



Appleather

Eco-Friendly & Plastic Free

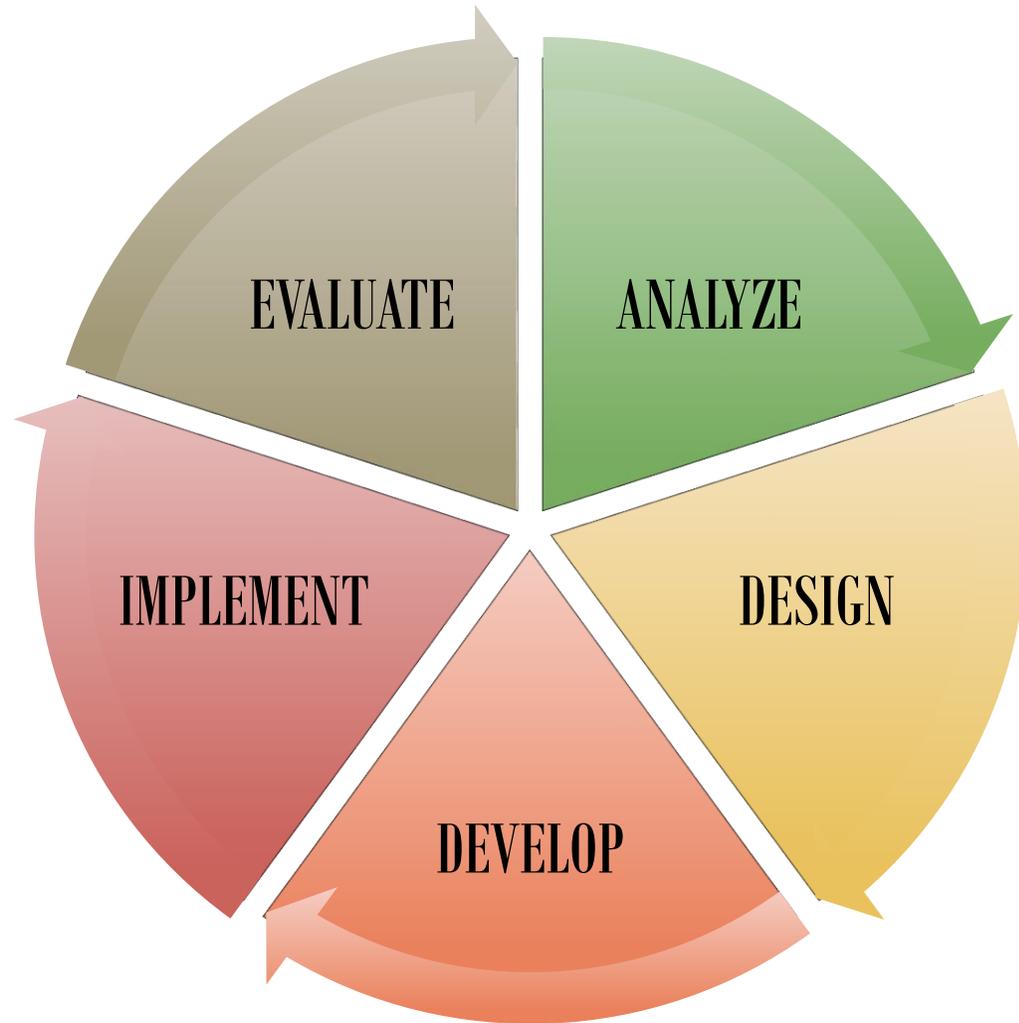
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Problem Based Learning



Apple peels - the resource of the future

“Over the years we have been experimenting on how to convert left-over fruit into leather-like material. By doing so, we are able to bring a eco-friendly and animal-friendly product to the market”- can be read on Fruitleather Rotterdam web side. Durable, leather-like material can be made by transformation leftover fruits such as pineapple leaves, cork, apple peels, other fruit waste. You can find shoes, boots, handbags, billfolds, and seat covers for your car made of leftover fruits. Recently, Tesla joined automaker: BMW, Mercedes-Benz, Lexus, and Ferrari offering vegan leather seating.

According to the report presenting trends, forecast and dollar values of the global vegan leather market the global vegan leather market is projected to grow at a CAGR of 49% over the forecast period of 2019-2025. Grand View Research (GVR) a business consultancy estimates that the vegan leather market is set to be worth \$85 billion globally by 2025.

A Canadian fashion company, SAMARA, is making vegan leather items out of apple peel waste collected from the juicing industry. The designers have not yet figured out how to make it entirely plastic-free; they still use some polyurethane (PU) for a binding agent, which is the eco-friendly version of PVC. Polyvinyl chloride (PVC) is commonly used in the textile industry and is notoriously bad for the environment.

Apples are universal, tasty, available all year round and can perfectly fit into the ecological trends, strive to comply with the zero-waste principle. The trend, encourages us to utilize the parts of apples that we usually dispose of. In most applesauce productions, a lot of apple peel is leftover, and it usually ends up in compost. Whereas, this "waste" contains plenty of vitamins and nutrients. Apple peels contain vitamins A, C and K, as well as calcium, phosphorus and potassium. Almost half of the fibre in each apple fruit is located in it.



What is vegan leather?

A material which does not use animal skins and serves as a replacement of real leather

Also called:

- Pleather
- Faux leather
- Artificial leather

STAKEHOLDERS

‘Vegan leather industry will be worth \$89.6 billion by 2025’

Companies



Ecologists



Vegans



Plastics - harmful components of artificial leather

Damage the natural environment

Plastics cause harm to humans, animals and plants through toxic pollutants.

Non-biodegradable

It can take hundreds or even thousands of years for plastic to break down. The environmental damage is long-lasting.

Contribute to global warming

The production of plastics requires the use of fossil fuels (gas, oil, coal).



The objective of our project

To create a new type of vegan leather which is:

- Free of harmful plastics
- Based on recyclable materials

Apple waste products

- ▶ In the juicing industry, nearly 75% of apple fresh weight is extracted as juice.
- ▶ The left-over 25% is collected as a food waste - apple pomace.
- ▶ The global production of apple pomace is estimated to be 4 milion metric tonnes per year.





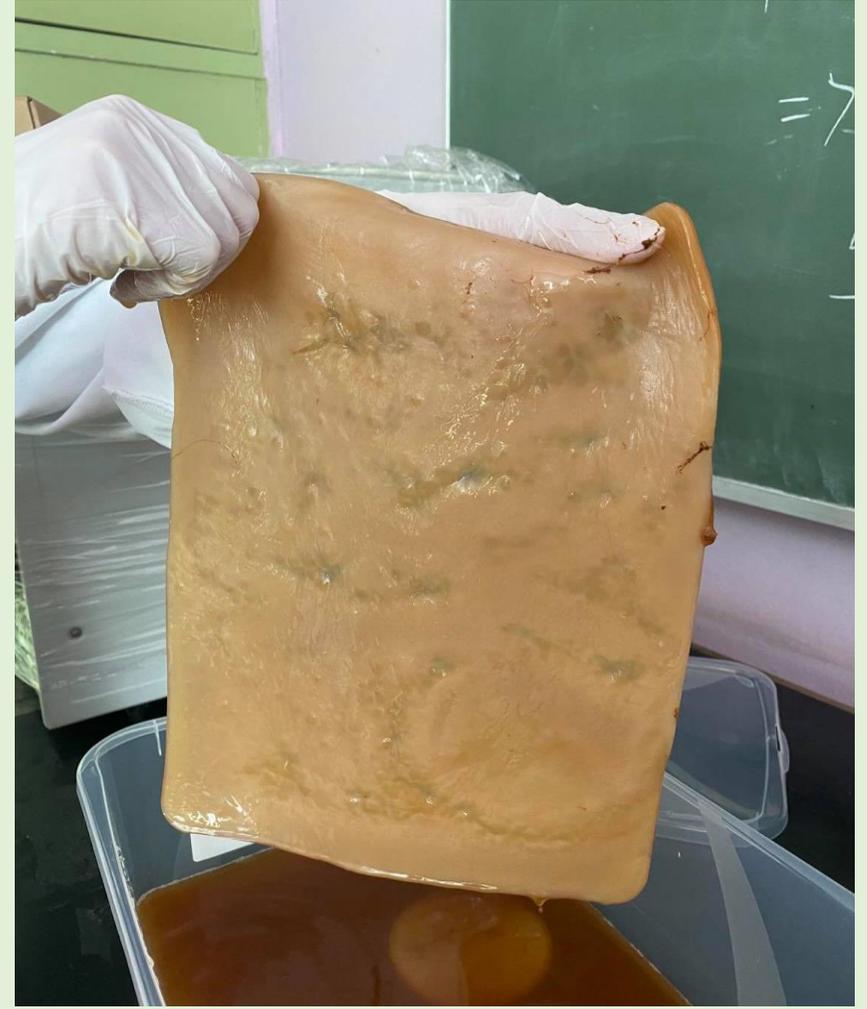
Kombucha

- ▶ Fermented drink produced by bacteria and yeast living in SCOBY (Symbiotic Culture of Bacteria and Yeast)
- ▶ SCOBY contains microorganisms, such as acetic acid bacteria (*Acetobacter xylinum*), which are responsible for the synthesis of bacterial cellulose

Cultivation of SCOBY



Planting SCOBY



Obtained bacterial cellulose

Chemical treatment of the material

Pre-treatment

I. Microorganism
removal

II. Neutralization

III. Bleaching

Post-treatment

Glycerol

Bacterial
cellulose

Apple
powder

Appleather

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graph TD; P1[I. Microorganism removal] --> A[Appleather]; P2[II. Neutralization] --> A; P3[III. Bleaching] --> A; G[Glycerol] --> A; BC[Bacterial cellulose] --> A; AP[Apple powder] --> A;
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Prototype

Right After Preparation



1 Week Later

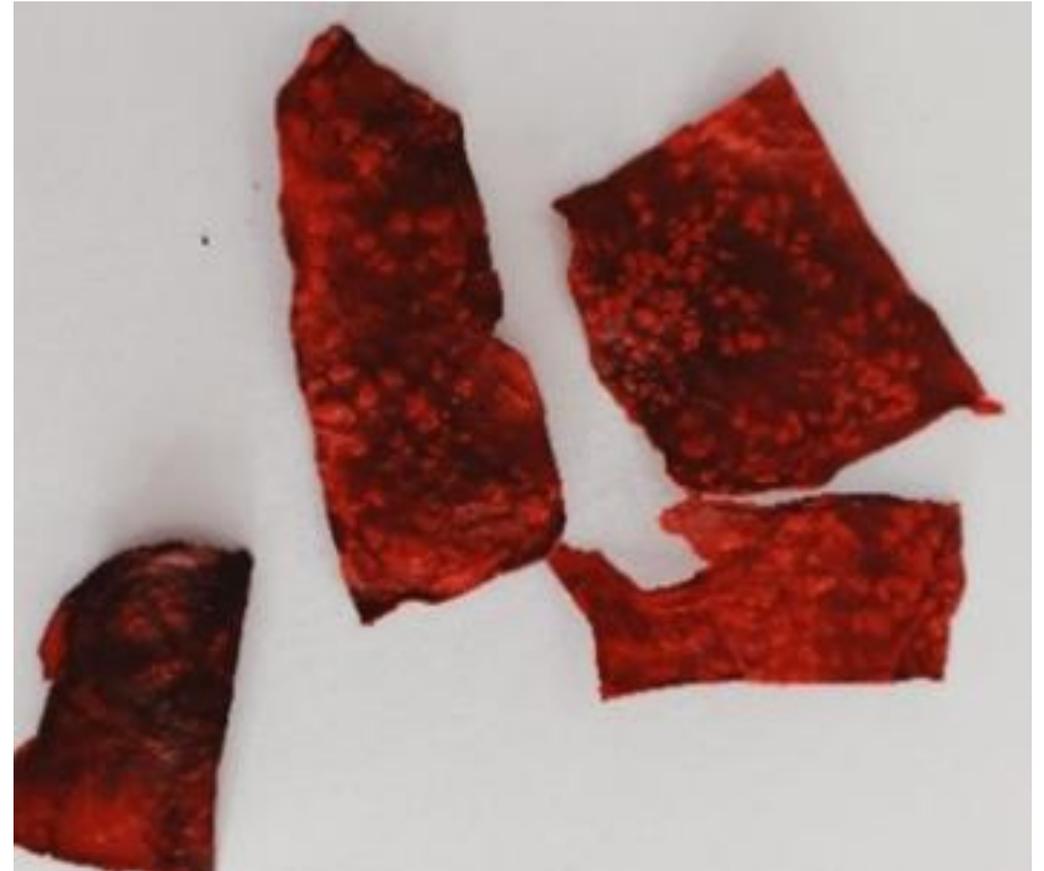


1 Month Later



Dyeing the material

App leather (containing 50% apple powder) after dyeing



Advantages of Appleather

Biodegradable
and eco-friendly

Appleather is fully biodegradable and does not contain substances harmful to the natural environment

High tensile strength

The material can withstand a lot of stress while being pulled or stretched before it breaks.

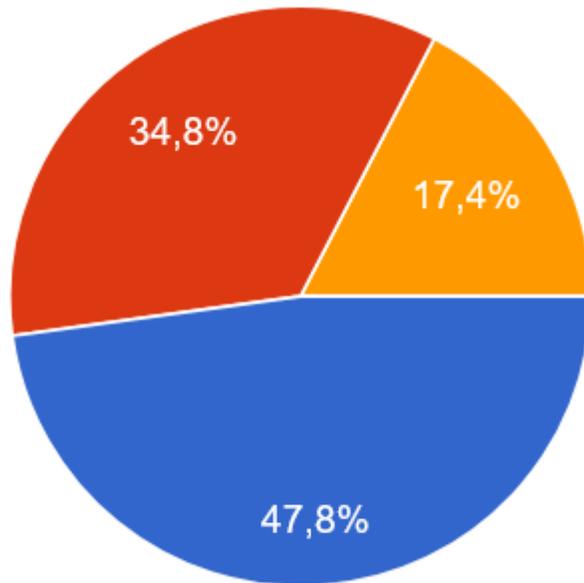
Easy to dye

The colour of the material can easily be changed, making it an attractive alternative for production of consumer articles

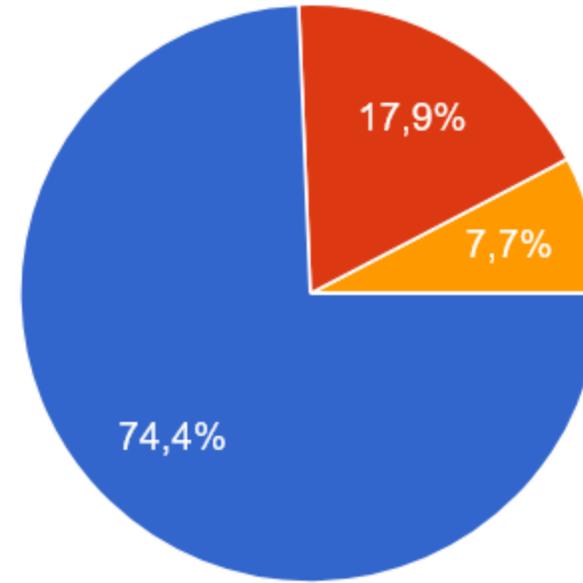
Survey results



More about Appleather



What our respondents think about making leather from apple waste



What our respondents' opinions are about Appleather

- Like it
- Dislike it
- No opinion



We believe vegan leather is our future

Thank You For Your Attention!

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