



ShyBloom

A low-power "flower lantern" light that provides interaction and emotional value.

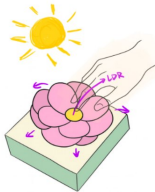
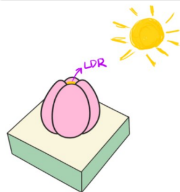
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Concept & Proposal

Concept Overview

The **Shybloom** is a **low-power** "flower lantern" controlled by a Bela board that **opens** when a hand **approaches** and **closes** when it **leaves**, responds to **ambient light** by opening in darkness and closing under bright light, and can enter a **breathing mode** activated by a button. Inspired by mimosa, we adopt an **umbrella-style** central slider with ribs and tensile links so a **single actuator** synchronizes all petals, delivering a **playful** yet **resource-efficient** interaction.

Under Light



In darkness



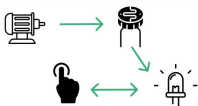
System

We adopt an **umbrella-inspired** mechanism to demonstrate **opening-and-closing** while keeping the look clean and simple.

- **Hide complexity:** Place each moving support inside the umbrella to avoid visually messy exposed linkages.
- **Automate motion:** Manual extend/retract is impractical; use a motor-driven vertical slider.
- **Transmission choice:** Install a rack-and-pinion at the base to convert motor rotation into vertical sliding of the central slider.
- **Petal construction:** 3D-print hollow stems and attach thin plastic sheets as petals.

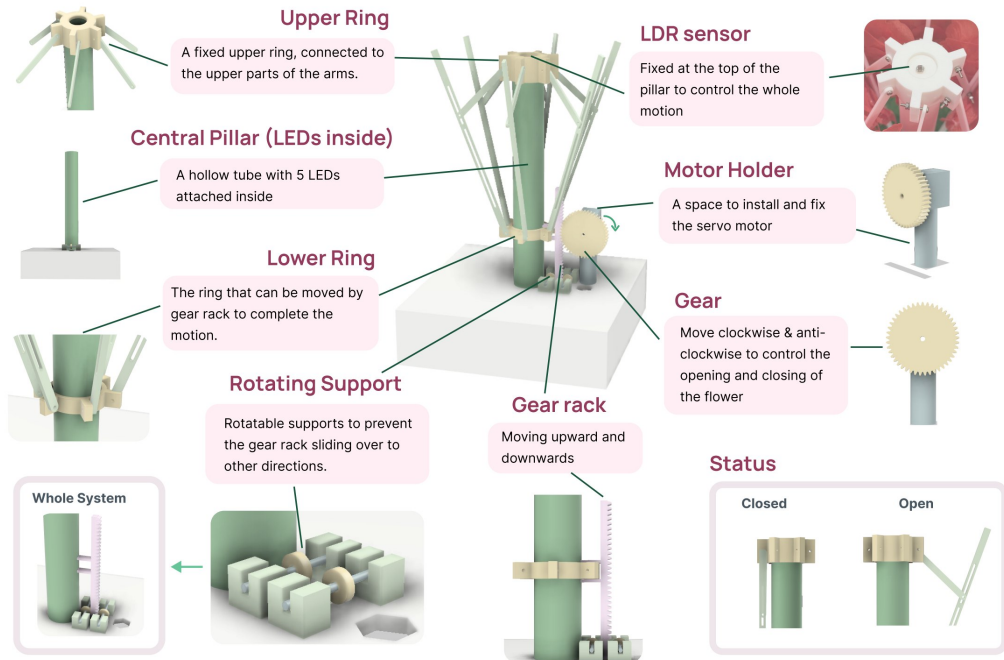
Integrated lighting: Mount a ring of LEDs on the petals; route wires through the hollow stems to keep the appearance tidy.

Resourceful Design



- **One actuator** drives all petals by an umbrella-rib mechanism or a hinge-and-cable linkage.
- A **single LDR** handling **both proximity and day/night** by detecting shadow dips against an adaptive ambient baseline in software.
- Passive elements (rubber bands or springs) provide return motion, reducing reversals and power consumption.
- Structural parts made from reclaimed packaging board and acrylic offcuts to cut costs and material footprint.

System & Mechanics



Electronics & Code

Code

- Pins for **LEDs, LDR, Button, Potentiometer** and **Servo Motor**.
- Initial position for motor to ensure accuracy.

While running, the system will constantly read the reading from **LDR** and compare the reading to the pre-set **threshold**.

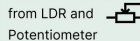
If the value is **greater** than the threshold (**bright** area):

- Motor moves in **clockwise** direction - **close** the flower
- LEDs **off**

If the value is **smaller** than the threshold (**dark** area):

- Motor moves in **anti-clockwise** direction - **open** the flower
- Gain readings from **potentiometer**
- LEDs **on**- brightness determined by **potentiometer reading**- allow users to adjust the brightness
- LED 'Breathing' Mode available through **button** control- gradual rise and fall of the **brightness**- creating better **atmosphere**.

Gaining reading from LDR and Potentiometer



Loop for visual slowing of the servo motor



Statements for detecting the button



Statements for the breathing function

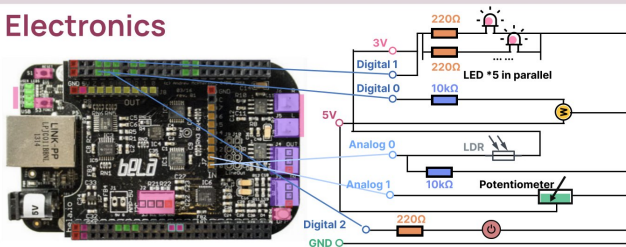


```
void loop()
{
    float raw = analogRead(PIN_LDR);
    Serial.print("The LDR reading:");
    Serial.println(raw);
    float potentialreading = analogRead(PIN_potentiometer);
    Serial.print("The potentiometer reading:");
    Serial.println(potentialreading);
    if (raw >= threshold && currentposition != 0.025){
        digitalWrite(PIN_LED, LOW);
        for (float d=currentposition; d<=0.09; d+=0.001){
            pwmWrite(PIN_SERVO,d,50);
            delay(20);
        }
        currentposition = 0.09;
    }

    if (raw < threshold && currentposition != 0.09){
        int currentButtonReading = digitalRead(PIN_BUTTON);
        if (currentButtonReading != initialButtonReading) {
            delay(10);
            int checkState = digitalRead(PIN_BUTTON);
            if (checkState == currentButtonReading) {
                if (currentButtonReading == LOW) {
                    breathingstatus = !breathingstatus;
                }
                initialButtonReading = currentButtonReading;
            }
        }
        float duty = 0.0;
        if (breathingstatus){
            breathPhase += breathDirection*breathStep;
            if (breathPhase >= 1){
                breathPhase = 1;
                breathDirection = -1;
            } else if (breathPhase <= 0){
                breathPhase = 0;
                breathDirection = 1;
            }
            duty = breathPhase * potentialreading;
        } else{
            duty = potentialreading;
        }
        pwmWrite(PIN_LED, duty, 1000);
        for (float d=currentposition; d>=0.025; d-=0.001){
            pwmWrite(PIN_SERVO,d,50);
            delay(20);
        }
        currentposition = 0.025;
    }

    delay(20);
}
```

Electronics



Product Showcase & Evaluation

Challenges & Improvements

1. The beams are **not strongly fixed** and will **move** slightly in **horizontal** directions.



We added **washers** on **both sides** of the beams and also **two nuts**, one to **fix** it, and one to **lock** it.



2. The **hollow** part of beam is **too long** for movement and will cause over movement that the **frictions** shift to **different angles**.

We fixed this by **shortening the hollow part** of the longer beam to make the shorter beam **fixed at that point** through the motion.

3. **Gear rack** will **shift forward and backward** during the vertical movement. The horizontal vibration makes the structure **inconsistent**.

We added **two round supports** at back and front, and two slices of wood on the **right and left** respectively.



4. The **speed** of servo motor is difficult to control.

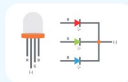
```
for (float d=currentposition; d--0.025; d--0.001){  
  pwmWrite(PIN_SERVO,d,50);  
  delay(20);  
}  
currentposition = 0.025;
```

We **split** the whole rotation into **small parts** by **0.01 difference** to visually control the speed.

Future Design Direction

Customized Color

Change the LEDs to RGB ones or use **neo pixel** to **allow change of color**.



Light features of the flower pedals

Cutting holes on the surface of the central pillar and **stick the LEDs** to the **pedals** for lighting.



Product Showcase

