Summer Project with XRCVC

01.06.2016 - 01.07.2016

Production Technique of Tactile Graphics
for Educational Purposes

Xavier's Resource Centre for the Visually Challenged

Centre housed in St. Xavier's College and headed by Dr. Sam Taraporevala.
Second centre in Thane

- Support and training

- Advocacy

- Awareness

First established to support Xavier's VC students,

Indoor Navigation Project Status

Beacon project with **Next Byte Wave Tech**, currently being built for the Mumbai International Airport

When ready, XRCVC will help with testing, evaluation, feedback to make the app accessible

Tactile Graphics- Brief

- Tactile graphics for blind and low vision students
- Thermoforming machine available. Material imported, expensive.
- Find local, more affordable sources.
- Evaluate mould making processes: handmade with paper, hand etched Aluminium, 3D printing
- Deliver 4-5 teaching aids
- Feasibility report for suggestions to Sarva Siksha Abhiyan

Literature

BANA guidelines for tactile graphics- US and Canada

Thermoforming process

Process Document from APH

All About Thermoforming

Plastic sheet heated to pliable temperature, stretched onto mold, cooled to form product

Sheet is called film when referring to thinner material

American Thermoform Corporation- Braille printers, Braille paper

Braille paper, Swell-Touch paper. Styrene, Vinyl sheets

Put plastic over mould, heat from top to warm plastic, suction from below to form it around the mould. Can build one at home.

Video—>

Tactile Graphics Kit from APH


Pattex


Almanach


Ludolf Backhuisen, Bewegte See mit Schiffen: 80.5 x 126 cm

Vendor Capabilities

Industry uses epoxy moulds to create raised regions on printed diagrams. No detail, meant for sighted users.

Embossing for invitation cards, etc.

Unskilled in working with educational content

Can handle production once initial mould has been made

Mould

All material must be heat proof

1. Thick Aluminum foil + embossing tools

2. CNC cutting- metal and wood

3. 3D printing- heat resistance

4. Laser cutting

5. Polymer deposit (usually used for braille printing)

Base must be porous

Non plastics, preferably- wires, cables, fabric, paper, cardboard,

Copy

Brailon- proprietary material from APH- ~₹60 per sheet

Calendared vinyl- PVC + plasticizers, heat stabilisers, etc

Inexpensive local alternative: ₹20 per foot squared

Content Required Immediately

Map Work:

- Political map

- Geographical, relief maps- National, state

- River map

Low cost, editable for examinations

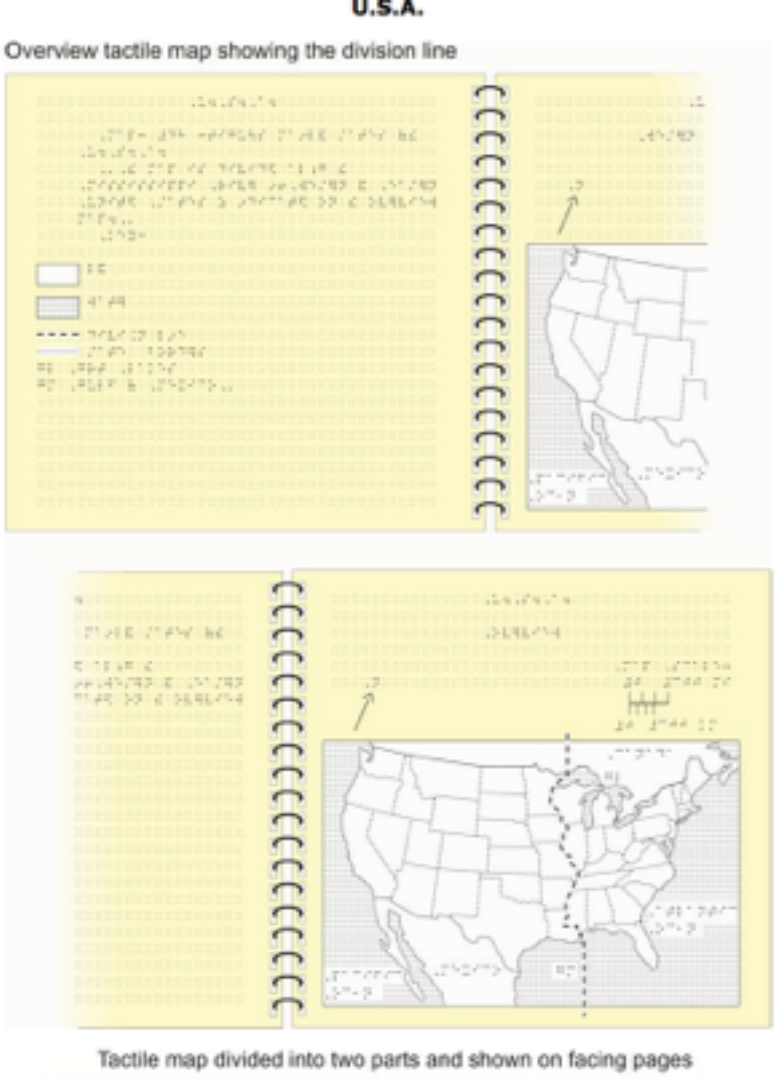
Maps

Depicting tactile maps. Pointers from BANA Guidelines and Standards

Use outlines where necessary

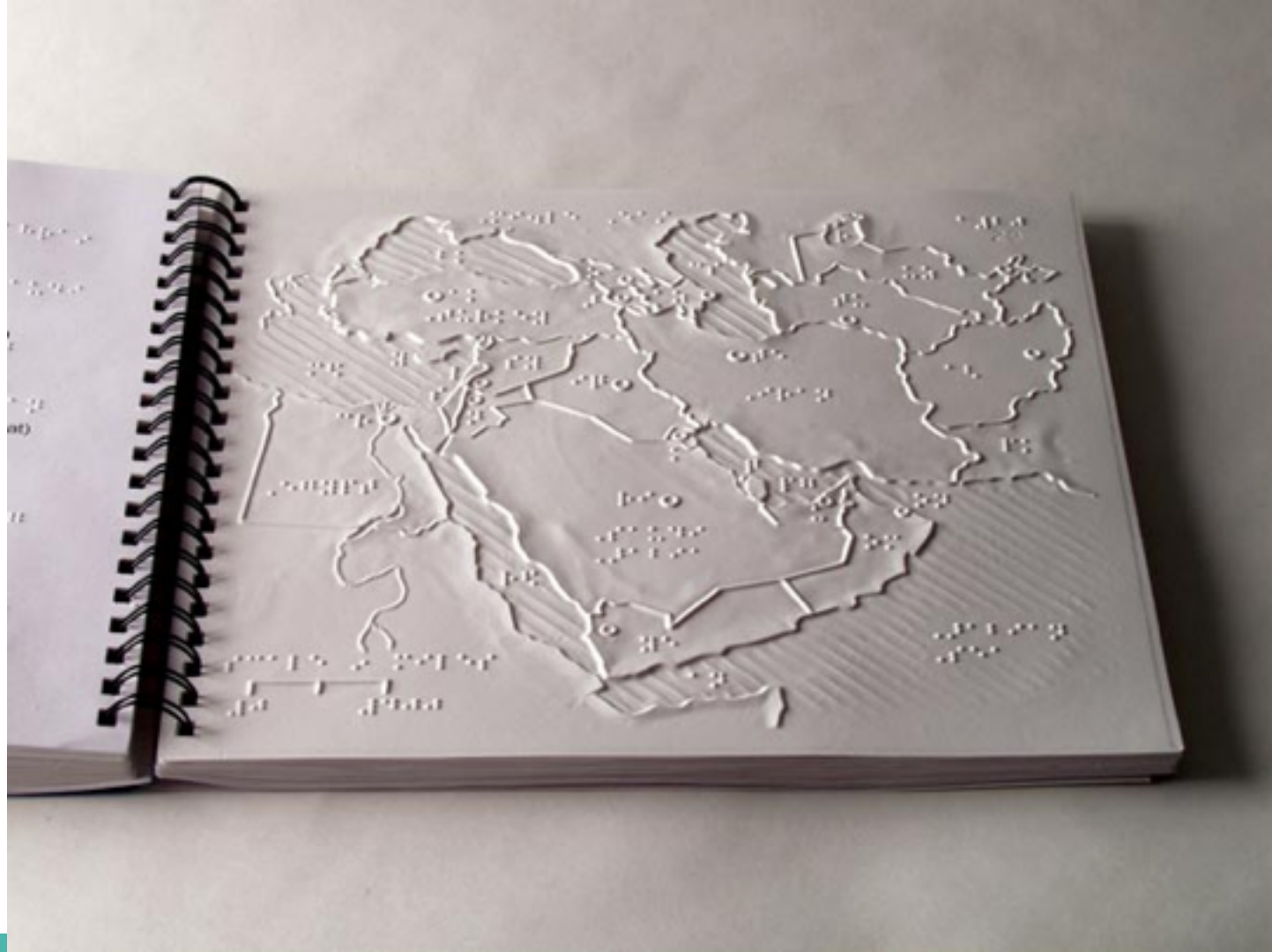
Split line to indicate page carryover: http://brailleauthority.org/tg/web-manual/u3usa.html

At times, image outlines are required to indicate containment such as water or land areas on a map.
3.7.1 Print information may be eliminated if it will not hinder the purpose of the diagram.
Example: Small islands, rivers, mountains, lines of longitude and latitude, etc., may be left off many maps. Minor cities could be eliminated if only major cities are essential.



American Printing House (APH)

World maps



Misconceptions

Scale perception

Himalayas: 8,848 m (Everest)

Western Ghats: 2,695 m (Anamala)

When given just numbers: So the himalayan mountains are like needles?

Chennai- 6.7 m

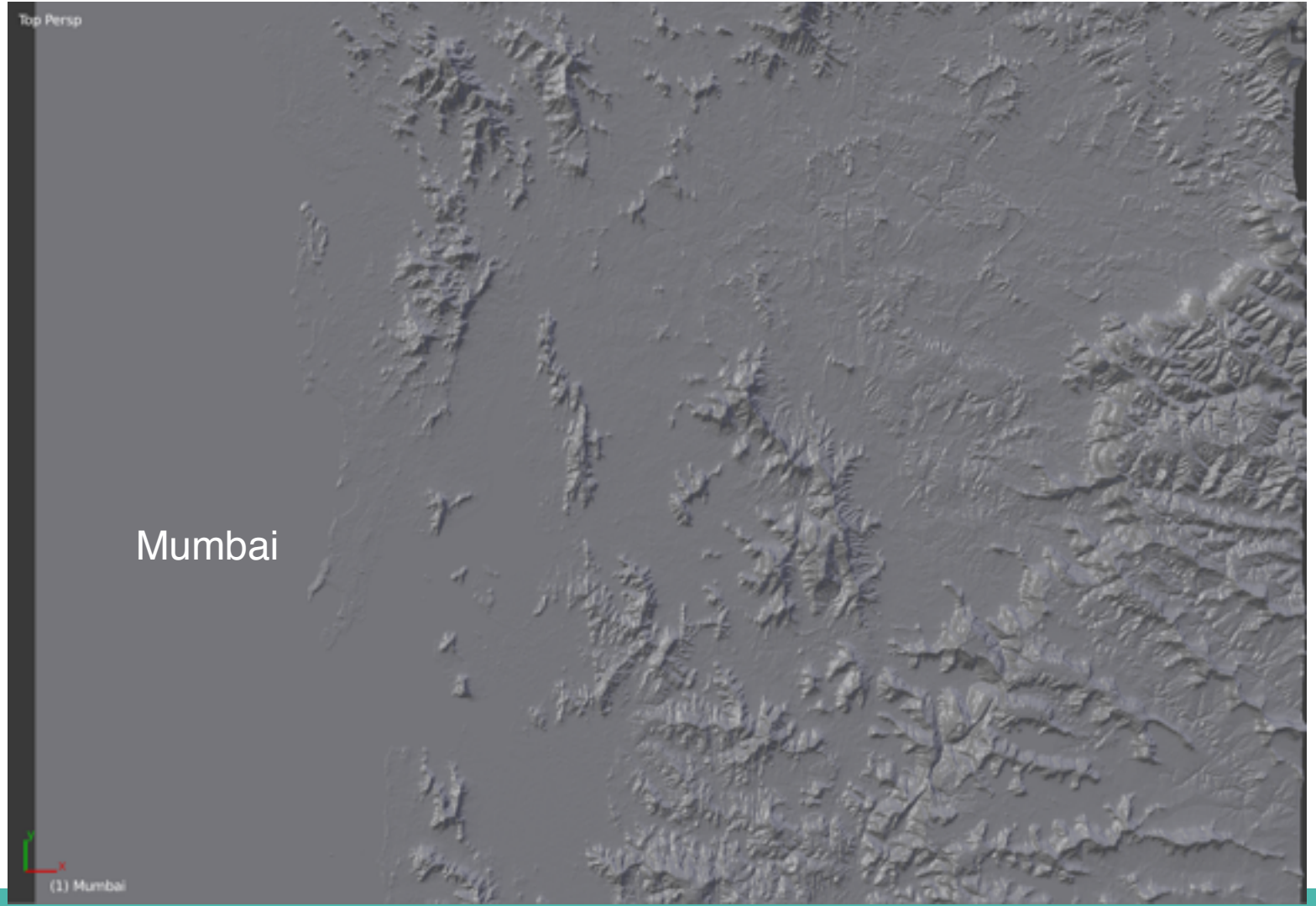
Bangalore - 920 m

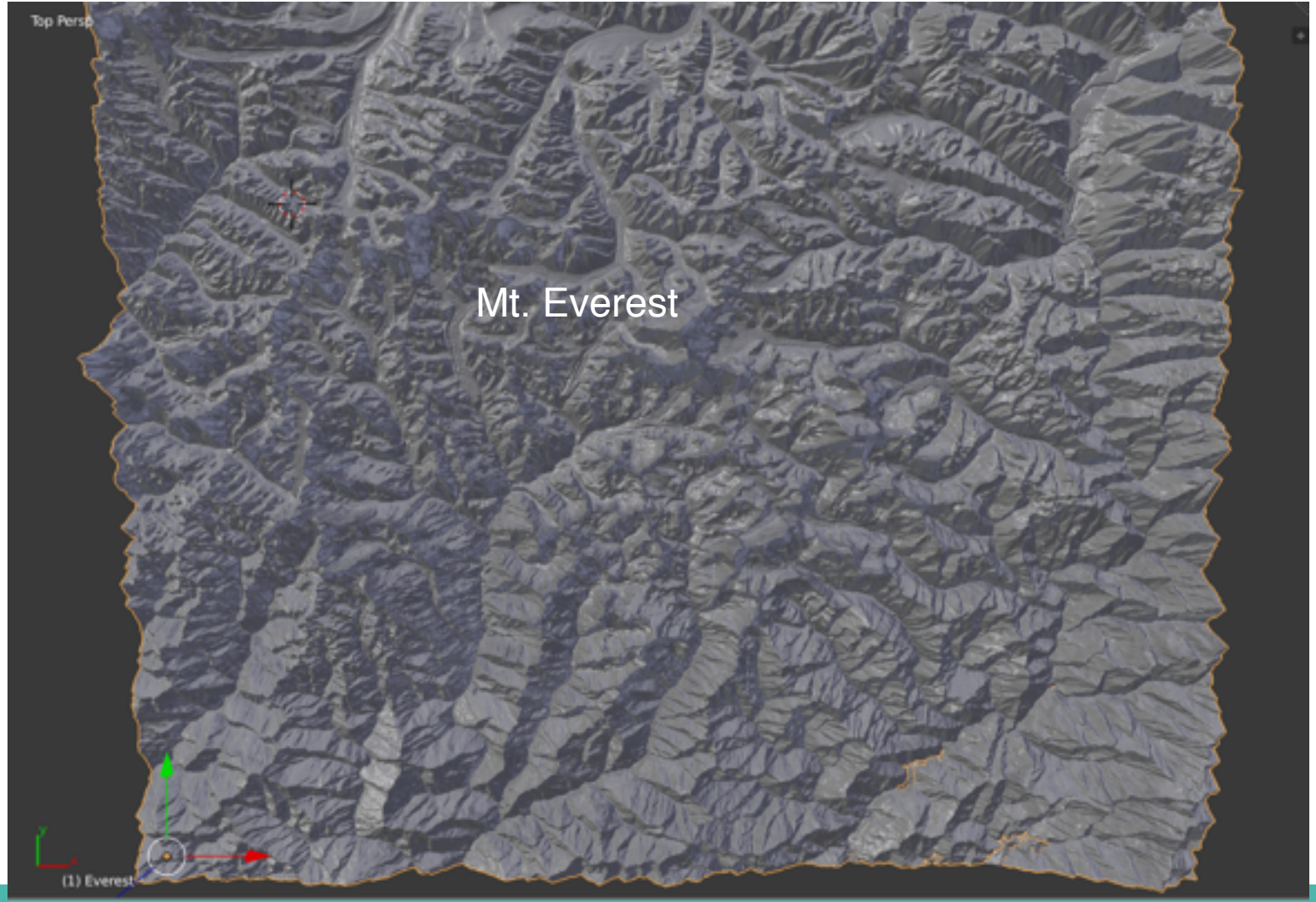
Delhi - 216m

Mumbai- 14 m

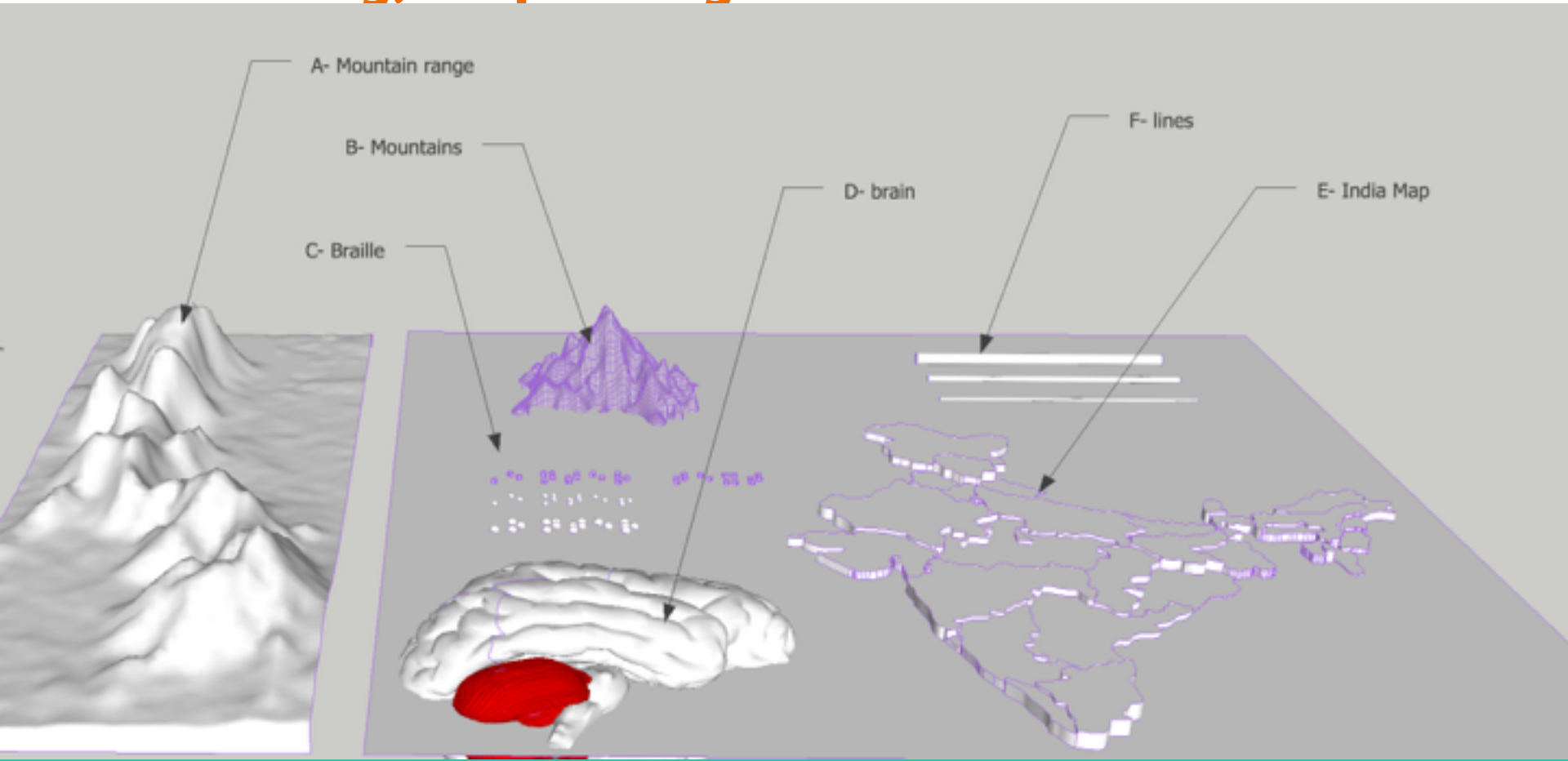
Kolkata- 9.1 m


Bay of
Bengal
ANDAMAN
SEA
ARABIAN
SEA


Top Persp
Mumbai
(1) Mumbai


Top Persp
Mt. Everest
(1) Everest

CNC cutting, 3D printing



Alternate Material

Textured paper

Cardboard

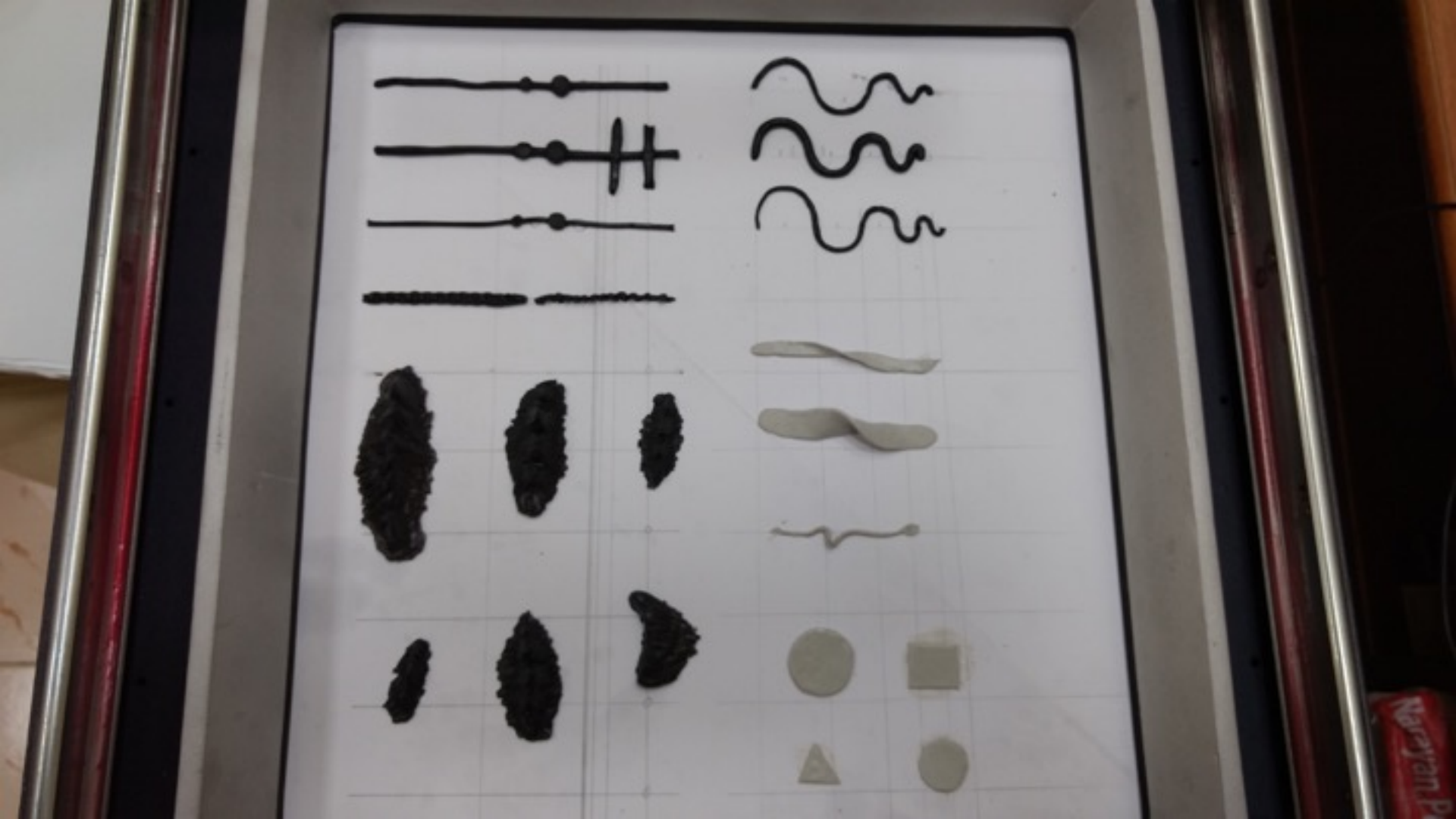
Copper wire

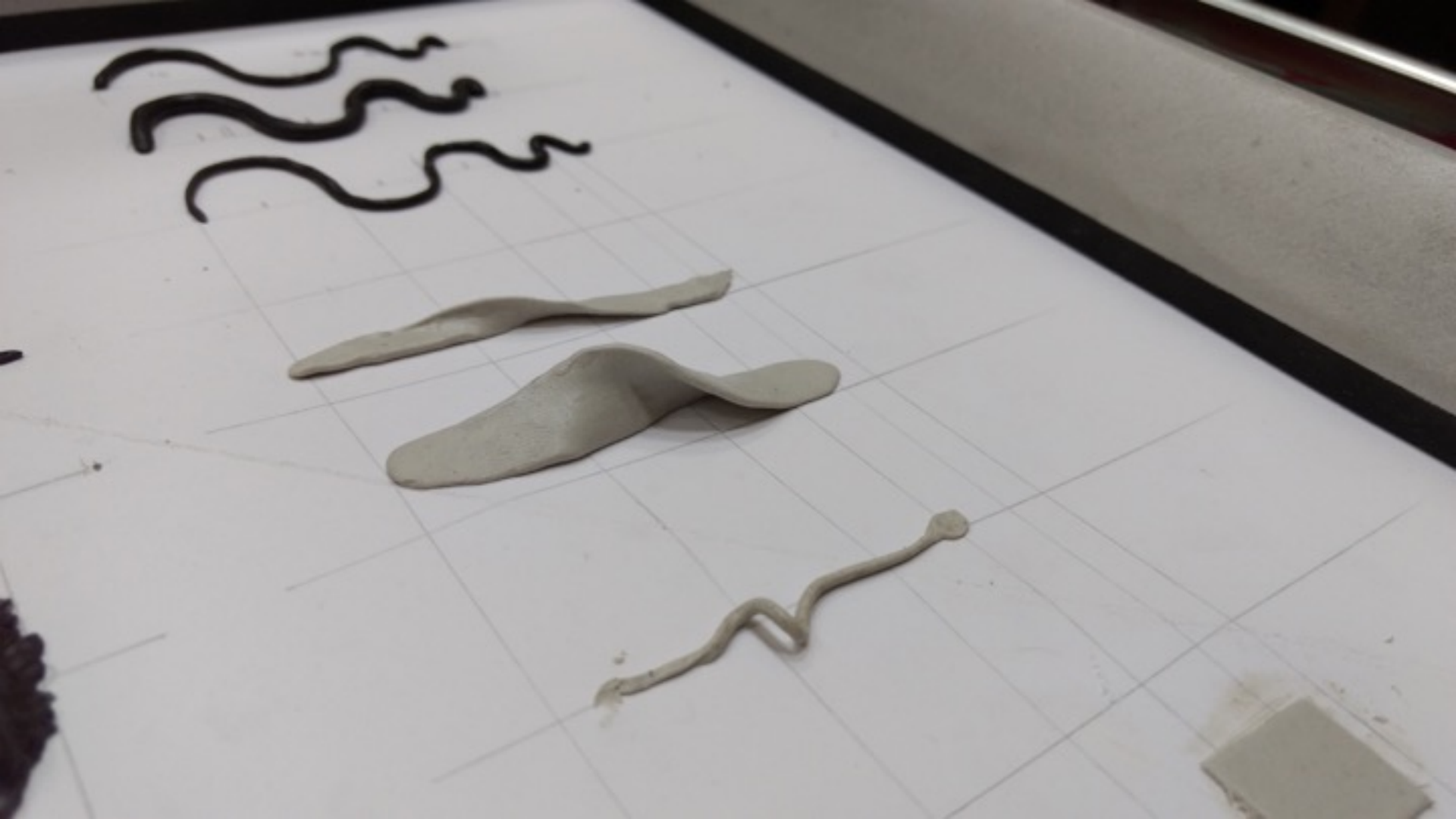
Pins

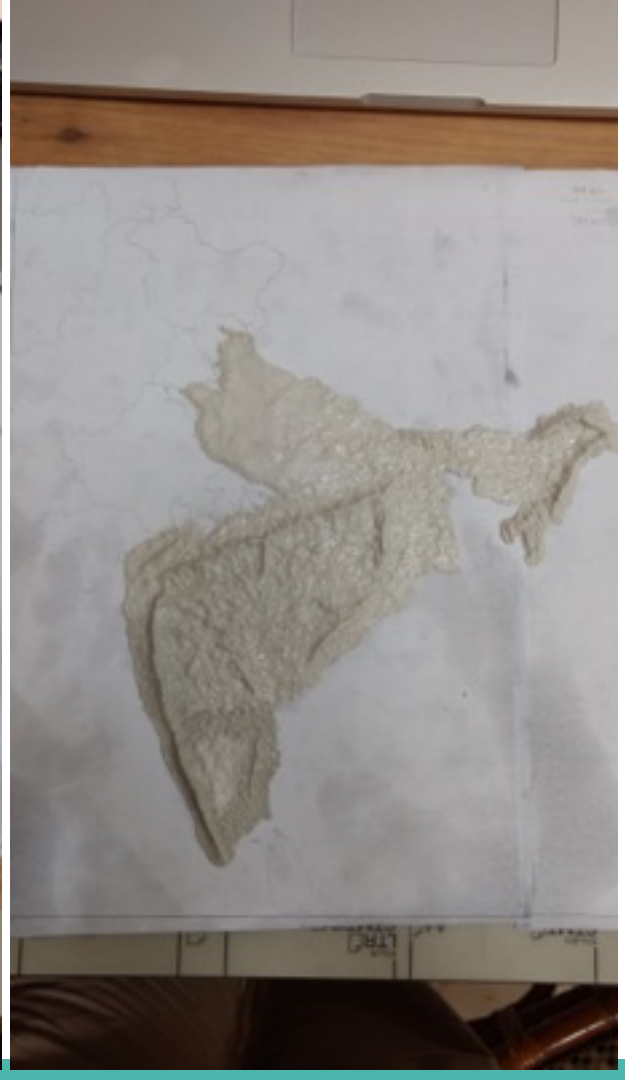
Epoxy- M-seal

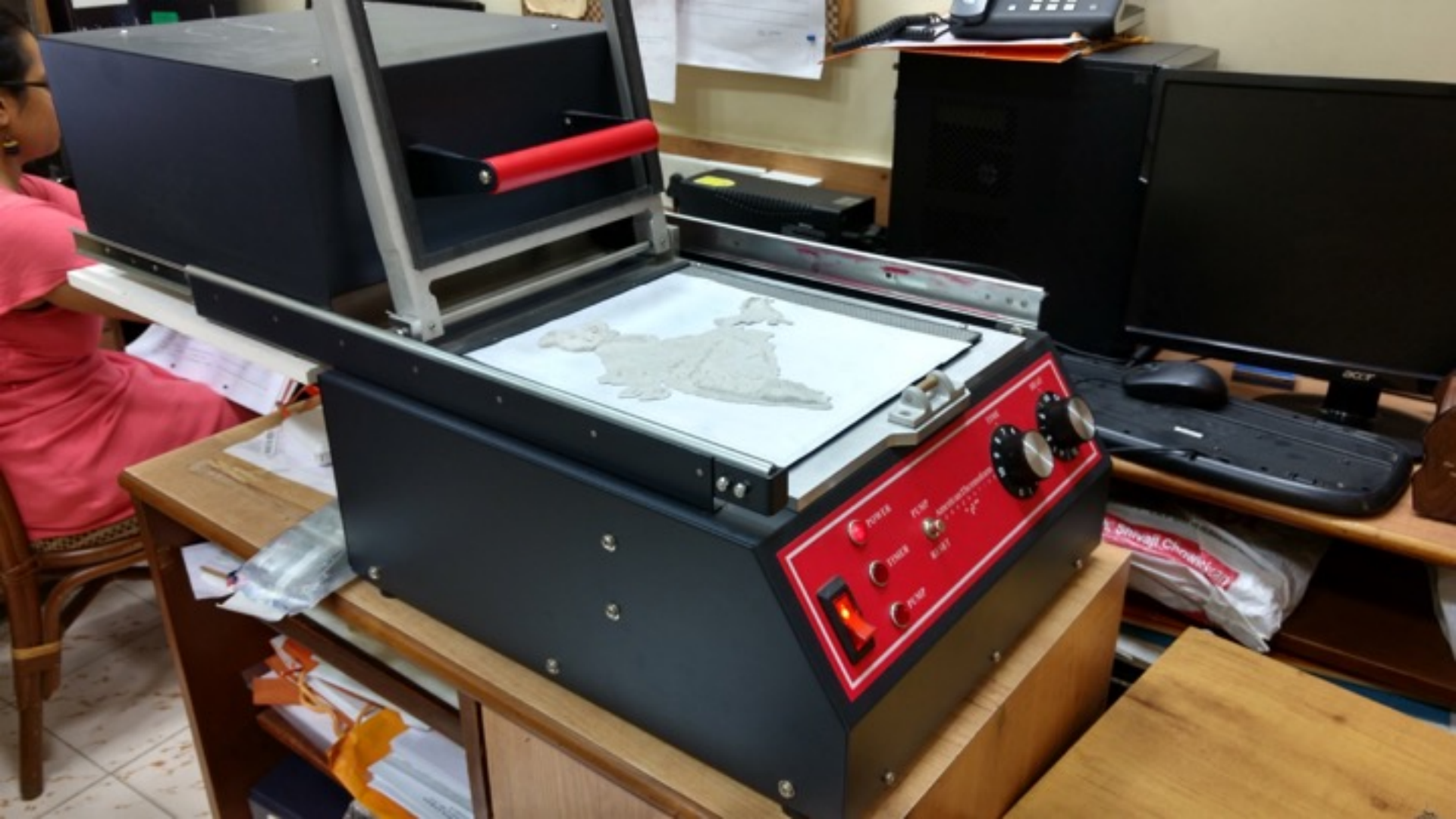

Araldite
New Improved
Johnson's baby hair off

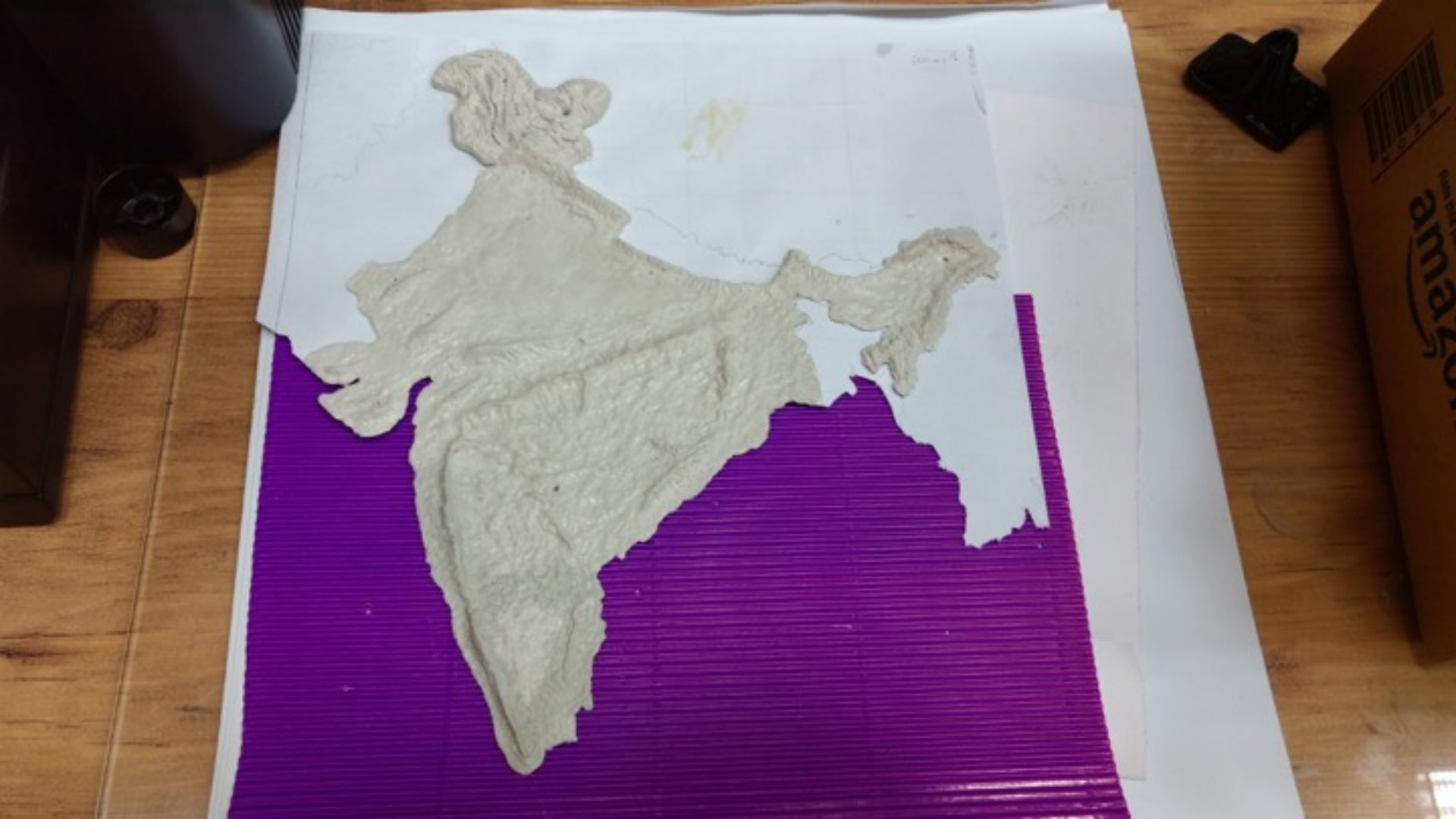

WESTCOTT

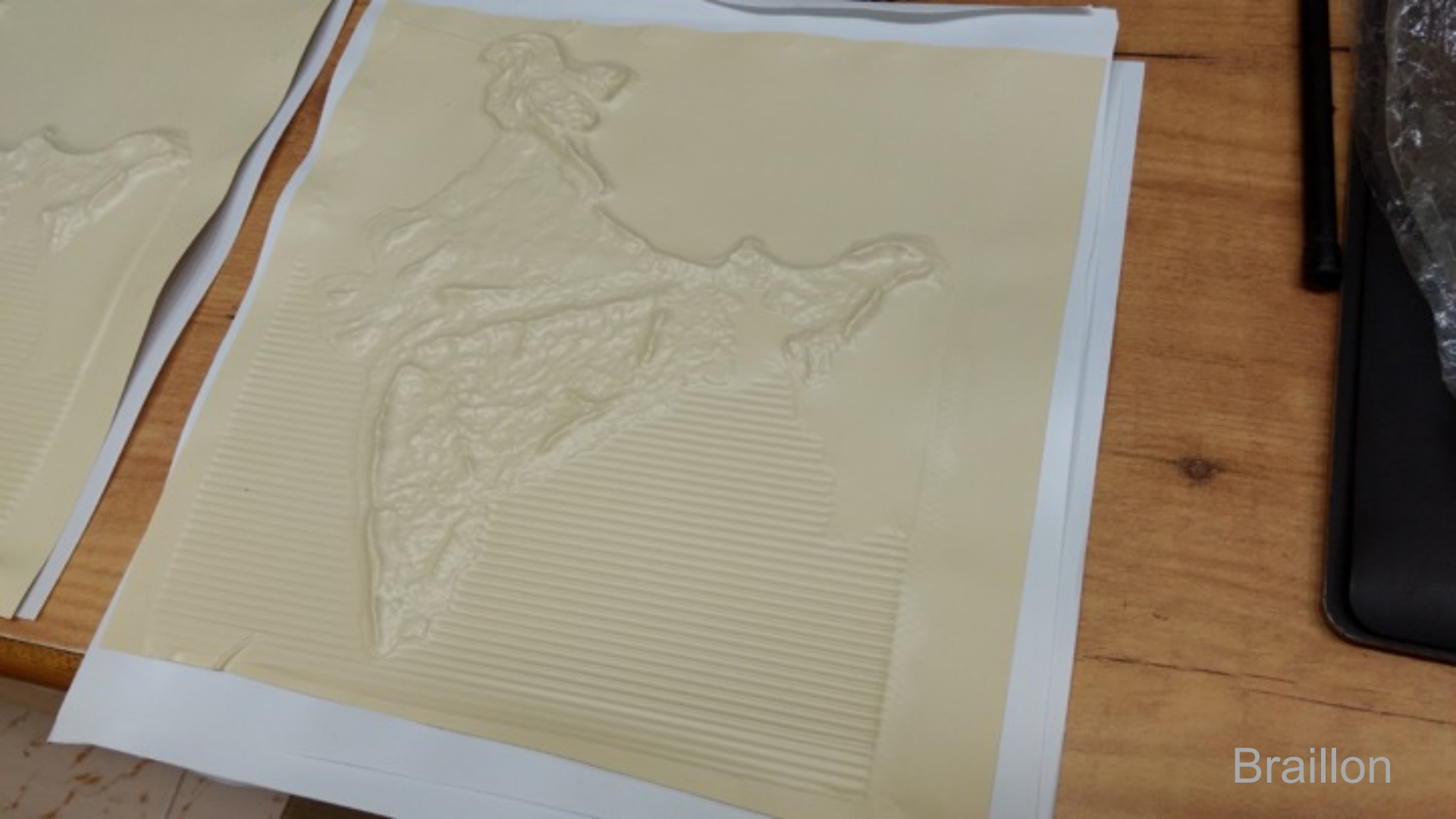




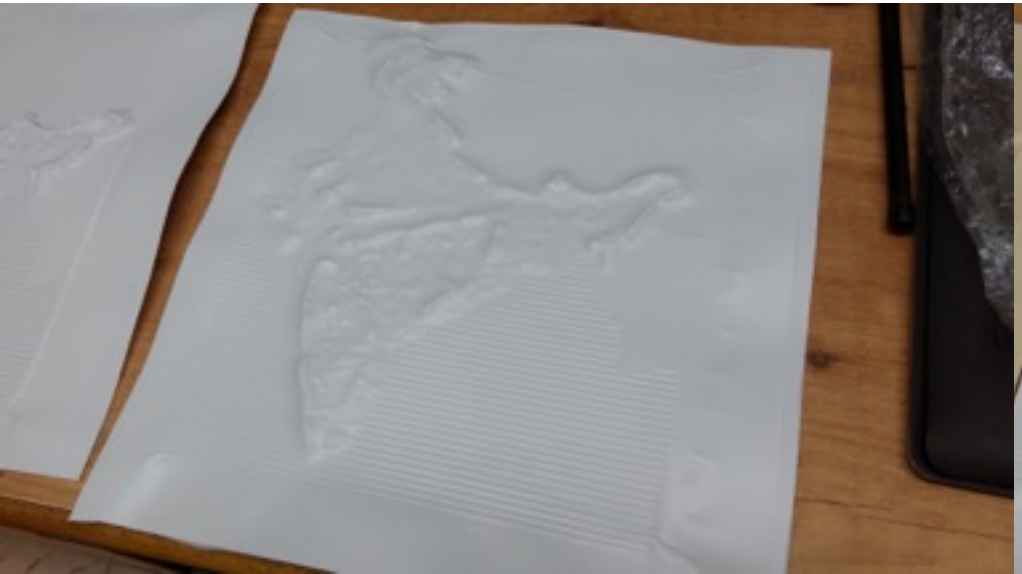



Braillon


0.3mm Vinyl

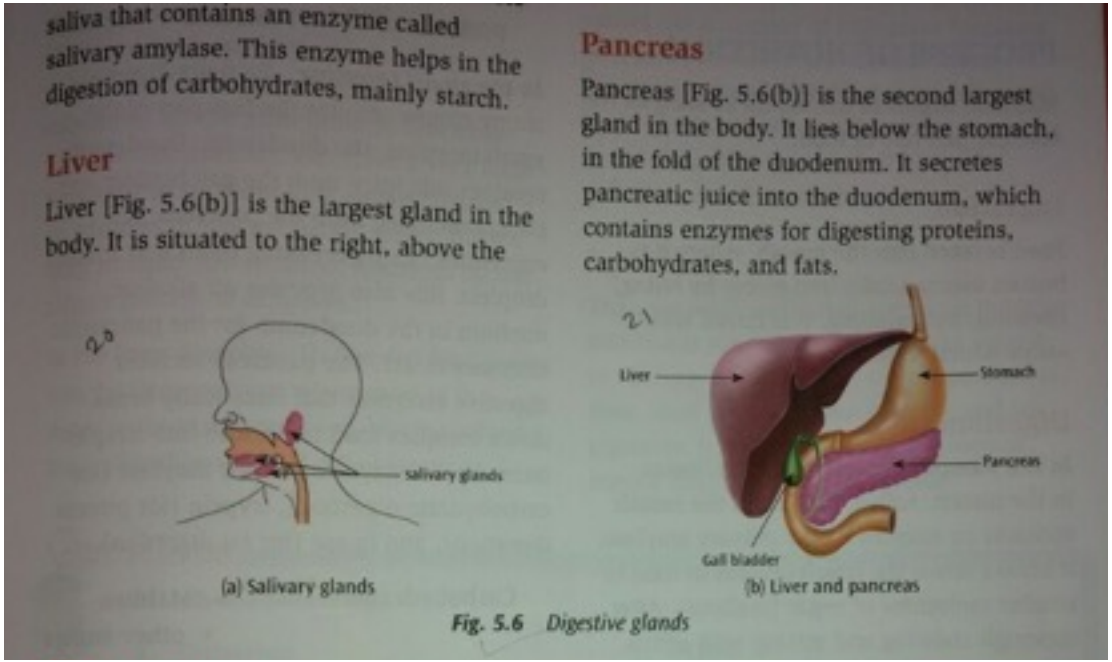
Hits and misses

Wrong temperature results in loss of detail



Biology Textbook Diagrams

More complex and challenging



saliva that contains an enzyme called salivary amylase. This enzyme helps in the digestion of carbohydrates, mainly starch.

Liver

Liver [Fig. 5.6(b)] is the largest gland in the body. It is situated to the right, above the

Pancreas

Pancreas [Fig. 5.6(b)] is the second largest gland in the body. It lies below the stomach, in the fold of the duodenum. It secretes pancreatic juice into the duodenum, which contains enzymes for digesting proteins, carbohydrates, and fats.

(a) Salivary glands

(b) Liver and pancreas

Fig. 5.6 Digestive glands

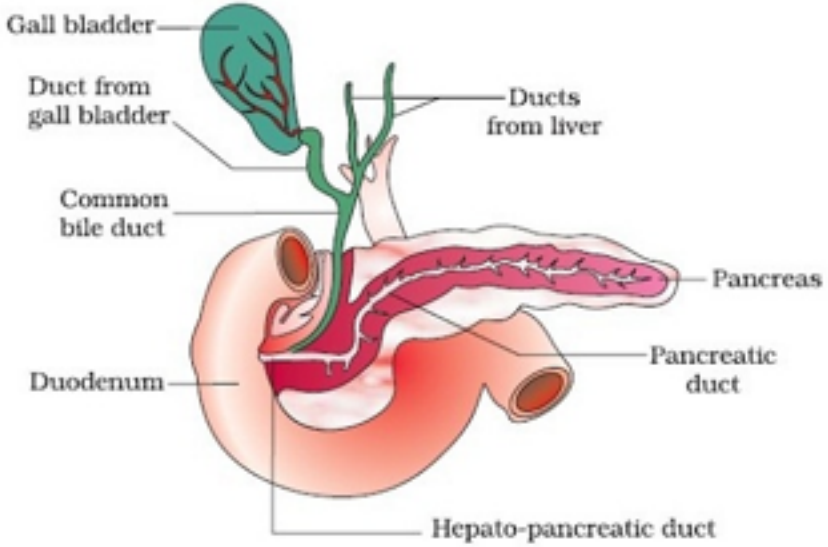
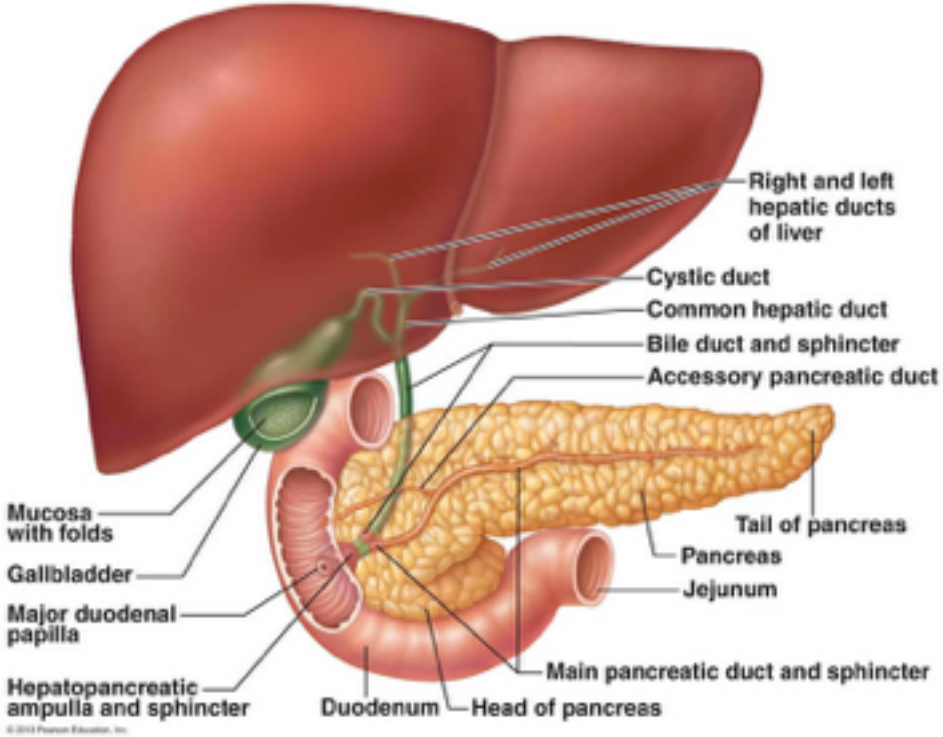


Figure 6. The duct systems of liver, gall bladder and pancreas



Summary

Thermoforming machine set up with material for mould and copies

Prototyping will be done at centre

Research and exploration in 3D graphics required

Recommendations to be sent to Sarva Siksha Abhiyan

Week 1	Assimilating brief, literature review, industry processes review, redefining brief
Week 2	Sourcing local material for copying, visiting vendors for production
Week 3	Alternate material, refined how epoxy can be used
Week 4	Sample diagrams, testing with users


Thank you!