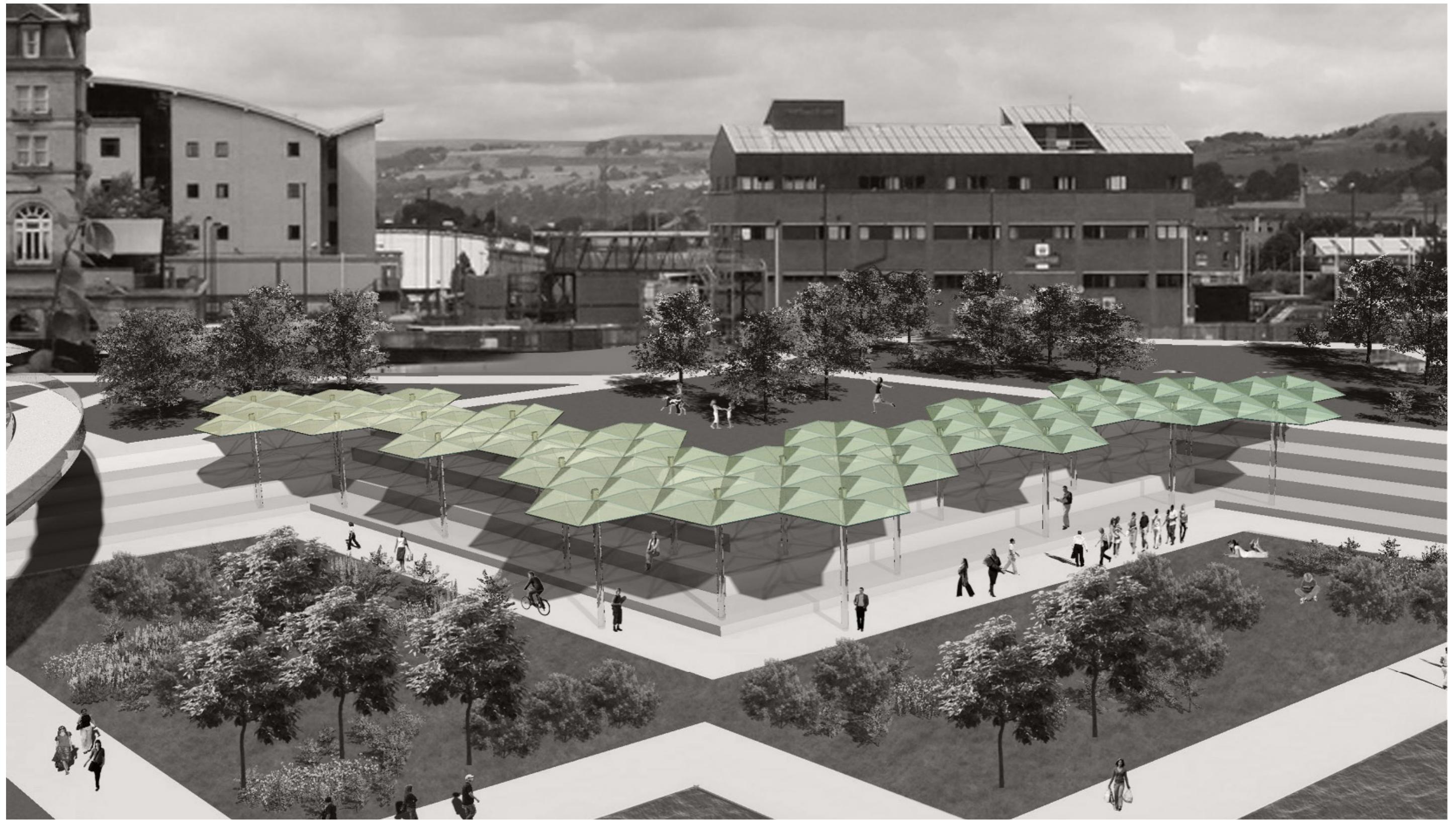


# ALBENA ATANASSOVA

MMU ID:12019128 / Re-Map / Studio 4.3 / MSA



**RE-MAP**  
[ A . A ]

ALBENA ATANASSOVA

RE-MODEL

As the next part of this project I specifically focused on the “creature”. The idea was to create a model that moves in an actuated and responsive or interactive way. Under the Graphene hub project I chose to focus on the interactive graphene canopy element and explore how the individual triangels could move based on a live data stream of the weather conditions for Bradford’s location in order for the canopy to provide natural ventilation and shade (when temperatures are above 15 degrees and during summer to prevent direct sunlight te triangel would fold one into another at certain points) as well as protection from the environment (in particular when it rains the canopy would be fully closed).



**RE-MAP**  
[ A . A ]

ALBENA ATANASSOVA

SIMULATION OF MOVEMENT

In order to set the scene for a further exploration on generating movement for part of the canopy I looked at creating a 3D model that could show how the overall canopy would move along with a detailed view of how a segment of the canopy can be manipulated. This led to the decision that for the prototype a set of 2 triangles would be used as a means of providing the weather responsive canopy to be manipulated digitally through rotation along 2 axis.

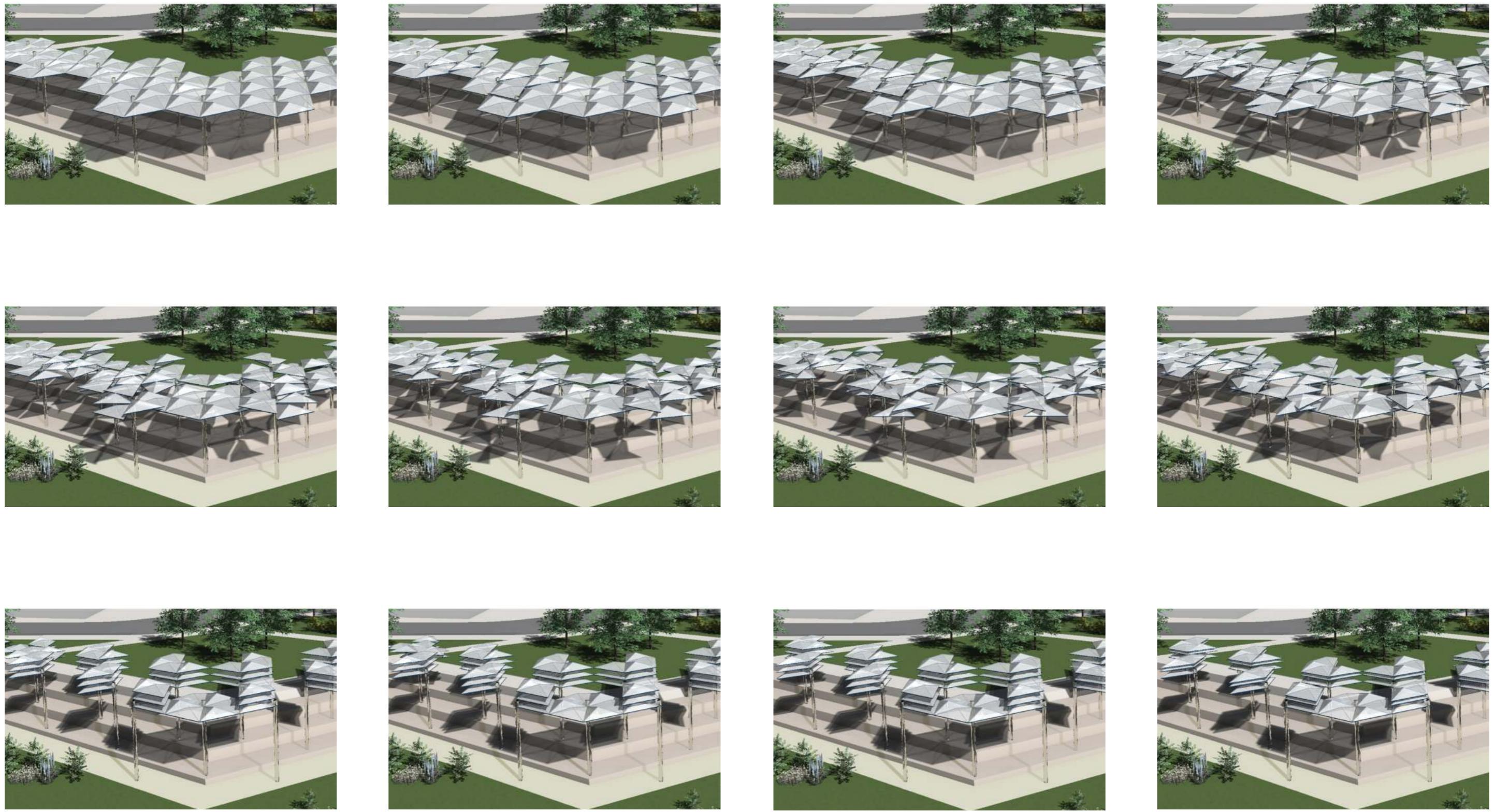


**RE-MAP**  
**[ A . A ]**

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SIMULATION OF MOVEMENT

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**RE-MAP**  
[ A . A ]

ALBENA ATANASSOVA

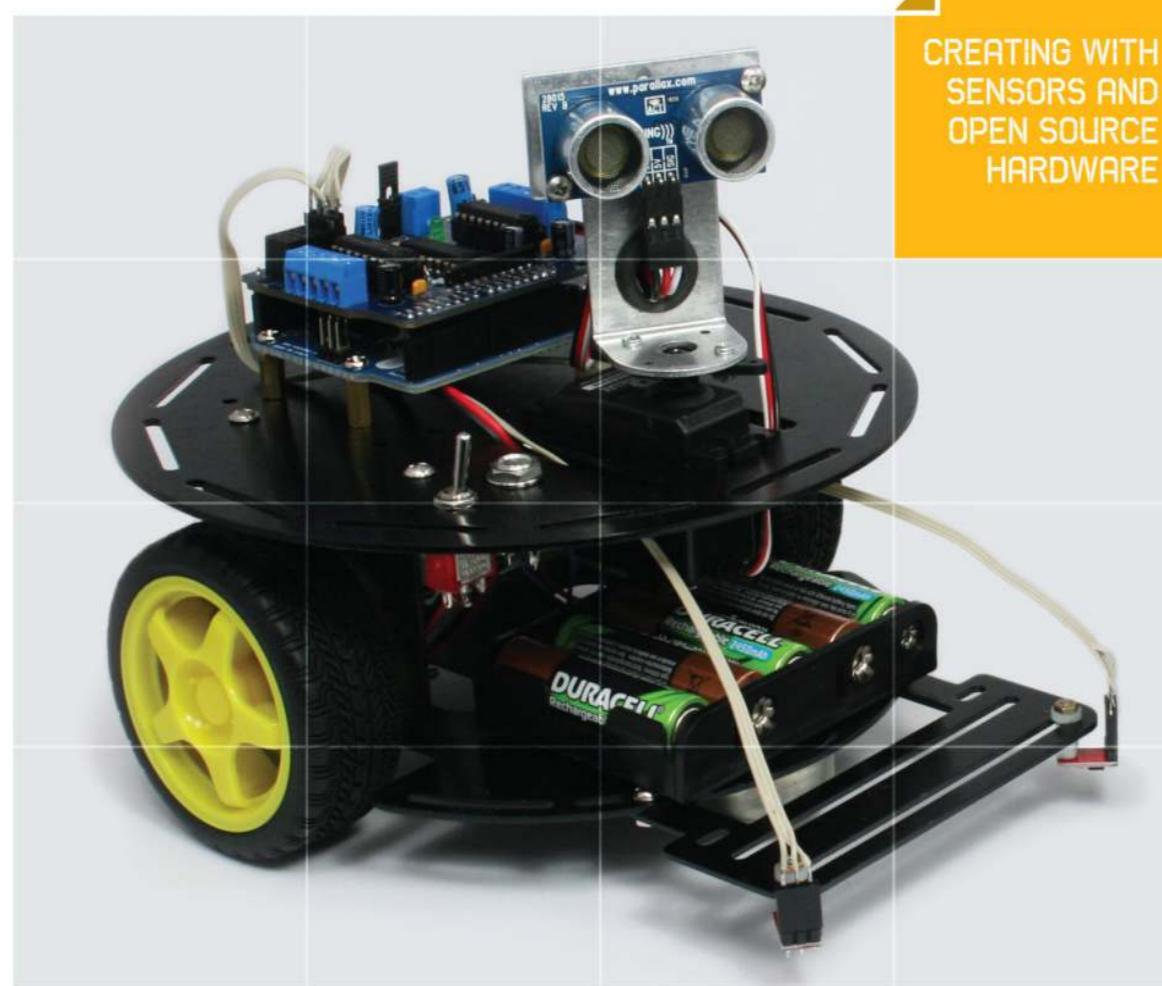
SIMULATION OF MOVEMENT

In order to set the scene for a further exploration on generating movement for part of the canopy I looked at creating a 3D model that could show how the overall canopy would move along with a detailed view of how a segment of the canopy can be manipulated. This led to the decision that for the prototype a set of 2 triangles would be used as a means of providing the weather responsive canopy to be manipulated digitally through rotation along 2 axis.

Michael Margolis

# Make an Arduino-Controlled Robot

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Make:  
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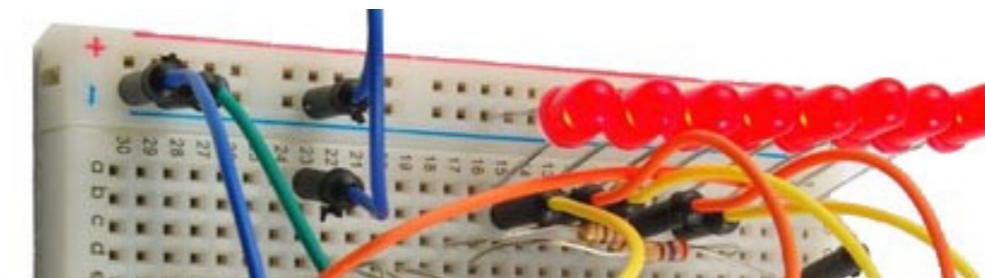
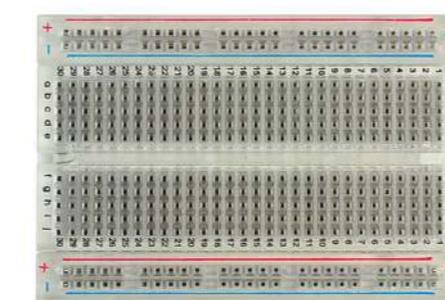
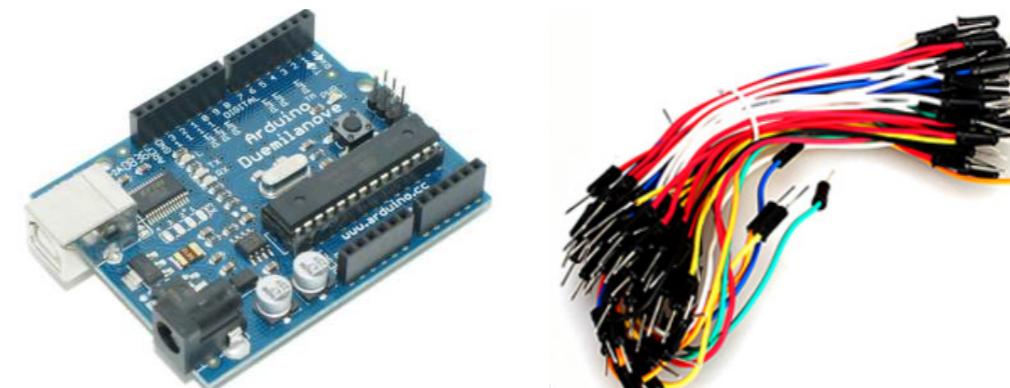
RE-MAP  
[ A . A ]

ALBENA ATANASSOVA

MAKING THINGS MOVE RESEARCH



Learn by  
Discovery



Arduino Duemilanove

Breadboard 400 spaces - 1 piece

Resistor 220 Ω - set of 5

Resistor 2.2K Ω - set of 5

Conductor/cable - 1 piece

Jumpers set of 140 connectors

Servo - GWS S35 STD continuous rotation servo - 1 piece

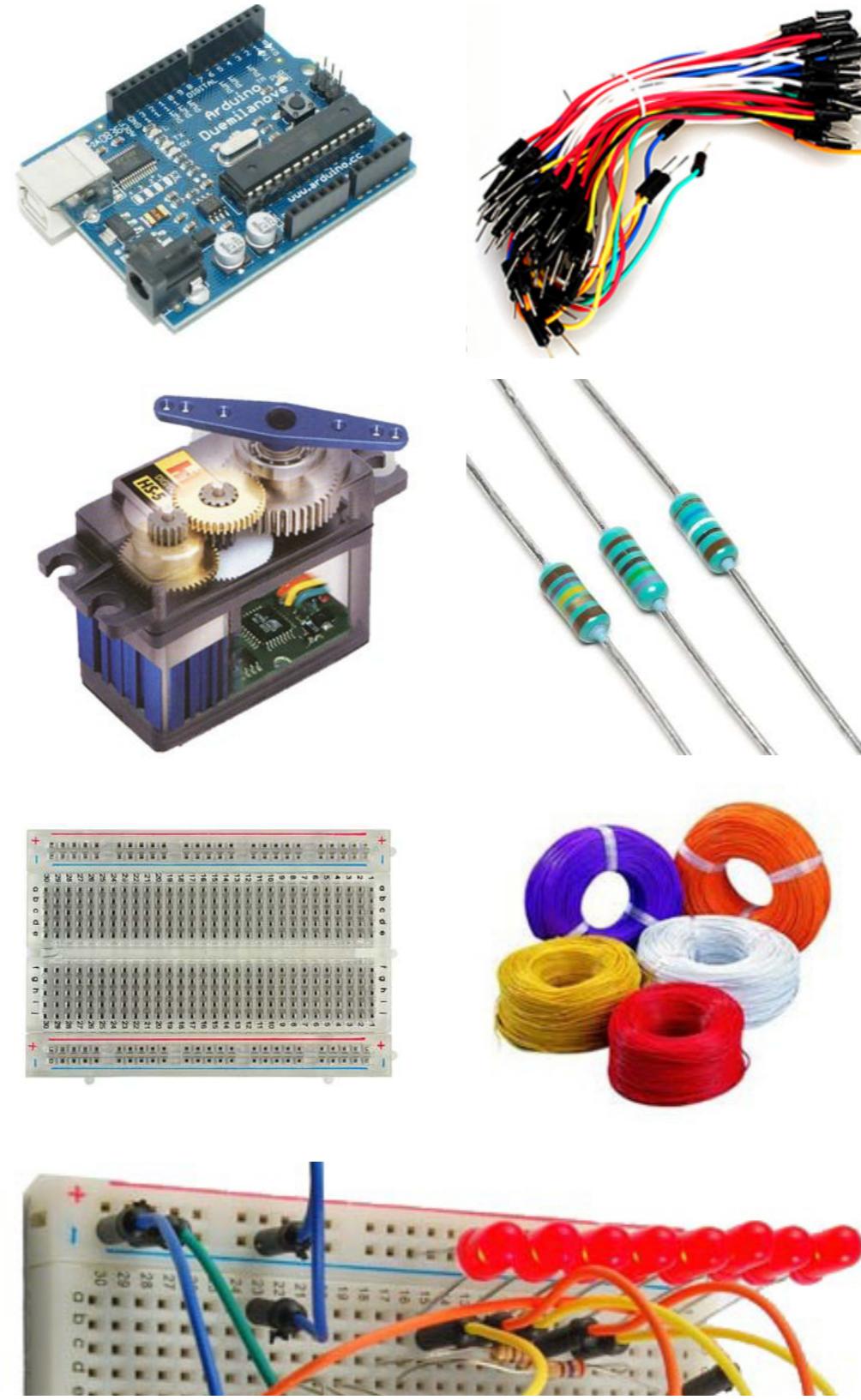
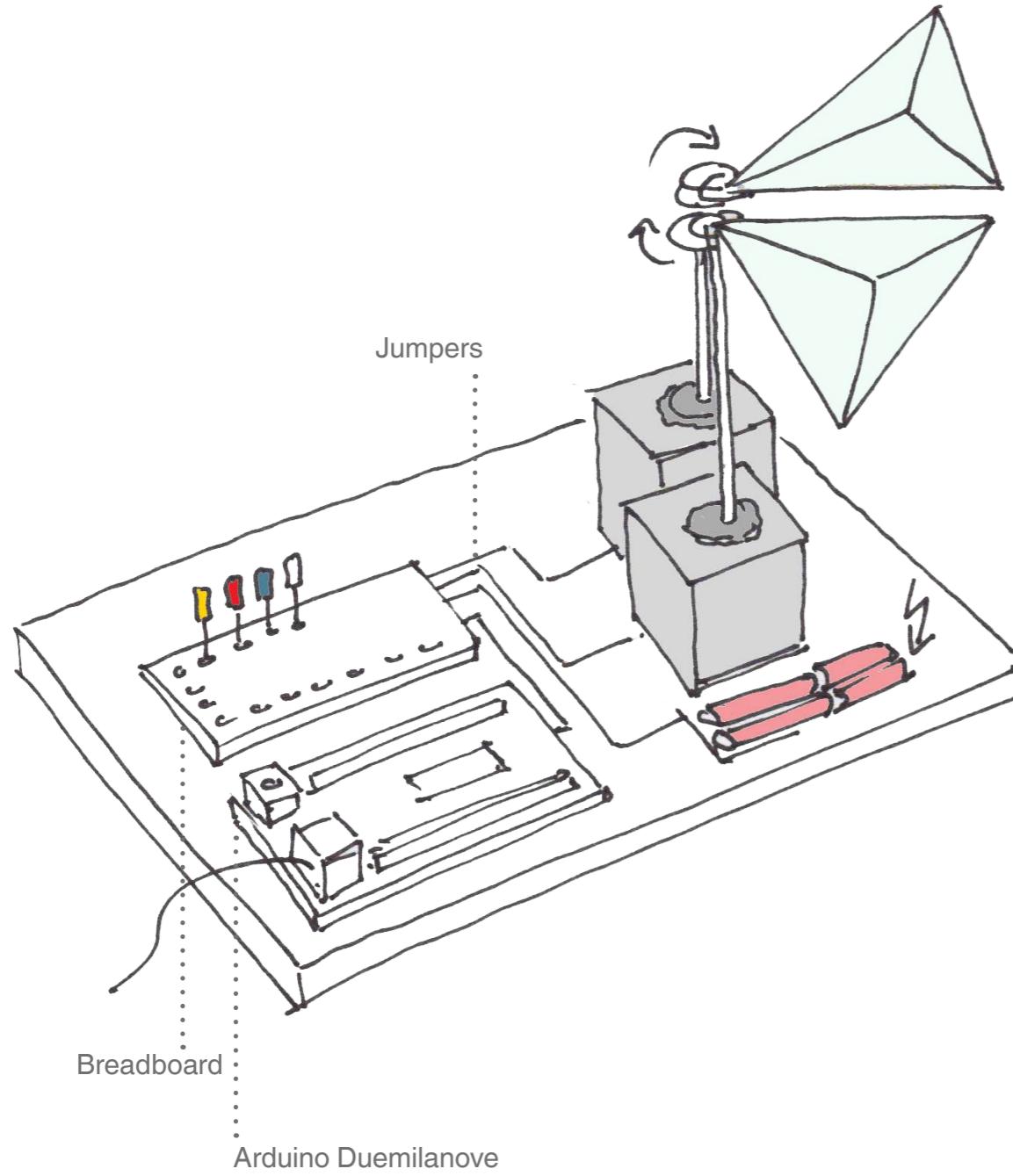
Servo - HD-3001HB with 180° angle of rotation - 1 piece

LED lights - red, yellow, blue 10,000 mcd

4 batteries AA

Connection elements, A4 base and silicon glue

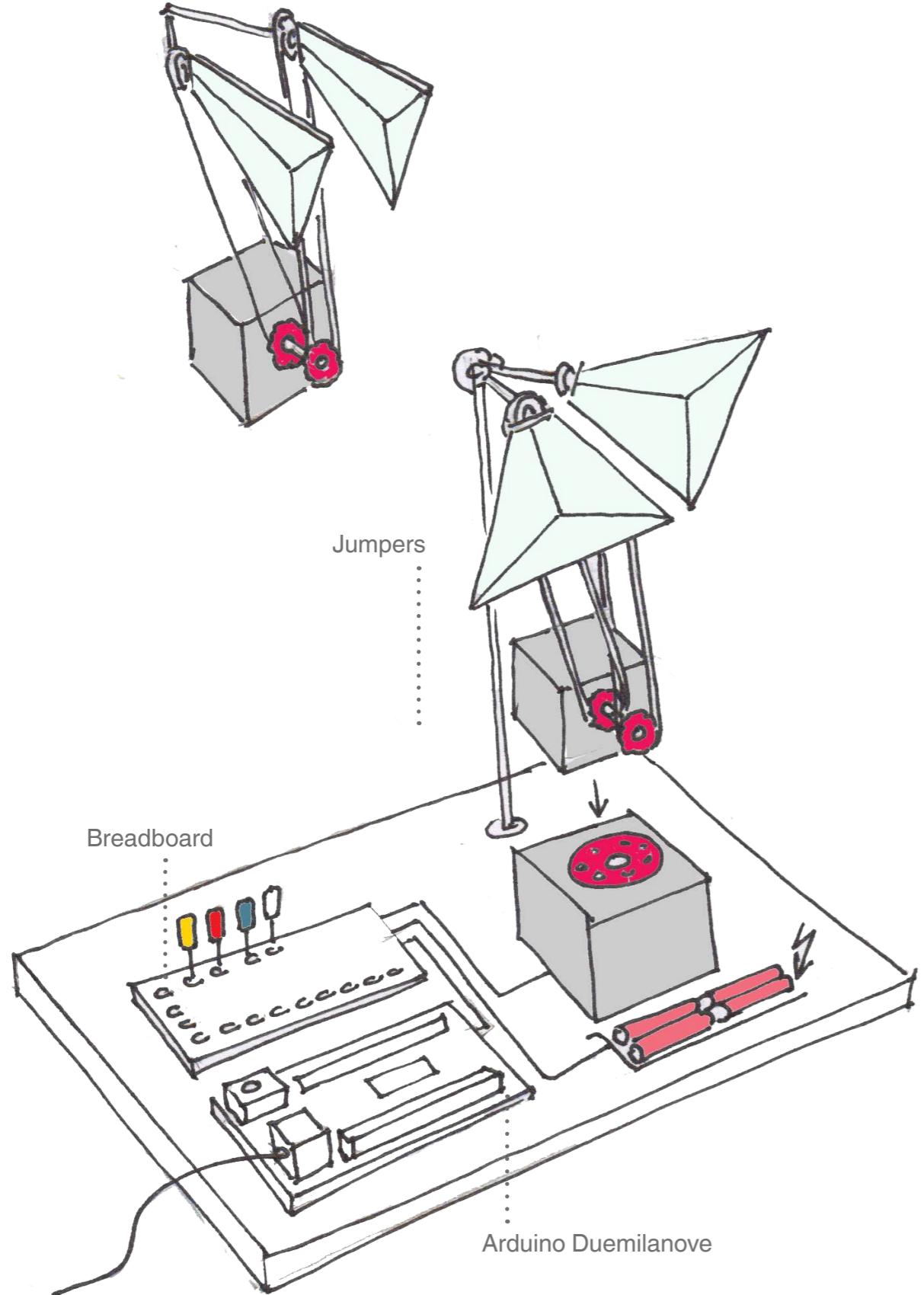
The next step was to look at how to make each of the triangular elements to move via an arduino, connected to the laptop. For this to be possible I looked at various literature on the topic and made a list of all the required components I would need for my project.



In this case each of the triangles is connected to a separate servo, which then connects to the electrical circuit. The movement is thus in one horizontal axis for both of the triangles. Furthermore in this case each triangle needs to be connected to a column - type of element that would then connect to the servo.

In terms of regulating the rotation the LED lights would demonstrate the live data stream of the weather conditions for Bradford, Westfield site. If the light is yellow it would signify lower temperatures and rotation of both triangles so that they have only a slight gap inbetween. If the light is red then the higher temperature would relate to a bigger gap inbetween the 2 components. Finally, if the light is blue then it would allarm for a higher humidity and rain which would result in the triangles being fully attached to one another forming a metaphorical umbrella to protect the visitors underneath the overall canopy.

- Triangle part of canopy
- Servo with 180 degrees rotation
- Duracel batteries AA
- LED yellow - low T
- LED red - high T
- LED blue - rain



**RE-MAP**  
[ A . A ]

ALBENA ATANASSOVA

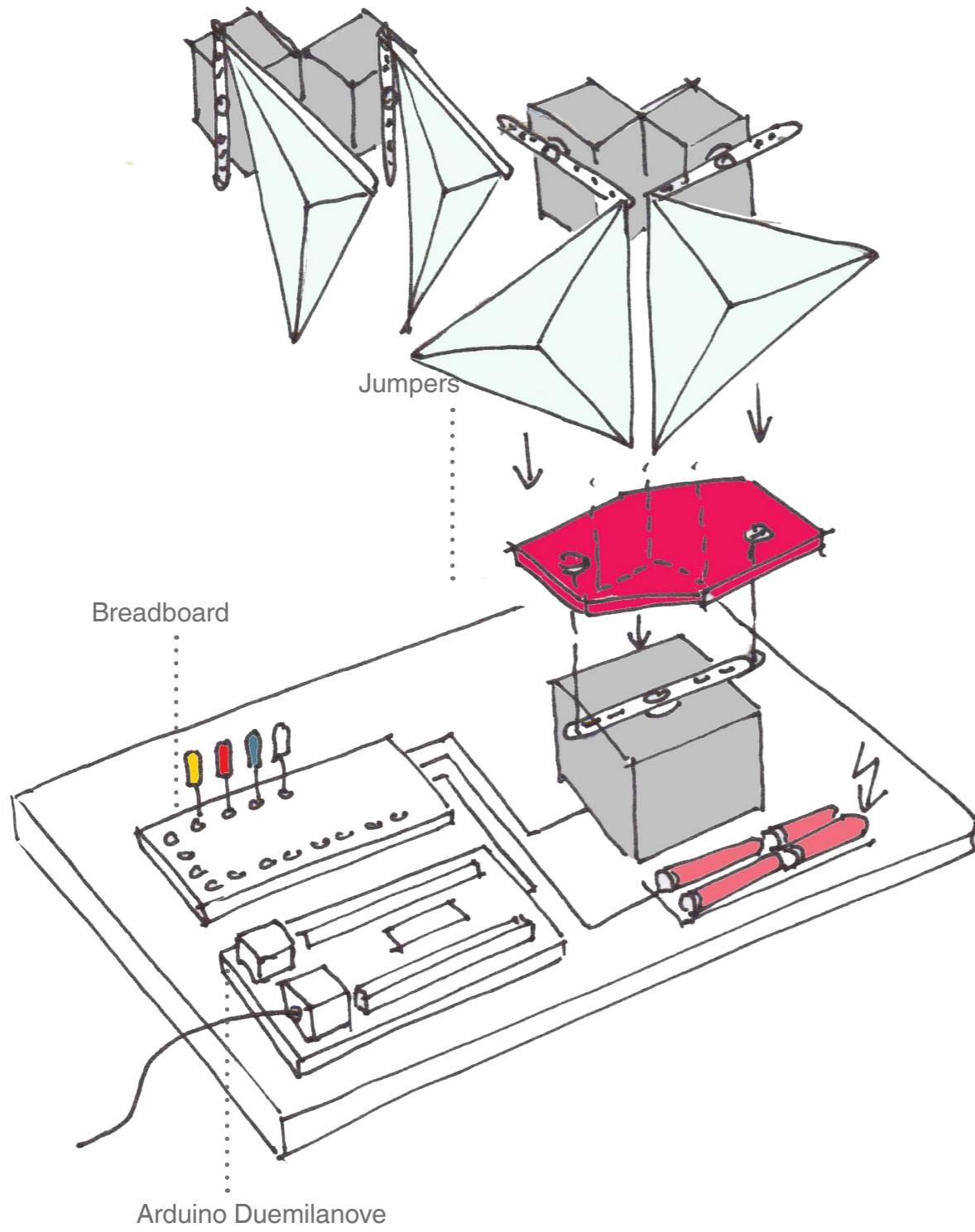
MAKING THINGS MOVE RESEARCH

When I started off looking into rotation of the triangular elements I used this as a direct reference to what the initial video treated.

In this case each of the triangles is connected to one common servo, with the aim to rotate in 2 axis - a horizontal and a vertical one. This is achieved through the application of a series of gears. In this case though the chain elements and gears are unstable. It is hard to regulate motion from the base servo up to the second servo positioned on top of it while maintaining the movement for both triangles.

The LED lights would demonstrate the live data stream of the weather conditions for Bradford, Westfield site. If the light is yellow it would signify lower temperatures and rotation of both triangles so that they have only a slight gap inbetween. If the light is red then the higher temperature would relate to a bigger gap between the 2 components. Finally, if the light is blue then it would allarm for a higher humidity and rain which would result in the triangles being fully attached to one another forming a metaphorical umbrella to protect the visitors underneath the overall canopy.

- Triangle part of canopy
- Servo with 180 degrees rotation
- Duracel batteries AA
- LED yellow - low T
- LED red - high T
- LED blue - rain
- Gears



**RE-MAP**  
[ A . A ]

ALBENA ATANASSOVA

MAKING THINGS MOVE RESEARCH

When I started off looking into rotation of the triangular elements I used this as a direct reference to what the initial video treated.

Finally it was resolved that each triangle should be rotated via a separate servo to secure movement around a horizontal axis, while both these servos would sit on a common base that is attached to a third servo, securing movement in a vertical axis. In this case each of the triangles could move in 2 axis which means that a more accurate representation of the responsive canopy could be made via the prototype.

The LED lights would demonstrate the live data stream of the weather conditions for Bradford, Westfield site. If the light is yellow it would signify lower temperatures and rotation of both triangles so that they have only a slight gap inbetween. If the light is red then the higher temperature would relate to a bigger gap between the 2 components. Finally, if the light is blue then it would allarm for a higher humidity and rain which would result in the triangles being fully attached to one another forming a metaphorical umbrella to protect the visitors underneath the overall canopy.

- [Green square] Triangle part of canopy
- [Grey square] Servo with 180 degrees rotation
- [Red square] Duracel batteries AA
- [Yellow square] LED yellow - low T
- [Orange square] LED red - high T
- [Blue square] LED blue - rain
- [Pink square] Common base

```

// Main sketch
// This sketch reads the current weather conditions from a public API and displays them on a screen. It also tracks the mouse position and rotates a servo accordingly.

// Weather API URL
String url = "http://api.openweathermap.org/data/2.5/weather?lat=42.3601&lon=-71.0589&appid=088374a1-e2f0-47c1-87d9-4a7e0a1a0a20";

void setup() {
    // Set up the serial port
    Serial.begin(9600);
}

void loop() {
    // Read the XML response from the API
    String xml = loadXML(url);
    int temperature = xml.getInt("main/temperature");
    String condition = xml.getString("weather/condition");

    // Map the temperature to a value between 0 and 255
    int mapTemp = map(temperature, 15, 30, 0, 255);

    // Set the servo rotation based on the mapped temperature
    servo.write(mapTemp);
}

// Function to handle mouse movement
void mouseMoved(MouseEvent e) {
    // Map the mouse x and y coordinates to values between 0 and 255
    int mouseX = map(e.x, 0, 512, 0, 255);
    int mouseY = map(e.y, 0, 512, 0, 255);

    // Set the servo rotation based on the mouse position
    servo.write(mouseX);
}

// Function to handle button presses
void buttonPressed() {
    // Check if the button is pressed
    if (button.pressed()) {
        // Set the servo rotation to 90 degrees
        servo.write(90);
    }
}

// Function to handle button releases
void buttonReleased() {
    // Check if the button is released
    if (!button.pressed()) {
        // Set the servo rotation back to 0 degrees
        servo.write(0);
    }
}

```

```

// Function to control all servos
void all_servos() {
    Servo Servo1;
    Servo Servo2;
    int ServoRotation = 0;
    Servo BigServo;

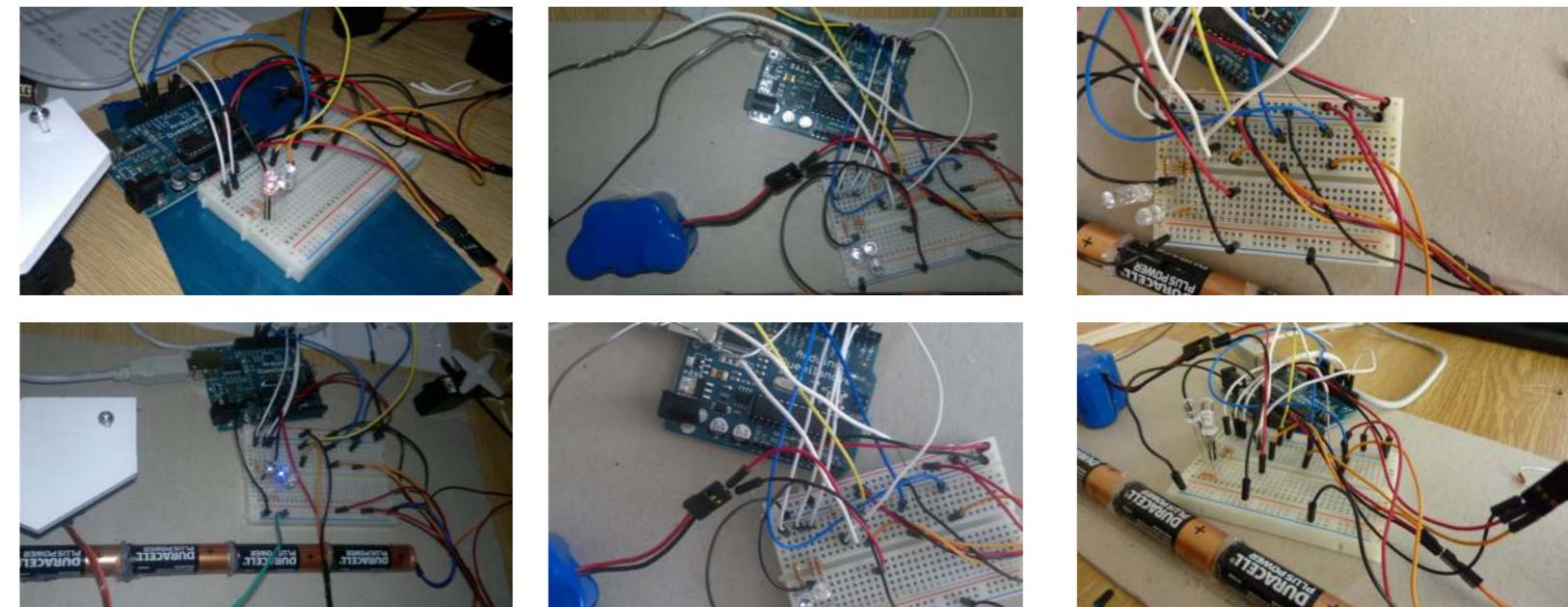
    // Check if the mouse is over the screen
    // This example works with the entire screen
    if (mouseY > 0 & mouseY < 512 & mouseX > 0 & mouseX < 512) {
        ServoRotation = map(mouseY / 512.0, 0.0, 1.0, 0, 255);
        Servo1.write(ServoRotation);
        Servo2.write(ServoRotation);
        BigServo.write(ServoRotation);
    } else {
        ServoRotation = 90;
        Servo1.write(ServoRotation);
        Servo2.write(ServoRotation);
        BigServo.write(ServoRotation);
    }

    // Set the LED states
    if (ServoRotation < NeutralPoint) {
        RedLED = 0;
        YellowLED = 44;
        BlueLED = 90;
    } else if (ServoRotation > NeutralPoint) {
        RedLED = 114;
        YellowLED = 121;
        BlueLED = 90;
    } else {
        RedLED = 90;
        YellowLED = 44;
        BlueLED = 90;
    }

    // Turn on the appropriate LED
    digitalWrite(RedPin, RedLED);
    digitalWrite(YellowPin, YellowLED);
    digitalWrite(BluePin, BlueLED);
}

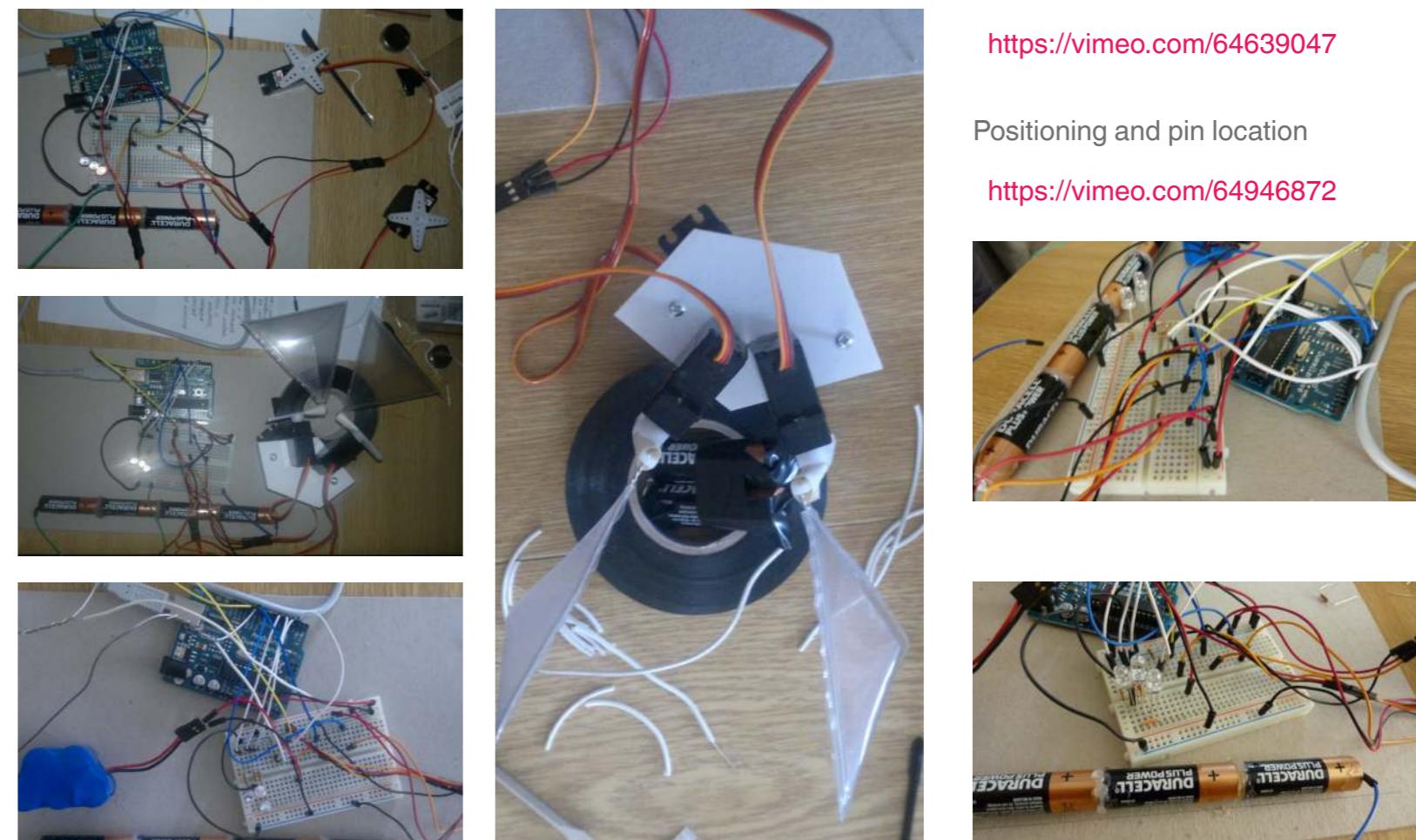
```

Scripting with Processing and Arduino software



<https://vimeo.com/64639047>

Positioning and pin location



<https://vimeo.com/64946872>