

# Lumen World: Cube Light

- Bringing the World to Her Desk  
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## Concept: 340

This project explores the idea of creating a poetic micro-world — a living presence on a desk — through an interactive light installation.

The concept is built on the theme of reclaiming emotional space in a work-dominated environment. My mum sits at her desk all year round. Her view is filled with documents, and screens. I often think: what if she could see something beyond work? Something gentle, emotional, and alive? This is where my concept begins.

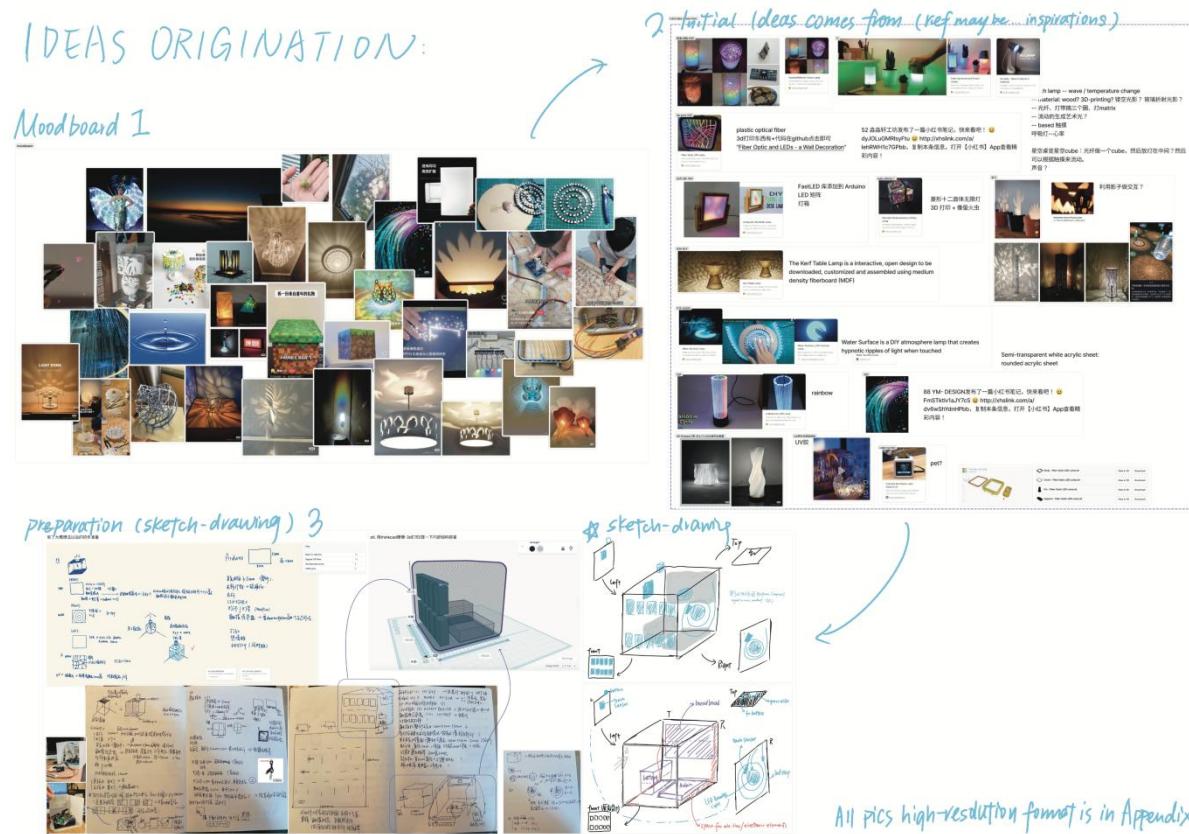
The installation brings a small “world” to her desk — a space composed of stars, flowing water, plant-like light, and soft wind, all expressed through responsive light. Using sensors, the installation reacts to proximity or touch, sending light ripples, growing tendrils of brightness, or gentle pulses — subtle responses that create a sense of companionship.

The core interaction is soft and fluid. When the palm gently taps the right surface of the cube, waves of light ripple outward, mimicking water. Touching the left side triggers a flowing light effect on the right — evoking the feeling of wind breathe, light and effortless. I hope this motion gives the viewer a sense of gentle flow. When the button is pressed, the light inside cube glows and casts the shape of geometric grass. When the black surface is touched, stars light up and follow the

direction of the hand. The star may softly “breathe” with light when she’s present, and slowly dim when she leaves — as if a quiet farewell.

The effect I hope to achieve is emotional resonance. By placing a responsive world on her desk, I want to offer her a moment of pause — to remind her that beyond the cycle of work, there is always beauty, nature, and care. This small world is my way of being there for her, even when I am not physically present. Creating this piece is not only a creative exploration for me, but also an expression of love, empathy, and reconnection.

## -- Idea Origination:



## Code Logic:

### -- Effects:

- Effect 1 - Star-light touching tracing effect (In cube's front)
- Effect 2 - Flowing light effect
- Effect 3 - Water Ripper effect

### -- Input:

- 10 touch sensors (D2–D6, A1–A5): detect finger taps on the front of the cube. Allow user to control star lighting direction through touch position and motion.

- 1 touch sensor - A (D7): triggers the flowing light animation when touched.
- 1 touch sensor - B (A0): triggers the ripple water wave effect when tapped.
- 1 button (D11): toggles the inner LED ring light (grass projection light).

**-- Algorithm:**

- Star Light:  
Touching different positions on the cube surface triggers the rigid LED strip to light up corresponding LEDs. Then it fades gradually when the hand moves away. Ten touch sensors, and each sensor activates a pair of LEDs, brightening upon touch and gradually fading (via fadeStep) when released, which create a soft interactive glow.
- Flowing Light Effect (Effect is in cube left side):  
Triggered by touch sensor A (D7 - right side), the LEDs light up sequentially along the LED strips (shared with the Water Ripple Effect), imitating wind blowing. After the wind passes, brightness fades behind it over time.
- Water Ripple Effect (Effect is in cube left side):  
Triggered by touch sensor - B (A0 - left side), lighting pulses first pass through the ring light (inner-ring), then through the middle and outer rings formed by LED strips. It uses timing delays and position grouping (inner, middle, outer ring) to create the ripple animation.
- Button+Grass Projection Effect:  
Button is off by default. Pressing the button toggles, button and a soft yellow LED ring light up together, casting a geometric grass-shaped shadow at the top of the cube.

**-- Output**

- 2 Rigid LED Strips (10 LED each)
- 1 LED Strip (32 LEDs)
- 2 Ring LED (12 LEDs)
- Star-following lights

**Circuit/schematic diagram:**

**circuit**

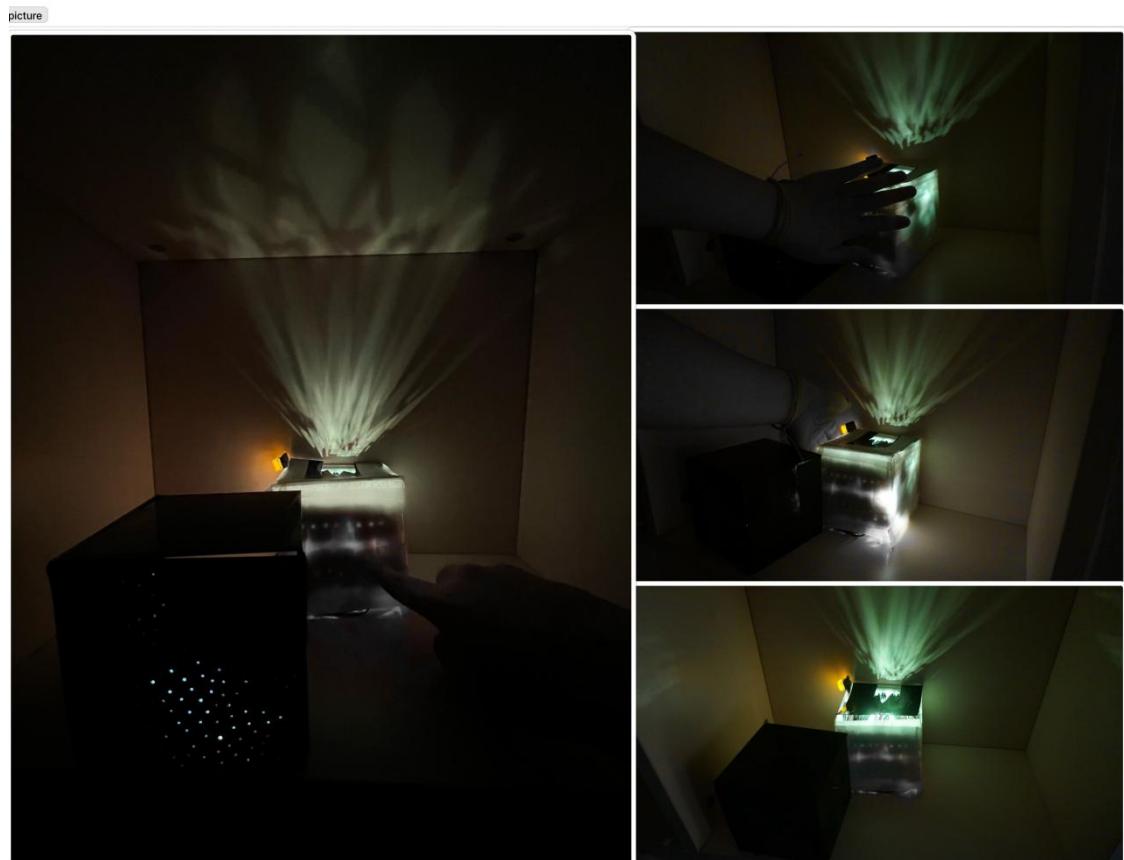
Sensor	Pin	Connect correspondingly
Touch Sensor - 0-5	V G S	Breadboard + Breadboard - <b>Digital Pin 2-6 (5 Sensors)</b>
Touch Sensor - 6-10 (digital pin is not enough, so i put it in analog area)	V G S	Breadboard + Breadboard - <b>Digital Pin A1-A5 (5 Sensors)</b>
Touch Sensor (Left Cube) -- trigger flow light effect	V G S	Breadboard + Breadboard - <b>Digital Pin 7</b>
Touch Sensor (Right Cube) -- trigger ripple effect	V G S	Breadboard + Breadboard - <b>Analog Pin A0</b>
Rigid LED Strip - 1	V G S	Breadboard + Breadboard - <b>Digital Pin 13</b>
Rigid LED Strip - 2	V G S	Breadboard + Breadboard - <b>Digital Pin 12</b>
Button (toggle)	V G S	Breadboard + Breadboard - <b>Digital Pin 11</b>

Actuator	Pin	Connect correspondingly
LED Ring Light - 1 -- Ripple Effect + Flow Light	V G D R	Breadboard + Breadboard - <b>Digital Pin 10</b> LED Strip Din
LED Strip	V G Din	Breadboard + Breadboard - <b>LED Ring Light - 1</b>
LED Ring Light - 2 -- Grass Projection Effect	V G D R	Breadboard + Breadboard - <b>Digital Pin 9</b> none

**Library:** #include <Adafruit\_NeoPixel.h>

## Materials and Appearance:

-- The relationship between the device and the environment



## -- Material Specifications and Usage List

Material List			
Material	Size	Number	Description (aim)
Arduino Uno R3	53.4 mm*68.6 mm	1	<a href="https://docs.arduino.cc/hardware/uno-rev3/Tech-Specs">https://docs.arduino.cc/hardware/uno-rev3/Tech-Specs</a>
MINI Breadboard	400孔 8.5cm*5cm	1	
LED Strip (WS2812)	30 lights/per strip	1	<ul style="list-style-type: none"><li>• Flowing LED Lights</li><li>• Water Ripple Effect</li></ul>
LED Ring Light (WS2812) - HS-F12A	12 lights 5cm*4cm*0.7cm	2	<ul style="list-style-type: none"><li>• One for grass projection effect</li><li>• One for inner ring water ripple effect</li></ul>
Rigid LED Strip (WS2812) - HS-F12P	10 lights/per strip	2	Starlight-effect fiber optic light source
Touch Sensor - HS-S43P	18mm 30mm	10	Sensor for Star-light Effect
Opal Acrylic LED Diffuser	10cm 10cm 1.5mm	6	For Cube Shape
Black acrylic mirror surface + frosted opaque	10cm 10cm 3mm	6	For Cube Shape
Fiber optic filament	Diameter 1mm 10m/per	4	For Star-light Effect
3M black light-blocking tape	3cm*60m	1	Fiber optic bundling + light shielding
Drilling machine + grinding	Contain Diameter 1mm	1	Fiber optic hole drilling + polishing
Power bank (battery case + 2 batteries)	9V	1	Power UP
Latching illuminated button	36*24mm	1	Switch for Grass Projection Light
Tracing paper			For Light Diffusion

## Video Link:

<https://www.dropbox.com/scl/fi/nc2x20e3fyup3pjg9wknj/video.mp4?rlkey=svlrob9j24r85adnv114i01hk&st=21ah73rm&dl=0>

## Challenges & Reflection:

### Challenges Faced:

- LED Strip Connection The strip didn't light up because I mistakenly connected Arduino to the DO (data out) instead of DIN (data in). Reversing the connection solved the problem.
- Pin Limitations With limited digital pins, I moved some touch sensors to analog pins. This caused misreadings when some tools treated them as analog sensors (0–1023). Defining them as digital inputs fixed the issue.
- LED Ring Mapping The WS2812 ring LEDs required manual index setup (e.g., inner 0–9, middle 10–...). Light flow direction also had to be adjusted for smooth animation.
- Checked Arduino UNO specs before the project to plan pin usage and avoid conflicts.

### Material Issues:

- 1mm optical fiber was too stiff; a softer type is needed for flexibility.
- 2mm acrylic couldn't be cut with scissors.
- Touch sensors' red indicator light interfered with visuals and had to be hidden.

### Reflection:

- 3D-Print model next time: Thinkcad web build by myself & download other people's model in web

- 3D-print 1: View other people's work & get assets <https://www.instructables.com/>
- <https://www.thingiverse.com/>
- 3D-print 2: <https://www.printables.com/>
- 3D-print 3: <https://makerworld.com.cn/zh>
- Easy 3D-modeling than Maya, and support STL format and live-view when you share your project to others <https://www.tinkercad.com/dashboard>

## Work Process



This screenshot from a Figma design board illustrates the project's progress and documentation:

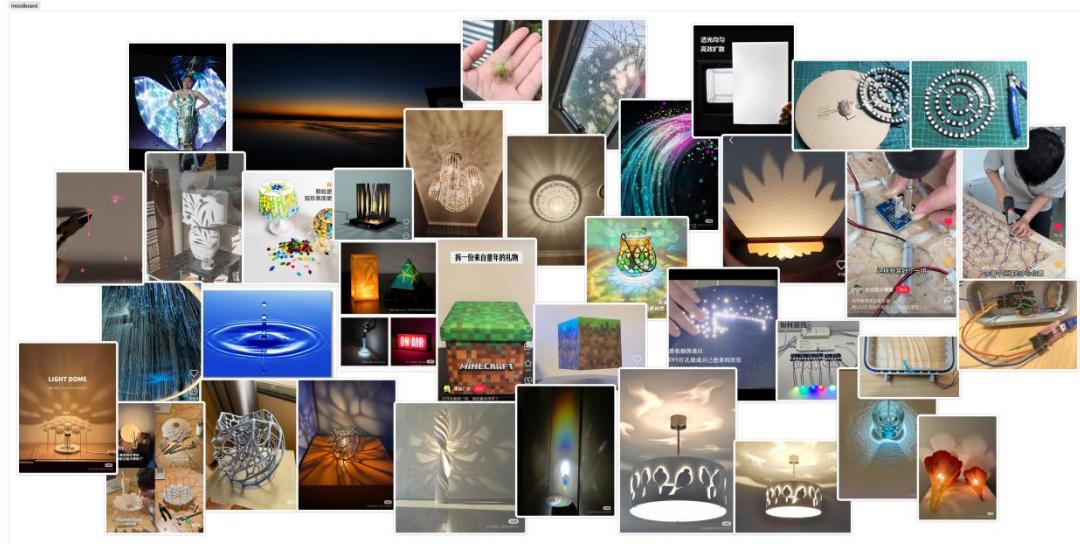
- Left Side:** A large grid of small images showing the progression of the project from initial components to the final assembled state.
- Right Side:** A vertical column of images showing the final product installed in a dark room, with a legend explaining the steps:
  - 基本上完成好电路部分 (基本上完成好电路部分)
  - 测试大小是否装得下 (Test size to see if it fits)
  - 打壳 (Shell)
  - 镶光纤+打圈 (Install fiber optics + loop)
  - 右侧光(effect2, 3) (Right side light (effect2, 3))
  - 测试光效星星效果 (Test light effect star effect)
  - 测试效果 (Test effect)
  - 测试effect1星星 (Test effect1 star)
  - 故障 (Fault)

View high-resolution here:

<https://www.figma.com/board/q9fc2oS71MtloR7PMpLQSK/Arudino-Joyce-Final?node-id=0-1&t=pCvISIqONoggViSk-1>

## Appendixpic

### Appendix A. Moodboard.



### Appendix B. Initial Ideas Comes From.

Initial idea comes from:

**Fiber Optic LED Lamp**  
3d print STL  
plastic optical fiber  
3d打印东西有+代码在github点击即可  
"Fiber Optic and LEDs - a Wall Decoration"

52 淘森轩工坊发布了一篇小红书笔记，快来看吧！ 😊  
dyJOLuGMRIyFtu 😊 http://xhslink.com/a/lehRWH1c7GPbb, 复制本条信息，打开【小红书】App查看精彩内容！

FastLED 库添加到 Arduino  
LED 矩阵  
灯箱

The Kerf Table Lamp is a interactive, open design to be downloaded, customized and assembled using medium density fiberboard (MDF)

Water Surface is a DIY atmosphere lamp that creates hypnotic ripples of light when touched

Semi-transparent white acrylic sheet:  
rounded acrylic sheet

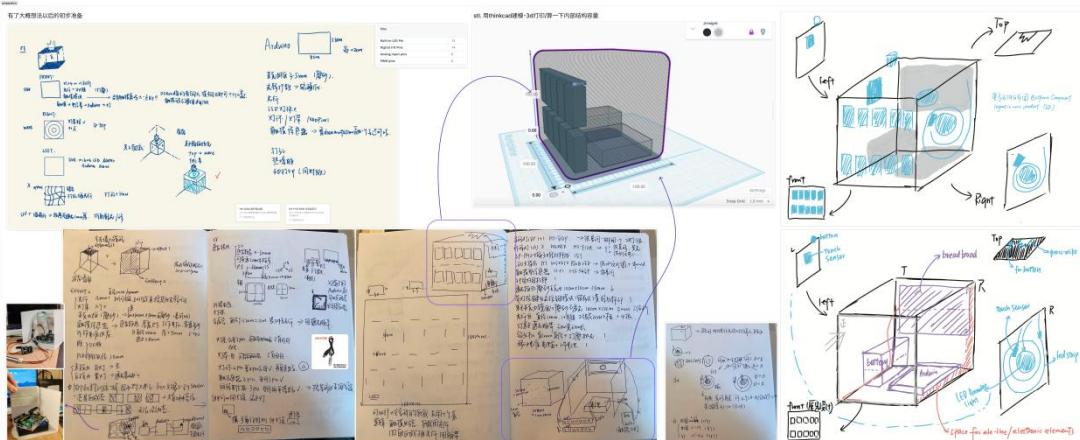
rainbow

UV胶

pet?

Body - Fiber Optic LED Lamp.stl  
View in 3D Download  
Cover - Fiber Optic LED Lamp.stl  
View in 3D Download  
Pin - Fiber Optic LED Lamp.stl  
View in 3D Download  
Support - Fiber Optic LED Lamp.stl  
View in 3D Download

## Appendix C. Preparation.



## Appendix D. Material List

Material	Size	Number	Description (aim)
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## Appendix E. Circuit & Form

**circuit**

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## Appendix F. Circuit

