Disorient Sign 2014 - Preliminary Inspection

2022-07-24

by Devyn, John Fries

Spoken to by text: Viktor G, Jacob J, Jason C, Naim B, Justin D, JD (no reply)

SUMMARY

We had a productive day of Disorient forensics. I think I chatted with almost everyone who touched the Sign over the years. It's gone through several changes to the control system between 2014 and 2019.

Main state of components

There are no control boards, neither the original master (BeagleBone Black + RS485 baseboard) nor the most recent individual ones (Teeny 3.1). The last ones were Jacob's personal stock, which he took back and repurposed for other projects. The original control board's (and control PC's) whereabouts are unknown.

Thus, the Sign is currently not operational.

All the breakout boards exist, one for each letter, though we were not able to completely test them without the control boards.

All the LEDs light up in some form, except for one short section, though we were not able to completely test them without the control boards. That said, they seem mostly operational.

There is no control PC.

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What's needed

In short, the Sign needs attention from someone like Jacob, who designed the most recent system (unfortunately, he's unavailable), or perhaps Viktor, if he wants to revive the original control system (which still exists, in part).

In addition to a lead, it needs a small team of people knowledgable in programming, electronics, and mechanical assembly.

I believe the original 2014 team was: Viktor, Jason, Naim, Matt Mets (?)

I believe the most recent 2019 team was: Jacob, plus others unknown.

Sign needs control boards, computer, possible custom wiring, programming, and further setup and testing.

RECOMMENDATIONS

Crucially, the Sign has no control system. As a preliminary assessment, I can see three options:

Option 1 - Restore the original control system (part of which still exists)

Components needed:

- Another of the original master control board. In theory, that could be programmed in New York, and either shipped to LA for install, or even installed on playa. Viktor has a BeagleBone Black, but it needs a RS485 baseboard, and the two need to be assembled and programmed.

- Control PC to run the software

- Ethernet cables, length TBD by the desired physical installation.

- Extension cords and power strips, TBD by the desired physical installation.

Time / Skill needed:

- Unknown time to source, assemble and program the control board.

- Unknown time to source and set up the control PC.

- Unknown time to make adjustments to the sequencer software. In 2014, the Sign and Helios were mapped together and run from the same PC. I would guess that the same software can run the Sign by itself, but I've asked Jason to confirm and am awaiting a reply. There may be other updates required, such as for newer operating systems.

- Once the programmed control board is in hand, this could be finished by a team with basic comfortability with electronics. In general, it should be an easy system to connect, though you need to reserve some time to complete inspection of LEDs and wiring, and troubleshooting any additional issues.

- At a minimum, I would guess at least 1-2 days of setup and testing, possibly more. There may be other issues discovered.

- Depending on additional testing of breakout boards, wiring, and LEDs, further repairs may be needed. You probably want to assume at least soldering will be needed.

Design considerations:

- This system had all the letters synchronized together in patterns. This was Leo's original.

- Physically, the letters need to be close enough for cable and power runs. Jason's original notes refer to some distance issues. It sounds like they were figured out, but It all just needs to be planned out.

Option 2 - Restore the most recent system (not much of which still exists)

Components needed:

- Nine (9) Teeny 3.1 control boards, or similar updated versions.

- Computer to program control boards

- Six to eight custom RS485-to-WS2811-LED-strip cables. There are three on the Sign now, though I was only able to confirm that one works.

- Extension cords and power strips, TBD by the desired physical installation.

Time / Skill needed:

- This needs a real hacker team that takes care of the control boards, custom connectors, and programming. Though, similar to #1, once that is in hand, the system should be relatively easy to actually connect.

- Once the programmed control boards and connectors are in hand, this could be finished by a team with basic comfortability with electronics. In general, it should be an easy system to connect, though you need to reserve some time to complete inspection of LEDs and wiring, and troubleshooting any additional issues.

- At a minimum, I would guess at least 2-3 days of setup and testing, possibly more. There may be other issues discovered.

- Depending on additional testing of breakout boards, wiring, and LEDs, further repairs may be needed. You probably want to assume at least soldering will be needed.

Design considerations:

- This system had all the letters running independently. I believe the patterns were all white, though this shouldn't be necessary. Patterns were designed that it didn't matter what the other letters are doing - it all looked good together. It doesn't sound like Leo worked on these.

- Physically, the letters can be installed independently, without need for proximity to each other. They only need power.

Option 3 - Design a new control system with contemporary components

This is a total unknown, but a new control system could be based on the latest designs - software and hardware - used by Leo's studio.

DETAILED FINDINGS

Video overview by John Fries, 2022-07-18
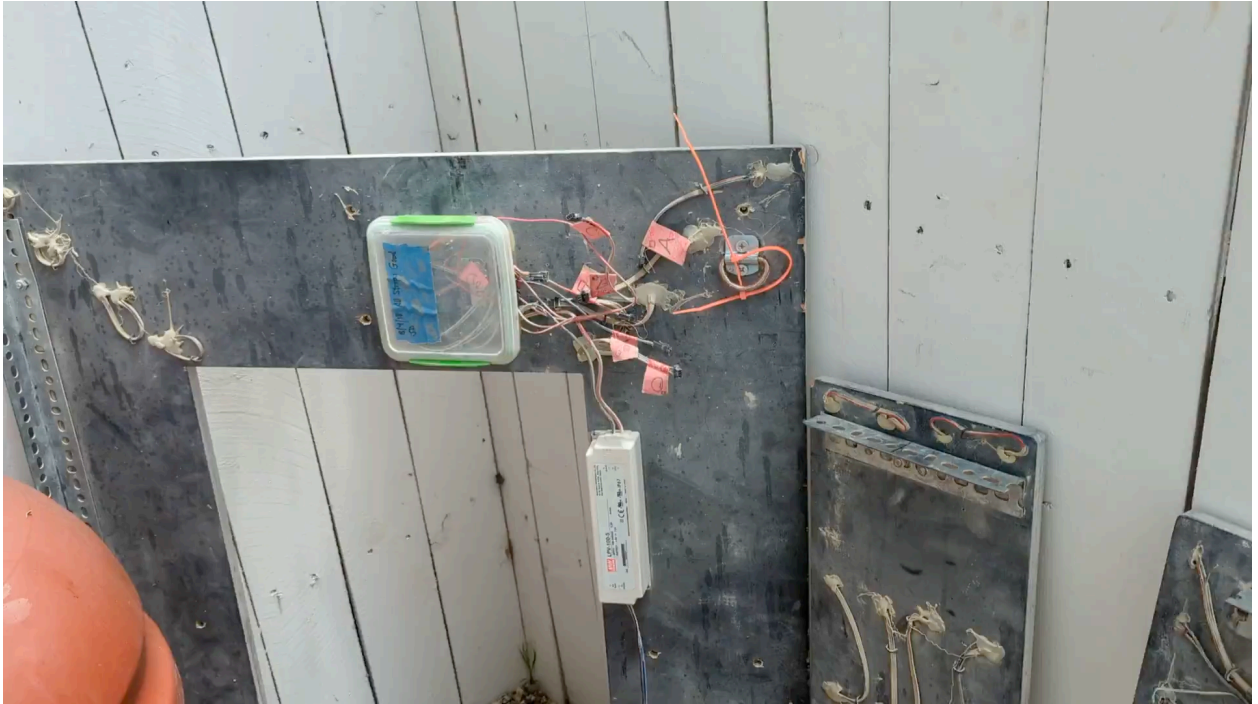
[Google link to video](#)

[Backup Dropbox link](#)

Physical

- The physical components seem to be in good shape. The wood and plexiglass are in acceptable condition.

- Each letter has a top bracket for mounting and attachment.

- There are (five or six?) orange storage boxes that currently contain various hardware - bolts, screws, fasteners. These originally housed the breakout boards, as seen in this photo:


- There is a single wooden crate on casters, with foam padding inside, that contains the Sign for travel and storage.

Control Boards

- There is no complete set of control boards. Control system has been reconfigured several times over the years, and is currently incomplete right now.

- Original control board is missing. This photo provided by Viktor:
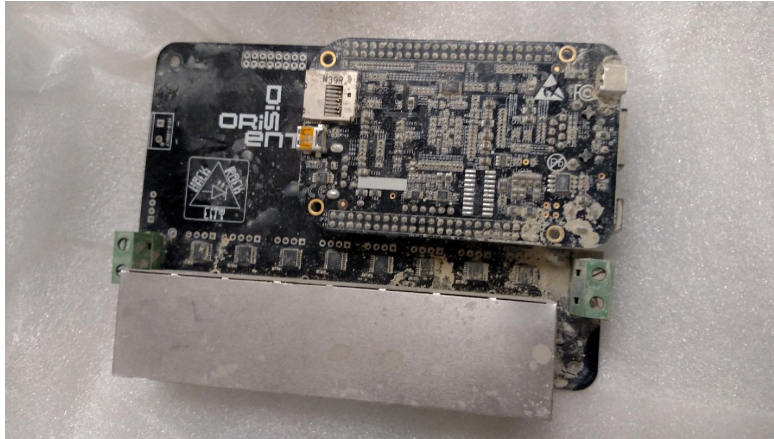
- Each letter has the original breakout board. I believe these are LEDscape boards by Matt and Trammell. Second original photo from Viktor.
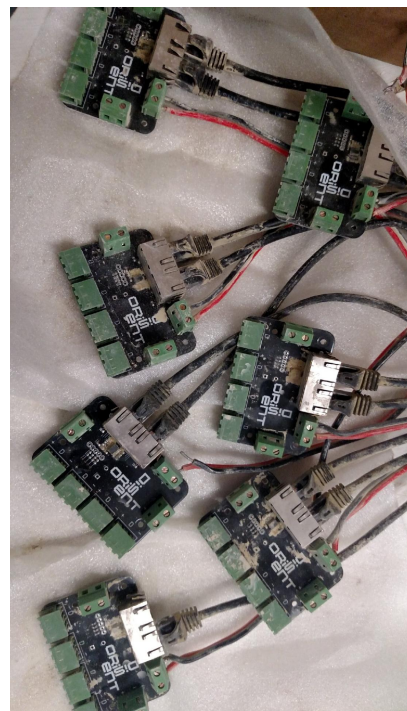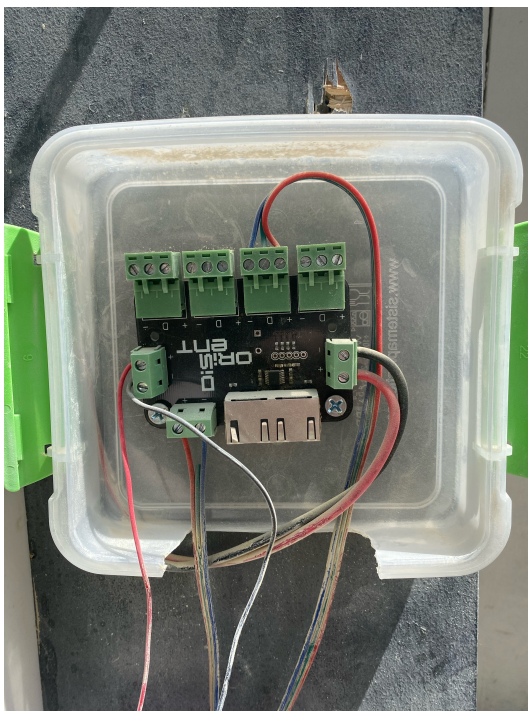
- Three letters have custom breakout-to-LED wiring, which last connected the Teeny boards directly to the strips. Other six custom wires are missing.

- The second I and the N work have old individual control boards that Jacob made. He's surprised they're still working!

LEDs

- Almost all the LEDs appear to light up.

- The LEDs themselves light up, though the existing illumination patterns don't allow for complete inspection. For the most part, they all light up a single color, but through testing (eg, of each color RGB) was not possible. We would need to go back with patterns running to really see.

- There may be a single LED here or there that is dim, but again, without the control software to run test patterns, the simple default illumination was not enough to properly diagnose individual LEDs.

- There is one bad section in the E, approx 8" long, that doesn't turn on at all. There's a note from JD that he tried to fix it in 2018, replacing the strip, but the problem remained. That needs some attention. Other than that, I didn't see any complete sections off.

- With the exception of the 8" section, I think the LEDs are in good shape. Even the few that might be dim probably won't be noticed. Still, ideally another session is required for proper inspection of the state of the LEDs.

- The second I and the N work running old sequences (off the above-mentioned control boards) and appear to work as intended.

NOTES FROM OTHERS

Viktor

- The [orange] bins had the breakouts and power supplies, and one in the center had the beaglebone

- You might have to rebuild the control system if there's not enough there, or not enough documentation from whoever set that up

- I think each breakout went back to the controller

- I have a Beaglebone Black that you can have. I don't have the baseboard with all the RJ45 ports. I do have an extra used LED strip breakout board.

- If you want to go down this route, I found this email from Matt Mets about programming the beaglebone:

    Instructions for setting one up here:

    https://github.com/osresearch/LEDscape/blob/master/Setup.md

    I think you're using a different protocol, so you'd need to edit the startup script to use OPC receiver.

- I also found this from Jason C:

    Here is a summary, hopefully this puts us all on the same page:

    - The Helios and the sign (and the DEX) will all be using the same control system.
    - Naim will be sending me network protocol details ASAP.
    - The sign will have a single BeagleBone; physically it should probably be located on or near the 'R'.
    - There will be a control PC driving this via a single ethernet cable connected directly to the BeagleBone; no network switch needed.
    - There will be a breakout board on each letter connected to the LED strips on that letter.
    - Power for LEDs is at per-letter power supplies.
    - The central BeagleBone will be connected to the breakout boards on each letter by CAT6 cabling (running RS-485, not ethernet).
    - This is good and gives us the robustness we were concerned about. There may be more than one cable per letter but this is very manageable.
    - Cable length limits are similar to that of ethernet, giving us plenty of breathing space.

- We used Jason's sequencer the first time around and I found the .layout file for that (which has the mapping files & config file)

- I'm not sure how you would use the beaglebone without the HRC baseboard.

- That baseboard is not for ethernet. It has RS485 drivers on it.

- Same PC. They were mapped together that year [regarding control with Helios in 2014]

<u>Jacob</u>

- In the past few years, Teenys 3.1s were using. There wasn't a main control board. Instead the Teensys ran independently. Patterns were designed where synchronization didn't matter. Random white zips that would quickly fade into existence, move along a random part of a strip, then extinguish.

- So the red board is a controller that I made when I was learning electronics some years back. Definitely janky. I'd be surprised it it worked still…

- The first board was my revision for the following year, which uses an Octo adapter:

   https://www.pjrc.com/store/octo28_adaptor.html

- But the distribution boards come from 2013 or 2014 when Trammell and Matt had developed their own system. LEDScape I think it is called, which ran off Raspberry Pis.

- They were my personal Teenys' that I had brought back home and repurposed in other projects.

- I think when I did the Octo board work most of that was done in a container with parts I had available.

- And what needs to be done is to have all the strips replaced, and get new control boards. There are a lot of professional ones these days, but we're a month away so time wise not sure if this is possible.

REFERENCES

Disorient Sign wiki

Sign in 2014, mapped with Helios and running off the original control system:

Sign in 2019, running off the most recent control system:

A copy of this document and the above walkthrough video can be found at this Dropbox link