



23rd Elementz Fair

Project Code: SS23

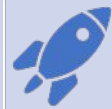
Project Title Fast Fashion

Submitted by: Fuhua Secondary School





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Introducing The Team

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Avis Designer



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1. THE PROBLEM

1.1 What is fast fashion?

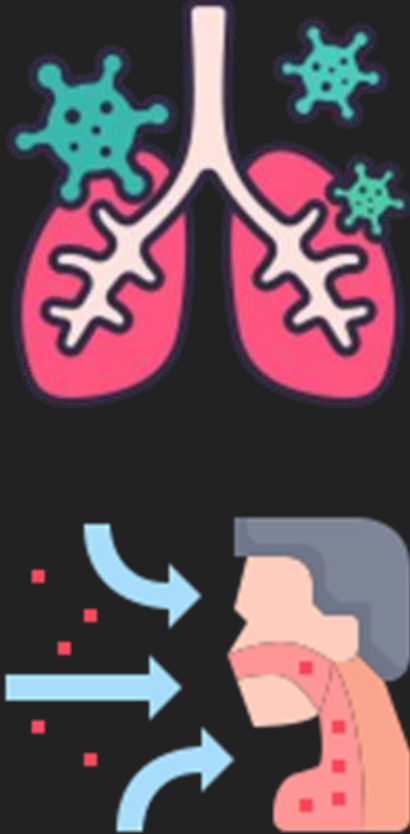
1.2 How does it affect us negatively?



- Fast fashion is an approach of fashion design that creates high volumes of low-cost clothing and accessories using low-quality textiles and dyes. that satisfies short-lived consumer fashion trends.
- Fast fashion creates clothing that are thrown away as quickly as they are produced.
- Factories dump noxious wastewater into rivers
Production of fast fashion uses synthetic chemicals, most of these toxic chemicals are known to cause cancer and other diseases in humans.



1.3 Effects on Employee Health



Workers are **constantly exposed to these toxic chemicals** and fumes. This **negatively affects their health.**

Inhaled plastic microfibers could cause inflammation.

Particle pollution and fine dust damaged lung tissues.

Multiple research reveals people working with plastic-based textiles and dust are at an **increased risk of respiratory problems.**



1.4 Effects on Biodiversity

Clothes production produces wastewater which affects the environment (biodiversity).

Contaminants such as microfibers reduces lifespans and harms the ability to reproduce in aquatic animals 500 000 tons of microfibers are thrown into oceans each year.

Eventually, when these aquatic lifeforms that have ingested microfibers are sold at the market, it poses a threat to human health as well.

Wastewater also acidifies oceans which makes it difficult for survival of corals.

Nervous systems of sharks, clownfish and other marine life may be affected as well.





1.5 Effects on Environment (carbon emissions)



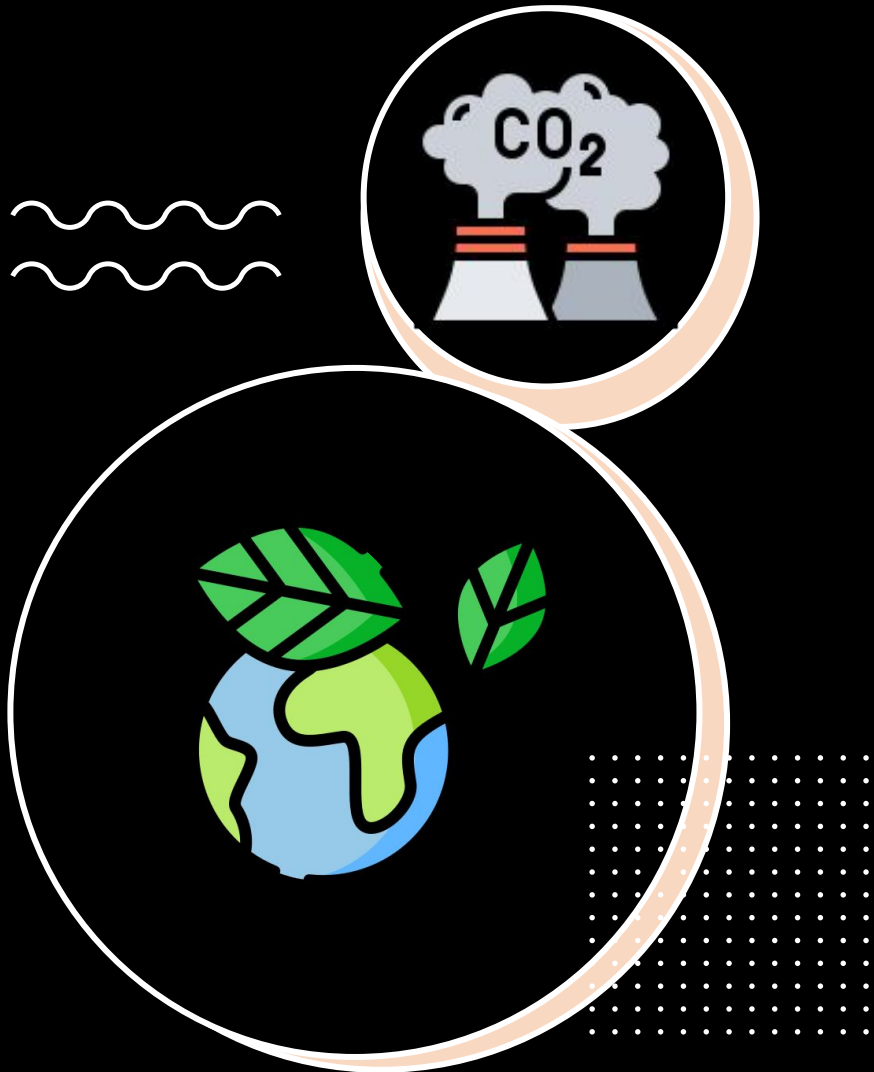
1.6 Child labour



- The fashion industry emits 1.2 billion tons of carbon dioxide annually. Fast fashion released 2.1 billion metric tons of greenhouse-gas emissions in 2018.
- Moreover, fast fashion affects children badly as 80% of apparel is made by young women between the ages of 18 and 24. To make matters worse, evidence of forced and child labour is present.



2 OUR SOLUTION (Overview+ Application)



We plan to make a shirt as well as accessories like bags which can **change its design using digital technologies and hardware such as using an embedded microcontroller** to control the change of colour by the LEDs sewn into the piece of garment as well as a website/app that modifies the design.

This allows our product to **display different patterns** based on the user's preference. With this, **people would just need one shirt in their closet due to its ability to change patterns according to the ongoing trend, deterring consumers from buying more clothes and wasting them.**

This **reduces fast fashion and thus its effects** in the long run. Additionally, it saves on expenses. Best of all they would not need to have the hassle of deciding what design to buy as they can print any desire they want on the shirt. **The user can draw or download their design on the user website made by us, send the design wirelessly to the microcontroller in the garment, which will signal specific LED lights to light up according to the design input.**

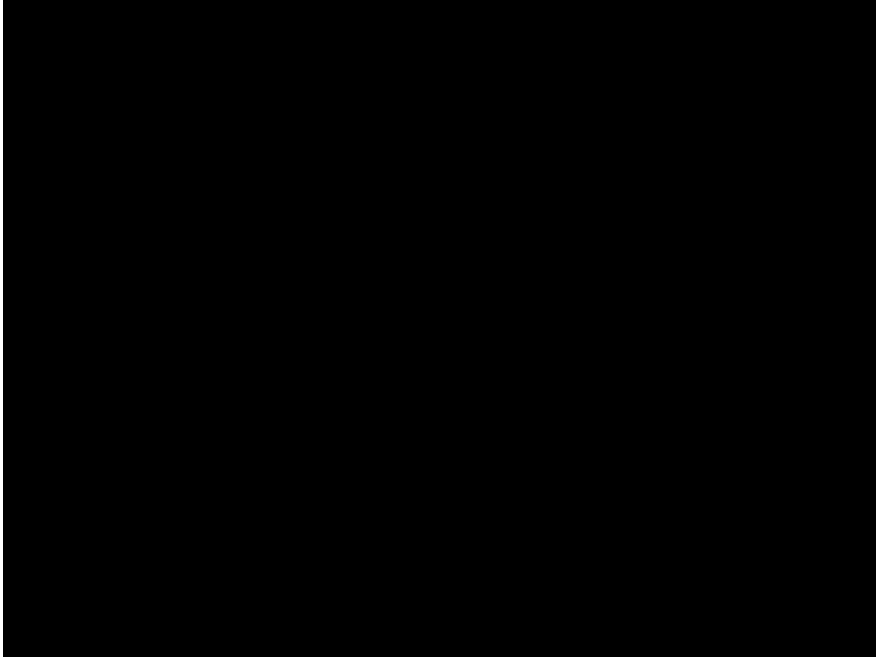
The microcontroller communicates with modules and sensors by opening and closing electrical current and thus the necessary light bulbs will light up to project the design. As current technology is still unable to effectively recycle textile fabric, especially because most fast fashion is made of a mix of synthetic, petrochemical-derived fibers such as polyester, this “one shirt fits all” approach would help to alleviate the problem.

3. OUR PROTO- TYPE

We have prepared two prototypes to showcase our ideas

1. A sweatshirt : the ideal concept presented in animation format
2. A backpack : a simplified idea presented as a 3D-printed physical prototype

3 Our Prototype



PROTOTYPE 1: Sweatshirt

- The video on the left presents what we would like to achieve ideally, where one piece of garment is able to change its colour and display design according to what the user desires
- This is the proposed user website for people to use to change the design of the shirt and know more about us.
Link to website : <https://avisfashion.netlify.app/>

PROTOTYPE 2: Backpack

Colour changing bag with the use of LED after lights being soldered, coded and processed by a microcontroller (Arduino board).



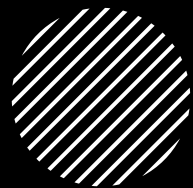
Elaboration

- For Prototype 1, a frame-by-frame animation was made with the aim to depict the shirt's ability to change its pattern and colour from one to another. In the actual production of the shirt, we aim to use sustainable and ethically sourced materials and workmanship in the.
- For Prototype 2, the bag was printed using a 3D printer. But in reality, more suitable sustainable materials would be used as well. After the printing is done, we added LED lights to it by soldering it onto a circuit board and then attaching it into the prototype. This circuit board is connected to a microcontroller (Arduino) that signals the LEDs to light up according to the code sent to it.
- For instance, users who want to change the design on their shirt/bag can access the main user website. Through the website, users can either download premade templates or draw out their design. Next, users need to download the drawing into a file which will be sent to the Arduino board for processing. Once the drawing is processed the respective LED lights will light up and display the design. Allowing our product to switch to different patterns based on the user's preference.

3. OUR PROTOTYPE



4. ANALYSIS



STRENGTHS

- Reduces negative impact on environment
- Drastically cuts down on consumerism just to keep up with fashion trends
- Encourages re-usability of the garment
- Slows down fast fashion and thus its negative effects on human health, the community and the earth, making the world a more sustainable place
- Encourages boundless creativity and exhibits the individuality of the user

WEAKNESSES (+ enhancements)

- Careful consideration when the designing the hardware of the shirt to ensure that it can be washed without damaging the circuit. This can be overcome by ensuring the microcontroller is in a waterproof case or can be detached before washing. Waterproof LED strips can also be used.
- LED light bulbs may break easily. It is imperative that the user handles the shirt with care and does not drop or crush the LED lights when putting on or removing the shirt.

5. How S.T.E.M Is Used

Science: Application our knowledge of circuits and electricity

Since our prototype depends on the various light bulbs to light up to project the respective designs, having circuits arranged in parallel would allow such bulbs can be controlled independently. Additionally, we chose the appropriate LED bulbs to use since we are aware that an LED with a low rating can melt when the electromotive force is too high.

Two semi-conductors, one has electrons (-ev) the other has holes (+ve), when electricity flows and the electrons crash into the holes they release photons.

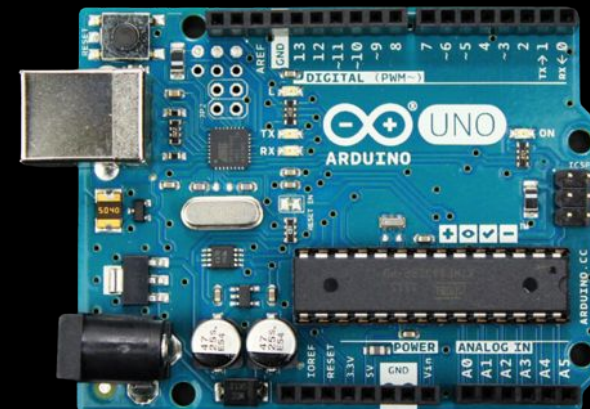
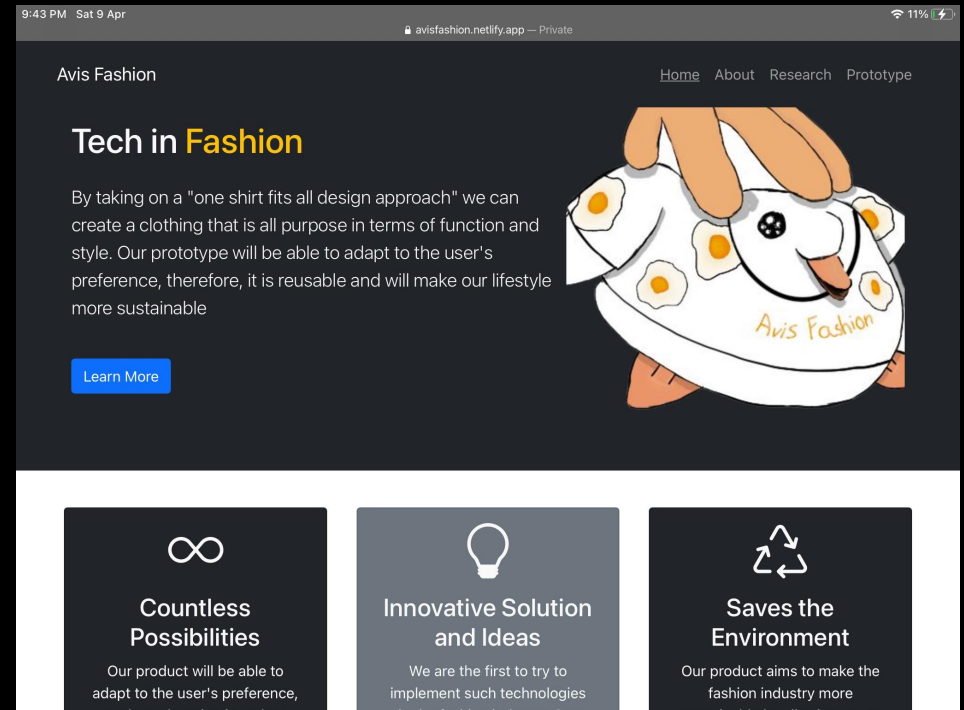


5. Application of S.T.E.M

Technology:

- Website to showcase our product
- Application for users to customise their shirts
- Programming of arduino board to control LED bulbs on prototype

Website url: avisfashion.netlify.app



5. Application of S.T.E.M

Engineering:

3D printing is a form of mechanical engineering

After the geometrical shape has been designed, it is processed into layers of 100-300 microns thickness, also adding support structures where necessary to prevent overhanging areas from drooping during the upwards printing process. The design is therefore precise and can be made to contain other mechanical or electronic components.

Mathematics:

- Calculating of the flow of current through the circuit and picking the correct LED bulbs to prevent the filament from melting.
- Calculating the dimensions of the prototype and scaling it down.
- symbols used in coding: (+, -, /, *, >, <, =)





**Downloadable
Designs**
Via Web Interface



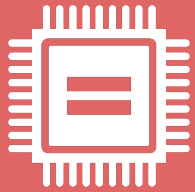
**Fabric
Substitute**



**S.T.E.M
Applications**



**Curbs
Fast Fashion**



**Programmable
Light Display**

1. Customisable to adapt to the latest fashion trends
2. Re-worn regularly and is less "disposable"

OUR PROTOTYPE



**Promotes
Individuality**

1. Wide selection of designs available on the website
2. Independent users can create their own designs



**Less Pollution By
Manufacturers**

With lower consumer demand, manufacturers can cut down on production, contributing less to pollution



**Less
Consumer
Waste**



**Eco-
Friendlier**



**Plausible
Application**

In The Real World