# BIOMORPHUS

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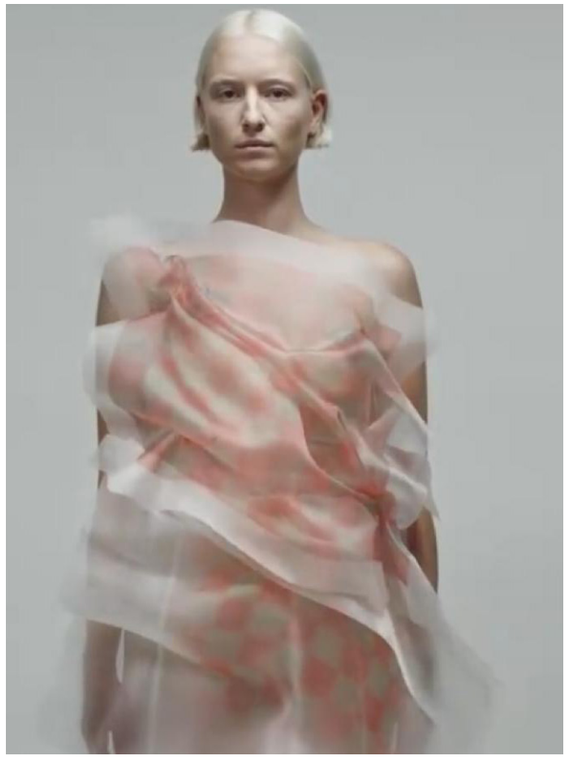
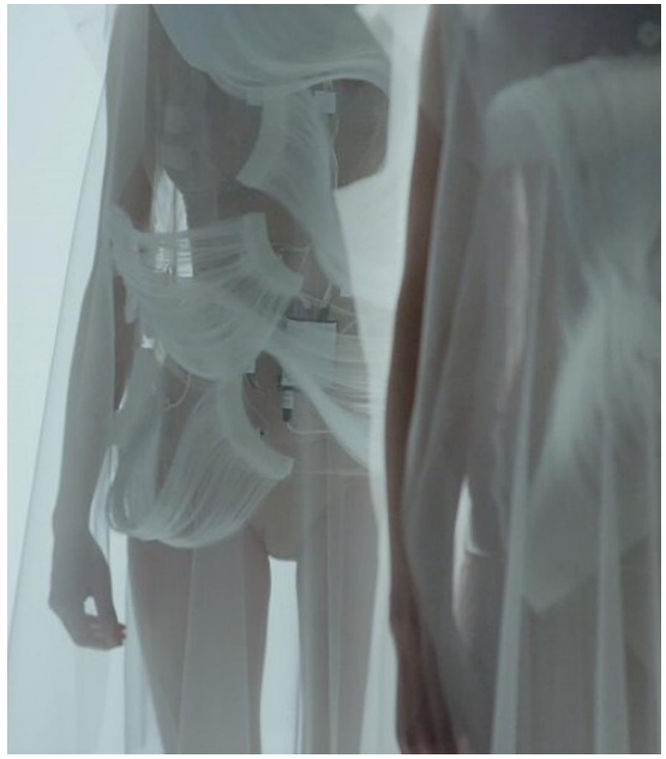
# Brief

This project unveils a conceptual, biomimicry-inspired dress that blends fashion with technology, reacting to environmental changes like natural organisms. Equipped with sensors for distance, light, and sound, the dress transforms with fabric flowers, Electroluminescent Wire, and reactive movements, mimicking nature's intricate behaviors.

# Inspiration





Fashion designer Ying Gao brought in robotics designer Simon Laroche to help create (No)where (Now)here, dresses that activate when someone looks at them.

His robotic garments simulate the effects of virtual clothing creates clothing. This reflects the changes of the social and urban environment.

In the presence of strangers whose fingerprints aren't recognised by the scanner, these dresses become animated.

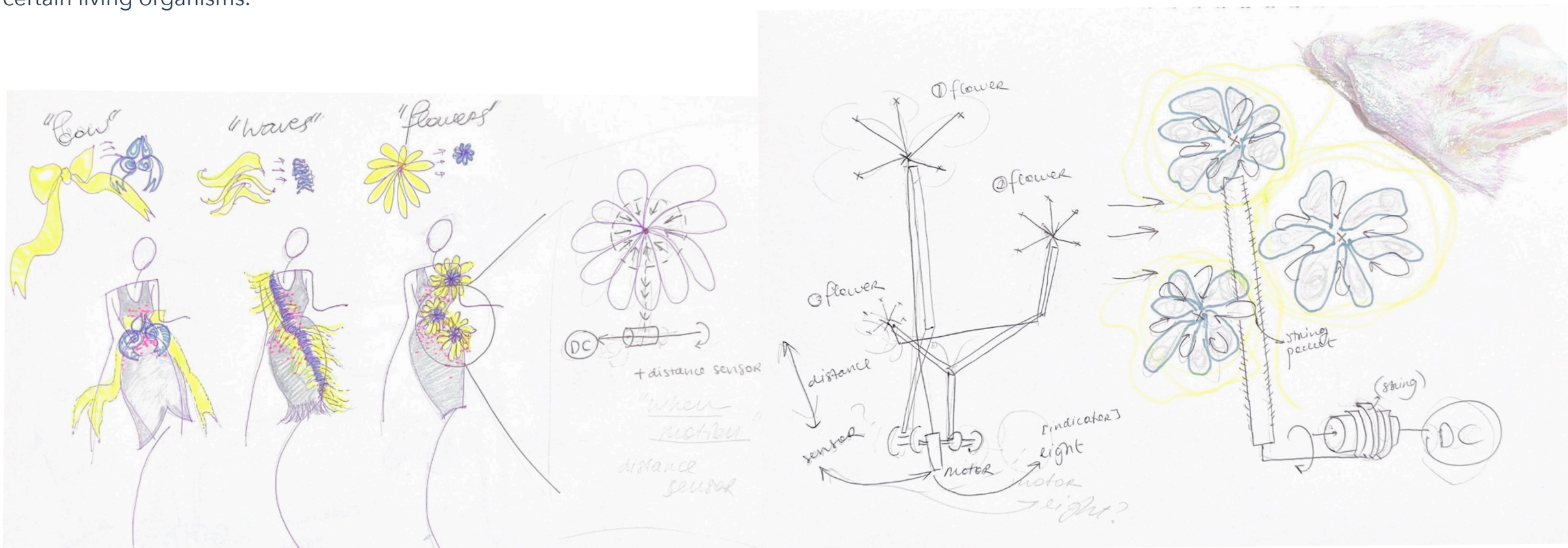
# Motivation

Try to redefine the interaction between humans and machines, transcending beyond the conventional confines of buttons and passive interfaces. At the core of this creation is the idea of symbiotic interaction, where the dress becomes an extension of the wearer, responding and adapting organically to environmental stimuli.

This concept challenges and expands our understanding of how we can harmoniously integrate technology into our daily lives. By incorporating elements that mimic natural organisms, it blurs the lines between the animate and inanimate, creating a more dynamic and empathetic relationship between humans and the technology they interact with.

# Ideation

The dress, crafted from a transparent, pearl-like fabric, incorporates three sensors that enable it to respond uniquely to environmental in ways akin to certain living organisms.




# Final concept

The dress, crafted from a transparent, pearl-like fabric, incorporates three sensors that enable it to respond uniquely to environmental in ways akin to certain living organisms.

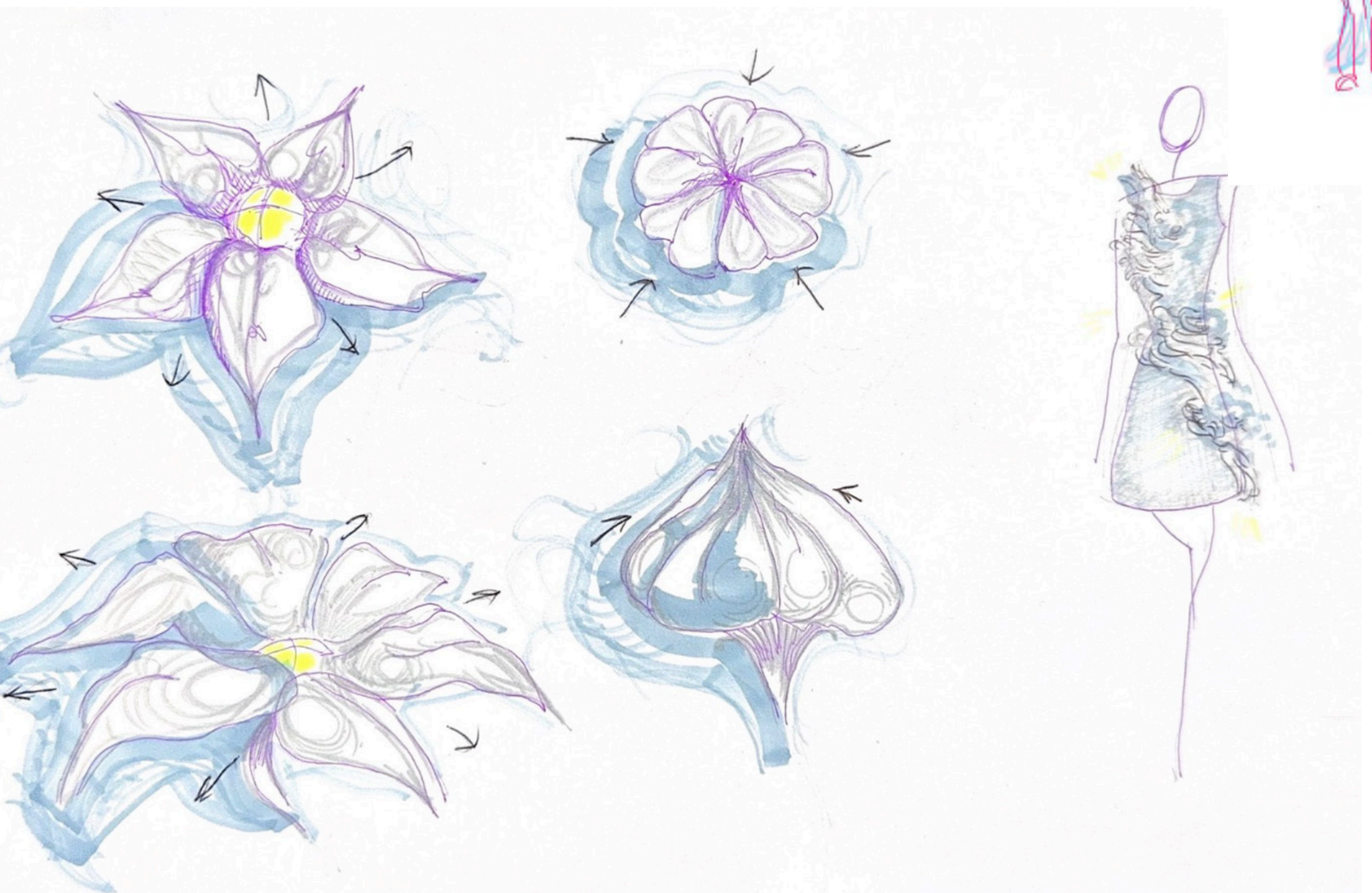
- The distance sensor, connected to a DC motor, animates fabric structures resembling flowers, mimicking the reactive behaviour of plants like the Mimosa Pudica through a thread pull system. These structures close when an object approaches and reopen as it moves away.
- As the light dims, the dress transforms with an Electroluminescent (EL) Wire, reminiscent of bioluminescent algae.This feature is integrated and regulated by a light sensor coupled with a MOSFET circuit, adding a mystical glow to the garment.
- The dress features a servo motor that reacts to sound and sudden air movements, particularly sudden loud noises and sudden air movements. Causing the dress to oscillate or tremble in a manner akin to natural defense responses.

# Prototyping

Initially, a system with petals that are closed individually using a servo motor was ideated. For this some petals were created and since the fabric is too light to hold a shape, the borders were glued to add weight.

Problem: petals would fold when pulled and the movement did not appear organic

One main difficulty was integrating a limit switch in the system so that the petals would not be pulled too much. A possible solution was adding a touch sensor at the end of the petal to record when they are touched, howeverIt was decided to make a time limit instead for more accuracy.

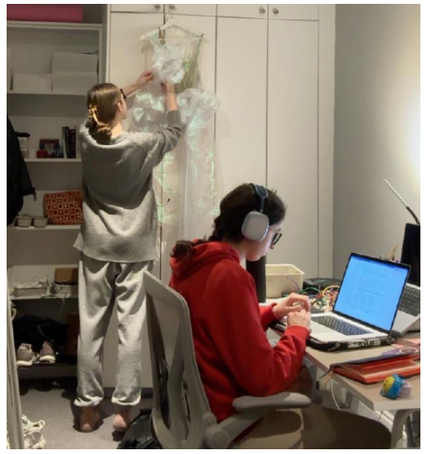


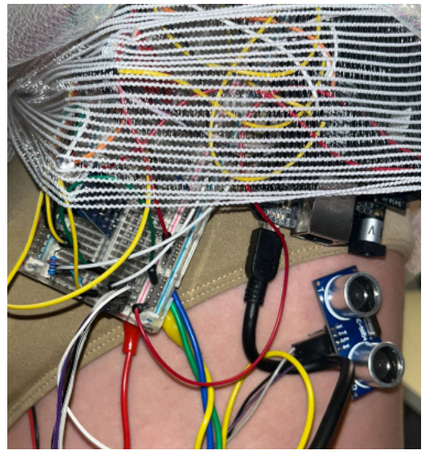

- Other options considered for closing the petals included shape-memory alloys, offering precision but limited by slow response and high power needs, and servo motors, which provide good control but can be bulky for fabric integration.
- Electromagnetic systems are fast but complex

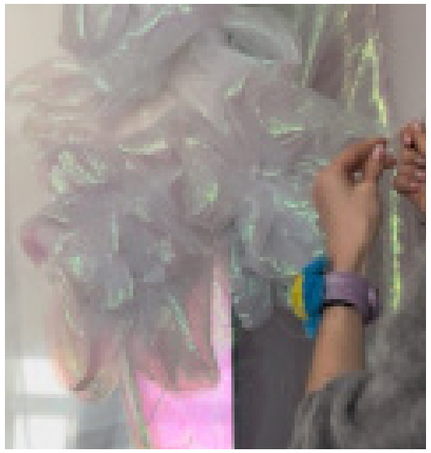
# SYSTEM

## Movement

The dress features flower-like structures that respond to nearby objects using an ultrasonic sensor. When an object approaches, the sensor activates a DC motor, causing the structures to close and reopen as the object moves away. Bela board controls the motor's direction based on the distance changes. The code includes mechanisms for averaging distance measurements to ensure smooth operation and setting thresholds for movement to avoid unnecessary activation.

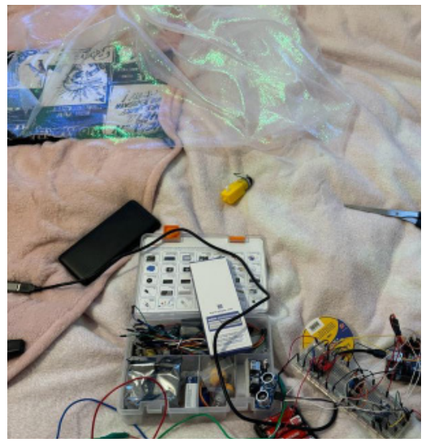


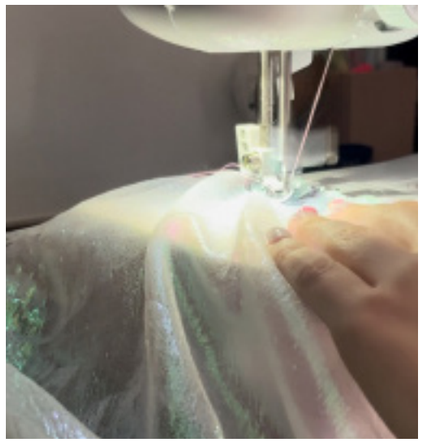




## Sound

The dress incorporates a servo motor that reacts to sudden sounds by mimicking a scared response through oscillation or trembling. Sound is detected via an audio input on the Bela board, activating the servo motor when the noise surpasses a set threshold. The Bela board controls the motor's movement using PWM, creating a smooth, dynamic reaction for an interactive experience.

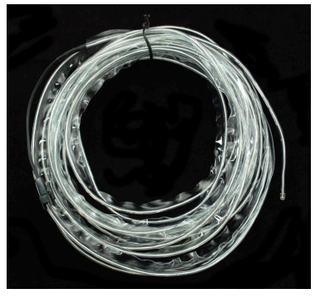




## Light

A sewable Electroluminescent (EL) Wire is integrated into the dress. A light sensor linked to the Bela board detects ambient light and activates the wire in darkness. The EL wire, powered by an inverter, is controlled via a MOSFET connected to the Bela board, enabling efficient management of the high-voltage EL wire with the board's low-voltage signal.

## Pre made kit



A Sewable Electroluminscent (EL) Wire Welted Piping- Aqua 5 metersa and 2xAA pocket inverter were integrated in our project.

This project stands as a testament to the potential of wearable technology in creating a future where our interactions with machines are as natural and instinctive as those we share with living beings.