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Constructing a physical installation to increase awareness about the endangered cultural elements of North East India

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Lastly, it would be a sin on my part if I don't express my heartfelt gratitude towards the staff at IDC, namely Abhijeet sir, Suraj sir, Nikhil sir and Samarth sir. Without their kindness, and expert guidance - I would not be able to complete this project.

I hope that I am able to do justice to all the support and trust that the above mentioned people have put into this project.

Contents

1.Introduction

North East India is known for its rich cultural heritage, and this is reflected in the diversity of its people. This region is home to a number of different ethnic groups and cultures, each with their unique traditions and languages [1]. However, today many of these languages face the risk of extinction [2] - and therefore, intangible cultural elements strongly intertwined with language, like folktales or folk songs face a similar risk.

The Northeast region has around 220 languages. Assamese, an Indo-Aryan language, is widely spoken in the Brahmaputra Valley of Assam and is the main language of many communities. Nagamese and Nefamese, both Assamese-based pidgin, are spoken in Nagaland and Arunachal Pradesh, respectively. Bengali is also widely spoken in lower Assam and Tripura. Nepali is widely spoken in Sikkim. However, there are numerous endangered languages that are difficult to preserve because of the lack of a proper script, or lack of concerted efforts.

In 2003, UNESCO recognized the need for preserving a region's intangible cultural heritage, manifested through oral traditions, performing arts, social practices, rituals and festivals, knowledge and practices regarding the nature of the universe, and traditional craftsmanship. As a consequence, the Convention for the Safeguarding of the Intangible Cultural Heritage was adopted by UNESCO [3].

Given the above points, it becomes imperative - to draw attention towards the rich cultural heritage of North East India, and through this awareness - evoke a sense of loss towards our extinct cultural intangibles.

2. Aim / Objectives

The aim is to draw attention to the rich cultural diversity of North East India and make people aware about the cultural intangibles from this region that are endangered, and slowly being lost.

The goal of this project is not to document the languages or the culture of North East India, but instead make people aware of the subject matter, and evoke some sense of loss. An effect of this sort can be achieved through a tangible, interactive installation; or through interactive media. Data visualization can also be used to put into perspective - terms such as endangerment, and its various degrees. For this project, I decided to create a physical installation which uses media and data visualization to bring attention to the subject discussed above on, in the following ways -

- An installation would naturally pique curiosity and allow viewers to engage with the topic better
- It can evoke stronger emotions of loss
- Longevity - a permanent physical installation would continue engaging people about the subject matter for a long time
- There are endless creative possibilities to explore for me as a designer in this domain. It is a domain that I have very little experience or knowledge in, but one that I want to learn and explore

3. Approach

Initially, secondary research and data collection was done to identify a suitable narrative to present through the installation. Following this, an iterative design approach will be used, where several scale model versions will be created, and improved upon iteratively - to get to the final model, based on which the installation will be constructed.

4. Secondary Research

It is important to note that language is not the only cultural intangible worth protecting, and there are several other elements, like songs, stories, rituals, superstitions, myths etc. - that can reveal a substantial amount of information about a population and their culture. According to The Language Conservancy's reports, out of the ~7,000 languages that exist in our world, about 2,900 or 41% are endangered. At current rates, about 90% of all languages will become extinct in the next 100 years [4]. And thus, it is imperative to ask whether we even lose anything if a language dies out - and there are multiple points of view. According to John Lipski, a Penn State professor of Spanish and linguistics, we lose cultural identities and the richness and diversity of humanity's linguistic heritage [5]. But not all linguists agree with this point of view, and the likes of John McWhorter, a linguist and lecturer in the Department of English and Comparative Literature at Columbia University offer differing views [6]. McWhorter presents a lengthy argument that while the loss of a language is a cultural loss, our attachment to a diverse range of languages is misguided. He believes that languages evolved due to geographical dispersal of people and is not inherently tied to culture. In an increasingly interconnected world, McWhorter believes that using and maintaining fewer languages is not only more manageable but also beneficial in terms of practicality. However, numerous other linguists contend that languages hold the key to unlocking various local knowledge, such as medicinal practices, ecological insights, weather and climate information, spiritual beliefs, and historical and mythological arts. This belief that - language discloses cultural and historical meaning - suffices that a critical link to the past is lost when a language is lost [7].

Having said this, both the actual as well as the perceived importance of a language to a culture or a population cannot be underestimated. And therefore, the loss of a language truly is a tragedy, especially in a place as diverse as North East India - where the loss of a language can mean the loss of unique perspectives about the world, and the loss of knowledge systems, as well as unique artistic practices.

To find out more about how many languages in the North East are actually endangered, and the histories of these different languages - secondary research was done. Emphasis was also directed towards learning about the current state of these languages, like the number of active speakers, conservation efforts etc. Research was also conducted to understand the reason why these languages are slowly dying out.

4.1 Collecting Data

Before ideating on what the physical installation would look or feel like, it is important to find a story worth telling. Therefore, it was necessary to collect data about the culture and languages of North East India. Data was collected from different sources. The following information was obtained about the local population (link to dataset) -

- Tribes of North East India
- Their population
- Languages that they speak
- Their Festivals
- Religion
- Traditional Dresses, Handicraft

Apart from demographic data, information about the different languages of North East India was also obtained -

- North East Indian Languages and their origin (Austroasiatic, Kradai, Tibeto Burman, Indo European)
- Number of current speakers
- Degree of endangerment of these languages

Information was also collected about a specific North East Indian language called Tai Khamyang and the ongoing efforts towards its conservation. Stories about this tribe's history, folktales, myths, songs and rituals was collected. This dataset was cleaned and improved further as the project progressed - until the final set of information used in the installation was obtained and verified.

NE Language data

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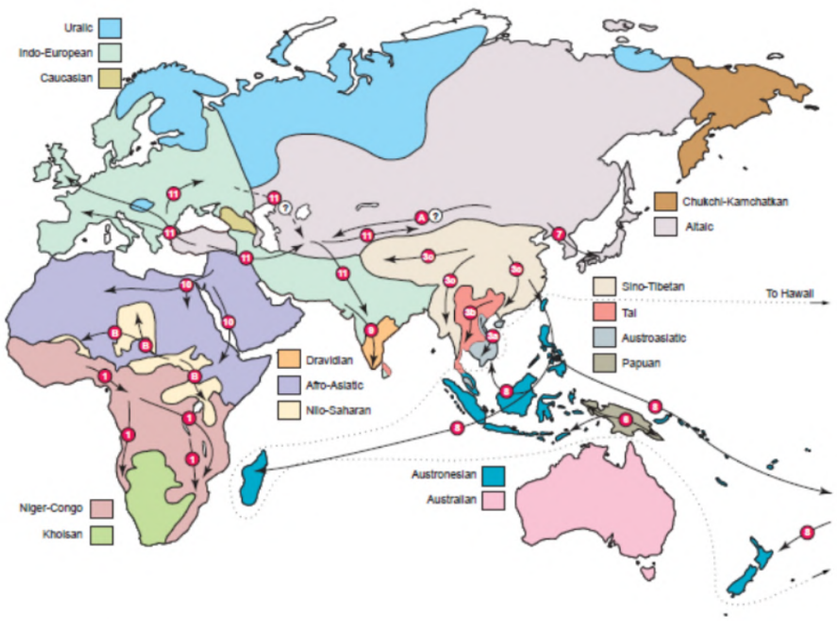
Share

	Tribe	Countries present	States present	Population number	Male: Female Ratio	Other names	Language	Festivals	Food habits	Traditional Dress	Religion	Handicraft	Source
2	Adi	India,China	Arunachal Prade	67,869	33,626: 34,243	Abutani,AboTar	The language	The fairs and fes	Rice and serves	The dress of Adi tribe is	The majority of	Art works are po	https://pasighat.wo
3	Ahoms	India	Assam	13,41,000		Tai Ahom	Assamese (ori	Tai-Ahoms durin	Some historians	Dress For Women	Hinduism, Ahom religion, Buddhi		https://www.britanr
4	Aimol	India	Manipur	5,000		subtribe of Kuki		Lamjir utt.(This f	The Aimols gorg	The men wear a dhoti.They wear a sleeveless coat which is			https://www.ne.cab/
5	Aka	India,Tibet	Arunachal Prade	8,167	3,940: 4,170	Hrusso	Hruso, also kn	Local festivals al	The main food o	The Aka costume deeply	The Aka are mai	Handicrafts, bas	http://myarunachal.
6	Anal	India,Myanmar	Manipur	1,23,377				Totangkam or Ak	The Anals alway	Lubu (Headgear), Chang (Loin cloth			http://ndpublisher.i
7	Anāl	India,Myanmar	Manipur	1,23,377		Anāl Naga	Anāl, also kno	Totangkam or Ak	Steamed rice (ng	Lubu (Headgear), Chang	Animism, Christianity		S.R. Tohring, 2010
8	Angami	India	Nagaland	1,20,00,000	1,024,649: 953,853		Tenyidi, Angan	"Sekrenyi" in Feb	Millet and maize	Lothas,Tsungkotepsu, Ch	Animism, Christi	Basket making. A	S. R. Tohring (2010),
9	Ao	India	Nagaland	2,26,625		Aoer	Ao language	Moatsu Festival,	Non-vegetarian	Rompung Tongpang	Animism	Weaving, Cane a	http://oaji.net/article
10	Apatani	India,China,Tibet	Arunachal Prade	43,777	21,254: 22,523	Tanw Apa,Apa T	Thier language	The Apatanis ha	The primary sou	Men invariably wore a th	The most follow	The tribe is know	http://intangibleher
11	Bahun	India,Nepal	Sikkim	40483		khas brahmin,U	Same as Chhe	All Bahuns are H	Bahuns are generally vegetarians. The Up		Same as Chhetri		https://www.encycl
12	Bhil	India	Tripura										
13	Bhutia	India,Bhutan	Tripura,Sikkim	60,300		Drenjongpa,Dre	Sikkimese, Ne	The Losar and Lo	Rice with animal	Bakhu (same like the Tib	Buddhism, Bön	Musical instrum	https://en.wikipedia
14	Boro	India,Bangladesh	Assam	14,00,000		Bodo	Tibeto-Burma	Baishagu: The Bo	Their main food	The traditional attire wa	•Today Bodo Tril	They have devel	https://www.shaanfc
15	Boro	India,Nepal	Meghalya,West I	3,12,05,576	15,939,443: 15,266,1	Meches	western sonat	Bwisagu, Kherai,	Napam(ferment	dokhona with fali and phasra, aronai, han		musical instrum	locals(oral source) Dr
16	Chaimal	India	Tripura	549		Saimar	They speak in	Like other tribes, they have separate form of dance, folk so			They are Hindus and follow all rit		https://trci.tripura.g
17	Chakhesang	India	Nagaland	1,54,874	78348: 76,526	Eastern Angami	Angami's Teny	Suhkuruhnye	Bamboo shoot,	Shawl is worn only by m	Mainly Christian	Carpentry, potte	https://www.ne.cab/
18	Chakma	Bangladesh,India,M	Mizoram	5,00,000			Chakma langu	Bizhu is the mos	Bamboo shoot is a traditional food of the		The vast majority of the Chakma		https://en.wikipedia
19	Chang	India	Nagaland	64,226	34226 : 31025		Chang, Nagam	Naknyu Lem (or	Basically non-ve	Mohnei, a cowrie-ornam	Christianity		S. R. Tohring (2010)

Fig. 1 Data about North East Indian tribes

Theories around the **migration of various linguistic groups in North East India** were studied as part of secondary research. The ancient migration routes (proposed) are very interesting to look at and reveal why North East India is considered a major corridor of human migrations and a major linguistic contact zone that was predicted to have witnessed an extensive population interaction [8].



Language families of the Old World and their suggested expansions, 1 (Bantu), 3a to 3c (Austroasiatic, Kradai, and Tibeto-Burman respectively), 6 (Trans New Guinea), 7 (Japanese), 8 (Austronesian), 9 (Dravidian), 10 (Afro-Asiatic), 11 (Indo-European). Other possible examples mentioned only briefly: A (Turkic), B (Nilo-Saharan) (after Diamond and Bellwood 2003: 598)

Fig. 2 Language families and population migration routes [1]

Around what time did these migrations happen - is also an interesting question to ask. Several pieces of literature was consulted in order to find out these details, especially Van Driem (2007; 2014). Although contested, theories suggest that the migration of Tibeto-Burman speakers from Tibet and Myanmar to North East India happened during the 6th to 7th century AD. Similarly, the migration of Indo-Aryan speakers from the Gangetic plains to the Brahmaputra valley happened during the 12th to 13th century AD. The Austroasiatic speakers are believed to have migrated to the region during the pre-historic period.

The Tibeto-Burman language family is the most widely spoken language family in the region, followed by the Indo-Aryan and Austroasiatic language families. The Tibeto-Burman language family has various sub-groups, including the Arunachal, Nagaland, and Manipur sub-groups.

The Indo-Aryan language family has various sub-groups, including the Assamese, Bengali, and Hindi sub-groups. The Austroasiatic language family has various sub-groups, including the Khasi, Garo, and Nicobarese sub-groups. Although currently Khasi is the the only surviving language. There are also several debates about the origin of the Khasi language. For tis project, I am aiming to stick to one or two pieces of literature as sources of data and avoid the debate around linguistics, as complete accuracy in terms of representation of data will not be possible as there are multiple theories around this subject.

The similarities between the languages in the region can also be observed. For example, many Tibeto-Burman languages have similar phonetics and grammatical structures. Similarly, many Indo-Aryan languages share similar vocabulary and grammatical structures.

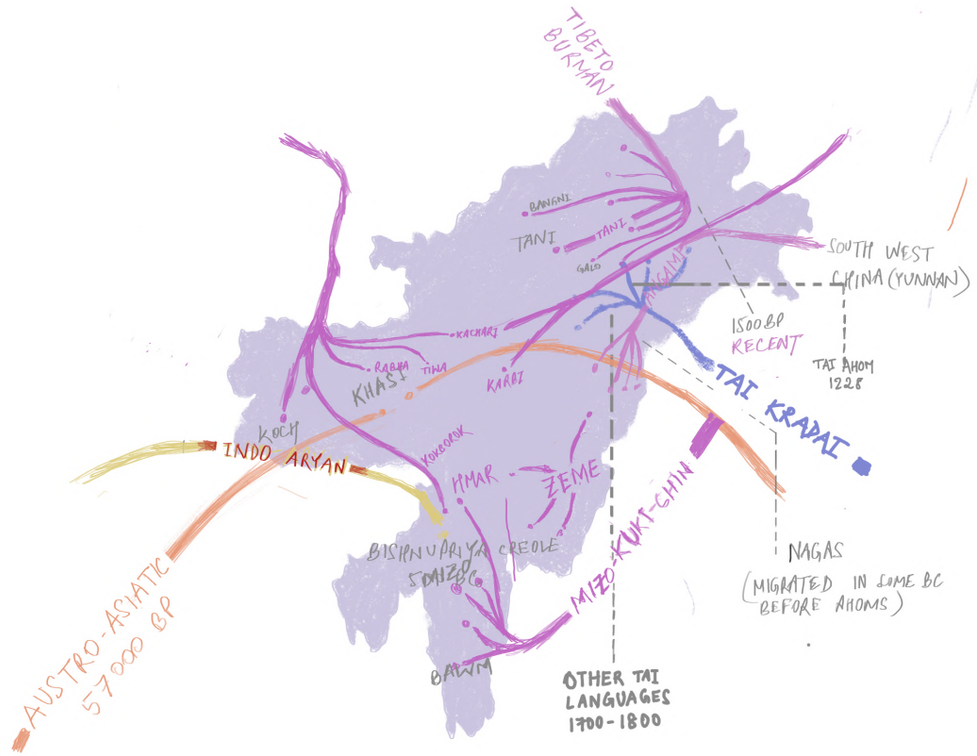


Fig. 3 Simple illustration to show various language families and how they migrated into North East India, along with examples of certain languages

Language census data of India was collected for the years 1991, 2001, and 2011). This data gives interesting insights into the growth of the number of speakers for Indo-Aryan languages such as Hindi, Bengali and Assamese - over the years in the North eastern states, and the decline in the usage of several non-scheduled languages. The data shows that Assamese is the most widely spoken language in the region, followed by Bengali and Hindi.

The data also shows that there are many endangered languages in the region. For example, the number of speakers of Tai Khamti language has decreased from 10,000 in 1991 to 6,000 in 2011. Similarly, the number of speakers of the Bodo language has decreased from 1.4 million in 2001 to 1.3 million in 2011.

	A	B	C	D	E	F	G	H	I	J
1	C-16 POPULATION BY MOTHER TONGUE									
2										
3	Table	State	District	Sub-	Area name	Mother	Mother tongue name	Total		
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6										
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8	C0116	12	000	00000	ARUNACHAL PRADESH	001002	Assamese	53791	29800	23991
9	C0116	12	000	00000	ARUNACHAL PRADESH	001999	1 Others	160	108	52
10	C0116	12	000	00000	ARUNACHAL PRADESH	002000	**2 BENGALI**	100579	54131	46448
11	C0116	12	000	00000	ARUNACHAL PRADESH	002007	Bengali	50543	28680	21863
12	C0116	12	000	00000	ARUNACHAL PRADESH	002011	Chakma	47073	23954	23119
13	C0116	12	000	00000	ARUNACHAL PRADESH	002015	Haijong/Hajong	2711	1353	1358
14	C0116	12	000	00000	ARUNACHAL PRADESH	002044	Rajbangsi	224	120	104
15	C0116	12	000	00000	ARUNACHAL PRADESH	002999	2 Others	28	24	4
16	C0116	12	000	00000	ARUNACHAL PRADESH	003000	**3 BODO**	7095	3787	3308
17	C0116	12	000	00000	ARUNACHAL PRADESH	003001	Bodo/Boro	5392	2927	2465
18	C0116	12	000	00000	ARUNACHAL PRADESH	003003	Kachari	1703	860	843
19	C0116	12	000	00000	ARUNACHAL PRADESH	004000	**4 DOGRI**	994	886	108
20	C0116	12	000	00000	ARUNACHAL PRADESH	004001	Dogri	994	886	108
21	C0116	12	000	00000	ARUNACHAL PRADESH	005000	**5 GUJARATI**	362	277	85
22	C0116	12	000	00000	ARUNACHAL PRADESH	005018	Gujarati	249	224	25
23	C0116	12	000	00000	ARUNACHAL PRADESH	005054	Ponchi	1	0	1
24	C0116	12	000	00000	ARUNACHAL PRADESH	005999	5 Others	112	53	59
25	C0116	12	000	00000	ARUNACHAL PRADESH	006000	**6 HINDI**	98187	61622	36565
26	C0116	12	000	00000	ARUNACHAL PRADESH	006030	Awadhi	117	72	45
27	C0116	12	000	00000	ARUNACHAL PRADESH	006040	Baghati/Baghati Pahari	1	1	0
28	C0116	12	000	00000	ARUNACHAL PRADESH	006042	Bagheli/Baghel Khandi	1	1	0
29	C0116	12	000	00000	ARUNACHAL PRADESH	006066	Banjari	13	8	5
30	C0116	12	000	00000	ARUNACHAL PRADESH	006086	Bhadrawahi	1	1	0
31	C0116	12	000	00000	ARUNACHAL PRADESH	006089	Bhagoria	17	9	8
32	C0116	12	000	00000	ARUNACHAL PRADESH	006096	Bharmauri/Gaddi	8	7	1
33	C0116	12	000	00000	ARUNACHAL PRADESH	006102	Bhojpuri	28186	17017	11169
34	C0116	12	000	00000	ARUNACHAL PRADESH	006123	Brajbhasha	59	43	16
35	C0116	12	000	00000	ARUNACHAL PRADESH	006125	Bundeli/Bundel khandi	27	22	5
36	C0116	12	000	00000	ARUNACHAL PRADESH	006142	Chhattisgarhi	38	29	9
37	C0116	12	000	00000	ARUNACHAL PRADESH	006173	Dhundhari	5	4	1
38	C0116	12	000	00000	ARUNACHAL PRADESH	006195	Garhwali	443	366	77
39	C0116	12	000	00000	ARUNACHAL PRADESH	006207	Gojri/Gujjari/Gujar	2	2	0

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Fig. 4 Population by mother tongue (district level) data from language census of India 2011

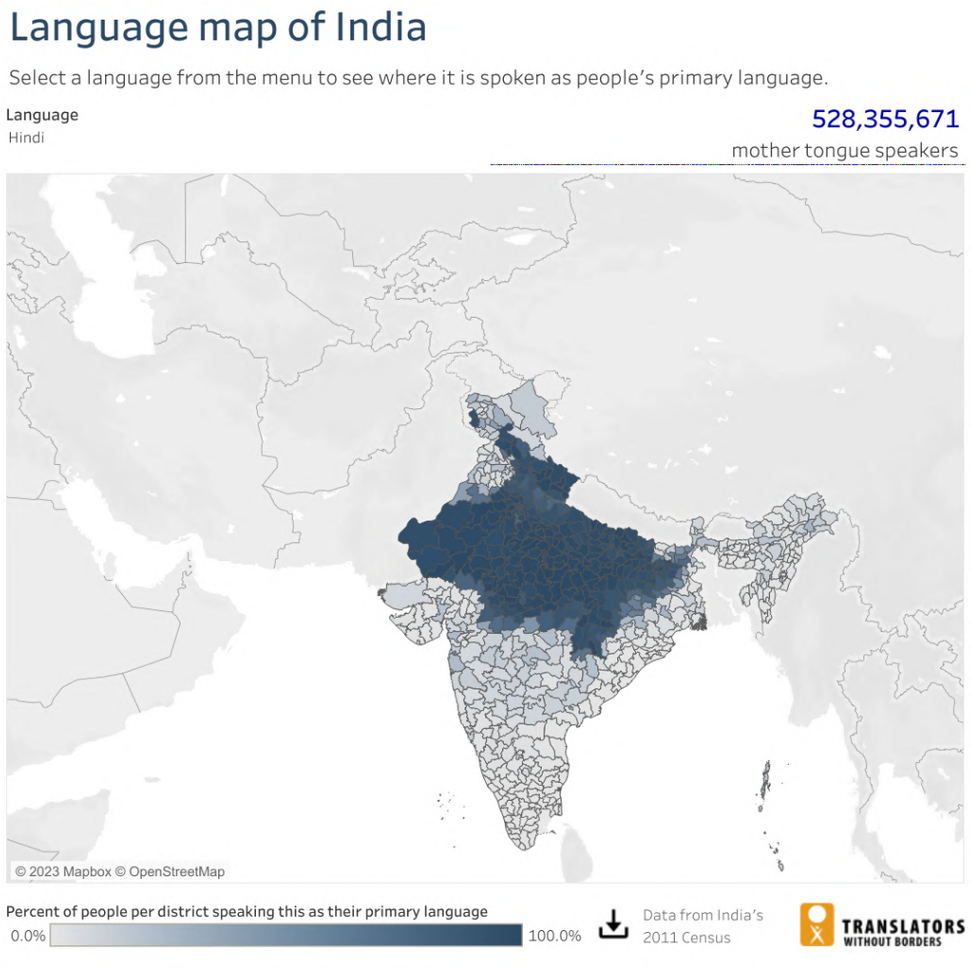

Fig. 5 Language map of India from the Language Atlas of 2011

Cultural artifacts like folksongs, oral recordings (if available), stories, list of common words, simple translations and vocabulary guides were also collected from various sources on the internet during this project.

These artifacts provide insights into the cultural and linguistic practices of the different linguistic groups in the region - and can be used to create an experience that will enable viewers, listeners etc. to establish an emotional connect with the region.

4.2 Exploring physical installations around the world

Research was also conducted to explore physical installations to understand the how the experience was created and to find inspiration.

Since my installation would use real data in order to generate art, and help users visualize the art in a 3-D space, I looked at the data visualization work of Giorgio Lupi. Lupi's visualizations are characterized by their intricate and playful designs, which often incorporate hand-drawn illustrations and bright, bold colors.

One of Lupi's most interesting data visualizations is her "Dear Data" project, which she created in collaboration with fellow designer Stefanie Posavec. The project involved the two designers exchanging hand-drawn postcards once a week for a year, each one containing visualizations of different aspects of their daily lives, such as the number of times they checked their phones or the types of weather they experienced.

Another notable project by Lupi is her "Data Humanism" manifesto, which argues that data visualizations should be designed to evoke empathy and emotion in their viewers, rather than simply presenting data in a sterile, objective manner. This approach is reflected in many of Lupi's other visualizations, which often use personal anecdotes and stories to contextualize the data being presented. I aim to evoke emotions similarly through my installation by cleverly using data.

Overall, Lupi's work demonstrates the power of data visualization to not only convey information, but also to tell compelling stories and engage viewers on a more emotional level. Her unique style and approach to data visualization have made her a standout figure in the field, inspiring others to think creatively and outside the box when it comes to representing complex data.

Research was also done to explore the kind of data visualizations that try to evoke a sense of loss. This could relate to visualizations that depict ecological or environmental loss or cultures.

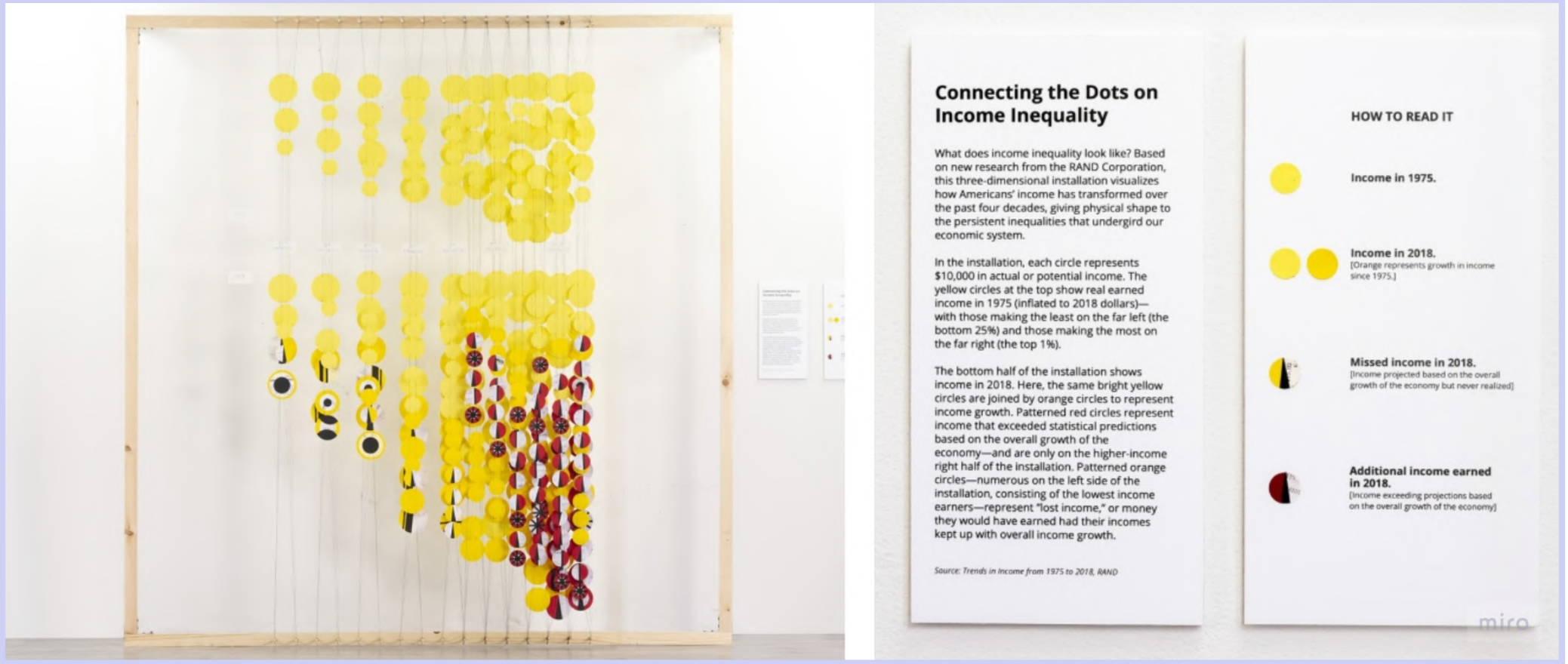

Fig. 6 Connecting the dots on income inequality by Giorgia Lupi

Fig. 7 “24 Preludes” by Giorgia Lupin

Giorgia Lupin’s “24 Preludes” visualizes Frederic Chopin’s famous 24 Preludes (written in 1838-1839) in the form of specially crafted tiles with geometric patterns - a fusion of the musical notations and visual art.

There were not a lot of examples of interactive installations about culture of language. One interesting installation I came across was Xu Bing’s “Living Word” - where 400 calligraphic variants of the Chinese character “niao” (meaning bird), are suspended in the air, giving the impression that the characters are taking flight.

World Wildlife Fund’s (WWF) 2008 campaign called Population by pixel used pictures of animals composed of as many pixels as there are numbers of that particular animal still alive. The team behind it were creative directors Nami Hoshino, Yoshiyuki Mikami, and designer Kazuhiro Mochizuki.

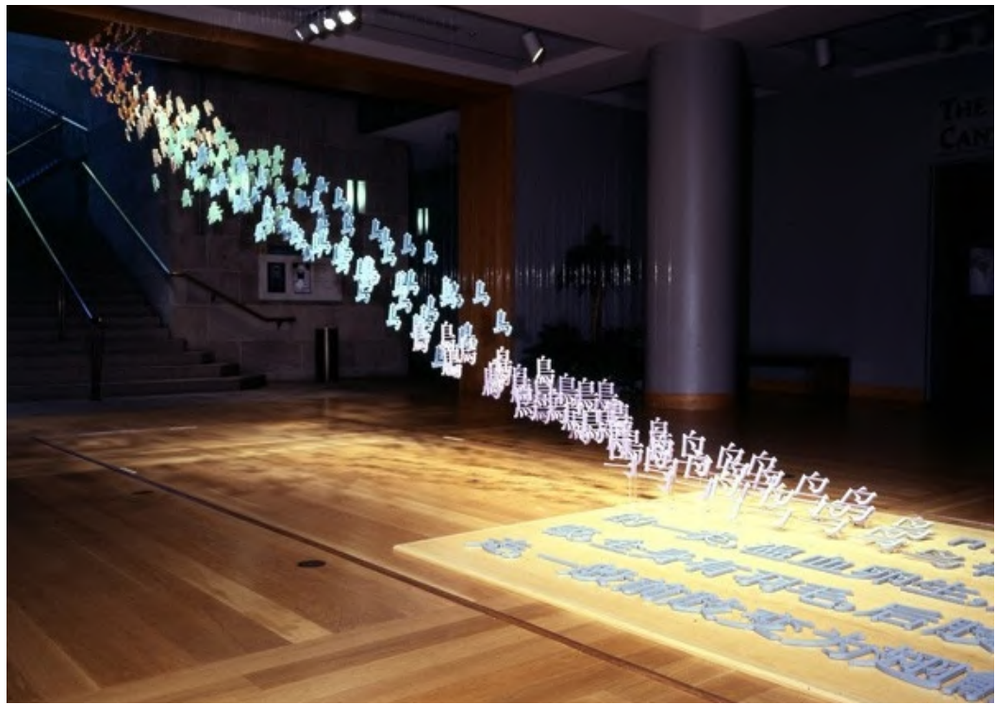

Fig. 8 Xu Bing’s “Living Word”

Fig. 9 African Wild Dog. Estimated between 3000 and 5500 remain Artist credits JJSmooth44

Fig. 10 Amur Leopard. Estimated about 60 remain; Artist credits JJSmooth44

The picture of the animal becomes too pixelated to understand - if the number of surviving animals of that species is too low. Therefore, the lesser the numbers, the lesser of that species we see. The visualization is powerful because if establishes a connect with the viewer through pictures that are legible, and then establishes a sense of loss - by placing constraints that disable viewers from seeing and knowing what a particular severely endangered animal looks like.

Memories of Nature: The Tree of Life is an installation inspired by Nature - that makes use of both physical structures and infographics to present a narrative. Through infographics, this installation represents the hierarchical chain of events that brought "everything into existence", and pays a homage to ancient Indian ecological knowledge systems, as well as teachings.

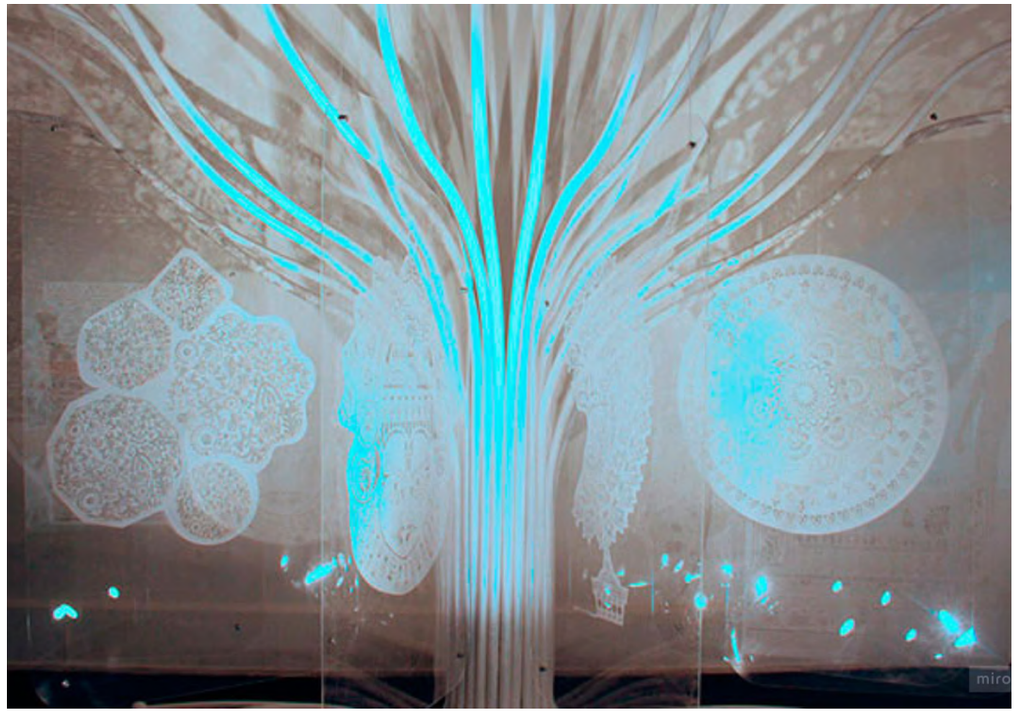

Fig. 11 and 12 Tree of life installation

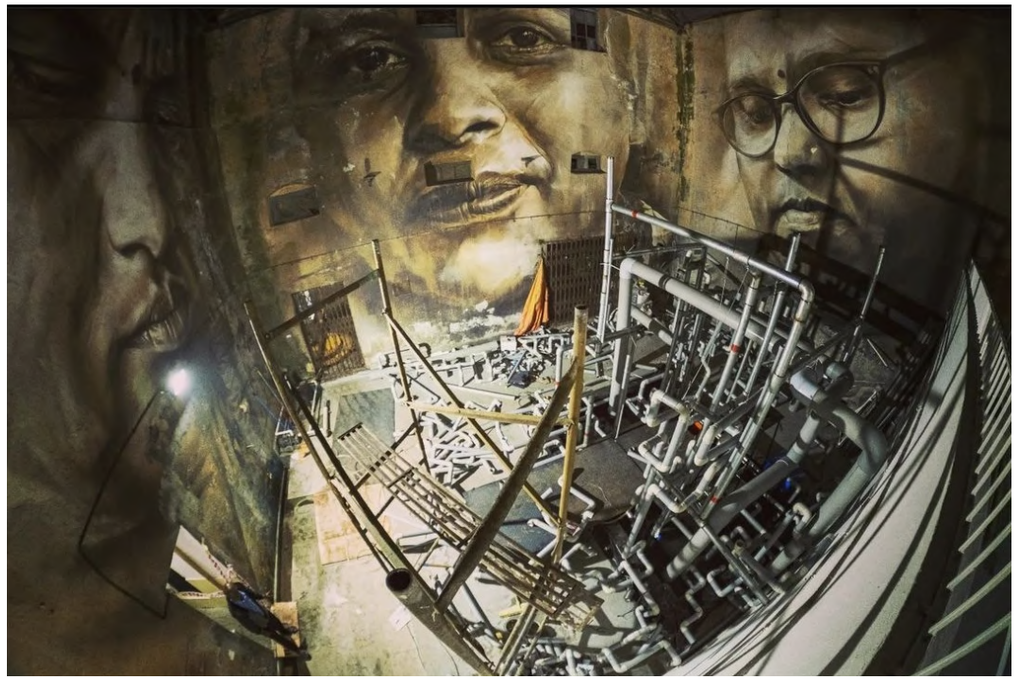

Fig. 13, 14 and 15 Pipes and Leaks installation at Mumbai Urban Art Festival

5. Primary Research

A survey was conducted with 45 participants, to gauge whether people were aware of the diverse range of cultures in North East India, and to find out how they would like to experience an unknown culture.

- The first question asked people to indicate what language/s they can speak, read and write in. This was important because it helped me understand the linguistic diversity of my audience, which could inform my installation design. The responses to this question revealed a wide range of languages, with Hindi and English being the most commonly spoken, followed by Marathi and Bengali.

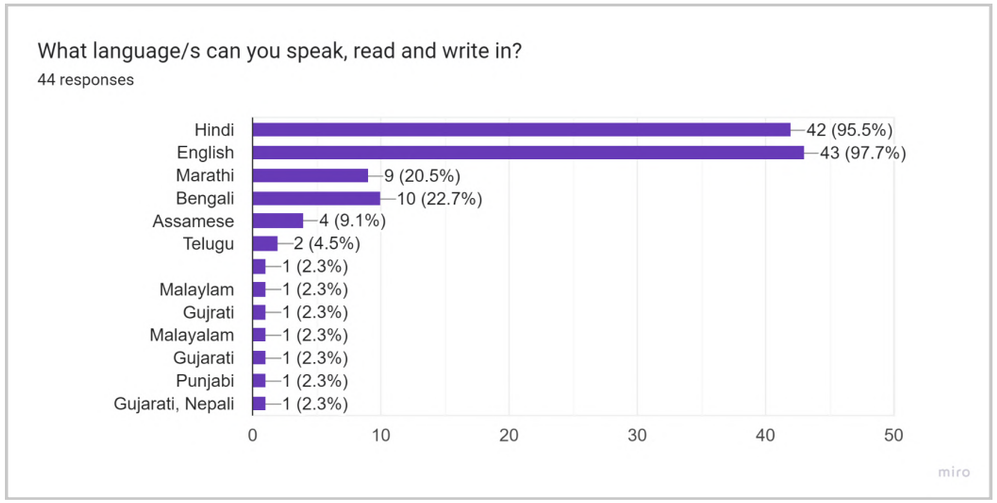

Fig. 16 Survey results to check linguistic diversity of IIT B students

- The second question focused on people's knowledge of the languages in North East India and whether they knew that many of these languages are endangered. This question was important because it helped me gauge how much awareness there was about this issue, which could inform the educational aspect of my installation.

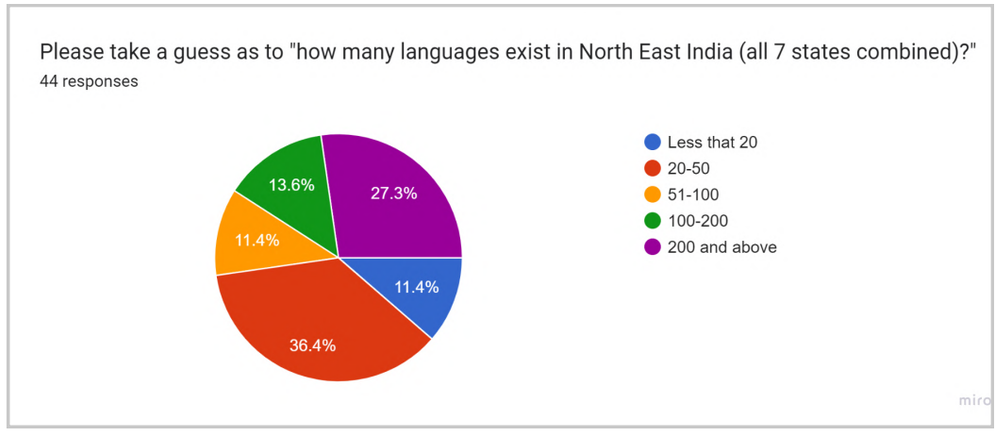

Fig. 17 Survey checking people's awareness about linguistic diversity in NE

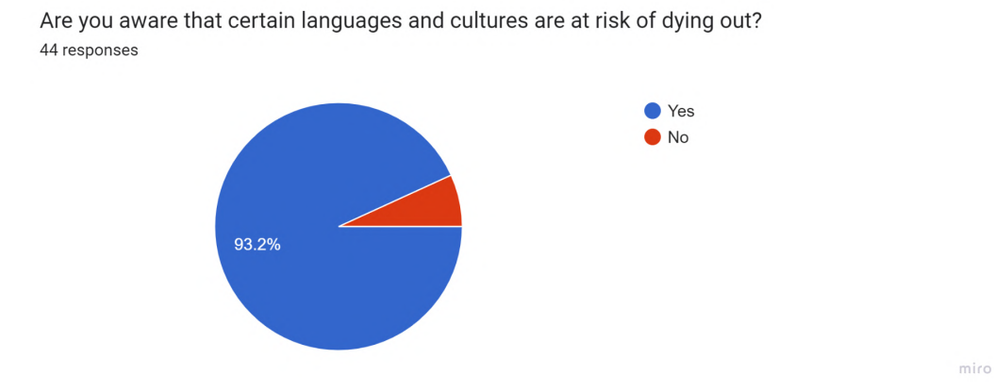

Fig. 18 Whether people are aware about endangered cultures and languages

- Most people were aware that there are languages cultures that are at the risk of dying out. However, people were not aware as to how many languages were present in North East India.

- The third question asked people how they would like to experience an unknown culture, with options such as through songs, stories, dances, folk rituals, documentary type videos etc.

- This question was important because it helped me understand the types of experiences that people found most engaging and memorable. The responses to this question were also mixed, with a wide range of preferences expressed - most commonly folk songs, folk stories and performing arts. However, some common themes emerged, such as the desire to experience a culture through immersive and interactive experiences that engage multiple senses.

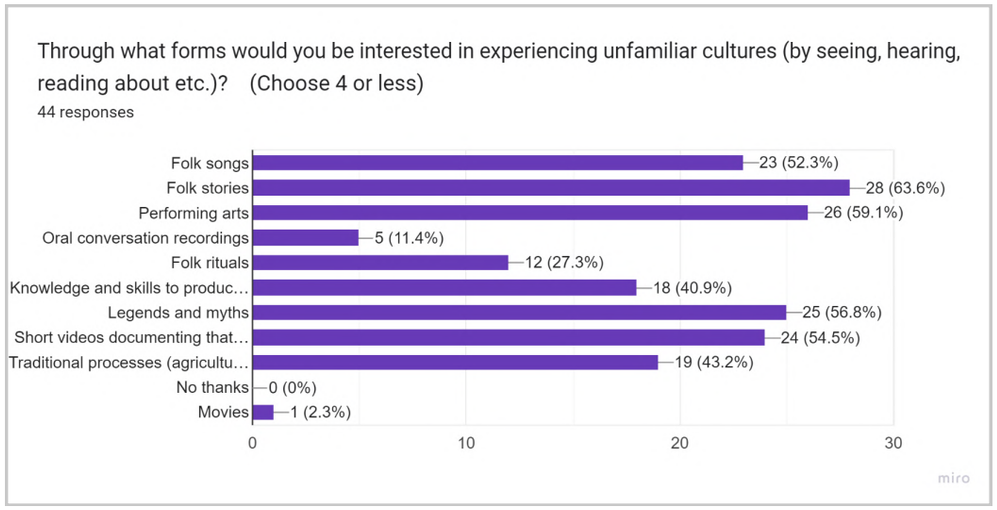

Fig. 19 Through what means do people want to experience new cultures

- A question was also asked to understand which intangible cultural elements would people be most disappointed in losing. This helped understand which cultural elements do people consider most important to them. Language was the top choice for this question.

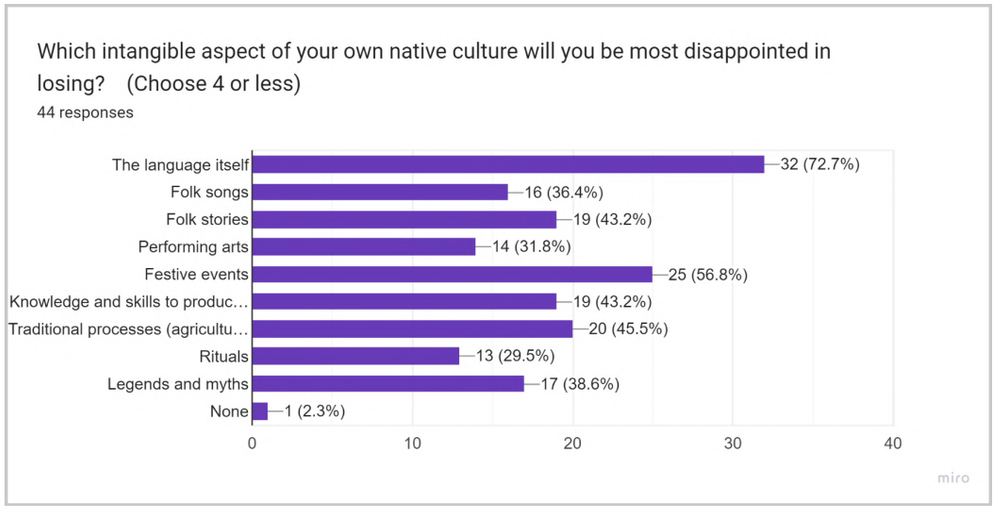

Fig. 20 What evokes a sense of loss

The reasoning behind this survey was to gather insights that could inform the design of a physical installation that would educate and engage people about the diversity and endangered status of the languages in North East India. By understanding people's language abilities, awareness of the issue, and preferred modes of experiencing an unknown culture, I could design an installation that would resonate with and educate a broad audience.

I also conducted user interviews with 5 participants -

- Two designers who created the Pipes and Leaks Installation in Mumbai Urban Art Festival (fig. 13, 14 and 15)
- Professor of Cotton University's Archaeology Department
- A writer from Assam
- A research scholar in linguistics, from IIT Bombay

Link to user interviews (sheet named Primary Research).

The interviews with the writer and the professor were exploratory in nature, and I was trying to find some interesting narratives related to the culture and traditions of North East India. The interview with the designers was to gain an understanding of the process of conceptualizing and creating an installation, as well as to find contacts of people around Mumbai who could help me out with sourcing materials and labour - cheaply. These interviews helped me identify -

- Ideation and creation process - when it comes to building physical installations
- Material sources, labour and expenses
- Choosing and designing an installation space

The key insights form these interviews were as follows -

- Representation of intangible cultural artifacts through tangible installations/ visualizations - would be a challange
- The abundance of languages and language sub-groups poses a challenge to the project - how many languages can we include?
- Not giving more attention to certain linguistic groups - is key
-

- The criteria for choosing which languages to include as part of the final installation/ data visualization - must be clearly defined. The following criteria were agreed upon by the interviewees as being most important -

  - No. of speakers - including languages with very few speakers, as well as those with a higher number of speakers
  - Another way could be eliminating languages with higher no. of speakers entirely - so that the focus remains on the dying languages
  - Depending on context, either selecting languages where the number of speakers is above or below a certain threshold, and proper reasoning for that choosing that threshold. Or making sure that the languages chosen have speakers ranging all across the board.
  - Ensuring that there is representation from all states of North East
  - Making sure that all the major language families are represented.
  - Representation based on degree of endangerment (maybe)

- The task of mapping the migration of civilizations is formidable.
- It is important to differentiate between folk tales, myths, and fables in the project.
- The inability to communicate with others in one's own language is a significant loss.
- Languages serve as a means to unlock traditional knowledge and culture.
- Globalization, the rise of Christianity, westernization, and the growing sense of national unity have led many people to adopt lingua franca languages like Hindi, Assamese, or Bengali

P3 Data

File Edit View Insert Format Data Tools Extensions Help Accessibility

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D2

	A	B	C	D	E
1	**User**	AKR_001			
2	**Description**	27 yr old male, designer. Created the Pipes and Leaks Installation in Mumbai Urban Art Festival			
3					
4	**Serial no.**	**Questions**	**Comments**	**Type**	**Priority**
5	AKR_001_001	About how the design of the installation came abou	The form is actually code generated, it follows the way mangroves grow.	US	Low
6	AKR_001_002	How was the design direction set	Since the theme was revolving around mumbai and we had a specific brief.	US	Medium
7	AKR_001_003		We were approached by MUAF and the whole project was funded.	US	Medium
8	AKR_001_004	Creative process	Once the ideation was completed post that I was using AR models of small pipes loops and isometric sketches to help the plumbers underst	US	Low
9	AKR_001_005		I don't sketch or create any sort of renders, that isn't my creative process. I code everything	US	High
10	AKR_001_006		There are no limits to the creative process when building a physical installation - it comes down to the pragmatics of the approach a lot	IN	High
11	AKR_001_007	About the exhibition space and how did they choos	We were given a certain space and we had to work with it.	US	High
12	AKR_001_008		Luckily the space had a tall ceiling and we could make the pipes and leaks installation that way	US	High
13	AKR_001_009		Rather than choosing a space that would be a perfect fit for their installation, they already got the space and worked with that space to crea	OB	High
14	AKR_001_010	Whether the installation came out exactly as desigr	I am an architect by training, OCD is a lifestyle. And structurally there would be many issues if we moved things.	US	Low
15	AKR_001_011		Although they did not make all the legs but yeah.	US	Low
16	AKR_001_012	How difficult was it to communicate their ideas to p	Yeah the plumbers and the team gave up mid way. It would have been way denser but they were genuinely tired.	BR	Medium
17	AKR_001_013		It was a different type of work for them and plumbers are used to doing utility driven work	IN	High
18	AKR_001_014		Every time we suggested something he would be so concerned that the pipes would leak and I was like that's the point	US	Medium
19	AKR_001_015	About how the installation came about, how many	We had a month to plan, 10 days of production.	US	Medium
20	AKR_001_016	Timelines of the project	We had about a week but more or less 5 days of work	US	Medium
21	AKR_001_017	Budget and funding	Budget was lower the better but went around 1.2 lakhs	US	Medium
22	AKR_001_018	Labour, contacts, challenges	Plumbers were the toughest to get because they would run away after seeing the project renders	BR	Medium
23	AKR_001_019		but somewhere we found a guy who said yes	US	Low
24	AKR_001_020		He was an old plumber of a senior architect i know, he put us in touch	US	Low

Final Final | Languages and deg of endangerment - cleaned | Selected 2 | Primary Research | Expenses | Deg | Explore

Fig. 21 User interviews

These interviews gave me a lot of interesting insights and directions for my narrative. Finally, I chose to center my installation around languages and dialects of North East India - and to create a sense of intrigue around the local cultures through the use of folktales and myths from the region. Based on these insights I decided to create a few narratives and ideated a few concepts around these narratives.

6. Ideations

6.1 Ideation 1 : Unheard Languages

Narrative : North East India is a hub of human migrations and the intermingling of diverse groups of people. Its rich intangible culture is expressed through more than 220 languages, and as these languages keep dying - we lose the means to unlock this region's rich cultural heritage which exists in the form of oral traditions and knowledge systems, songs and stories.

This first idea explores this narrative through a walk-through physical installation composed of several pipes that are a schematic representation of the routes (likely routes, as found in literature) through which population migrations happened.

Each pipe opening can be thought of as one language. Through each pipe opening, users can hear folk songs, oral recordings etc. of one particular language. Depending on the current number of speakers of the language, the volume of the folksongs/ recordings that can be heard - decreases or increasing. The more endangered the language, the lower the volume. This means pipes representing extinct languages will be dead silent.

Each pipe will have some data encoded on it - in the forms of colors and patterns. Eg. different colors for different language families.

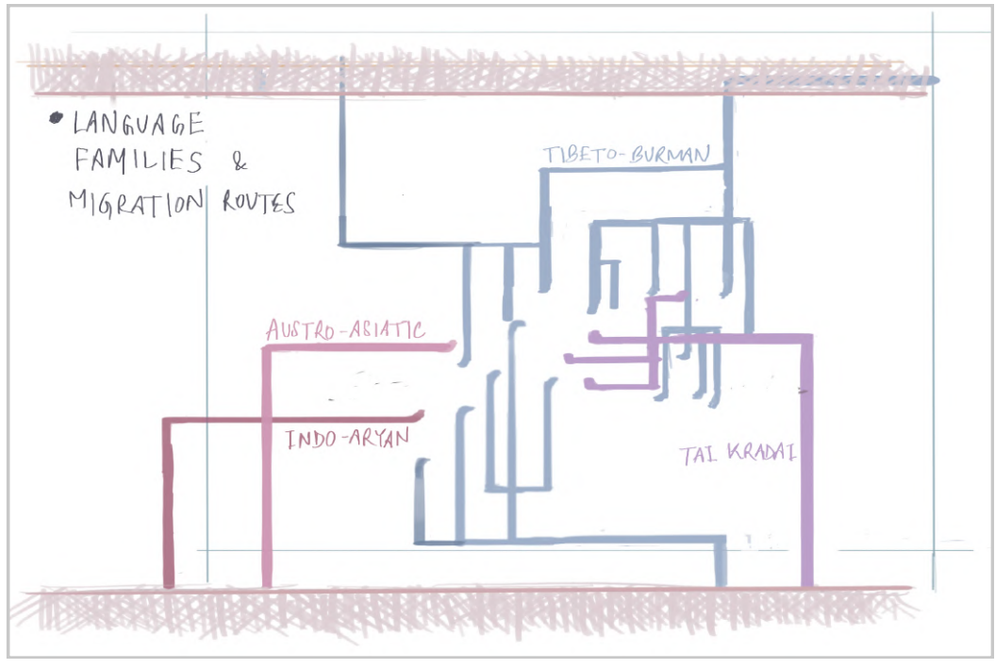


Fig. 22 Schematic representation of the movement routes of various North East Indian languages

One major issue with this idea - in terms of availability and authenticity of data - is that there are lots of conflicting linguistic theories regarding the migration routes of these languages - and no information can be considered an absolute fact.

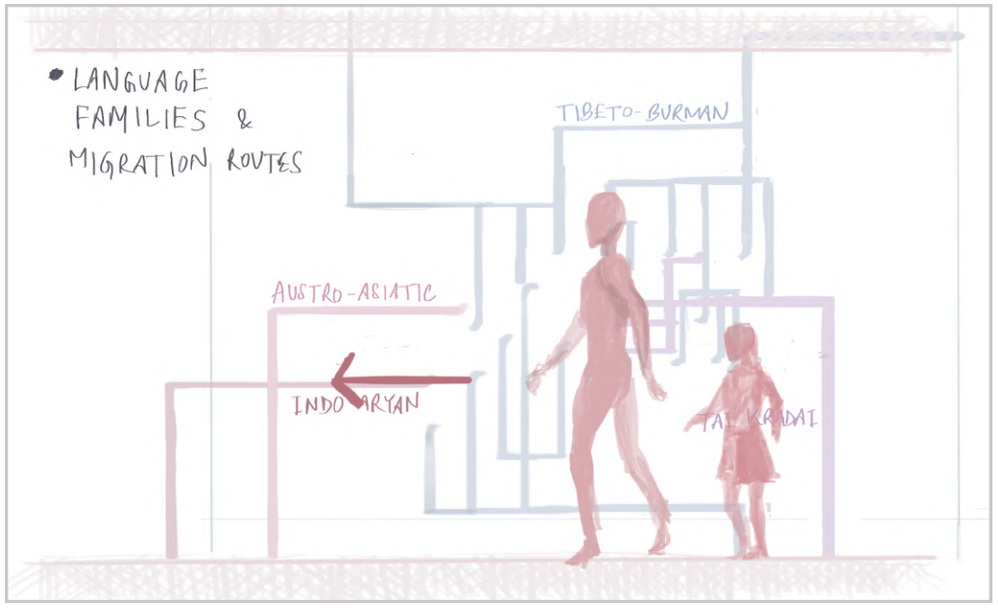


Fig. 23 People walking through the installation

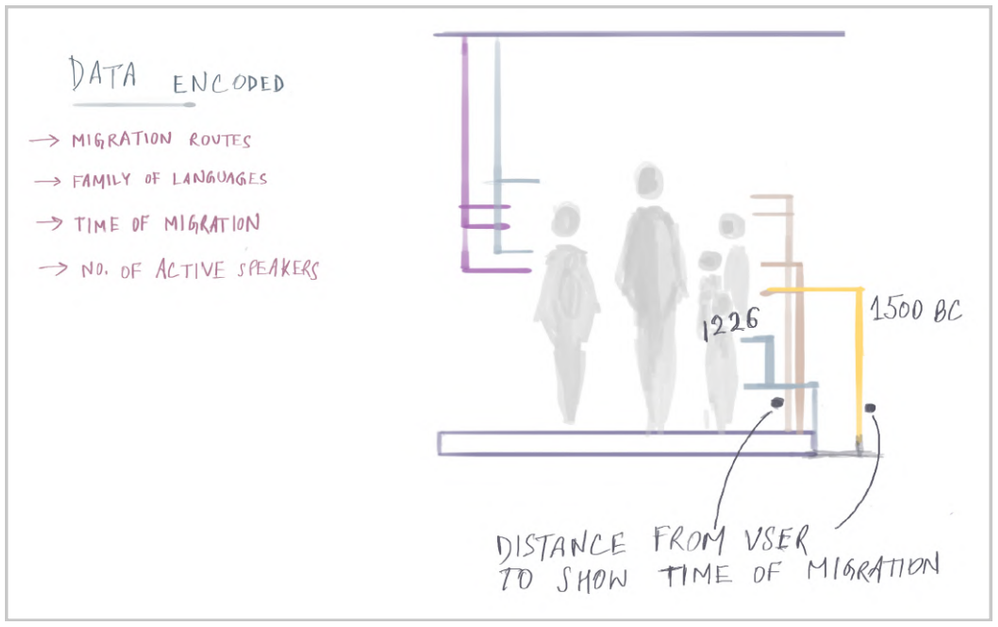


Fig. 24 Installation as you enter through it

Fig. 25 People listening to the songs playing through the pipes

The feedback I received for this particular ideation is as follows -

- Some way of choosing a language and following it. This would help viewers understand where the language came from and how it may have diverged. A sense of connection might also be established if a visitor follows the movement of a language over some distance
- Songs from a culture that is unrelatable - may not pique a viewer's interest much, since they will definitely not understand the words, and most likely will stop listening to it after a few seconds
- There should be some indication of what language it is - possibly through typography
- I will have to figure out a mechanism through which songs will play
- Additionally, I also received some suggestions regarding the materials that I can use

6.2 Ideation 2 : Lost Stories

The narrative that this idea revolves around is the same as the previous idea. However, instead of songs, this idea focuses more on the folk stories from the region. Colored scrolls or long pieces of cloth are hung from the ceiling, the colors representing different language families. Each of these scrolls represent a unique language from the region, and have a short folktale or fact about that language printed on them. The longer the scroll, the older the language. People can walk around checking these scrolls, reading the stories printed on each. The more endangered a language, the more erased and illegible are the stories printed on them. The feedback that I received for this idea was mostly positive, however, there was no interactivity in this idea. A possibility of combining ideas 1 and 2 was also pointed out. Also there has to be some way for people to find the whole story, possibly at the exit.

Fig. 26 People walking around the installation, reading the stories printed on the scrolls

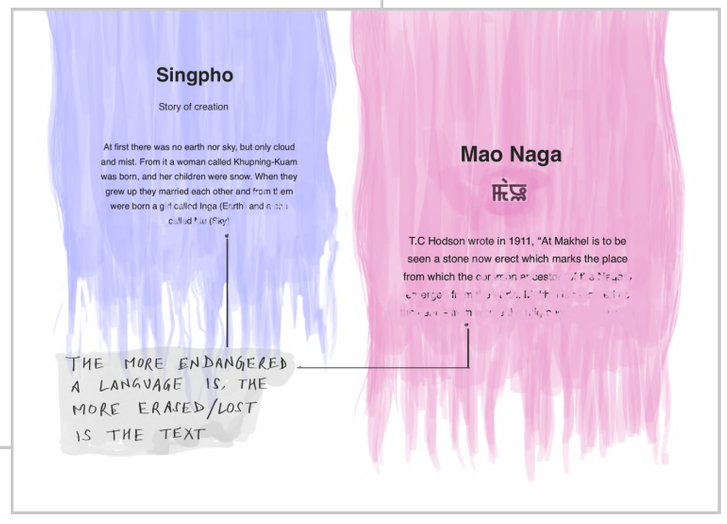


Fig. 27 A close-up of two scrolls

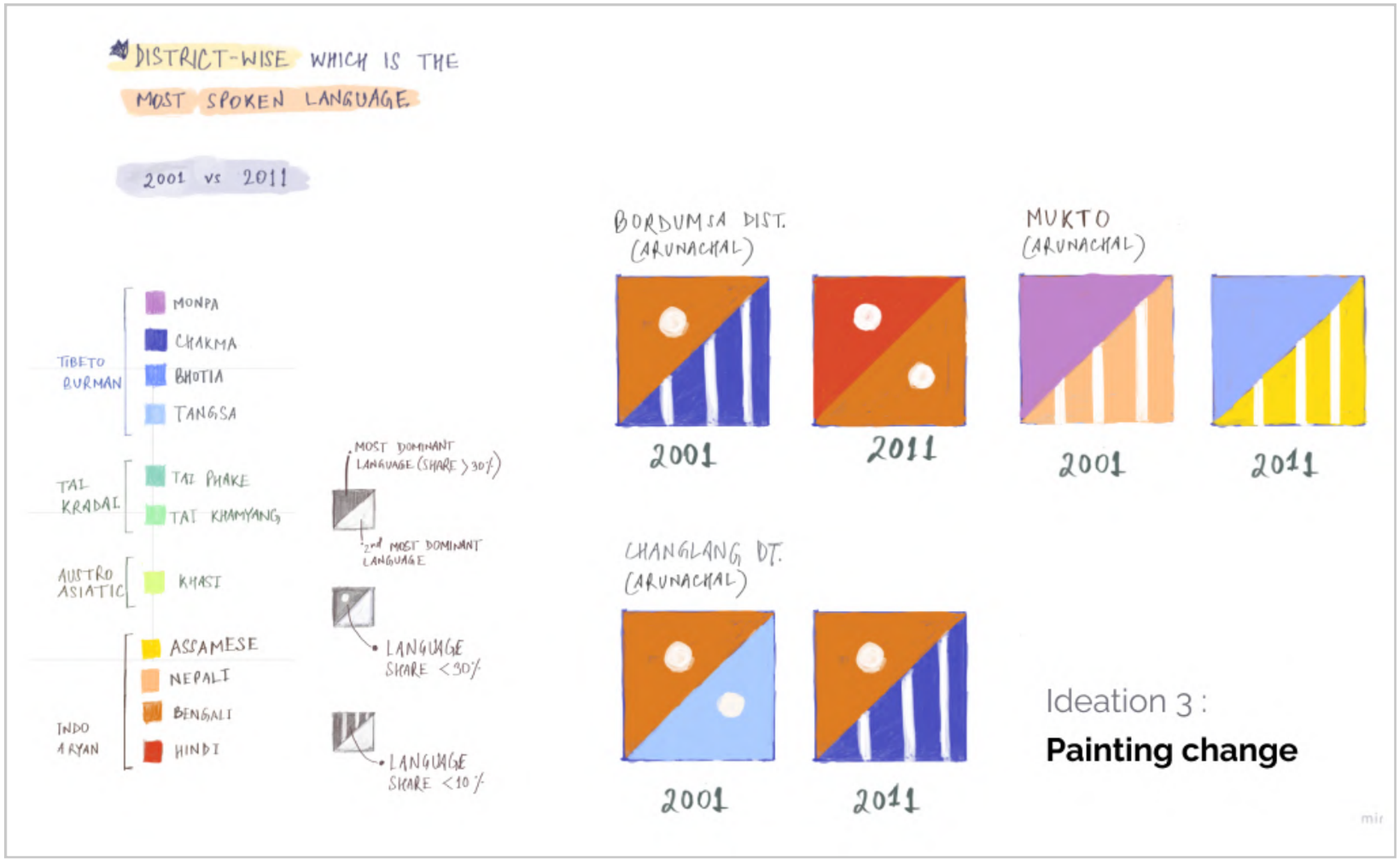


Fig. 28 Ideation 3 tiltled "Painting Change"

6.3 Ideation 3 : Painting Change

Narrative : There is an increasing adoption of lingua franca languages like Hindi, Assamese and Bengali and unfortunately this comes at the cost of ethnic languages, as the newer generation is more incentivized to learn these contact languages, and more often than not - end up speaking a pidgin between their mother tongue and a common contact language [9,10,11]. Many consider the ability to learn and speak lingua franca languages - a ladder to promotion and development in society [11].

This phenomenon is also observed in states with a large no. of scattered tribes, eg. in Nagaland where Nagamese, an Assamese-lexified creole language, has emerged as lingua franca among the numerous tribes in the state such as Angami, Ao, Zeme, Sangtam, Lotha etc.

The idea called "Painting change" - builds on this narrative and tries to visualize this change in the number of speakers of different languages in the region through a series of 14 paintings.

Each painting corresponds to a particular North East India state, and shows the most dominant and the second most dominant languages/ dialects spoken in each district of that state, therefore resulting in a set of 7 paintings. The first set of 7 paintings use data from the 2001 census report and the second set, from 2011 census report - culminating in a series of 14 paintings in total. Cool colors are chosen to encode Tibeto-Burman, Tai-Kradai and Austro-Asiatic languages, while warmer colors are used to encode Indo Aryan languages [fig. 28]. Viewers can spot how the dominant languages in the region have changed - from 2001 to 2011. Feedback that was pointed out revolved around a lack of interactivity and the fact that there was no way for people to experience the culture of the region as well. Suggestions were that a 3-D space can be utilized instead of 2-D - maybe using suspended cubes.

Fig. 28 “24 Preludes” by Giorgia Lupin visualizes Chopin's 24 Preludes in the form of colored tiles that contain encoded data in the form of geometric patterns

6.4 Ideation 4 : Participatory installation

The narrative is the same as it was for ideation 3. But this installation is participatory in nature. Each audience member will be given round colored balls which have the name of a language and abstract patterns painted on them - representing the family of origin, date of migration of that language into the region, and the degree of endangerment of that language. Users will take these balls, match the name of the language with openings atop a large vertical Galton box type set-up, and drop that ball through the opening into the Galton box. Naturally the balls will collide against the pins placed inside the box and settle into spaces dedicated for different languages.

Fig. 29 Ideation 4 - colored balls given to each audience member

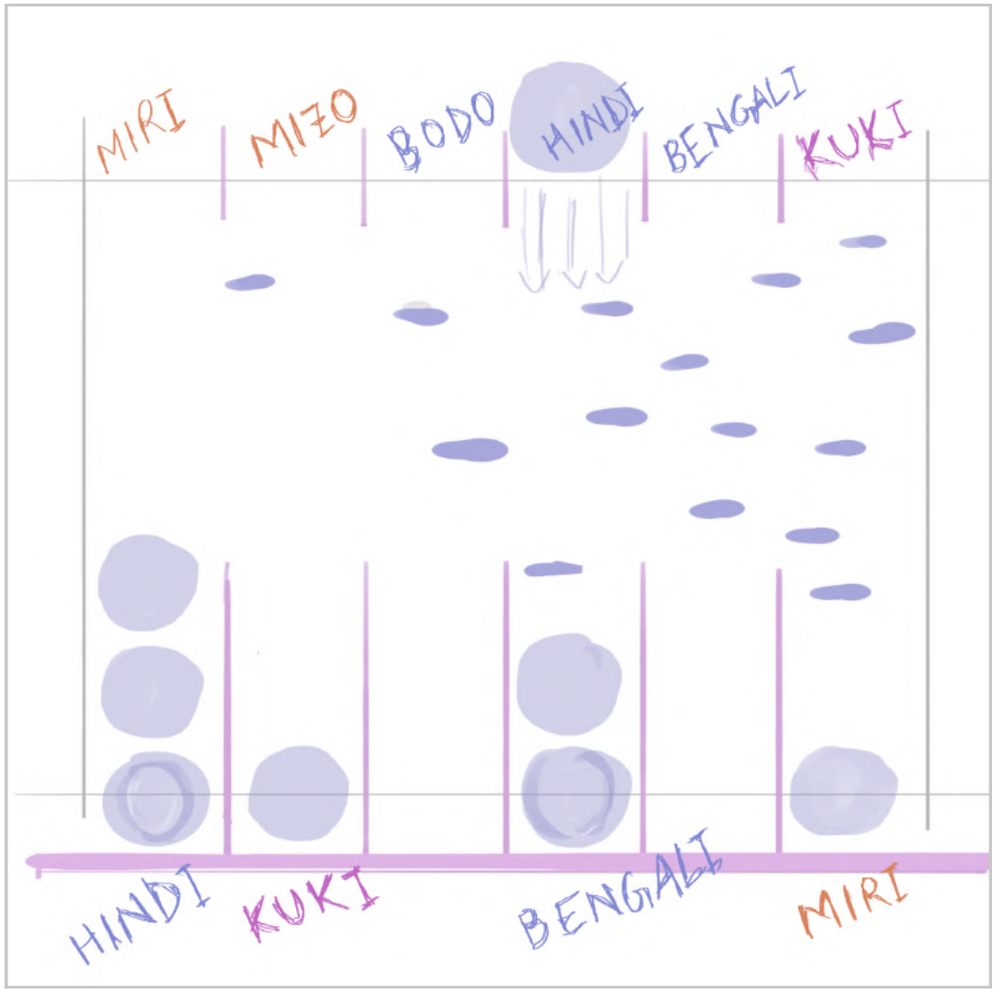


Fig. 30 Ideation 4 - large vertical Galton box like space where audience members will be asked to drop the balls that they were given

The pins inside the box will be set up in a manner that increases the likelihood of these balls settling into spaces dedicated for common lingua franca languages, while making it progressively more difficult for the balls to land into spaces dedicated for endangered languages. It will be made impossible for the balls to drop into spaces dedicated for extinct languages. Over time, as more audience members carry out this exercise, a bar chart sort of visualization will emerge - supporting the narrative. Instead of balls, this idea can also be carried out through colored pieces of paper, dripping paint or ideally - any other material with cultural ties to the region. The major feedback received for this idea are as follows -

- Will require lots of material, balls especially, or any other alternatives like colored paper
- Audience will be able to view the results only after some time, and people who attend the exhibition in its initial phases - may not get to witness the installation in its full glory
- This installation also heavily depends on the no. of people attending

Finally, **an evolved version of Ideation 1 was selected as the final idea** as more people were receptive/ excited about this particular idea. The idea was refined, and it was decided that audio recordings of folkstories would be played through the pipes, instead of folksongs. Also, the audios played would be English translations of the folk tales so that audiences can understand what is being said. Additional layers were added in terms of data encoding, going forward.

I also tried to explore the possibility of the pipe openings/ endings (where audience members would place their ears to listen to the audios) would be placed at a specific height and relative spacing - so that they end in a place that gives audience members an idea about the geographical location where the languages are spoken currently. For eg. pipes corresponding to languages spoken in Arunachal Pradesh would end at a higher vertical height, while languages that are spoken in Tripura would end at a lower height. The feasibility of this arrangement was evaluated and reconsidered in the following sections.

7. Design process

Aiming to enrich the data encoding aspect of Idea 1, I decided to include the following pieces of information on the pipes -

Through placement of pipe & overall structure

- Showing the movement of languages and where it is spoken currently

1. When did the language migrate to NE India (by observing the distance between viewers and the pipes rising from the ground, viewers can trace the historical migration timeline of each language in the region. Languages that migrated into the region more recently - are closer to the viewers)

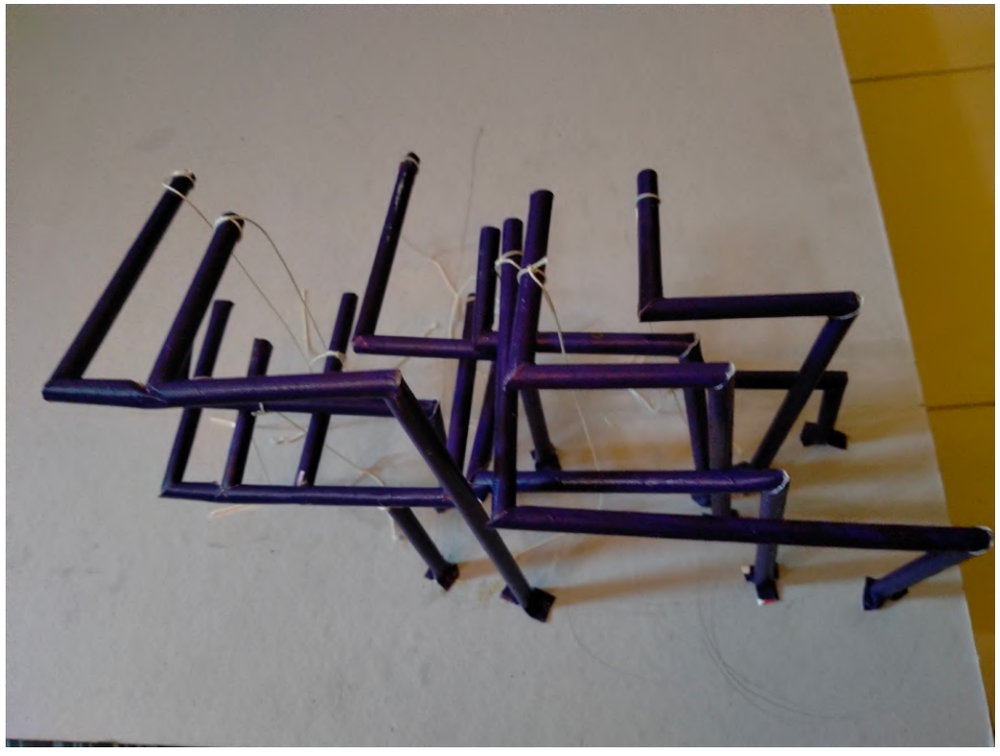
Through colors and patterns on the pipe

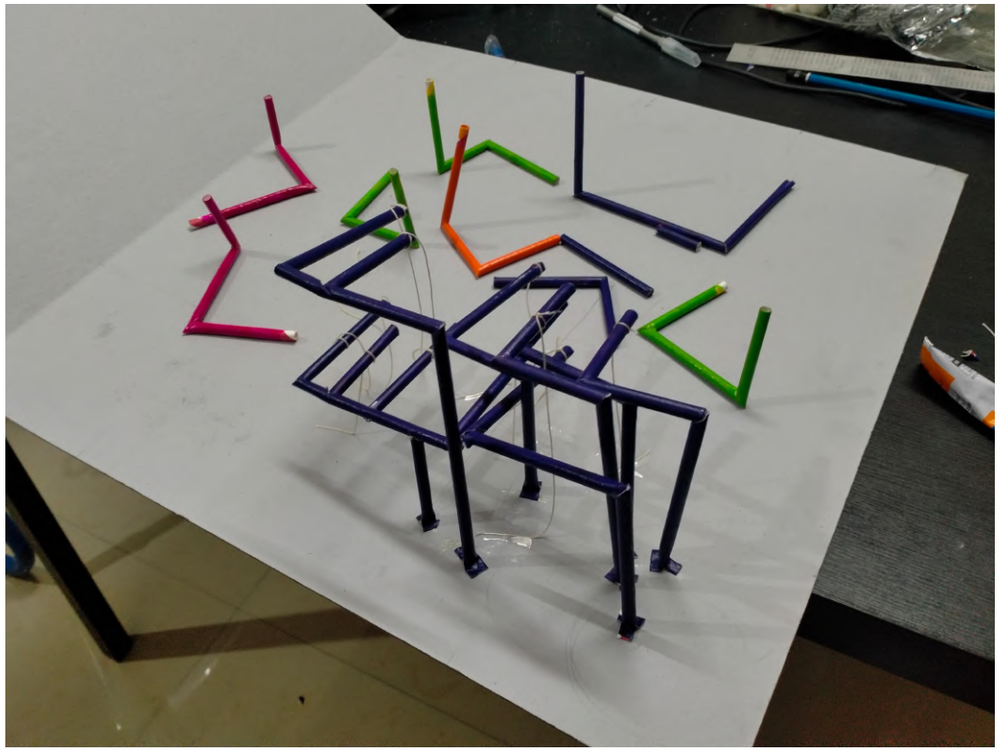
- Language family (through the background colors)
- Degree of endangerment and current no. of speakers (through patterns on the pipes)
- North East Indian states where the language is spoken currently (also through patterns on the pipes)

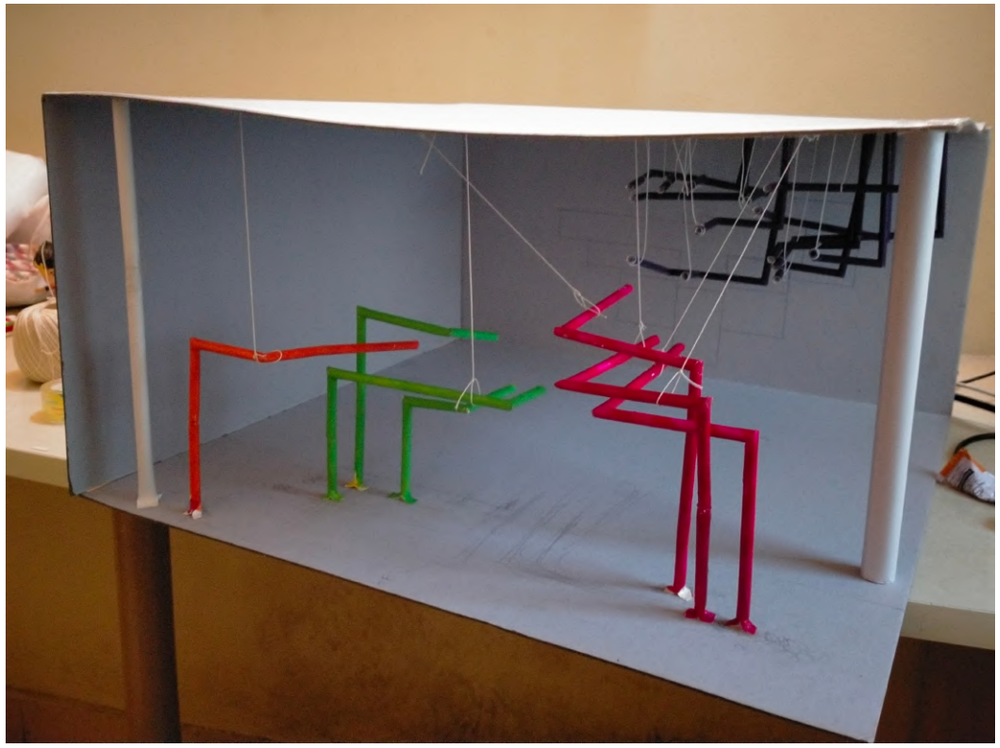
7.1 Scale model

To begin with, I built a scale model trying to replicate what the installation would ideally look like once done (fig. 31, 32, 33 and 34). The dimensions of this model were - 42 cm breadth x 59.4 cm length x 29.7 cm height. The scale model helped me communicate my vision to people from a non-design background, who had trouble visualizing what the installation space would look like based on the sketches.

In the scale model, pipes corresponding to Tibeto-Burman languages were painted dark blue, the only Austro-Asiatic language was painted orange, Tai-Kradai languages were painted pink and Indo-Aryan languages were painted green.







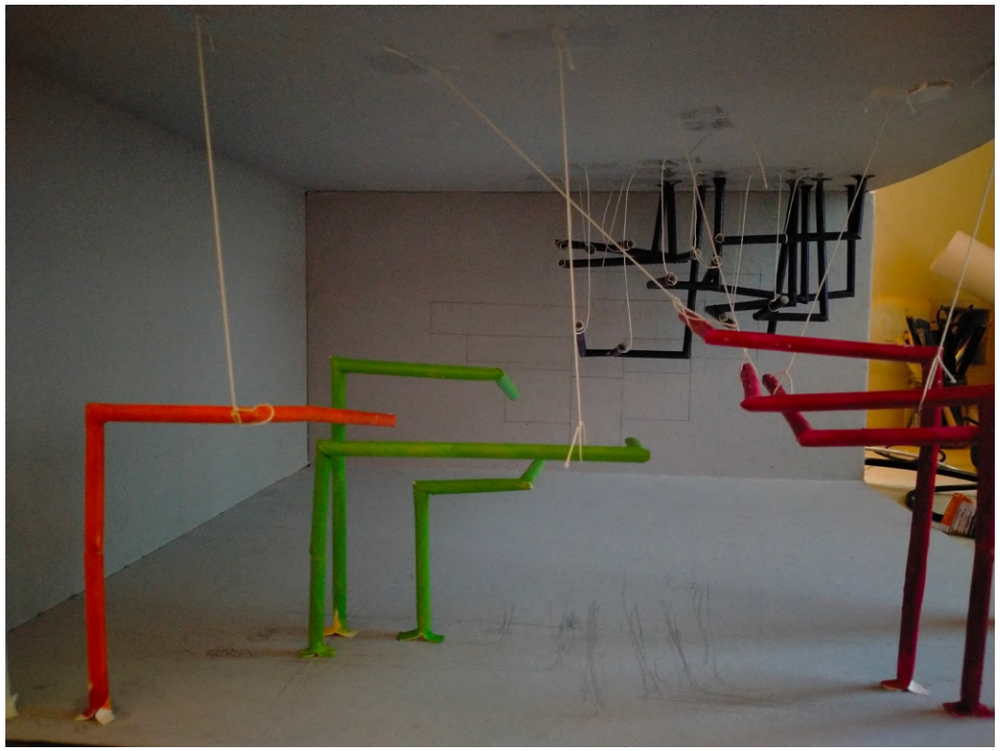


Fig. 31, 32, 33 and 34 (clockwise) stage-wise progression while building the scale model

This exercise helped me gain valuable feedback and insights from 4 people (two from design background and two from a non-design background), the key comments from which are listed below -

- *"How will I know the language's name just by looking at the pipes?"*
- *"How would it feel to walk between pipes? Maybe a bit claustrophobic or overwhelming?"*
- Pipes should be at an accessible height so that the audience can listen to the folk stories or songs playing through them
- There should be a mechanism to pull an earphone and listen to the audios playing from inside the pipe, to make it more accessible
- Why are purple pipes (Tibeto Burman) pointed towards us? and others pointed away from us?
- Regarding ending the pipes at a spot that gives an idea about the language's geographical distribution - not many people are aware about the geography of North East India and which state lies where. Therefore, it does not make sense to do this, unless a map of North East India is projected onto a wall or there is some way for people to decode this information
- Proper explanation needs to be provided in terms of how to interact with the installation and decode the data
- *"Why are some languages coming from above?"*
- Differences in volume levels (0-10) would be difficult to perceive, given that the number of speakers for certain languages are in 100,000s. Eg. a language with 2,00,000 speakers and another with 2,50,000 speakers would translate to comparable volumes (7 and 8, let's say) when audio recordings corresponding to these languages are played through the pipes. It will be **difficult to perceive these subtle changes in volume and deduce the no. of speakers of a given language**.
- The middle space for walking creates confusion
- No way to compare migration era between Tibeto-burman languages and others, since they are facing the opposite way. Comparing between only Tibeto Burman languages, or between the other set of languages would not be very difficult though, since the farther a pipe originates from the viewer, the older it is in terms of migrating into the region. Languages that migrated more recently into the region - are closer to the viewers.
- Tibeto-Burman pipes are very overwhelming to look at, and are very closely stacked
- Rather than absolute numbers, a way to relatively compare - also works with regards to knowing when these languages came
- *"Why will students inside IIT campus be interested?"*
- There was also some level of curiosity to how the regional language is actually spoken, and could there be a way to listen to both the English recording as well as the local language recording
- **Aesthetics** - the pipes need to look good

7.2 Explorations around feasibility of using pipes

I bought different pipes of 1 foot length (fig. 35) and and compared the acoustics, weight and costs of these pipes. Ideally, sound should not leak out of the pipe as that can ruin the acoustics of the set up. Since I was planning to create this installation with 10-15 languages at least, the material had to be cheap. The inner diameter had to be at least 60-70 mm, to allow room for the electrical system to sit.

Fig. 35 Comparing different pipes

There are several reasons why I did not choose bamboo as an alternative to pipes for my installation. Here are the key points -

- **Irregular inner diameter :** Bamboo pieces have irregularities in their inner diameter, which would make it challenging to ensure consistent sound quality across all the pipes. The varying diameters could lead to differences in resonance and volume, compromising the overall experience of the installation.

- **Time-consuming joineries :** Constructing joineries with bamboo requires significant time and effort. Bamboo is a natural material that is not uniformly straight, and achieving precise connections between the pipes would be labor-intensive. This could potentially slow down the construction process and delay the completion of the project.

- **Weight and stability :** Bamboo can be relatively heavy compared to other materials like pipes. Ensuring that the installation remains structurally sound and secure could be challenging when working with heavy bamboo pipes.

- **Susceptibility to cracking :** Bamboo is prone to cracking, especially when exposed to varying environmental conditions or stress. The presence of cracks in the bamboo pipes would lead to sound leakage, resulting in an inconsistent audio experience for the viewers. Maintaining the integrity of the bamboo pipes over time would require regular inspections and potential repairs.

Given all these reasons, I decided to use PVC pipes with 75 mm diameter. These pipes were the cheapest, robust, lightweight and provided good acoustics. Tee joints and elbow joints are also readily available for such pipes and that made the process of bending and making the pipes flow - much easier.

7.3 Explorations around technology

To figure out the electrical circuitry inside the pipes, I discussed the possibilities with an electrical engineer, electronics vendors from Lamington Rd, two seniors from IDC who built the “Gappe ka Dabba” project, and Prince - an M.Des first year student from IDC.

Essentially, each set-up had to work remotely, with its own power supply, speakers and a way to control and switch the audio from English to the regional language and vice versa.

Initially, a small speaker that runs on battery and can play audios remotely using an SD card was chosen (fig. 36). However, switching the audio was a challenge in this set-up.

Fig. 36 Speaker used initially

Therefore this set-up was quickly discarded in favor of an integrated circuit (fig. 38, 42, 43, 44, 45) that consisted of -

- an Arduino board as the main controller
- a switch to turn the set-up on or off
- an IR sensor to detect any movement in front of it and switch the audio or reset it to play from the beginning
- a 9V battery to power the system
- DFplayer mini module for Arduino, to play audios from an SD card
- a small speaker to amplify this audio
- a 10 ohm resistor

The cost of one such set-up was ₹1000, approximately. A PLA (Polylactic acid material) case to contain this set-up was 3D printed. This ensured that the electrical set-up was robust, compact and easy to handle (fig. 46, 47, 48). All the functions were coded into the Arduino (fig. 49).

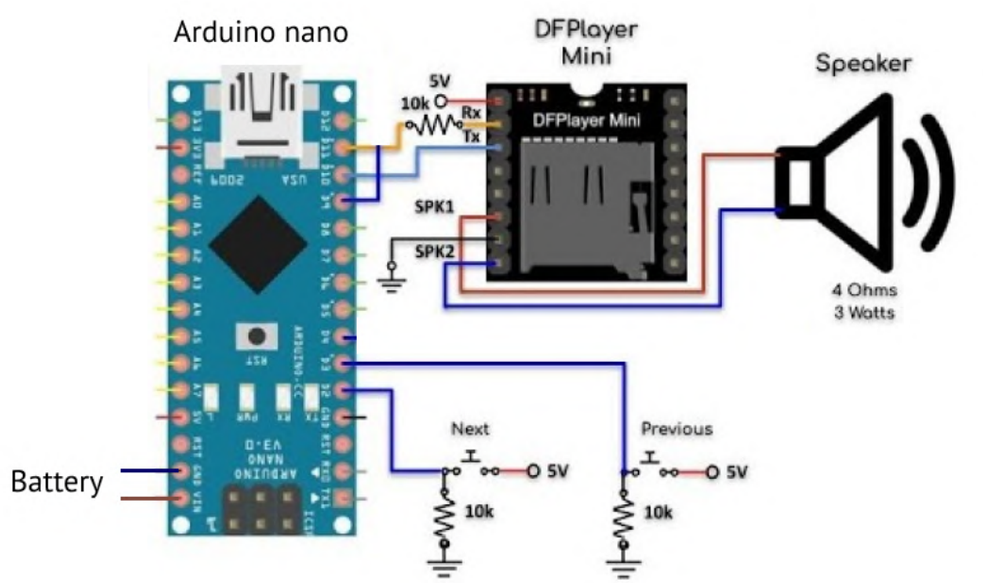


Fig. 37 Initial circuit diagram that was used, this set up is missing the IR sensor

Fig. 38 Initial set-up which used an Arduino Uno, was later switched to an Arduino Nano in order to make the circuit more compact

Fig. 39, 40, 41 Building the electrical set up

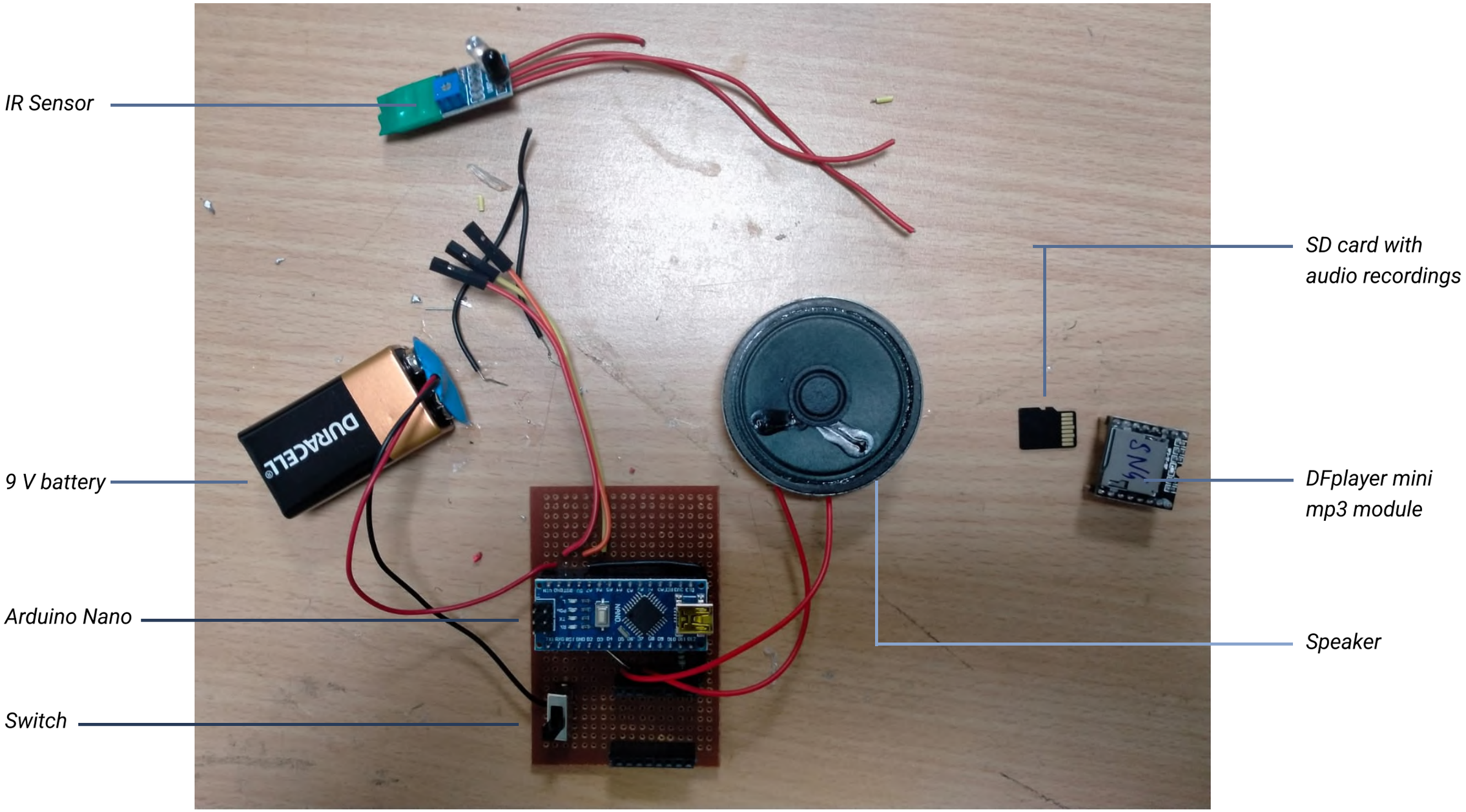


Fig. 42 Exploded view of the electrical circuit that was used finally

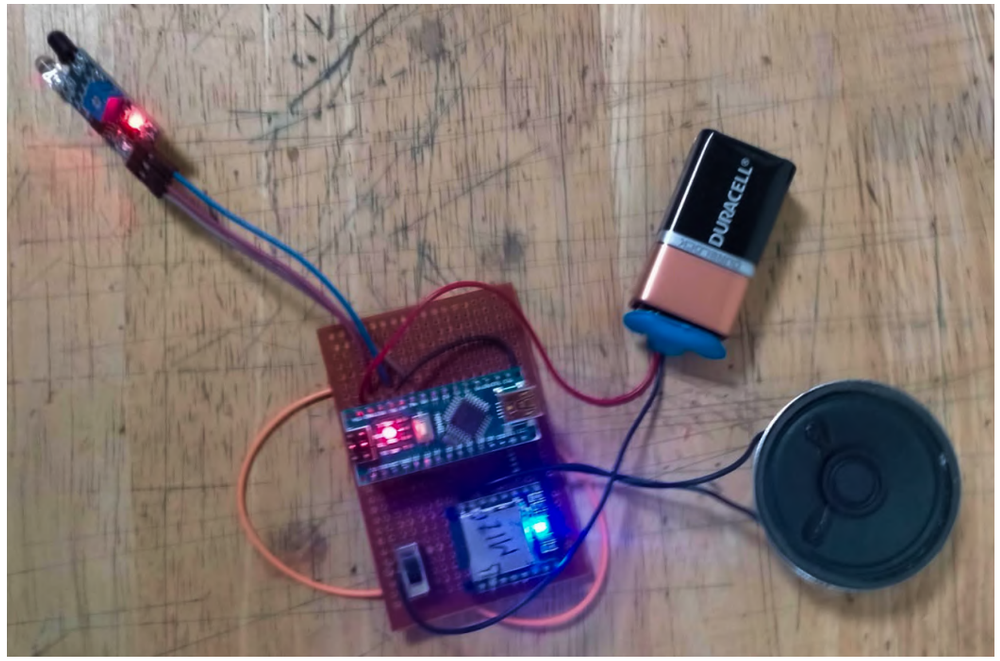


Fig. 43 Working set-up

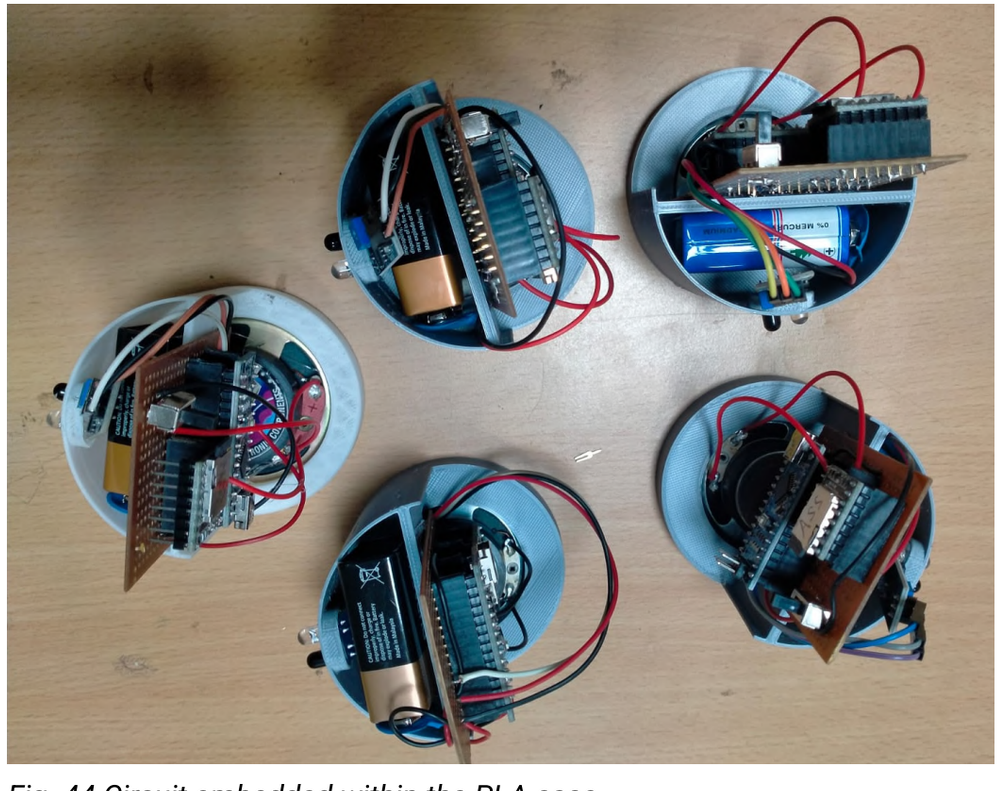


Fig. 44 Circuit embedded within the PLA case

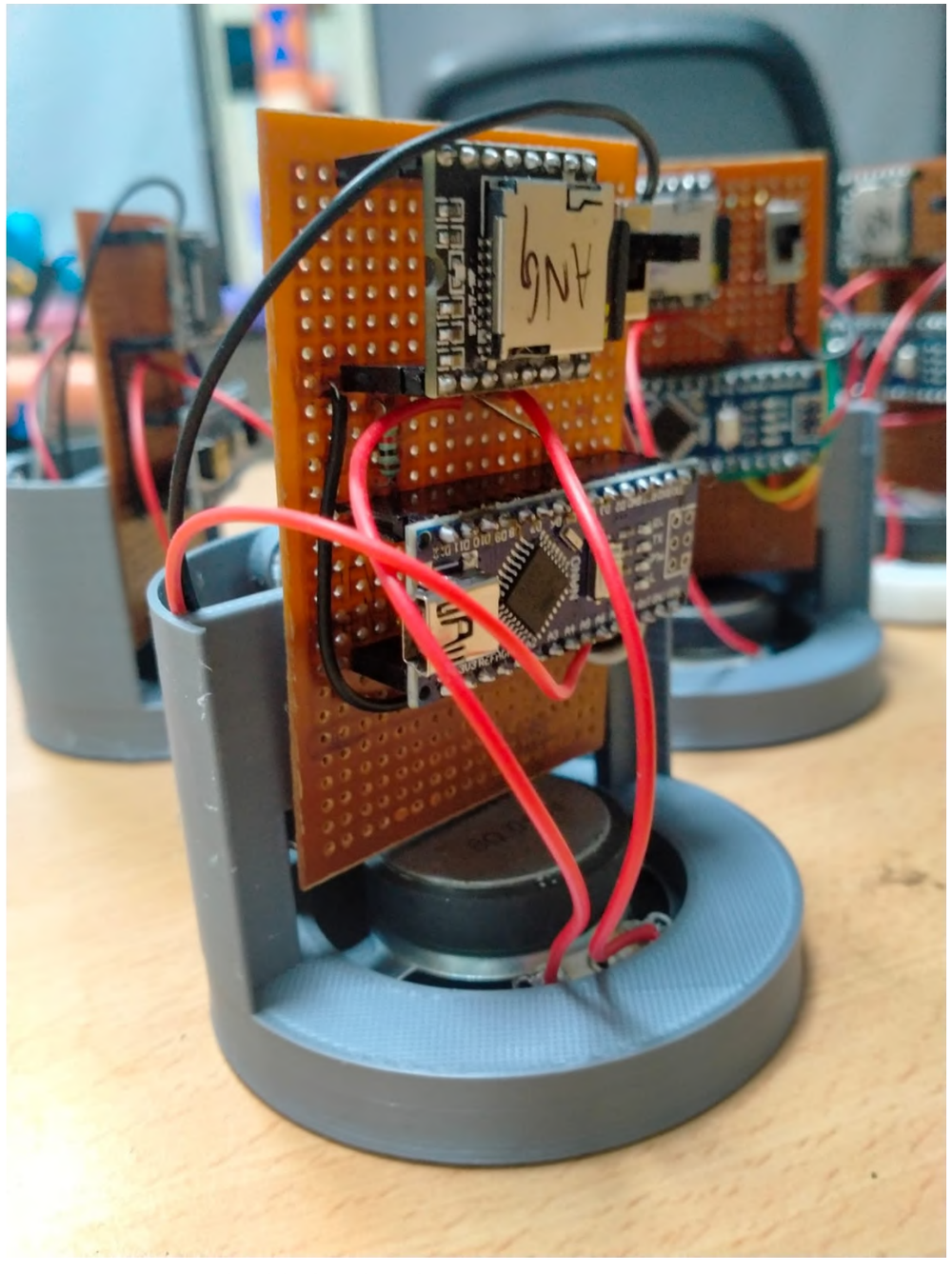


Fig. 45 Circuit embedded within the PLA case

Fig. 46 Design of the PLA case

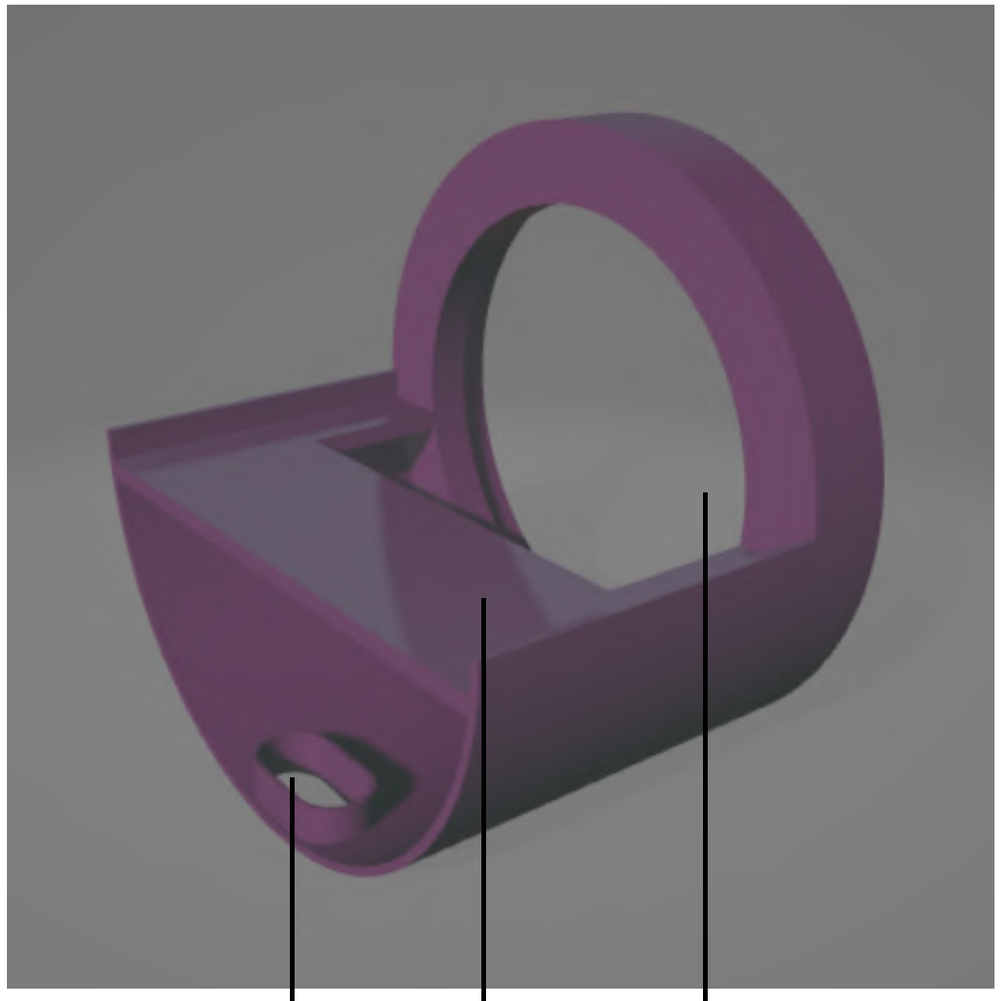
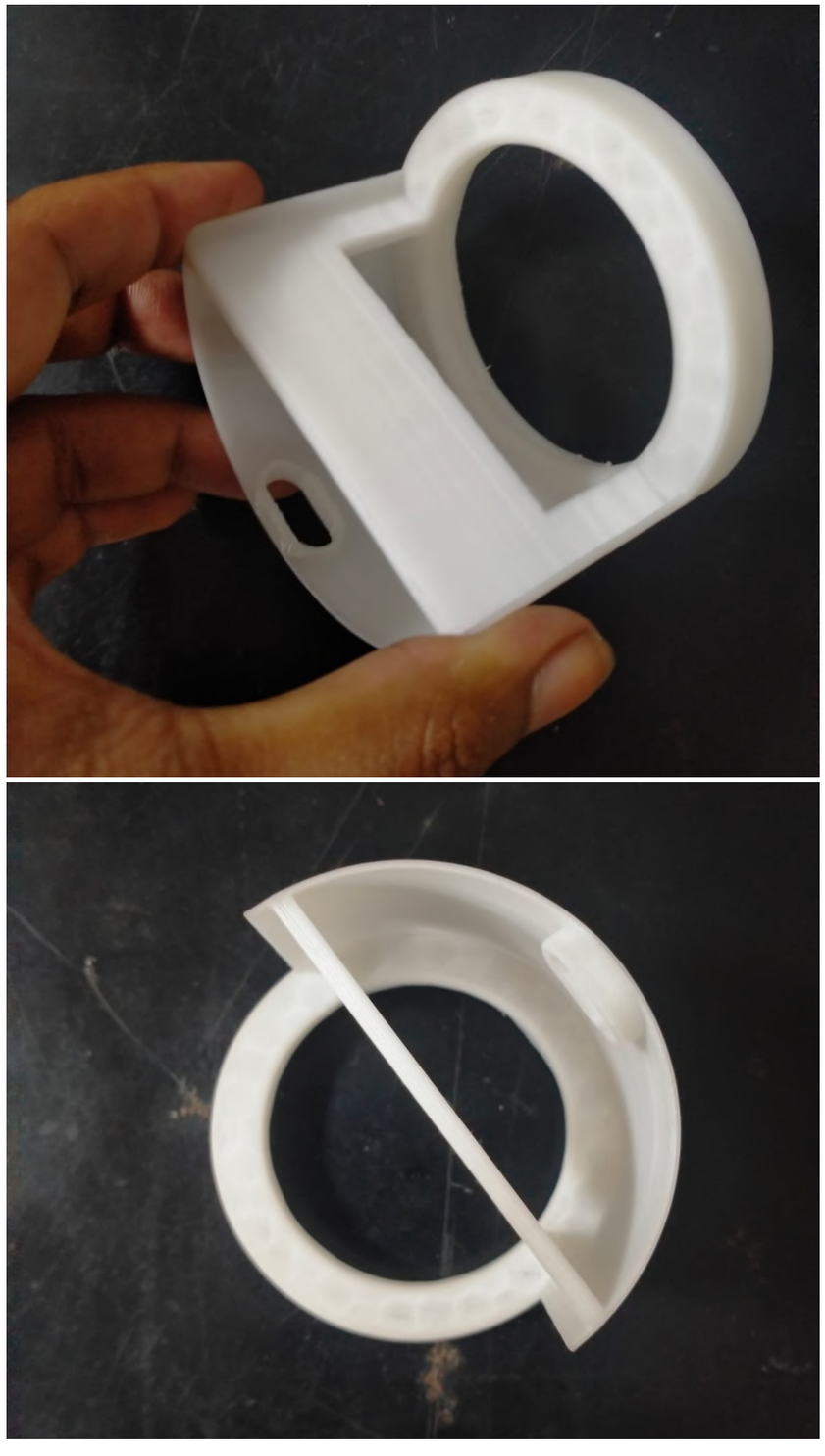


Fig. 47 and 48 3D printed PLA cases



1_Arduino_music | Arduino IDE 2.1.0

File Edit Sketch Tools Help

Select Board

1_Arduino_music.ino

```
#include "SoftwareSerial.h"
#include "DFRobotDFPlayerMini.h"


int next = 8, nval = 0, song = 0;

SoftwareSerial mySoftwareSerial(10, 11); // RX, TX
DFRobotDFPlayerMini myDFPlayer;
void printDetail(uint8_t type, int value);

void setup()
{
  mySoftwareSerial.begin(9600);
  Serial.begin(115200);

  pinMode(next,INPUT);
  Serial.println();
  Serial.println(F("DFRobot DFPlayer Mini Demo"));
  Serial.println(F("Initializing DFPlayer ... (May take 3~5 seconds)"));

  if (!myDFPlayer.begin(mySoftwareSerial)) {  //Use softwareSerial to communicate with mp3.
    Serial.println(F("Unable to begin:"));
    Serial.println(F("1.Please recheck the connection!"));
    Serial.println(F("2.Please insert the SD card!"));
    while(true);
  }
  Serial.println(F("DFPlayer Mini online."));

  myDFPlayer.volume(30);  //Set volume value. From 0 to 30
  //Play the first mp3
}

void loop()
{
 switch(song)
 {
   case 0: myDFPlayer.play(1);
           for(int i=0; i < 56000; i++)   // first song sconds
           {
```

Fig. 49 A snippet of the code in Arduino IDE

7.4 Encoding data

I experimented with color schemes and patterns to encode data, as well as enhance the visual representation of the "Whispering Grove" installation. Background colors were chosen to represent the language families. Given the importance of legibility and avoiding visual strain, I opted for light colors that would create a soothing ambiance for viewers.

Initially, to emphasize the connection to each state within North East India, I explored the possibility of using simplified icons of the state flowers as patterns. Each pipe would be adorned with the icon of the respective state's flower, offering a visual cue that allowed viewers to associate a specific language with its corresponding state.

However, the final designs ditched the idea of using icons of state flowers, and drew inspiration from the vibrant and intricate weaves of North East India. By incorporating patterns reminiscent of these traditional textiles, I aimed to celebrate the rich cultural heritage of the region and add a visually captivating element to the installation.

The key deciding factor was the choice to go for repeating sets of patterns on the pipes. The initial designs reminded me of the traditional weaves from the region and thus, I decided to go with these patterns.

Through these explorations with colors and patterns, I aimed to create a visually engaging and informative experience for the viewers. There was a lot of of back and forth with regards to negating any issues with contrast. The final output also changed a little bit according to the availability of materials such as paint and colored paper in the market.

Degree of endangerment is represented with colored bands wrapped around the pipes, the number of these bands revealing the number of speakers of that language. (Link to Figma file with designs)

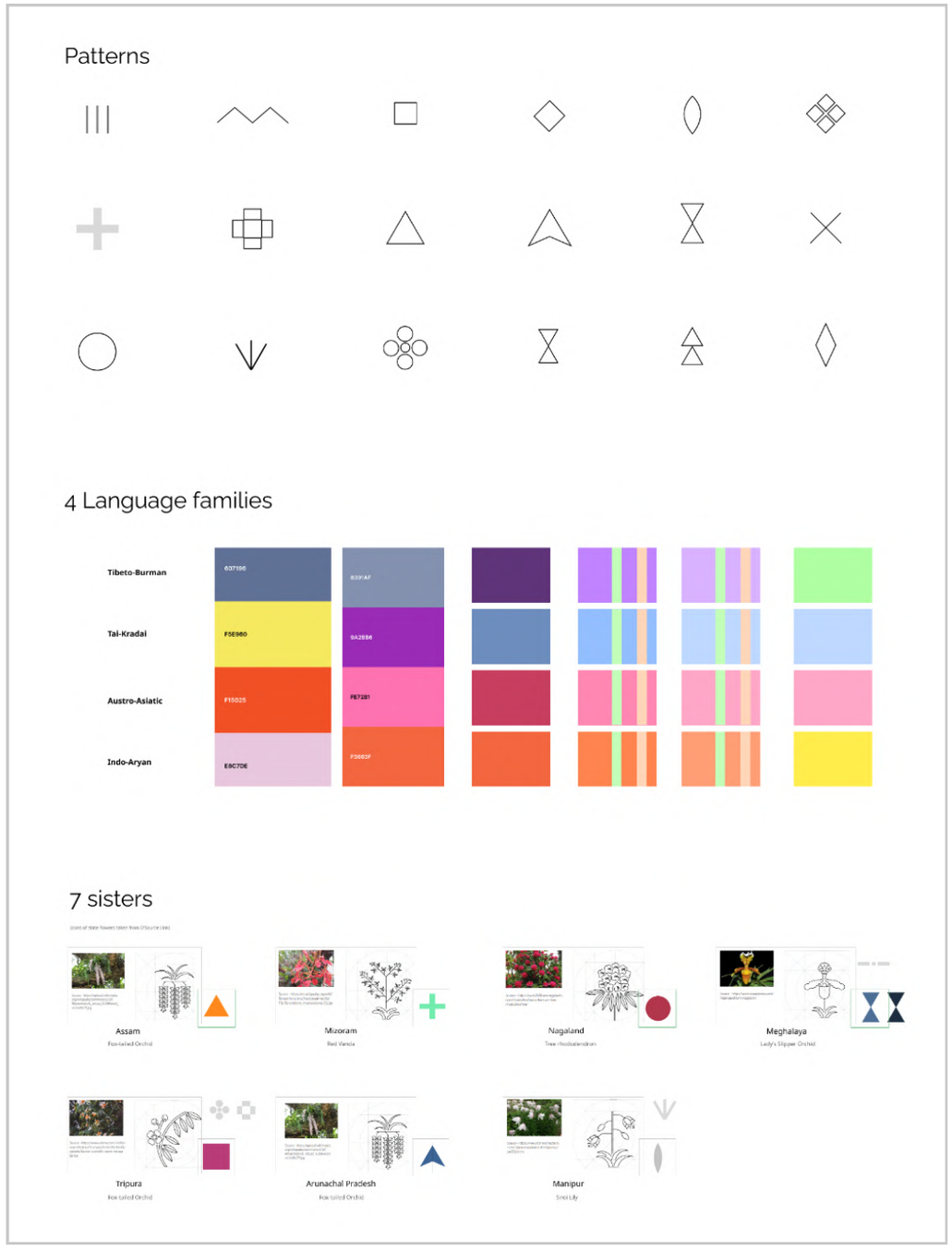


Fig. 50 Explorations with data encoding and colors. Source : D'source

Fig. 51 Drawing inspiration from the weaves of North East India. Source : D'source

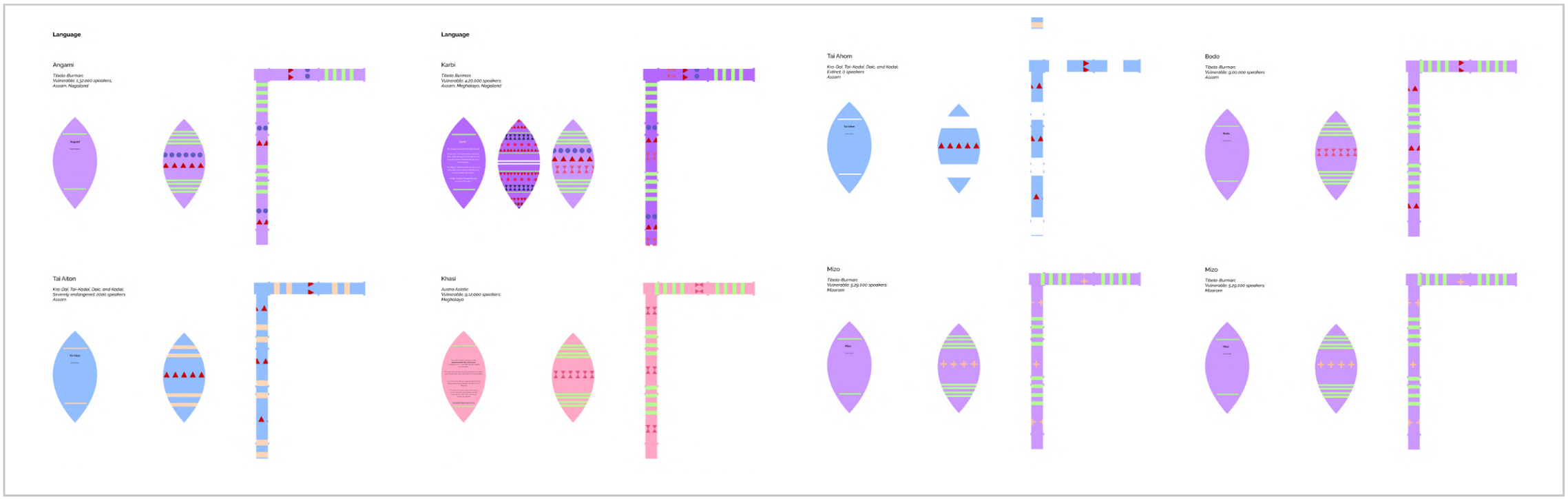


Fig. 52 Checking how the pipes would look with encoding

7.5 Building one working set-up

I chose to build one such set-up as proof of concept, taking the example of Khasi language. This process entailed -

- Painting the pipes, sticking colored paper patterns and strips
- Finding audio files of folk stories, and recording the English translation
- Editing these audio files to improve clarity, reduce noise and add background tracks to make the audio more interesting to listen to
- Building the electrical set-up

I presented the proof of concept prototype in the previous jury and received mostly positive feedback.

However, there were some concerns about me reducing the complexity and richness of the visualizations in order to make the installation more palatable to the general public.

Fig. 53 Pasting colored stickers on the pipe

Fig. 54 In the process of creating the proof of concept prototype


Fig. 55, 56 and 57 - The pipe corresponding to Khasi language. The ***patterns on the pipes convey information about the no. of speakers*** *of the language, its* ***degree of endangerment****, as well as the* ***language family it belongs to*** *and the* ***states where this language is spoken****.*

7.6 Preparing data

For the final installation, a set of 12 languages were chosen based on the sampling rationale discussed on page 13 (link to data). Also, a small number was chosen keeping in mind the logistic implications, as well as the availability of audio recordings. The authenticity of the data was cross-checked with linguists in HSS department, IIT Bombay. The dataset shown in fig. 1 was improved upon to include -

- Language family, Language branch and name of language
- Checklists to keep a track of whether audio recordings and transcripts were found and whether the final audios are created or not
- State and country where the language is spoken
- Degree of endangerment (link) of the language and the number of speakers according to different sources (the number of speakers finally considered is as per UNESCO's World Atlas of languages)
- Timeline of migration of the language into North East India
- Distance of the pipes from viewers to communicate these timelines
- Total length of pipes required
- Links to sources of all of these above mentioned points
- Links to recordings of folk stories and folk tales from the region
- Calculating the relative volume of audio from the number of speakers
- Narrowing down the final list of languages to 12 - Angami, Assamese, Hajong, Hmar, Khasi, Kokborok, Mech, Mizo, Singpho, Tai Ahom, Tai Khamyang and Vaiphei

P3 Data

File Edit View Insert Format Data Tools Extensions Help Accessibility

Share

L1 Number of speakers in 2016 (UNESCO)

	A	B	C	D	E	F	G	H	I	K	L	M	N	O
1	Language Family	Language branch	Language Name in English	Recordings and Transcripts Found	Audio Made?	Sticking done?	Countries	State	Degree of endangerment	Speakers in 2007 (Van Driem)	Number of speakers in 2016 (UNESCO)	Number of speakers in UNESCO World Atlas of languages	Description of the location	Migration Time
2	Tibeto-Burman	Angami-Pochuri languages	Angami	☑	☑	☑	India	Assam; Nagaland	Vulnerable	800 AD	132000	1,53,000	between Dimapur (Assam) and Kohima (Nagaland)	Around 300 supposedly when the construction the great wa
3	Indo Aryan	Bengali-Assamese	Assamese	☑	☑	☑	India	Assam, Arunachal Pradesh, Meghalaya and Nagaland	Safe		15,000,000	15,311,351	Assam, Arunachal Pradesh, Meghalaya and Nagaland	1200 AD
4	Indo Aryan with some Tibeto-Burman substrates	Bengali Assamese; Old Hajong or Khati Hajong was Bodo-Koch	**Hajong**	☑	☑	☑	India	Assam, Meghalaya, Arunachal Pradesh	The Tibeto Burman Hajong is now extinct while the more modern Hajong	0/ 80,000	0/ 80,000	72,000	Assam, Meghalaya, Arunachal Pradesh	1000 BC to 1000 AD
6	Tibeto-Burman	Mizo-Kuki-Chin I	Hmar*	☑	☑	☐	India	Assam; Manipur; Tripura; Mizoram	Vulnerable	50000		98,988	Assam, North Cachar and Cachar districts; Manipur, Churachandpur	1800 AD
7	Austroasiatic	Khasic group	Khasi	☑	☑	☑	India	Meghalaya	Vulnerable		912000	1,431,344	eastern half of Meghalaya	2000 to 250 BC

Final Final | Languages and deg of endangerment - cleaned | Selected 2 | Primary Research | Expenses | Degree of Endangerment | Explore

Fig. 58 Final list of languages

7.7 Preparing Audio files

The first task was to find audio recordings of folk tales and folk stories, along with annotations - so that I am able to create the English translations for them. Paradisec Catalogue was a valuable resource when it came to finding these, although annotations were missing. However, scouring the depths of the internet enabled me to find annotations for these audio files, by matching the file name codes and verifying if the words said sounded exactly same as the ones mentioned in the annotation documents.

The authenticity of some of these audios was verified by linguists in HSS department, IIT Bombay.

I collected all the transcripts of the selected folktales in a single Google doc, and edited those stories to make them shorter and more crisp (Link).
I recorded and edited all 12 English audios of folk tales, with an emphasis on removing any background noise, improving voice clarity and loudness, ensuring smooth transitions, adding sections of local folk songs and background sound effects to make the listening experience richer.
I edited the native language audio recordings to achieve a similar effect as mentioned above. (Link to audio files)

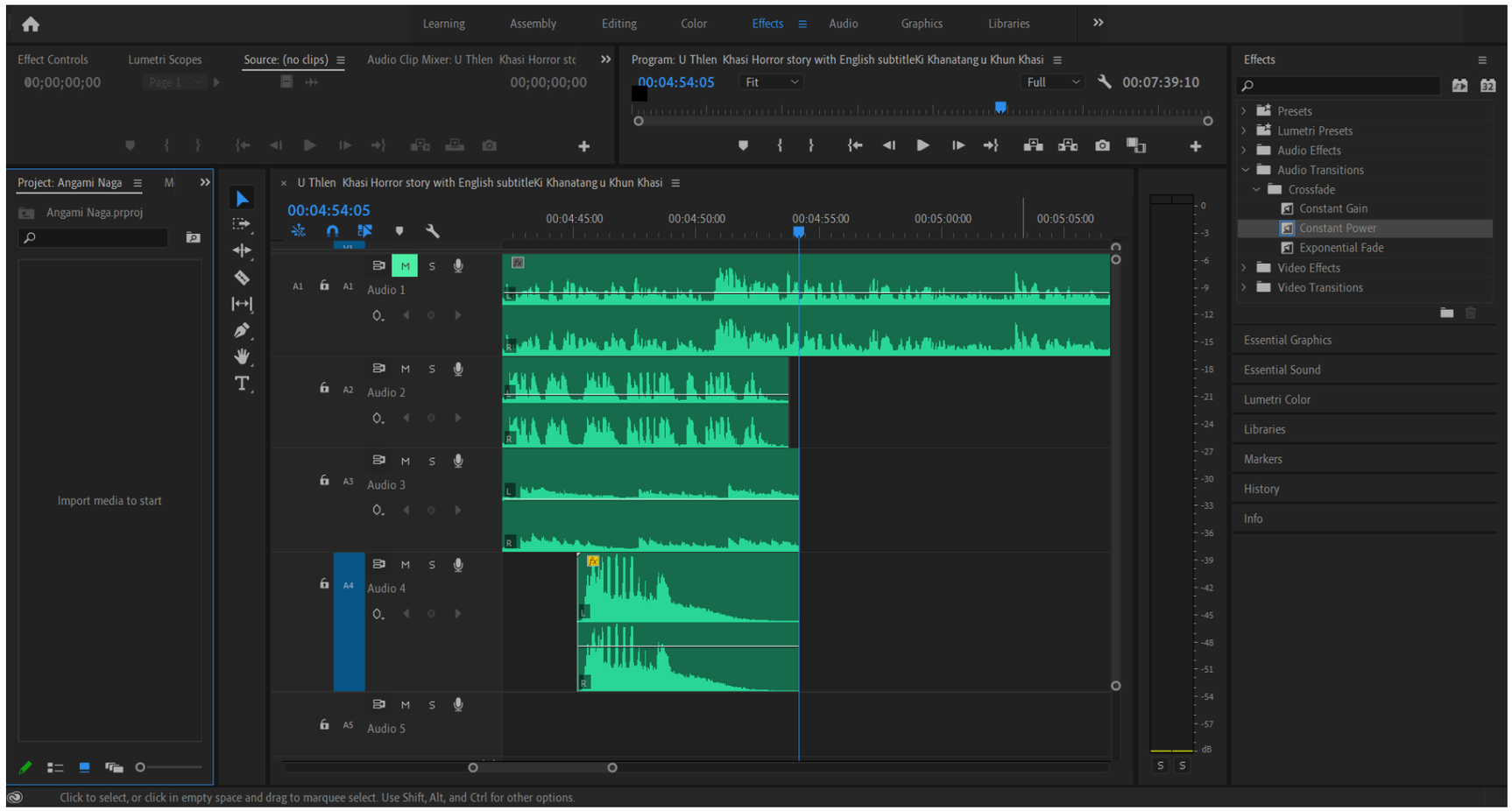


Fig. 59 Creating audio files on Adobe Premiere Pro

7.8 Location considerations

The installation site must essentially fulfill the following conditions -

- The space needs to have a high footfall, so that students and faculty from IIT campus can attend the exhibition, without inconvenience. This will improve attendance, and enable me to effectively evaluate if my design outcome fulfills the objectives of my project
- The site must be sheltered from rain, stray animals and insects.
- The site needs to have proper lighting. I will still be using focused lights to improve the aesthetic quality of my installation.
- The site needs to have approximately 20x20x10 ft (length x width x height) of available space
- Large, less distracting surroundings are preferred
- Place needs to be comfortable to access and not too hot

Given these conditions, I sent out applications to utilize a few spaces inside IIT Bombay for setting up and exhibiting my installation. The list included - VMCC ground floor foyer, Lecture Hall on the first floor of Rahul Bajaj Technology Innovation Center, ground floor foyer of L3 Lecture Hall Complex, and first floor corridor of Lecture Hall Complex.

I got permissions to exhibit my installation in the Lecture Hall on the first floor of Rahul Bajaj Technology Innovation Center.

Fig. 60 - VMCC Foyer, ground floor

Fig. 61 - First floor corridor (next to Shiru Cafe) of Lecture Hall Complex, IIT Bombay

Fig. 62 Lecture Hall on the first floor of Rahul Bajaj Technology Innovation Center, where I got permission to exhibit my installation

Fig. 63 and 64 Other suitable locations inside IIT B campus

8. Final Concept and Design

Given the feedback received from the scale model, and owing to difficulties in getting permission to suspend pipes from the ceiling,
I decided to set up all pipes from the ground up. The key concern here was to create a set up that could be easily installed on site and taken apart after the installation.

Therefore, the final concept emerged as thus -

The installation, called “Whispering Grove”, consists of 12 pipes systems set up in a linear manner, one after the other - each corresponding to a language/ dialect from North East India. At the entrance to the exhibition, visitors are required to pick one or multiple “Story Leafs”, which are leaf shaped pamphlets containing the first part of a local folktale. Initially, these pamphlets were rectangular, but the shape and design was modified based on Ajanta ma’am’s suggestions.

An audio recording of the second half of the folktale is played through the pipes. Each pipe plays audio recordings of folktales from the region and language that it represents. Each story leaf and pipe - is adorned with intricate patterns and hues that reflect the unique characteristics of the respective language's origin and its degree of endangerment.

These pipes will play audio recordings in both English and the regional language. Sensors on the pipe will enable viewers to switch between these language, as well as to play the recording from the start. This will add an interactive component to the installation.

Fig. 58 Story leaf containing the first half of a Khasi folktale

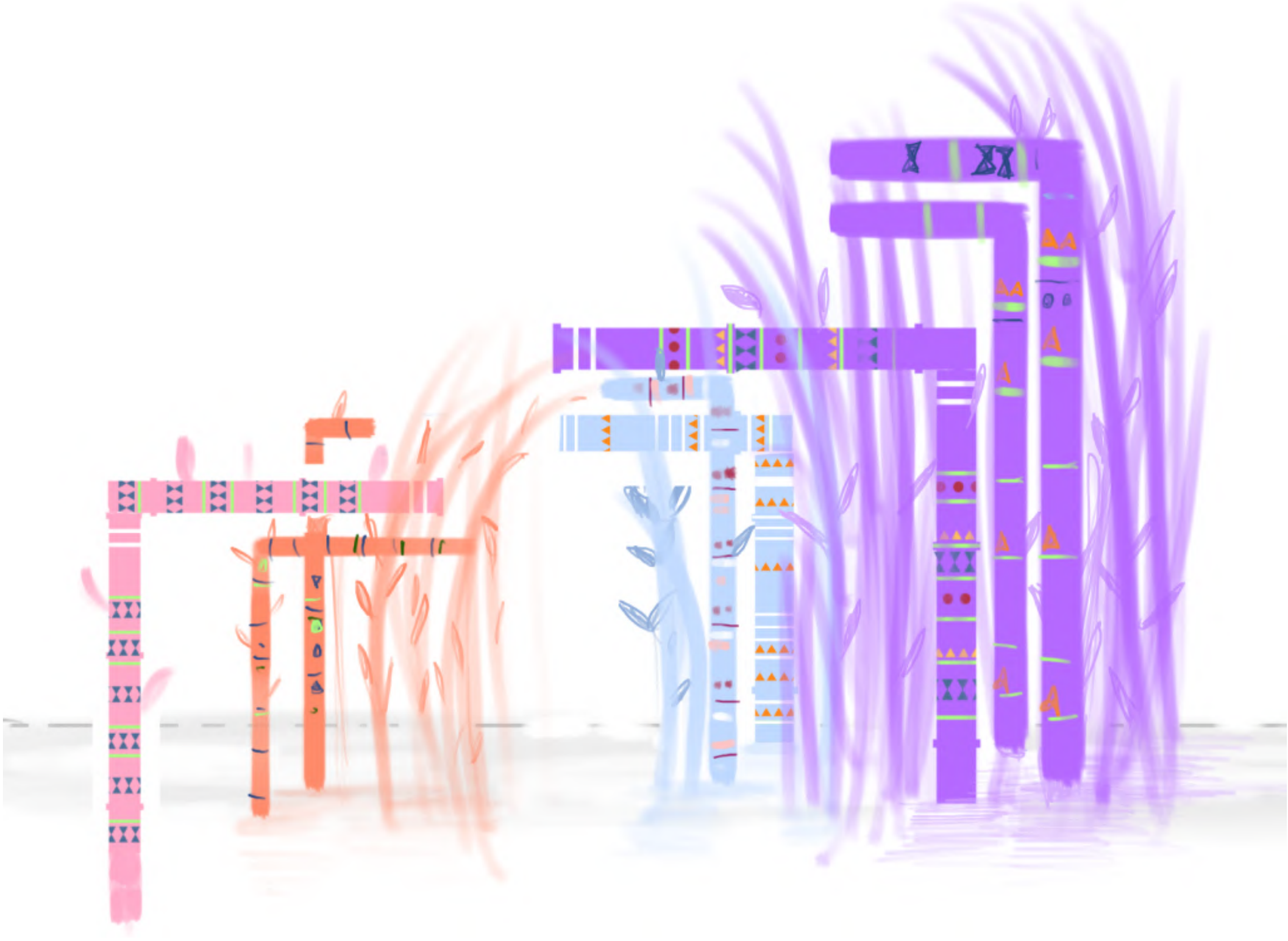


Fig. 59 Concept sketch of the final installation

Whispering Grove

An ode to North East India's fading languages

Step into the *Whispering Grove* - a humble, yet unique celebration of language, culture, and storytelling, that reminds us of the invaluable diversity embedded within each linguistic tradition, and the need to preserve these linguistic treasures, before they vanish into silence.

In this immersive experience, the vibrant cultural heritage of the region is beautifully interwoven with data about its endangered languages.

As you enter, **you are requested to collect Story Leaves,** which are **leaf-shaped pamphlets**, and will introduce you to a language and its stories.

Colored pipes, emerging from the ground, represent the diverse languages found in this enchanting region. Each pipe is meticulously adorned with intricate patterns and hues that reflect the unique characteristics of the respective language's origin and its degree of endangerment.

As you lean closer to the pipes, the air comes alive with the ethereal melodies of folktales, whispered by the voices of the past.

The overall ambiance of the exhibition space evokes the tranquility and mystique of bamboo groves, found in abundance in the region, magically echoing captivating narratives from our lands.

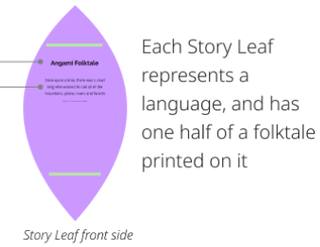
Fig. 60 Description of the installation to be placed in the exhibition space

What do I do in the Whispering Grove?

Step by step interactions

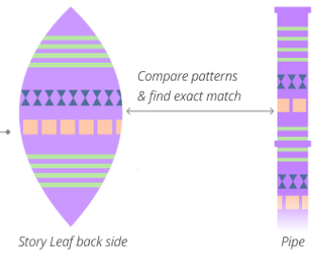
1. Pick one or multiple *Story Leaves,* which are leaf shaped pamphlets

2. Read the first part of the folktale written on the *Story Leaf*

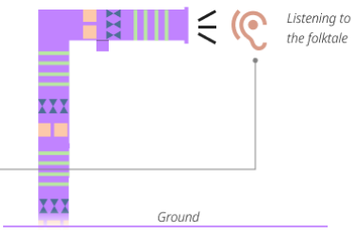


Each Story Leaf represents a language, and has one half of a folktale printed on it

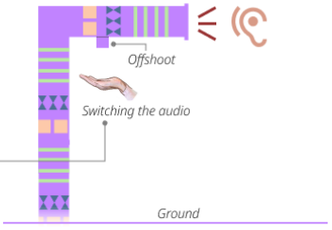
3. Find the pipe with patterns that exactly match the ones on the back of the *Story Leaf* to listen to the second part of the folktale



4. Once you have found the correct pipe, place your ear against the pipe opening to listen to the second part of the folktale, either in English or in the local language



5. Wave your palm under the pipe once, below the small cylindrical offshoot (as shown), to restart audio, or to switch between English and regional language audios

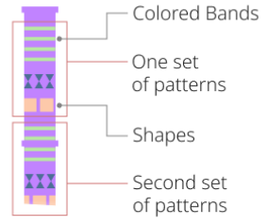


Wait for a few seconds for speech to begin, while a melody from the North East region plays in the background

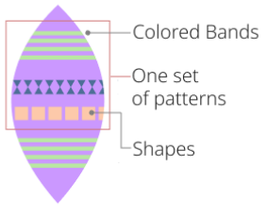
Fig. 61 Step by step process of how to interact with the installation

How to read the encoded data? Part 1

1 Each pipe and Story Leaf is adorned with a set of patterns - *consisting of colored bands, followed by simple shapes* - repeated multiple times, drawing inspiration from the traditional weaves of this region



Choose any one of these repeating sets, and follow the sections below to understand the encoded data



2 Match the background color with the colors below to find out which family your language beongs to

Tibeto-Burman
Migrated from the regions of Tibet, Myanmar, or China. ***Most languages in NE India belong to this family.*** *20 independent subgroups, and anywhere from 100 to 300 individual languages (depending on definitions) spoken here.*

Tai-Kradai
Migrated from countries around Southern China & Mainland Southeast Asia like Vietnam & Cambodia. 6 main languages, mostly spoken in Assam

Austro-Asiatic
Large language family in Mainland Southeast Asia, eg. Vietnam & Cambodia. ***Khasi is the only Austro-Asiatic language in NE India.***

Indo-Aryan
Originated in mainland India. This family is a branch of the larger Indo-European language family. 10-20 languages

3 Match the shapes on the pipe with the ones below to deduce the state where that language is spoken

Arunachal Pradesh | Assam | Manipur | Meghalaya

Mizoram | Nagaland | Tripura

*Continued on the next page

How to read the encoded data? Part 2

4 Check the color of the bands on the pipe - to find out the vulnerability status of the language

Safe
Language is ***used by all ages****, from children to old.*

Severely endangered
Older generations use the language*; but the* ***subsequent generations do not use the language****, and may only understand it.*

Vulnerable
Spoken by most children*, but* ***usage is restricted*** *to specific domains, like homes.*

Critically Endangered
Only the older generation can speak the language to a limited extent or occasionally.

Definitely endangered
Children may not be using the language as 'mother tongue' *at homes, in near future*

Extinct
Nobody can speak nor understand the language. ***Every speaker has passed away.***

5 Number of bands that appear together in a set - represent the number of active speakers of a particular language

1 band
0 to 1000 speakers

2 bands
1000 to 10,000 speakers

3 bands
10,000 to 1,00,000 speakers

4 bands
1,00,000 to 10,00,000 speakers

5 bands
> 10,00,000 speakers

**Note - do not count every band on the pipe. Just count the number of bands that appear together as part of one set.*

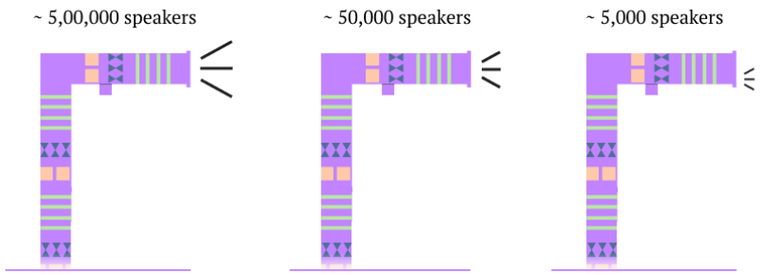
Fig. 62 and 63 Instructions to read the encoded data, to be placed at the site of exhibition

How to read the encoded data? Part 3

6 The volume of the audio clips playing from the pipes is directly proportional to the number of speakers of that language

As languages fade, so does the chance to hear their stories and wisdom.

With each passing day, these voices grow fainter, until their existence fades into silence



7 The horizontal distance between viewers and the pipes emerging from the ground - signifies the historical migration depth of each language into the region

Pipes corresponding to languages, that migrated to the region long back, originate further away from the viewer

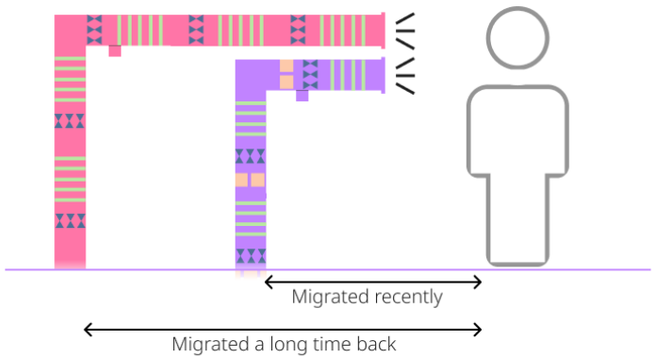


Fig. 64 Instructions to read the encoded data, to be placed at the site of exhibition

Scan QR to know more

Scan the QR codes below to learn more about these languages and carry these folktale recordings with you

Angami Naga

Assamese

Hajong

Hmar

Khasi

Kokborok

Mech

Mizo

Singpho

Tai Ahom

Tai Khamyang

Vaiphei

Fig. 65 QR codes that users can scan to learn more about the project


I'M NOT FAT
BIG BONES


Journey to
in-laws' house
Hajong language

Figures on pages 42 and 43 show some snaps from the final exhibition - conducted during the evaluation phase and during DES

9. Scaling up my work

To build the installation, I bought 120 ft of pipes, 21 tee joints and 18 elbow joints around 1000 ml of paint and a bunch of colored paper to build the stickers out of.

The pipes were cut into smaller pieces of required lengths. Any markings and text on the pipes, or joints were polished and removed (fig. 66 and 67). All of this work was done in the plastic studio within IDC. One key feedback I received was that the set up required some affordance that would intuitively let people know that they had to place their ears next to the pipes. I 3D printed a pipe opening that looked like a speaker head (fig. 69), but as luck would have it, I found out that 10ft pieces of pipes already come with an opening that resembles a speaker head. Another key feedback was to install some sort of an indication as to where one must place their palm to switch audio tracks. I made these from cardboard paper and painted them in the same shades as the pipes. (fig. 70, 71, 72)

Fig. 68 Pipes cut and kept in plastic studio

Fig. 66 and 67 brand markings were polished and removed

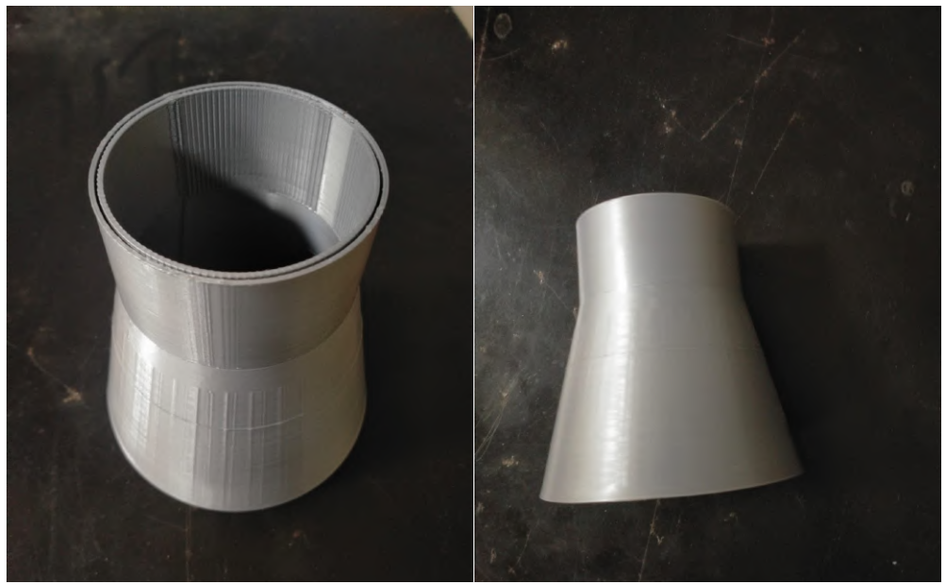


Fig. 69 3D printed pipe head

Fig. 70, 71, 72 Affordance that helps people understand where exactly they can place their palms

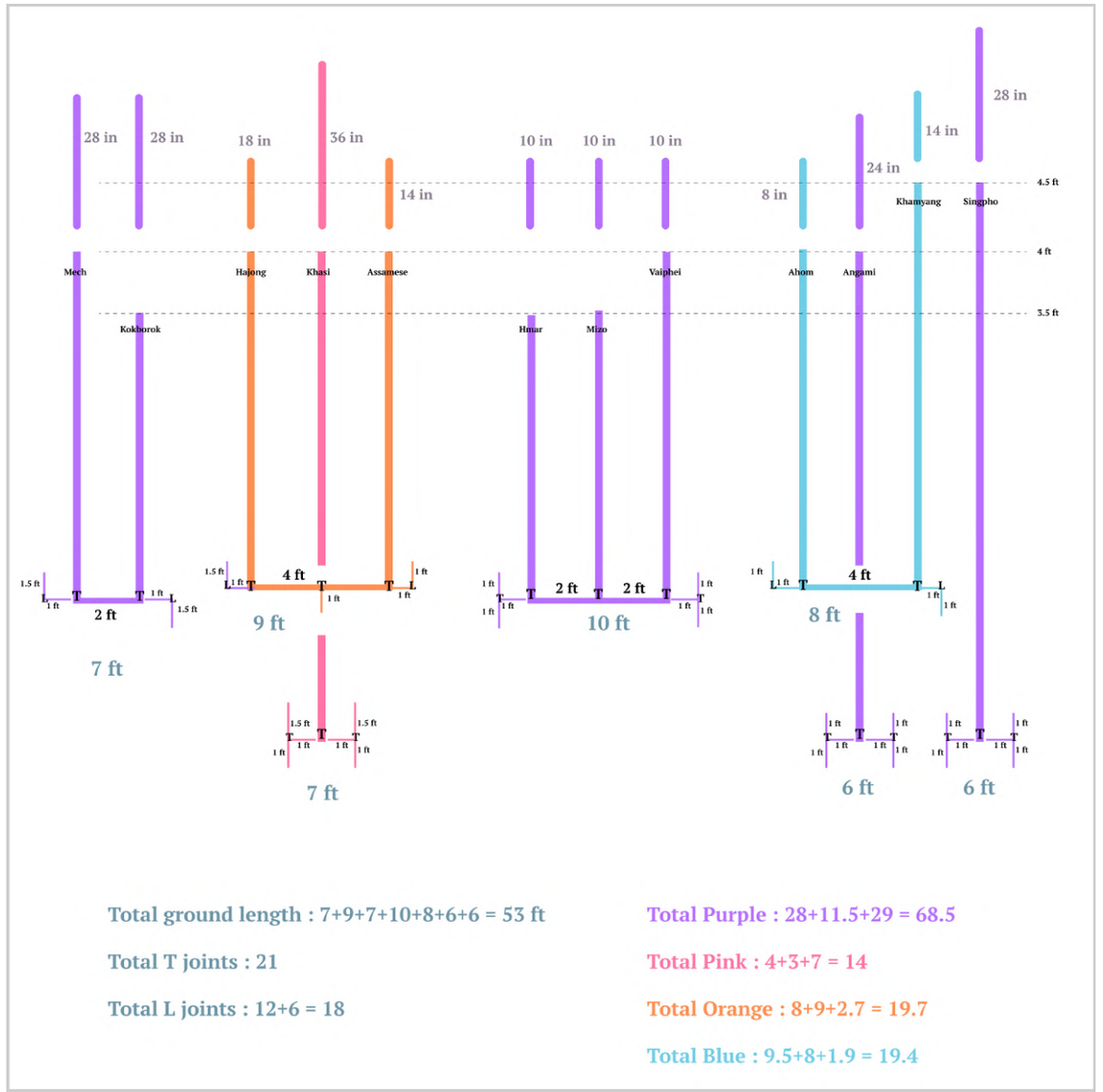


Fig. 73 Keeping track of all the material requirements, as well as the overall set-up and layout of the installation

To keep track of the material requirements, I created a rough guide of the set-up and the layout of the installation (fig. 73). The standing pipes are all supported by a base layout of pipes on the ground. I marked the lengths as well as joints in this set-up. The lengths and overall layout was estimated through a process of trial and error.

Pipe pieces were cut according to this guide, and then painted in the paint studio (fig. 78, 79, 80, 81). Patterns and strips that would go on the pipes - were laser cut (fig.82, 83) and, with some help from friends, pasted on the pipes (fig. 84). Holes were drilled on the pipes to make space for IR sensors to poke out.

Fig. 74, 75, 76, 77 (clockwise) working in the plastic studio

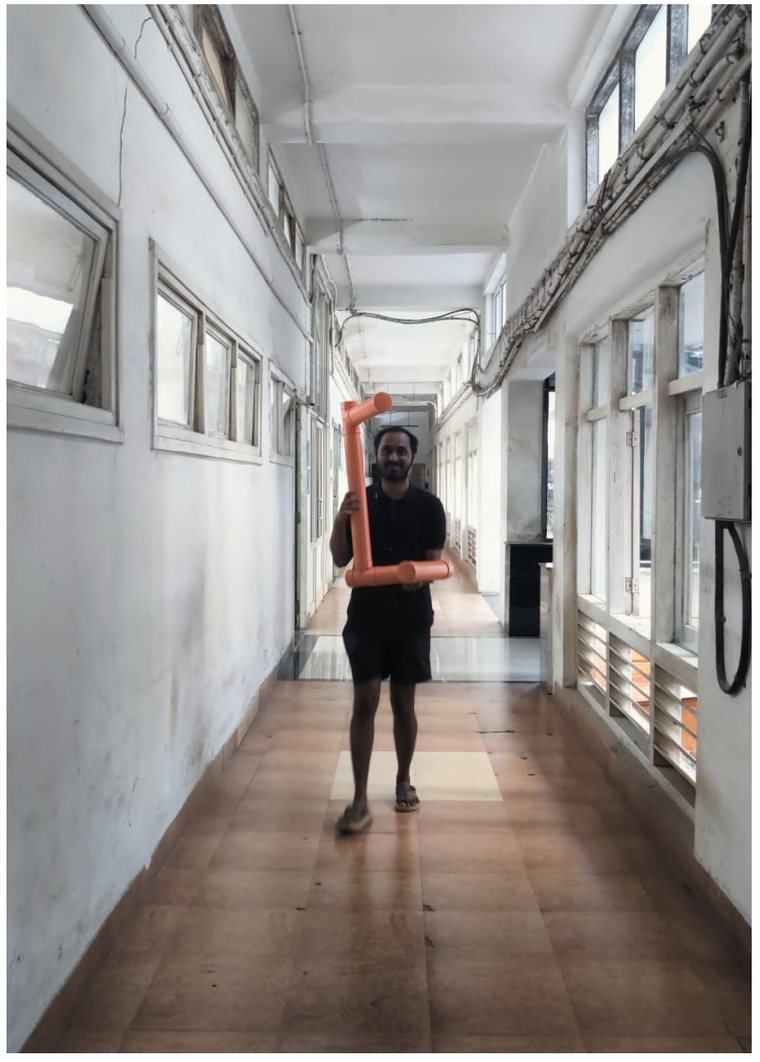


Fig. 78, 79, 80, 81 Pipes and joints were painted in the paint studio

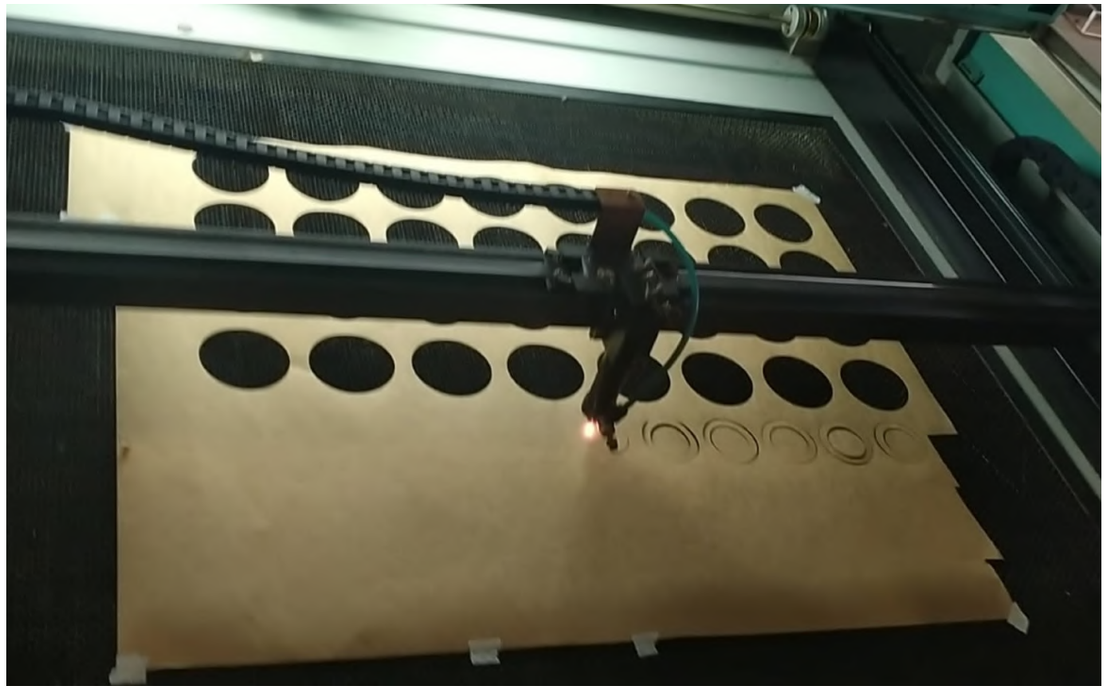


Fig. 82, 83 Laser cutting the required patterns

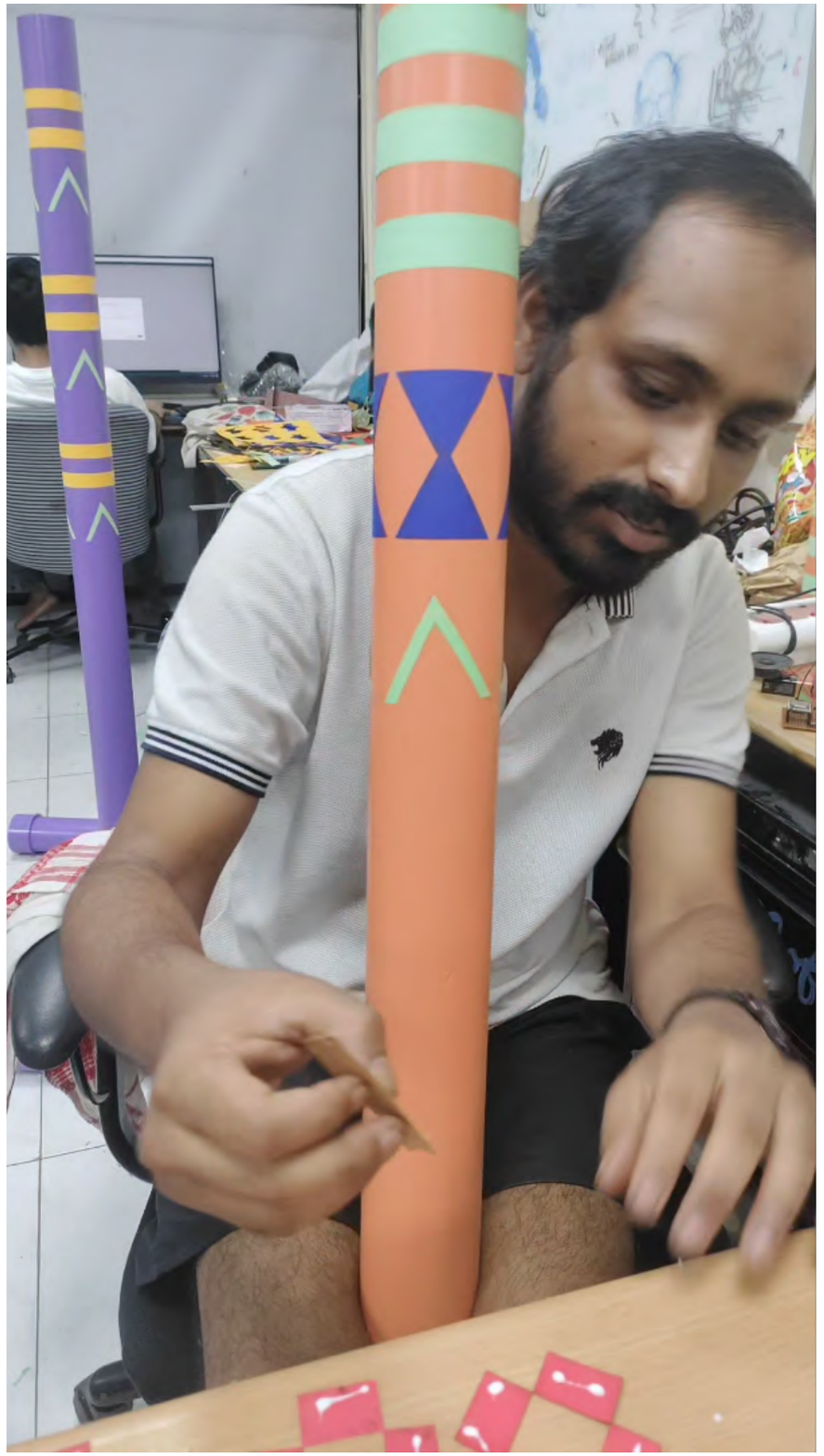


Fig. 84 Pasting the patterns on the pipes

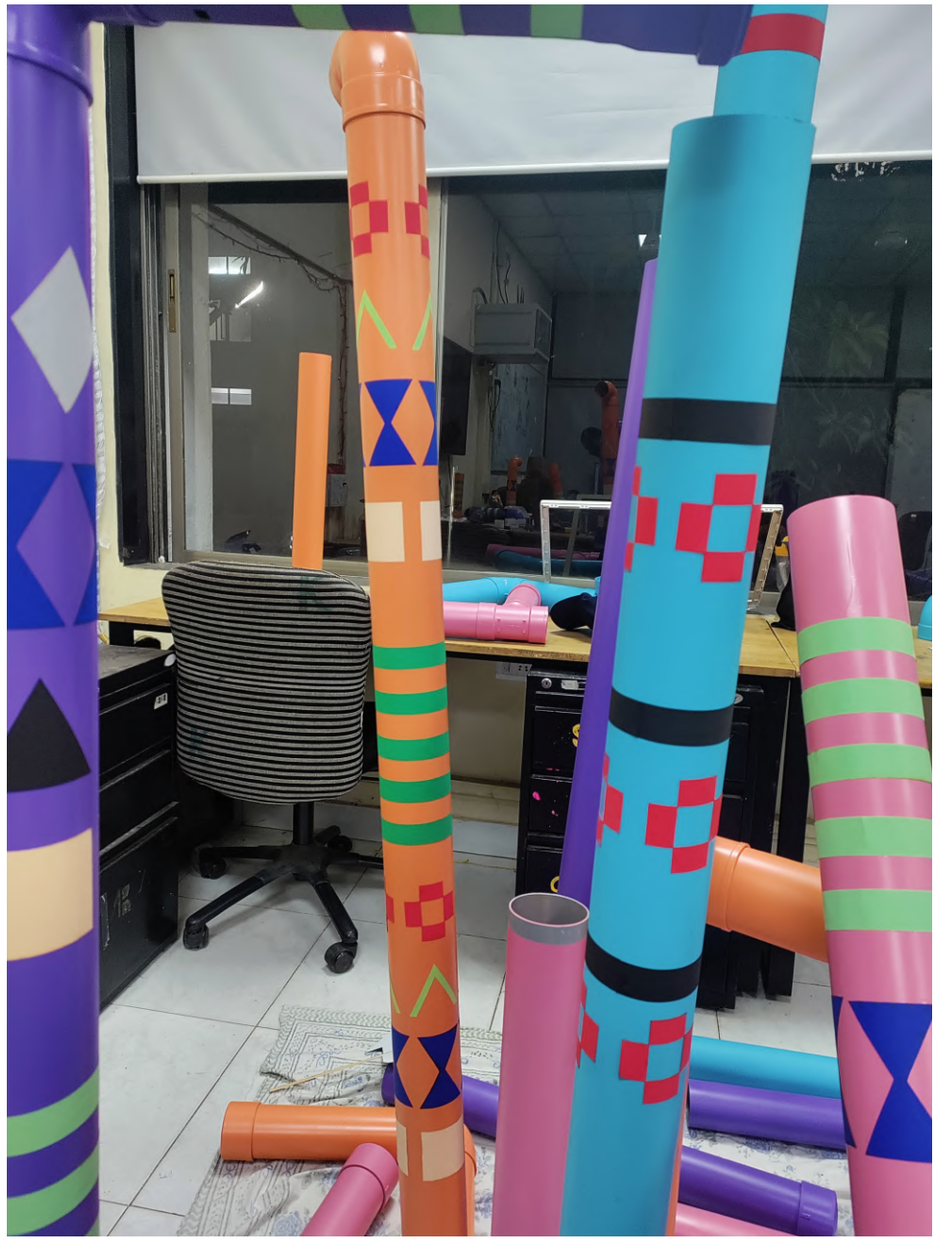


Fig. 85, 86 Progress until completion of report, the exhibition is to be set up on the 19th and 20th of July, Monday and Tuesday

10. Evaluation Plan

The evaluation plan for the "Whispering Grove" project will focus on assessing the impact of the installation and gathering feedback from the target audience. The following evaluation points will help measure the effectiveness of the project in achieving its objectives:

Measuring impact on awareness : Conducting a pre-exhibition survey to gauge audience's knowledge about the subject. Questions could include :

- How many languages do they think are spoken in North East India?
- Are they aware that certain languages in North East India are endangered?

Repeating the same survey after they have attended the exhibition - can help assess any changes in awareness and understanding.

Gathering feedback on the experience : Engaging with the audience by asking casual questions about their experience with the installation, like -

- What part of the installation did they enjoy the most?
- Did they listen to the audio recordings in the pipes completely?
- Did they read any of the stories printed on the story leaves?

The key would be to encourage viewers to provide detailed feedback on their overall experience and any specific aspects they found particularly impactful or engaging. Audience should also be encouraged to point out any aspects of the exhibition that they failed to relate to, or found dull, confusing or uninteresting. This is also a good opportunity to understand any issues that viewers felt while interacting with the installation.

Assessing interest in learning multiple languages : Observing audience's interactions with the installation can help to determine their level of interest in exploring multiple languages and dialects.

- Monitoring whether audience members pick up more than one story leaf, indicating their curiosity to learn about different languages
- Observing if they attempt to listen to the audio recordings from multiple pipes, showcasing an eagerness to experience and understand diverse linguistic traditions

Interest in Further Exploration : Evaluating audience's inclination to learn more about the endangered languages, especially those that have become extinct or have a low number of speakers. This can be done by -

- Monitoring the usage of QR codes provided at the installation to determine if they scan them to access additional information
- Gather feedback on their desire to explore and preserve endangered languages and intangible cultural elements further.

This evaluation plan can generate interesting insights regarding the awareness levels, engagement, and interest of the target audience in the cultural diversity and endangered languages of North East India. The findings will help assess the success of the project in raising awareness, fostering cultural appreciation, and stimulating curiosity among visitors.

Evaluation will be mainly done in two phases. The nature of the initial phase of evaluation will be more informal, with room for free-slowing conversations which will not burden audience members who are visiting to just casually experience an art installation. However, the second phase of evaluation will dig deeper and aim at receiving detailed feedback from audience members who are willing to give their time, and insights.

11. Challenges and learnings

Undertaking this project presented me with several significant challenges, particularly in the realm of creating a physical installation. As someone with limited experience in this field, working with materials, spaces, and tools was relatively new to me. It required a learning process and the adaptability to navigate unfamiliar territories.

Here are the key challenges I encountered during the execution of the project, and how they helped me grow :

1. Limited Experience : Creating a physical installation was a new endeavor for me, and I had minimal prior experience in this domain. I had to quickly learn about different materials, their properties, and suitable construction techniques to bring the vision of "Whispering Grove" to life. Thankfully, the staff in IDC studios were extremely kind and provided me with guidance and help whenever required.

2. Studio Familiarity : To execute the project the way I envisioned, I needed to effectively utilize the studio facilities in IDC, namely - the plastic studio, CNC studio, and paint studio. Understanding the equipment, tools, and techniques was a bit intimidating at first, but became easy very quickly given the guidance I received from the staff.

3. Scaling Up the Prototype : The initial prototype of the installation was just one pipe, full scale and completely working - the one corresponding to the Khasi language. But scaling up the project to include 12 pipe setups posed significant challenges. It involved careful planning, logistical considerations, and ensuring consistency in quality across all installations. Scaling up required meticulous attention to detail and coordination to maintain a cohesive and visually appealing final product.

4. Managing Raw Materials : Procuring the necessary raw materials was a constant challenge throughout the project. I needed to source pipes, paint, electronics components, and stickers, often in bulk quantities. Finding reliable suppliers, negotiating prices, and ensuring timely availability of the materials were all aspects that required careful management and coordination.

5. Outgoing Nature : As an introverted person who prefers working late nights and early mornings, it is a challenge to adhere to the timezone that the rest of the world operates in, as well as stepping out of my social comfort zone to interact with, say, wholesale dealers or material suppliers and all sorts of people. However, I recognized the importance of building relationships with individuals, and gradually developed connections that ensured smooth procurement and successful execution of the project.

7. Finding Audio Recordings and Verifying Dialects : One of the major challenges I encountered was sourcing audio recordings of folktales specific to each language or dialect represented in the installation. Additionally, verifying whether the folktales were in the dialect I needed or if they belonged to closely related dialects proved to be a time-consuming task. While finding recordings for a language with ~500,000 speakers is relatively easier, it became extremely difficult when dealing with languages spoken by only ~5,000 speakers. This required patient and extensive secondary research, reaching out to local communities, collaborating with language experts to ensure the authenticity of the recordings, persistence, and a deep appreciation for the linguistic intricacies of each dialect.

8. Generating Interest and Attendance: Another significant challenge was generating interest and attracting visitors to the exhibition. The subject matter of endangered cultural elements from North East India might not be familiar or immediately captivating to the general public. I faced the task of creating awareness and cultivating curiosity among individuals who may not have previously been exposed to the cultural diversity and significance of the region. I distributed flyers and short write-ups with images within Whatsapp groups and via mail to students and staff of IIT Bombay, as well some of my friends in Mumbai.

Through collaborations, I learned the power of collective knowledge and the benefits of building strong networks within relevant fields. Engaging with language experts, local communities, and cultural enthusiasts not only enriched the project but also fostered lasting connections and a deeper understanding of the cultural landscape. Finding reliable suppliers, negotiating prices, and ensuring timely availability of materials - taught me values of careful management and coordination.

Undertaking a project that pushed my boundaries and challenged my existing skills required determination, perseverance, and an openness to new experiences, despite moments of doubt and uncertainty.

12. Reflections

Alka ma'am's feedback from my last jury helped me see this project in a new light, when she said that she was excited to see how this project would evolve in a year. It made me realize that this installation is not a "final outcome", but just the first version of a project that would begin in an academic setting, and would continue as a personal project after my time at this institute ends.

And thus, it made me think about all the improvements that I can, and must make going forward -

- **Data Visualization :** Ideally, I would have liked to increase the richness of the data captured through the colors and patterns on the pipes - and make a strong case for this project in the data physicalization domain. Some ways to do this would be to use the distance between each separate pattern or strip - to encode the no. of speakers for a language at a state level. The distances could also be gradually changed to show how the number of speakers has changed over time, and the sparseness of these speakers in terms of geographical distribution. Another aspect that was pointed out to me in my previous juries was that it seemed like I was reducing the complexity of the data visualization to make my design outcome more palatable to the general public. The network and movement of pipes could reveal complex relationships between different languages and could also reveal the supposed movement routes of these languages over time. Another interesting aspect could be experimenting with different types of pipe layouts and efficiently using the 3 dimensionality of the space - in order to enrich the information encoded.

2. Multi-sensory experience : Right now, my installation indulges the senses of sight and hearing only. However, experimenting with materials with more interesting surface textures, incorporating artifacts such as silk threads atc. could add another of tactility to the installation. Incorporating curated videos can help viewers understand and relate to culture of the region better.

3. Use of eco friendly materials : I had frequent existential crises throughout the design phase with the fact that I was using PVC pipes as the base material for this installation. Even though the material worked perfectly, it was difficult to come to terms with the negative environmental impacts of using it. Everytime I would cut, grind or polish the pipes, I knew at the back of my mind that some harm was being done to the environment.

Going forward, I would definitely experiment with more eco friendly alternatives and despite the limitations with using bamboo, (discussed in section 7.2) I believe that it is worth the effort to pick and choose the pieces and put careful effort into making a stable set-up - using bamboo.

4. Accounting for color blindness : As I have mentioned already, the choice of colors of the patterns on pipes was also dependent on the availability of materials in the market. My installation currently does not account for accessibility issues like color blindness and this is definitely a limitation that I must overcome in future versions.

13. Conclusion

In conclusion, the installation titled "Whispering Grove" aimed to draw attention to the rich cultural diversity of North East India and raise awareness about the endangered cultural elements of the region. Despite encountering numerous challenges throughout the journey, such as navigating the unfamiliar terrain of creating a physical installation, sourcing audio recordings, and generating interest from the public, the project persevered and achieved its objectives to a satisfying extent.

The installation, consisting of 12 pipes representing different languages and adorned with intricate patterns, serves as a tangible reminder of the endangered cultural heritage of North East India. By incorporating interactive elements and bilingual audio recordings, the installation bridges the gap between languages and invites viewers to explore and appreciate the folktales from the region. However, there are certain shortcomings of this particular version of the installation, and I will direct my efforts towards navigating these shortcomings in order to improve this project further.

14. References

1. Ancient population migrations in Northeast India: A closer look at the ethnolinguistic prehistory; Manjil Hazarika
2. The languages of the seven sisters; December 2019; Madhumita Barbora
3. Bonn, M., Kendall, L. and McDonough, J. (2016), Preserving intangible heritage: Defining a research agenda. Proc. Assoc. Info. Sci. Tech., 53: 1-5. https://doi.org/10.1002/pra2.2016.14505301009
4. https://languageconservancy.org/language-loss/#:~:text=Since%201950%2C%20the%20number%20of,in%20the%20next%20100%20years.
5. https://www.psu.edu/news/research/story/probing-question-what-lost-when-language-dies/#:~:text=But%20what%20exactly%20is%20lost,diversity%20of%20humanity's%20linguistic%20heritage.
6. The language hoax: Why the world looks the same in any language; John McWhorter
7. https://www.smithsonianmag.com/smart-news/four-things-happen-when-language-dies-and-one-thing-you-can-do-help-180962188/
8. Migration Memories" in Karbi Oral Tradition, 2007; https://karbi.wordpress.com/2007/12/19/%E2%80%9Cmigration-memories%E2%80%9D-in-karbi-oral-tradition/
9. 'The lingua franca cycle: Implications for language shift, language change, and language classification.' Anthropological Linguistics 49(3–4): 207–236
10. Language and Culture in Northeast India and Beyond, Stephen Morey and Scott DeLancey
11. Hindi as a Contact Language of Northeast India. Defining the Indefinable: Delimiting Hindi. https://doi.org/10.3726/978-3-653-03566-7/15
12. D'source
13. "Language Extinct & Endangered." The Guardian. Retrieved from https://www.theguardian.com/news/datablog/2011/apr/15/language-extinct-endangered.
14. "Endangered Languages of South Asia." Academia.edu. Retrieved from https://www.academia.edu/10167737/Endangered_Languages_of_South_Asia.
15. "Languages Spoken in NE's Hills May Have Originated 4,500 Years Ago." The Times of India. Retrieved from https://timesofindia.indiatimes.com/india/languages-spoken-in-nes-hills-may-have-originated-4500-years-ago/articleshow/79833037.cms.
16. "On the Origins of Bodo-Garo." ResearchGate. Retrieved from https://www.researchgate.net/publication/283365471_On_the_Origins_of_Bodo-Garo.
17. "Boro People." Wikipedia. Retrieved from https://en.wikipedia.org/wiki/Boro_people.
18. "Hajong Language." Wikipedia. Retrieved from https://en.wikipedia.org/wiki/Hajong_language.
19. "The Khamyangs: Assam's History and Folk Traditions." Sahapedia. Retrieved from https://www.sahapedia.org/tai-khamyangs-assam-history-and-folk-traditions.
20. "Khamyang Language." UNESCO. Retrieved from https://en.wal.unesco.org/countries/india/languages/khamyang.

21. "Assamese Language." Wikipedia. Retrieved from https://en.wikipedia.org/wiki/Assamese_language.
22. Goswami, G. C.; Tamuli, Jyotiprakash (2003). ""Asamiya"". In Cardona, George; Jain, Dhanesh (eds.). The Indo-Aryan languages. Routledge. pp. 391–443. ISBN 978-0-7007-1130-7.
23. "Manipur: A Look into Migration and Identity of Kuki Tribe." Organiser. Retrieved from https://organiser.org/2023/05/17/174501/bharat/manipur-a-look-into-migration-and-identity-of-kuki-tribe/.
24. "Vaiphei Language." Endangered Languages Project. Retrieved from https://www.endangeredlanguages.com/lang/5706.
25. "Social History of the Vaiphei Tribe." Quest J
26. "Khasi Language." Wikipedia. Retrieved from https://en.wikipedia.org/wiki/Khasi_language.
27. "Background Sounds." Pixabay. Retrieved from https://pixabay.com/sound-effects/?utm_source=link-attribution&utm_medium=referral&utm_campaign=music&utm_content=6407.
28. "Naga Folk Song." YouTube. Retrieved from https://youtu.be/-hUiG2lS7qQ.
29. "Naga Folk Music and Dance." YouTube. Retrieved from https://youtu.be/dQsDLUMld9U.
30. "Sound Effect from Pixabay." YouTube. Retrieved from https://youtu.be/dQsDLUMld9U.
31. 28. "Music of the Mishing Tribe." YouTube. Retrieved from https://www.youtube.com/watch?v=L83IpA8gYvE.
32. "The Marriage Ceremony of the Karbi Tribe." YouTube. Retrieved from https://youtu.be/d_CgkvEAEuE.
33. "Nuchhimi: A Story by Kailash Chandra Nongmeikapam." Mizo Writing in English. Retrieved from https://www.mizowritinginenglish.com/2008/06/nuchhimi.html.
34. "Traditional Khasi Music." YouTube. Retrieved from https://youtu.be/YHH-4zRbjW4.
35. "Traditional Garo Music and Dance." YouTube. Retrieved from https://youtu.be/XrXd4vA3H7Q.
36. "Traditional Bodo Dance." YouTube. Retrieved from https://youtu.be/W45GAWS6mkI.
37. "Traditional Karbi Dance." YouTube. Retrieved from https://youtu.be/09BOxIhLjHQ.
38. "Angami Naga Folk Tales: A Conversation with Kosau Talie." Sahapedia. Retrieved from https://www.sahapedia.org/angami-naga-folk-tales-conversation-kosau-talie.
39. "The Hajongs: A Comprehensive Study." SIL International. Retrieved from https://www.sil.org/system/files/reapdata/10/00/22/100022442587326284498652101808630826905/Ohur_Ghubay_Jawa.pdf.
40. "Folklore Texts from Assam." Southeast Asian Languages and Cultures Resources. Retrieved from http://sealang.net/assam/texts.htm.
41. "Folktales from Mizoram." Fried Eye. Retrieved from https://www.friedeye.com/travel/folktales-from-assam/.