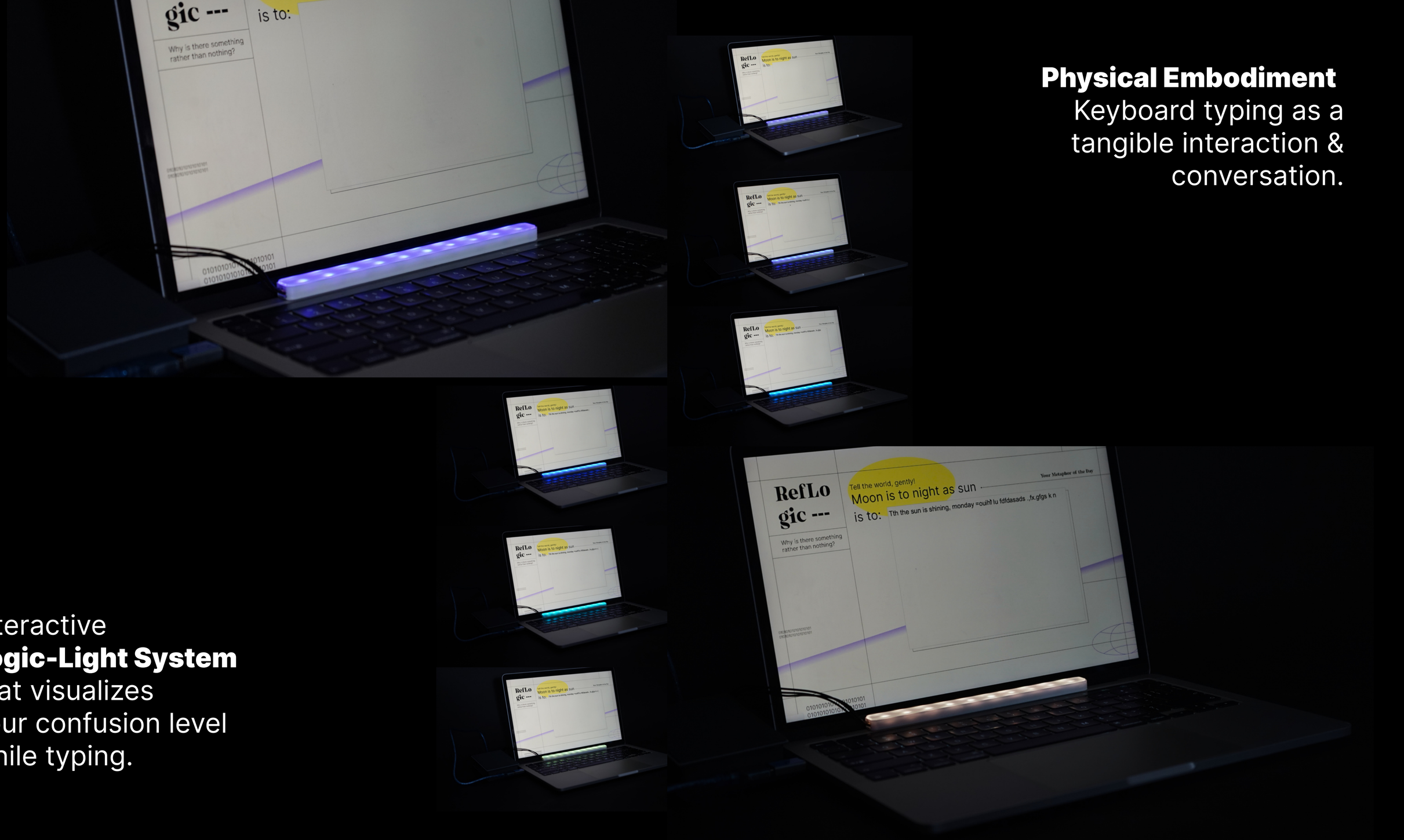

RefLo
gic ---
Why is there something rather than nothing?
Tell the world, gently!
Moon is to night as sun
is to:
Your Metaphor of the Day

RefLogic

Description

How about your conversation with keyboard? As Graphical User Interface pervails today, users tend to ignored the physical nature of their interaction with the computer machine. However, their typing behavior into Keyboard serves as a direct agent with the machine. The goal for this piece is to create contextual awareness to the users who interact with RefLogic, that their keyboard is speaking to them while they are typing, and knows their mental states, their confusion level. The meaning for this project as a tangible display is to enable, and inspire future design space in potential applications, which include: affective companions, emotional awareness, etc. within the creative interaction with the keyboard.



Physical Embodiment
Keyboard typing as a tangible interaction & conversation.

Interactive
Logic-Light System
that visualizes
your confusion level
while typing.

RefLogic gives your Metaphor of the Day.
Your response to the prompt will be analyzed by the system, then converted to lighting signals.

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Why is there something rather than nothing?

Tell the world, gently!

Moon is to night as sun is to:

Your Metaphor of the Day

The Electric Logic

Word Equation:
a: the press speed is high (thres: > 20 character / 10 sec)
b: the delete button is pressed more than 3 times in 3 second
c: the word inputs have more than 50 percent typo
y: the person is confused

not a and (b or c)→ y

The system performs analysis once every 3 seconds. When Y is acheived once, Confusion Level +1. Otherwise, Confusion Level -1.

The Idea of “Gently” Typing:
- too fast → more error → you are confused
- moderate and less error → calm state
- too slow though less error → you are confused

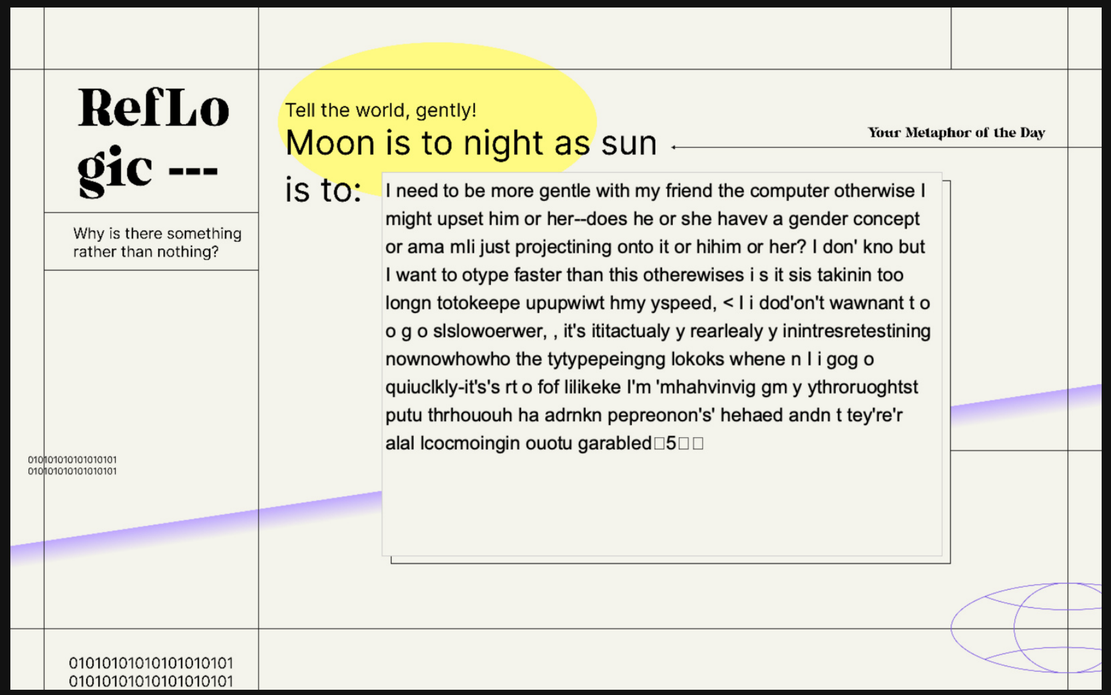


Fig: Professor Zach’s tryout with the system.
The programming logic is that when the keyboard tracks your higher typing speed, the input you typed will be more accurate if you typed Gently.

Human Emotion & Color Perception

Valdez, P., & Mehrabian, A. (1994). Effects of color on emotions. Journal of Experimental Psychology: General, 123(4), 394–409. https://doi.org/10.1037/0096-3445.123.4.394

Emotion as a joint function of color Brightness and Saturation, impacted by Brightness and Saturation.

Pleasure, Arousal, Dominance Emotional Model
Pleasure = .69B + .228
Arousal = —.31B + .60S
Dominance = —.76B + .328.

Hue Combination & Emotion Signal:

1. Purple-Blue (non-arousing pleasant, non-dominance)
2. Blue-Green (arousing, pleasant, less dominance)
3. Green-Yellow (arousing, non-pleasant, dominance)

9 Levels of Confusion-Lights

Neutral → Confusion

Reflection of the Process

This Project 1 - Gates is my first step into exploring the possibilities of Logic Gates as embodiment of tangible interaction. After initial ideation, I landed my ideas onto building a sensory experience inside the conversation with keyboard. The interaction with Keyboard, the direct agent with GUI users, is often ignored in the human-computer interaction workflow. The design goal for this device here is then to aware the users about their Emotion via visualizing Confusion Level through visual processing of colors.

To prob this, I first dived into the theory of color perception, and designed the interaction to be: when given a writting prompt to reflect their day using metaphors, will respond via typing, and their typing will determines the confusion level which will changes the light colors.

However, I realized that there were many design considerations that impacted the keyboard “experience” that I have not thought of.

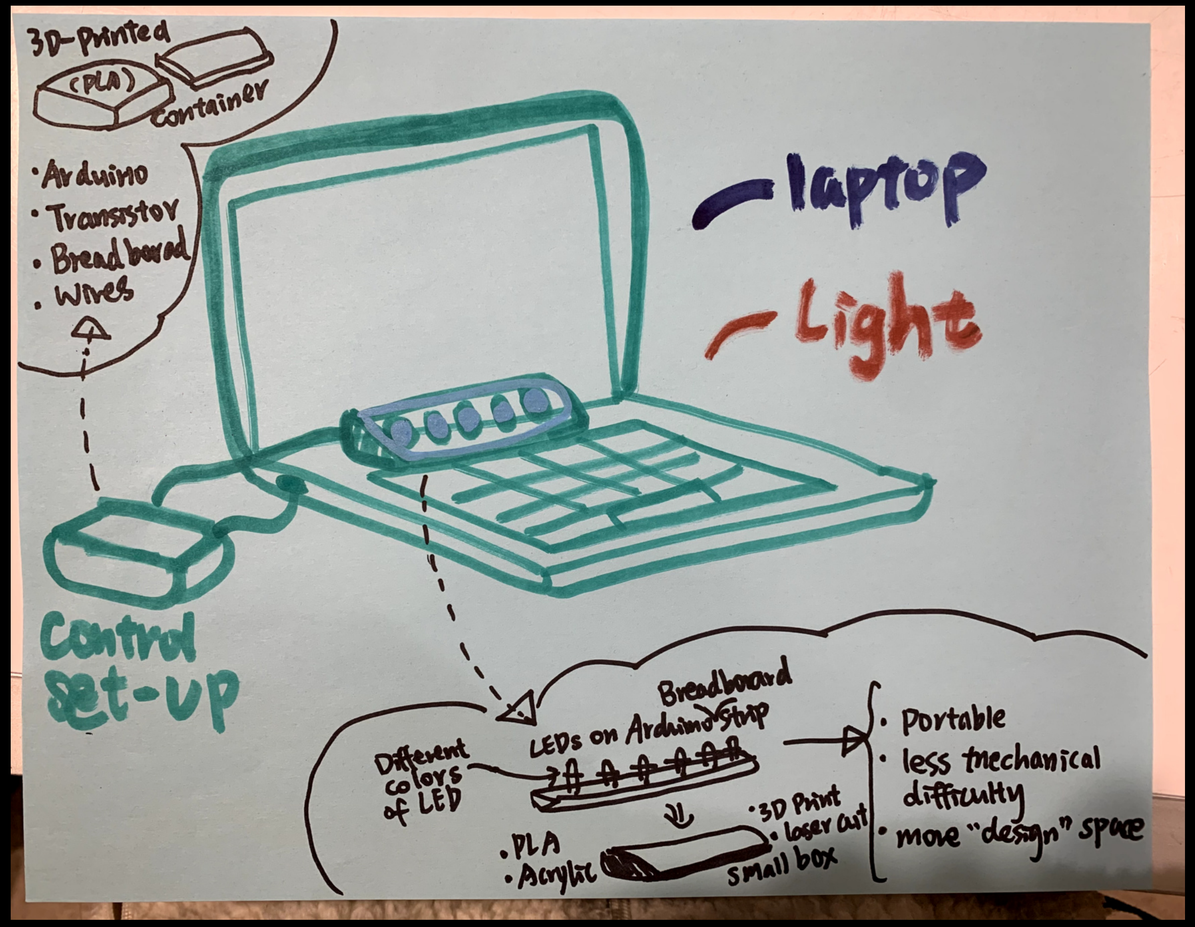
These Challenges are:

1. Integrating the lighting augmentation onto an existing keyboard that does not distract its original user experience.
2. Designing physical emodiment of confusion level based on Typing that aligns with user perception. For example, the perception of color matches the user perception.
3. Implementing the Software + Hardware part of the device, which includes coding the data analysis of keyboard detection that produces a color decision, and the control of the lighting stripes in response to the decision.
4. Considering the form factors of the device outlook that carries the feedforward and user expectations.

In the next pages, I will walk through my progresses to solve these challenges.

Progress 1: Project Ideation

- In this step, I struggled onto landing my ideas of such “conversation with keyboard” into building devices. But through sketching out the concept + form, my pathway to reach the design goal becomes clearer.



IDEA3: A keyboard like a conversational agent that interacts with you through type inputs, and reacts on your confusions reflected on the typing behavior.

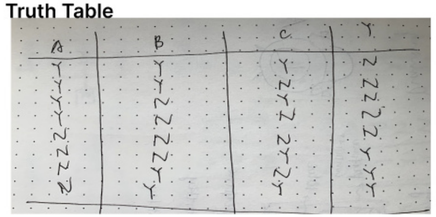
About:
When people are confused, this might indicate they need some help from the Internet. Keyboard that connects their thoughts to the online information serves as a medium. However, what if this connection is lost, and what if the input produce a twisted output? For example, the keyboard is confused by the confused input so that it outputs an inversed output?

Intended Interaction:
- User input any sentences in.
- Computer Program Analyze the press speed and input contents per 10 Sec.
- If satisfied the confused situation, react on level 1 → level 10 output in an incremented way.
- For Level n:
  - Blinkiness * (n*10%)
  - Brightness * (n*10%)
  - Color (Cold→Warm) (White → (decrease the amount) → Red)
- User is intended to pay more attention to the changing lights as they are more confused. and realize their type behavior is a matter of conversation with the keyboard agent.

WORD EQUATION
A: THE PRESS SPEED IS HIGH
(Thres: > 20 character / 10 sec)
B: THE DELETE BUTTON IS PRESSED MORE THAN 3 TIMES IN 30SECOND
C: THE WORD INPUTS HAVE MORE THAN 50 PERCENT TYPO
Y: THE PERSON IS CONFUSED

(B OR C) AND NOT A → Y

Truth Table

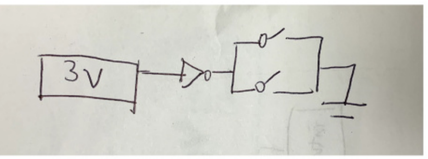


Material:

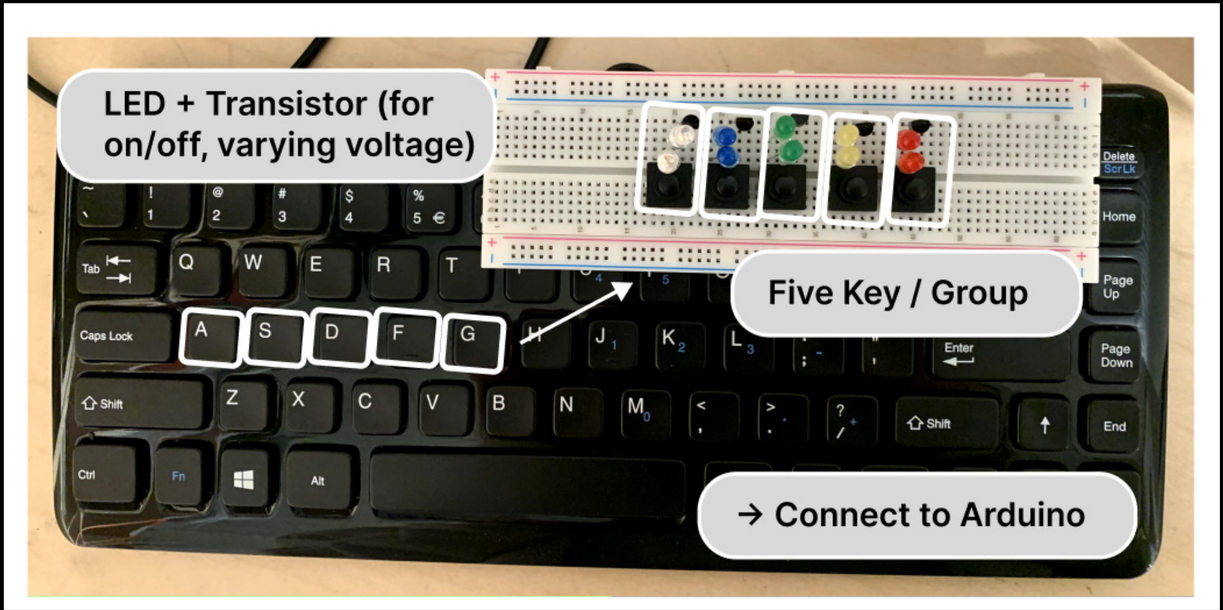
Customizable Backlit Keyboard -
→ will replace by LED stripes

https://www.amazon.com/RK-ROYAL-KLUDGE-Mechanical-Ultra-Compact/dp/B089GN2KBT/ref=sr_1_1_sspa?crid=YI8XW5G9YHR&keywords=backlit%2Bcustomizable%2Bkeyboard&qid=1663719714&sprefix=backlit%2Bcustomizable%2Bkeyboard%2Caps%2C82&sr=8-1-spons&th=1

Logic Diagram

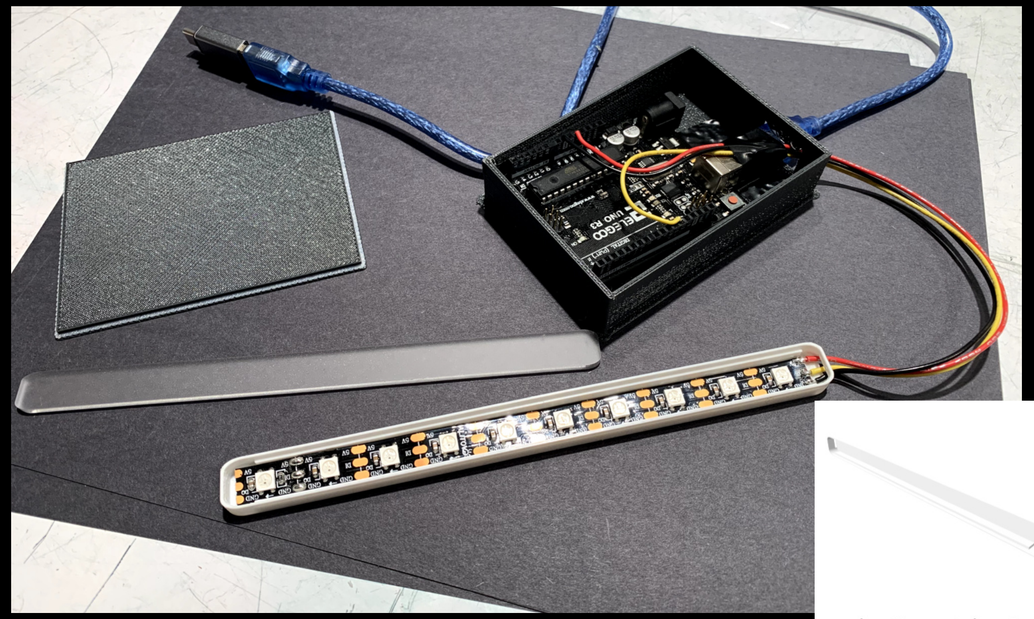


Progress 2: Physical Interaction



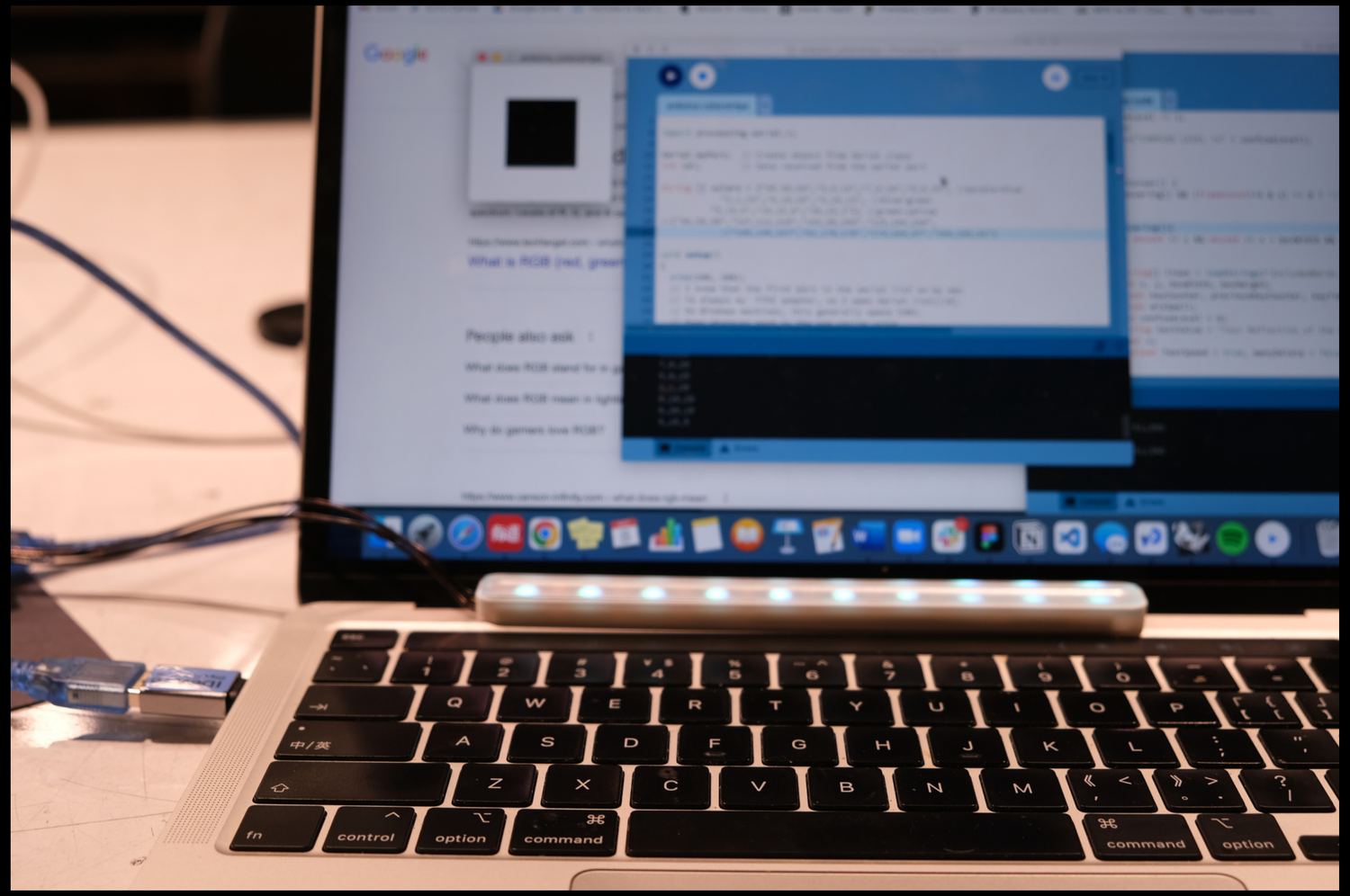
- In this step, I was looking for possible ways to integrate lighting stripes into the keyboard naturally. Originally, I want to embed the lighting into the Keycaps, but this approach seems hard to implement and its lighting effect might not be as expected. The reason is that the LED stripes can do a better job than the typical LEDs in presenting programmable colors. Also, inserting LEDs into keycaps will add heavy jobs into mechanical part, and I have to find a more light-weight solution.

Progress 3: Improved Physical Interaction



- In this step, I figured out the possible ways to externalize the lighting set up, instead of inserting them into the keycap. The solution would be designing a container that aesthetically look consistent to the laptop that I am using, so that it integrates into the keyboard in a seamless way. Thus, I designed the container that aligns with my Macbook's aesthetics, as well as the container for Arduino that does not distract the user experience.

Progress 4: Get the System Working



- In this step, I implemented the “Software” part of the device, in which I coded out the data analysis part.
Actually, this part takes me longer time than I expected, because this is my first time using processing to control a device.
However, by continuously debugging, I finally combined my hardware + software part within this tangible interaction.

Final Thoughts

The RefLogic is definitely a rewarding experience for me, as I’ve stepped into a new zone of using physical computing to target one aspect of sensory experience, through conversational device.
In the next steps, I will explore more of the Physical Embodiment part that I believe will enable more design space within the idea of Logic Gates.