracked=more stable
- Slow pulse means you've finished that segment!



GETTING LIGHTS AND OTHER STUFF

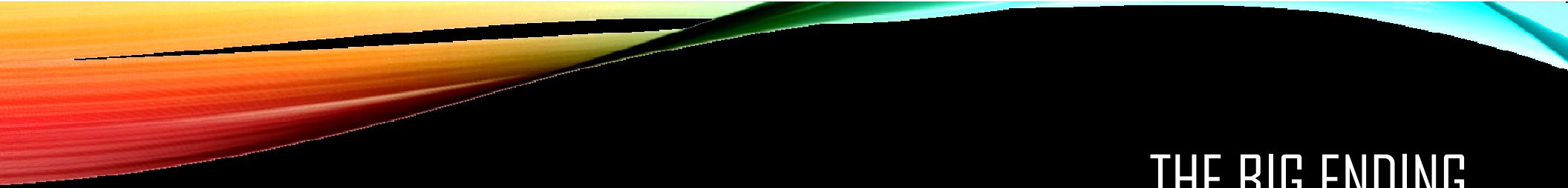
- No lights down the middle yet?
- Badge rotates through idle states that expose new options
- Be warned: connecting resets the timer on that rotation!
- Watch for different commands than usual; you'll find it.

- That's also how to find new rim color patterns...



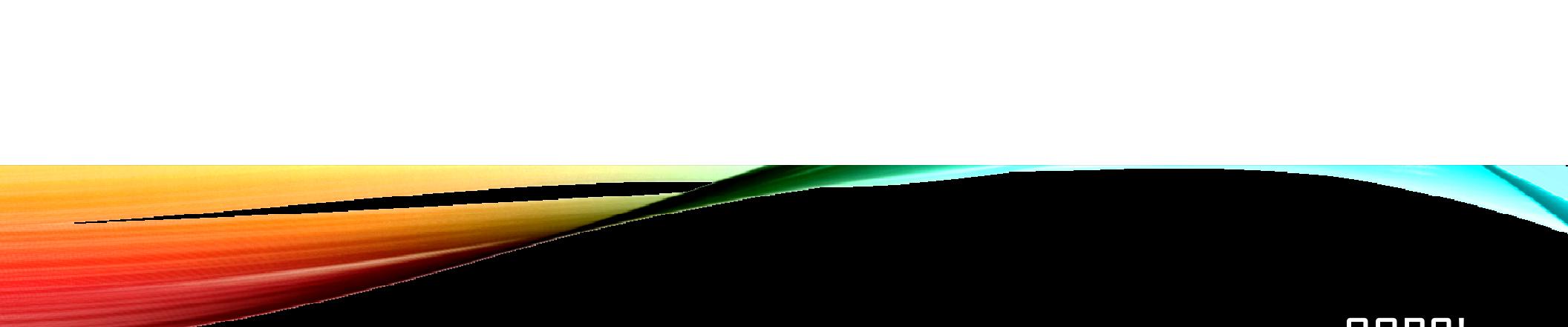
THE EDGE LIGHTS

- Used at times to get your attention (fail), or express a mood
- Doing certain things gives a permanent new pattern
- Can choose them under "status", and check file part progress
- (IMAGE HERE OF FILE PART PROGRESS)



THE BIG ENDING

- Centers around the TV
 - Reflects cracked characters of badges nearby
 - Organically, constantly shifting in and out of focus
 - All can see as you get closer and closer to success
 - Some great, glorious moment collectively have cracked it and are in range
 - The image is finally revealed!
- ...
- ...
- ...
- Yeah, not so much. JAKE AND TV STRUGGLES

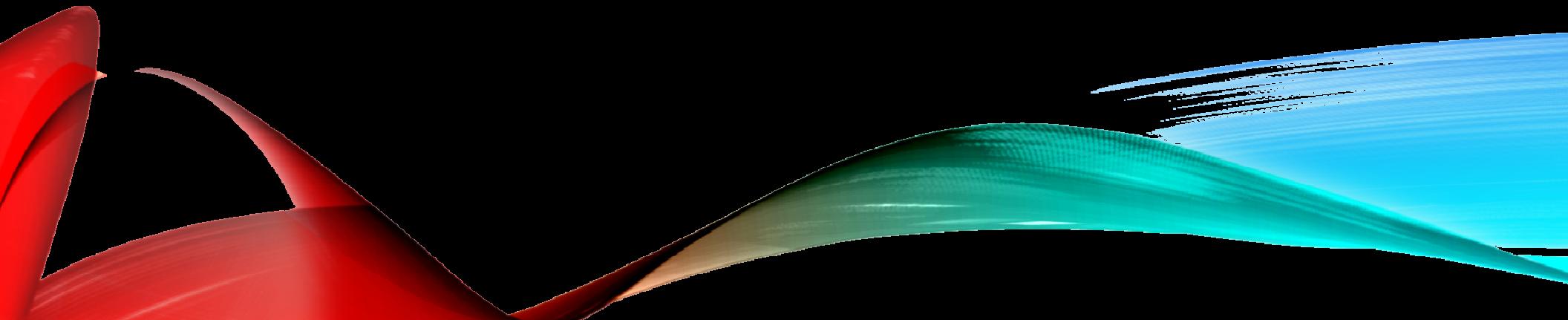


OOOPS!

- What's the right amount of fiddling to get to the game?
- Badge has seven distinct funny states it wants to tell you about, ANYONE seen one?
 - Signed you up for a dating site?
 - Wants you to give its PGP key to the "cute" entities?
 - Discovered there is no 2?
- Usual problem of who is the badge displaying for... cause the holder can't see it

SOFTWARE AND PROGRAMMING

Fuck fuck fuck fuck fucking fuck



HOPELESS TI SHILL

- MSP430! FRAM! Hooray!
- 3 major modules:
 - Radio MCU (MSP430FR2422)
 - Beacon, keep time, monitor the switch
 - Main MCU (MSP430FR597I)
 - Buttons, LCDs, LEDs, master game state, UART
 - Statemaker (Python tool)
 - Builds binary game specification from CSVs
 - Validation, visualization, and generation

STATEMAKER - VALIDATION

WARNING: C:\Users\george\Downloads\Badge States Walkthrough - State Sheet.csv:543:
,,,,,Are you familiar with the shadow org known as QUEERCON????,

^

Blank input type, but line has more contents.

WARNING: C:\Users\george\Downloads\Badge States Walkthrough - State Sheet.csv:580:
,,,,,Never seen you before.,,,
^

Blank input type, but line has more contents.

WARNING: C:\Users\george\Downloads\Badge States Walkthrough - State Sheet.csv:582:
,,,,,.....
^

Blank input type, but line has more contents.

WARNING: C:\Users\george\Downloads\Badge States Walkthrough - State Sheet.csv:583:
,,,,,Were you only let out to clean up or something?,,,
^

Blank input type, but line has more contents.

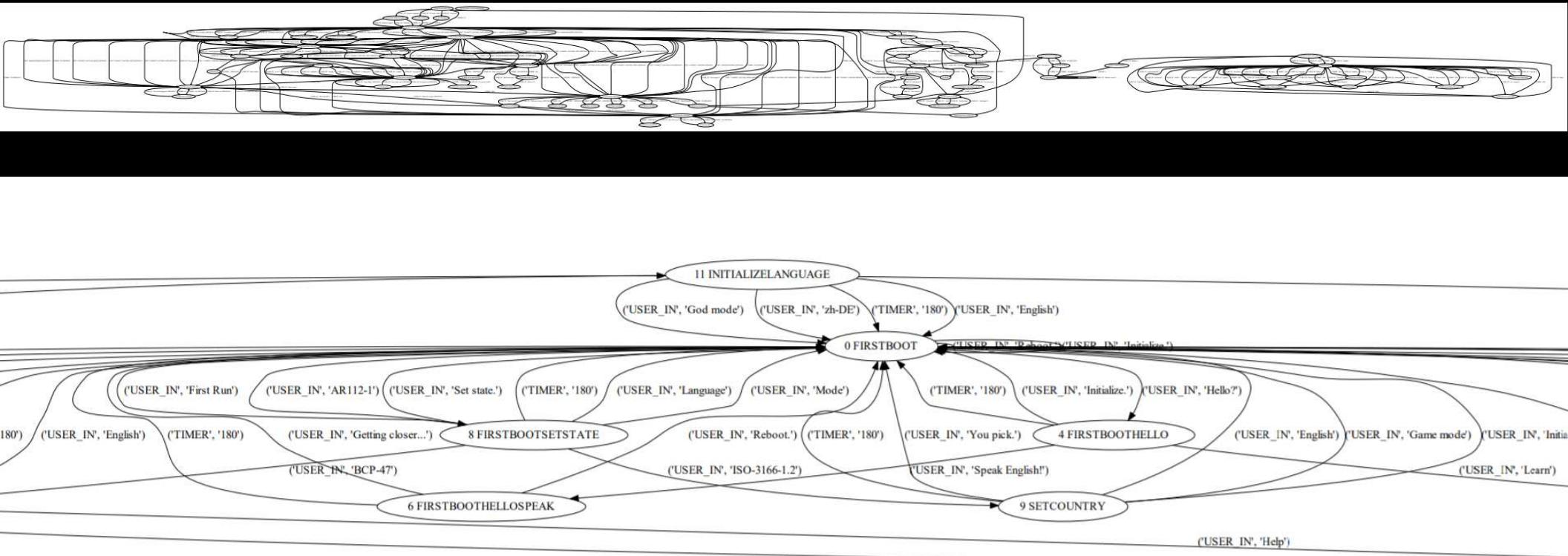
WARNING: C:\Users\george\Downloads\Badge States Walkthrough - State Sheet.csv:449:
USER_IN,Status check,4,STATE_TRANSITION,customstateteststatus,,
^

Implicitly creating undefined state 'CUSTOMSTATETESTSTATUS'

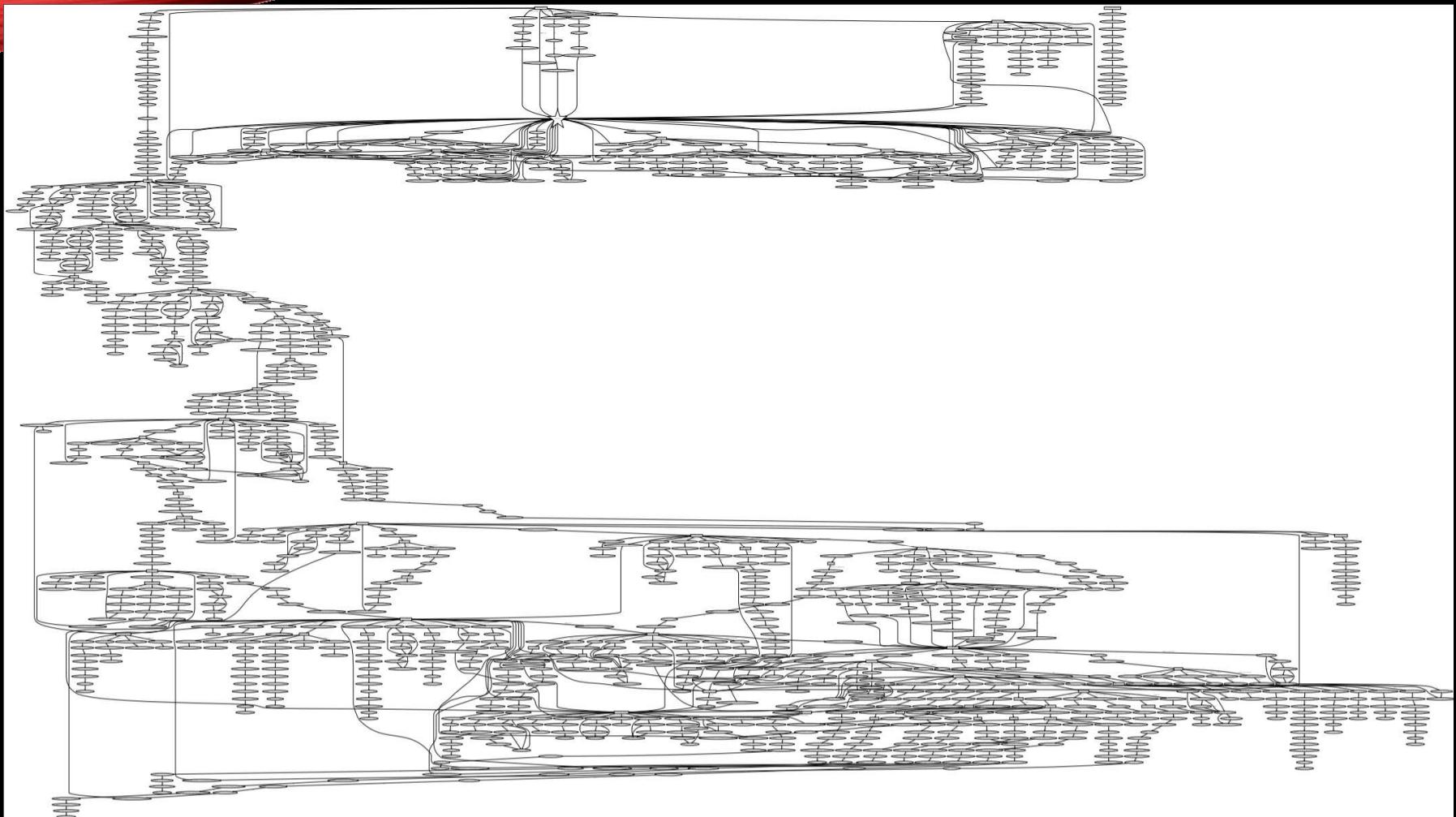
WARNING: C:\Users\george\Downloads\Badge States Walkthrough - State Sheet.csv:454:
CONTID,,STATE_TRANSITION,,colorFinder,,
^

Implicitly creating undefined state 'COLORFINDER'

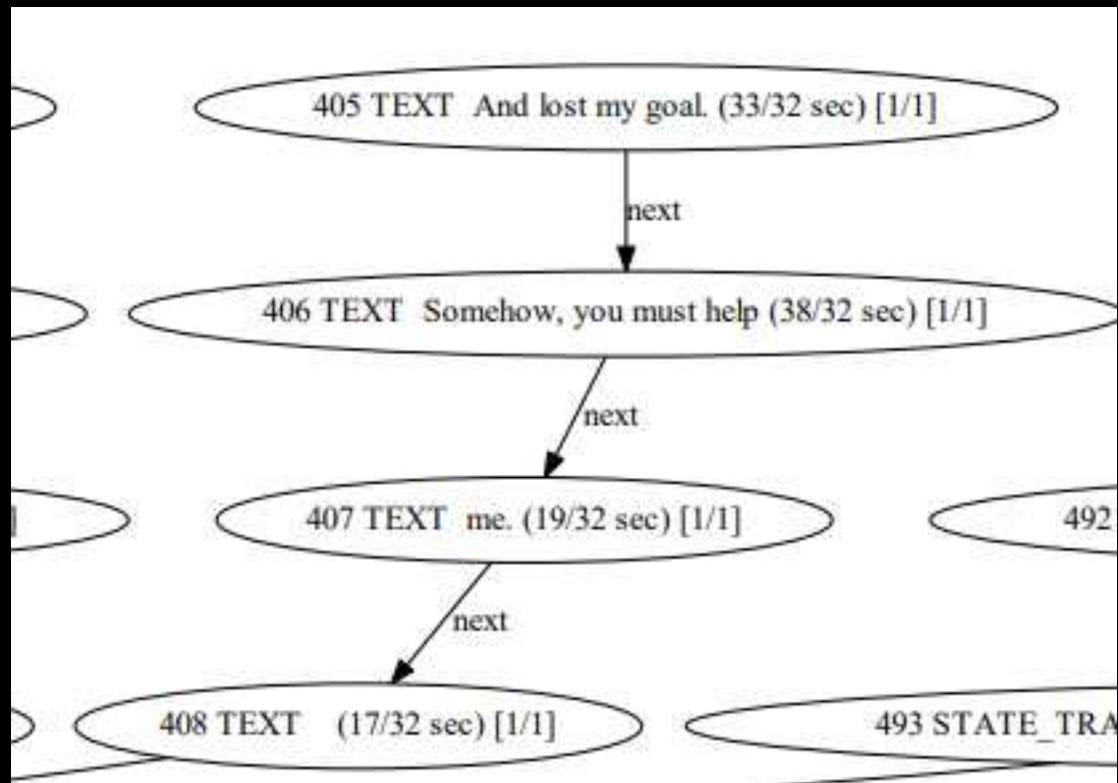
STATEMAKER - VISUALIZATION



STATEMAKER - VISUALIZATION

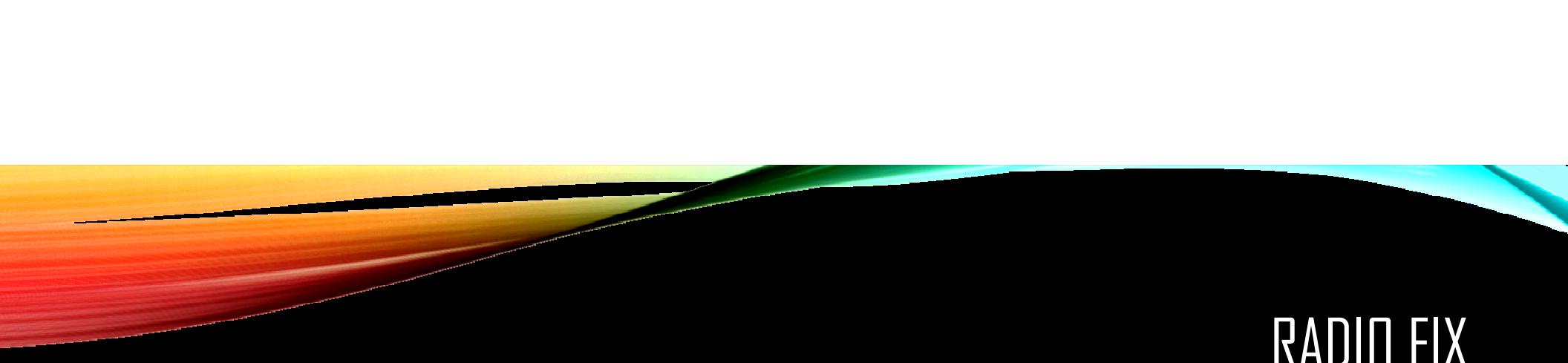


STATEMAKER - VISUALIZATION



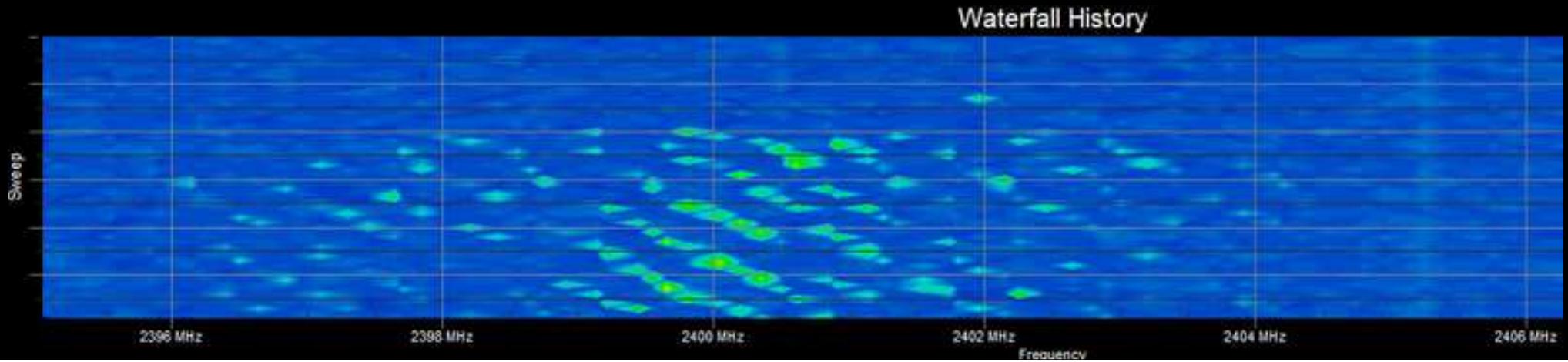
STATEMAKER - GENERATION

- Emits packed structs in Intel Hex format
- Loaded from the external flash
- Effectively an enormous set of 2D linked lists (is that a thing?)



RADIO FIX

- RFM75 – cheap Chinesium IP knockoffs that can't seem to agree what frequency is where
- 1 MHz (!) resolution
- Magic numbers and mixed Endian-ness
- Calibration sweep



The background features two large, stylized, flowing waves. The wave on the left is a deep red color, while the one on the right is a bright cyan. Both waves have a textured, ribbed surface and are set against a solid black background.

WRAP UP

Not done yet, but close!



BADGE FUN FACTS

- Two prototype runs
- Production run of 450
 - 29/200 (14.5%) of initial shipment damaged in shipping
 - ~50 Needed in-house re-work
 - 0.00% Unrecoverable
 - Assembled badges weigh over 180 pounds
 - Total shipping weight over 280 pounds
 - ~40 damaged in shipping (thanks UPS)
- First year doing PCB production and assembly separately
 - Second time using American assembler
 - Cheapest way to ship is in a coffin
- First year using jigs



THAT IS ALL. YOU CAN GO NOW.

(Questions?)

