

# performance of understanding.

ANAGHA  
RAO

2023

**FINAL SUBMISSION**



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# ESSAY, GRAPHS AND CITATIONS

SUBMISSION 1

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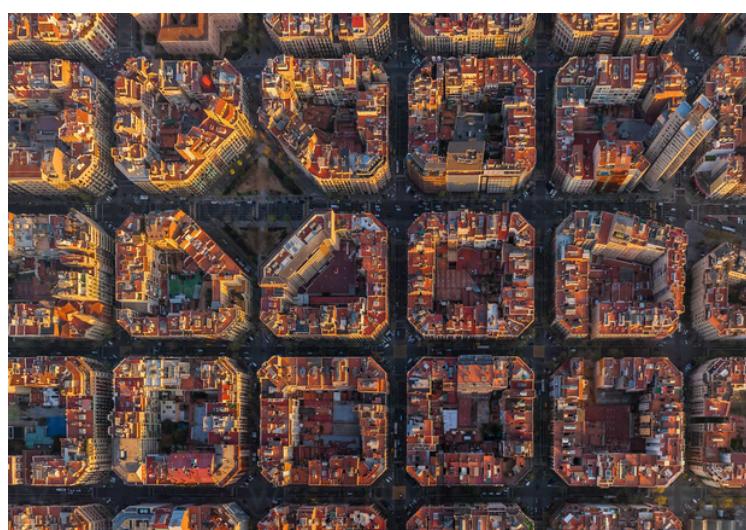
# LIVE TO SEE THE FUTURE

Will the world end in raging fire or crippling ice? I don't know about you but I'd rather not find out. At the rate our world is going, sustainability is the one religion we should all unite for. Sustainable cities and communities (Goal 11) of the UN's SDG's aims to amplify resilience against disasters, mobility, accessibility, preserve cultural heritage and increase greenery in metropolitan areas. Studies show by 2050, 68% of the population is going to be living in cities. With good urban design we can reduce congestion in cities and have more wholesome communities. By 2030 the UN focuses to enhance inclusive and sustainable urbanisation and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.

Industry innovation and infrastructure (Goal 9) is another SDG that is similar to Goal 11. It aims to boost economic growth, create jobs, encourage public-private partnerships and sustainable industrialisation. To achieve Goal 9 by 2030, it is also essential to support low income countries, invest in advanced technologies, lower carbon emissions and increase mobile broadband access. As of 2022, 95 per cent of the world's population was within reach of a mobile broadband network, but some areas remain underserved. The intersectionality between these two Goals and the rest are social inclusion, economic viability and environmental protection.

Moving on to the projects associated with these Goals, a prime example of an ongoing project concerning sustainable cities is the Superblocks in Barcelona. A Superblock, according to the dictionary, is a 400 x 400 m unit residential block with minimal to no traffic, crossed by pedestrian walks and often spotted with grassed malls.

Superblocks aim to prioritise people over cars and focus on accessibility through public transportation and allow for better community participation. The purpose is to recover space for the community, improve biodiversity, move towards sustainable mobility, and encourage social cohesion. The city introduced the Superilles (Superblock) –a government-funded project identifying 120 intersections to be converted, in the 2013-2018 Urban Mobility Plan of Barcelona.

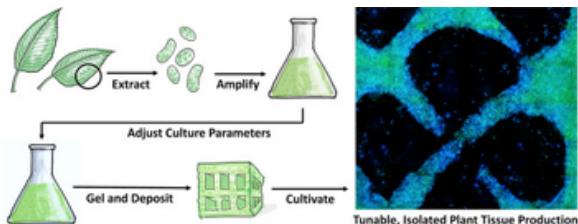
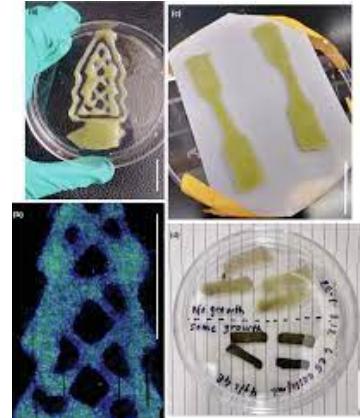


*Superblocks - 4 blocks meeting at square intersections*

The origins of the superblocks start with the architects Josep Lluís Sert and Le Corbusier who in Barcelona's Plan Macià, 1932, included 400x400m modules and the first superblock was built in 1993 near the Basilica de Santa Maria del Mar in the historical neighbourhood of El Born. In 2005, two more superblocks in Gràcia were planned. Pilot projects started in 2014 and increased pedestrian trips by 10%, accounting for 2,01,843 trips annually. The trips by cyclists went up by 30% as well. By 2024 the city is envisioned to be laden with 503 superblocks.

My second example revolves around lab cultivated wood.

Each year, the world loses about 10 million hectares of forest because of deforestation. To help counter this, researchers at MIT have pioneered a tunable technique to generate wood-like plant material in a lab, which could enable someone to "grow" a wooden product like a table without needing to cut down trees, process lumber, etc. With the help of 3D bioprinting techniques, we can grow plant material in sizes and forms that are unnatural [*as depicted on the picture to the right*]. The idea is that you can grow these plant materials in exactly the shape that you need, eliminating the need for subtractive manufacturing, leading to a reduction in energy and waste.



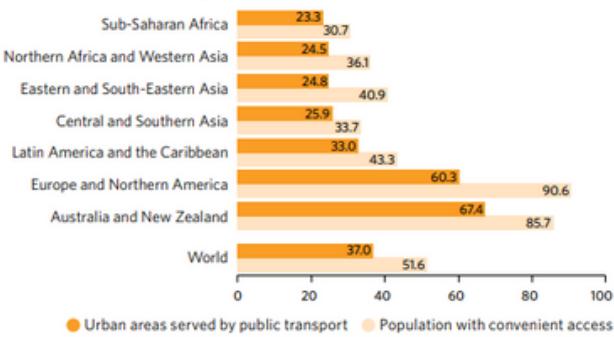
The process begins by growing plant material in the lab, the researchers first isolate cells from the leaves of young *Zinnia elegans* plants (specifically chosen as it grows fast). The cells are cultured in liquid medium for two days, then transferred to a gel-based medium, which contains nutrients and two different hormones. Adjusting the hormone levels at this stage in the process enables researchers to tune the physical and mechanical properties of the plant cells that grow in that nutrient-rich broth. [*illustrated in the picture on the left*]

The objective is to study lignification in lab-grown plant materials. Lignin is a polymer that is deposited in the cell walls of plants which makes them rigid and woody. They found that higher hormone levels in the growth medium causes more lignification, which leads to plant materials with more wood-like properties.

To conclude, the future of our country lies in the calibre and morality of our human resource. At the end of the day, whether it is small businesses or big countries, we must all sit down and evaluate our performance. Identifying areas that require improvement and making those advances is the secret to thrive and keep our place on this planet.

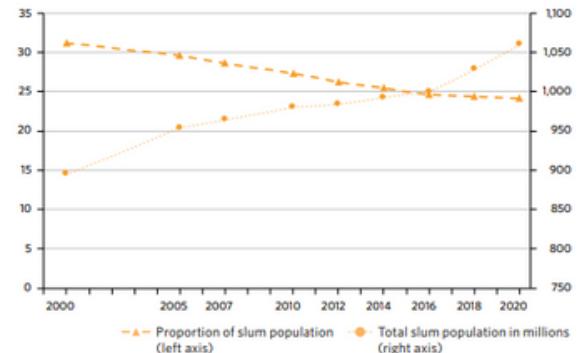
# Statistics.

Coverage of public transport and share of population with convenient access in urban areas, 2022 (percentage)

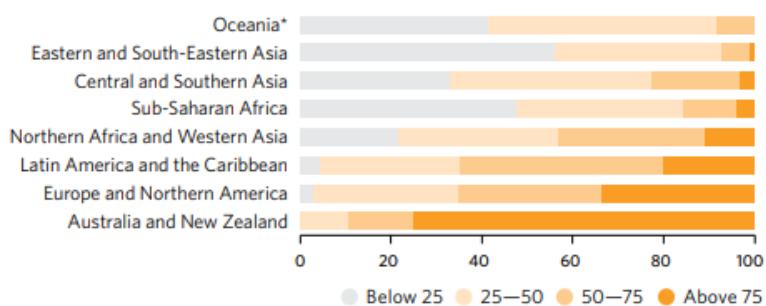


Note: Based on data from 1,507 cities in 126 countries.

Proportion of global urban population living in slums (percentage) and total slum population (millions), 2000–2020

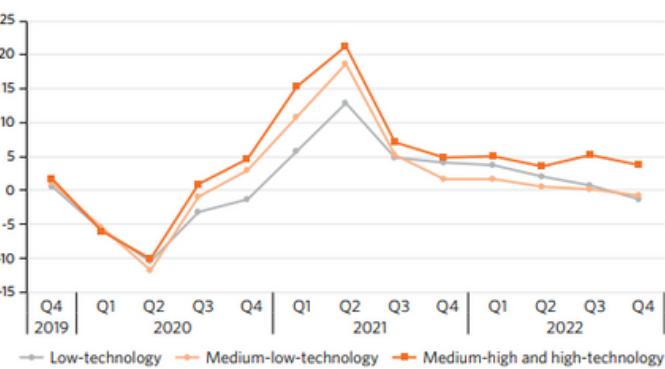


Proportion of cities in each region where the population has access to open public spaces, within a 400-metre walking distance, 2020 (percentage)

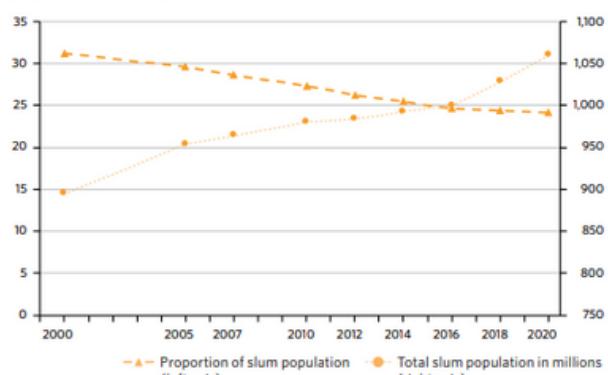


\* Excluding Australia and New Zealand.

Year-over-year growth rate of global manufacturing production, by technology, fourth quarter of 2019 to fourth quarter of 2022 (percentage)



Proportion of global urban population living in slums (percentage) and total slum population (millions), 2000–2020



# Citations.

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- Infrastructure and Industrialization - United Nations Sustainable Development

<https://www.un.org/sustainabledevelopment/infrastructure-industrialization/>

- Superblock (Superilla) Barcelona-a city redefined. Public Realm

<https://www.citiesforum.org/news/superblock-superilla-barcelona-a-city-redefined/>

- SDG Indicators - UNSD

10 July 2023: The Sustainable Development Goals Report 2023: Special Edition provides a powerful call to action, presenting a candid assessment of the SDGs based on the latest data...

<https://unstats.un.org/sdgs/report/2023>

- Toward customizable timber, grown in a lab

Adam Zewe | MIT News Office

<https://news.mit.edu/2022/lab-timber-wood-0525>

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# ITERATIONS AND EXPLANATIONS

SUBMISSION 2

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# CONCEPT 1: Sustainable Cities.

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## *Conceptual Framework:*

The idea was to design systems that provide solutions to traffic congestion in large metropolitan cities (in Bangalore particularly as it is the second most congested city in the world currently).

This idea came to me because recently a famous stand up comedian, Trevor Noah, ended up cancelling both his shows in Bangalore. There was a huge uproar and it made the headlines of newspapers. Trevor himself was late to his show because of the traffic but his show got cancelled due to sound equipment issues. The day of his show Bangalore recorded the highest congestion as people were coming from all over the place to see his show and there was the usual peak hour traffic. It was outrageous, people started selling their tickets because they were really late and couldn't get to their destination. I travel on the college bus every day and live about 2 hours away. I like to think I've seen a good share of bad traffic as well so when I heard about this incident I felt terrible for the people. This is a daily occurrence and something needs to be done about it.

## *Iterations:*

### **1. Public Bus Services**

Improving Public transportation is the first step to decreasing the amount of vehicular movement on roads. A full bus is 6.5 times more fuel efficient than a car therefore reducing carbon emissions as well and making the environment more sustainable.

My idea was to create an app UI (*slight change was made instead of the app I made a zine and drafted a proposal*) as well as a display for BMTC buses. Integrating displays in buses could allow for a tap and pay mechanism when the passenger enters the bus with the BMTC card.

BMTC buses are usually very overcrowded to the extent of people hanging out of the door. To solve this issue we have to increase the frequency of buses arriving at crowded bus stops. We can also increase the range of routes so the number of people getting on one bus reduces as the buses cater to newer routes that may be closer to their destination. We could also have separate bus lanes to reduce the traffic and ensure that the buses can reach their stops on time and abide by their schedule because another problem is the bus timings right now are a little unreliable. It also reduces the chance of accidents happening.

Displays at bus stops must also be put to inform people about 3 things. First, what routes are arriving in the next 5 minutes. What is the populace of the bus, whether there are already too many people. If it's high, people can see when the bus for the same route will arrive next. This reduces the anxiety of being late, and gives people a rough gauge of when the buses will be free.

*This is connected to the sdg's in a sense that it's promoting sustainable change, reducing carbon emissions, improving mobility and quality of public transportation. It helps further the agenda of sustainable communities and it lowers the carbon footprint of the whole city. (Goal 11)*

## 2. Traffic Signs and Parking Spaces

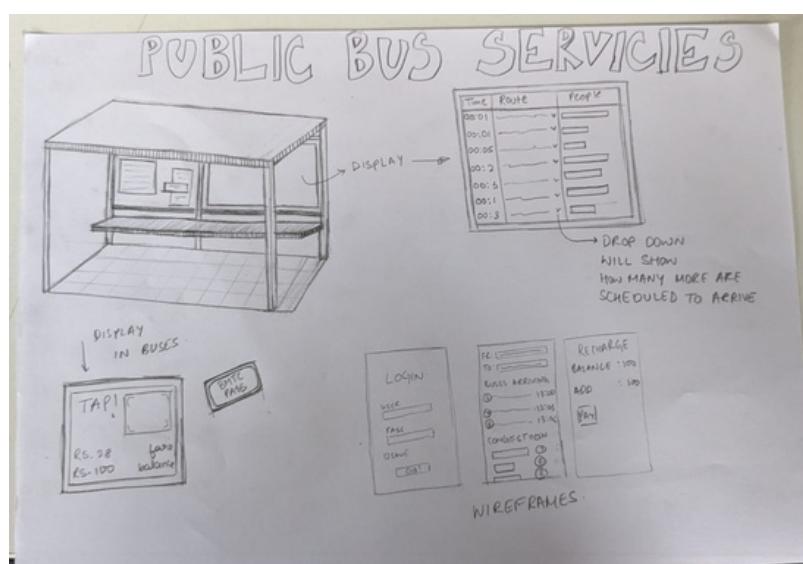
Improving traffic light management and having stricter parking rules can also aid in solving traffic congestion.

The idea was to install small camera cum audio devices on no parking signs. Usually these no parking signs have a range up to 100 m (i.e 50m on each side) . This device will start beeping if a vehicle stops for more than 4-5 minutes in that length. If it still doesn't move for another 5 minutes a photo of the number plate will be taken and the authorities will be alerted. This immediately increases space in narrow roads and improves traffic flow.

With cities like Bangalore hosting a large population, the question of “Arrey! Then where do we park?” will inevitably arise. Land utilisation of empty sites can be used by the government to have park-and-go spaces, instead of pointless new buildings coming up in every corner. Park-and-go spaces are encouraged to be there near bus stops and parks. These spaces can also be lined with plants to increase biodiversity.

With legitimised spaces for parking, apps like google maps can integrate features so as to find parking spots. It reduces anxiety of finding parking and doesn't ruin your mood.

*This is connected to the sdg'd in terms of innovation (Goal9) and improving mobility and transport (Goal11). Creating space and utilising vacant land helps in sustainable development in cities.*



# CONCEPT 2: Sustainable Communities. —

## *Conceptual Framework:*

I wanted to explore the other part of Goal 11 which was helping communities. India is a country of diversity and indulging and engaging in different cultures brings joy and growth. It improves the quality of life. Integrating green spaces and encouraging small business, bringing people together to participate in activities improves the appeal of the city and invites economic growth and investment. My two iterations will be catering to these.

## *Iterations:*

### **1. Urban farming and vertical agriculture**

I came across this while researching about my SDG. Helsinki (in Finland) employs urban farming that encourages locals to participate in the process and make their areas richer. Urban farming involves converting small pieces of land into crofts, it can even mean to grow vegetables, herbs and fruits in the comfort of your balconies at home or terraces above.

Vertical farming however, is the practice of growing crops in vertically stacked layers. It incorporates controlled-environment agriculture, which aims to optimise plant growth, and soilless farming techniques such as hydroponics, aquaponics, and aeroponics.

My aim here was to educate city dwellers about agriculture and have them participate and indulge in the process as so many children today don't have the exposure to it. This topic has so many benefits like improving greenery in cities, creating jobs, optimising land utilisation, spreading awareness and education, reducing carbon emissions caused due to transport of produce, fresher goods, encouraging newer research and experiments in genetic engineering and improving the quality of food to name a few.

The way I want to go about this is by creating a brand that has infrastructure for vertical farming. I want to design the way these vertical farms look as well as create an online marketplace for them. This will be a website/app. This marketplace is a collaborative space as well, where you can sell your cultivated herbs too. It has a community feature where you can discuss ways to improve growing produce at home and share various techniques and articles on the platform. This company can also drive the communities to use waste land to make them into small gardens as well. Communities can come together and cultivate produce and distribute it in their own local markets.

Of course living in cities introducing new technology can make the process faster and easier and more efficient.

*This is linked to the sdg's in terms of infrastructure innovation as well as building cleaner and more sustainable community spaces (Goal 11). It creates jobs (Goal 9&11) and improves the quality of life. Expanding into the primary sector and having overlaps with the secondary and tertiary sector as well boosts our rank up as a third world country. It creates green spaces and increases biodiversity in the area. Locally produced food helps lower carbon emissions as well.*

## 2. Tourism and community engagement

Bangalore is a very happening city.... But we just never seem to know what's happening at the right time. To help solve this problem, having an app that gives you details of all sorts of events all year round will never have you be bored again!

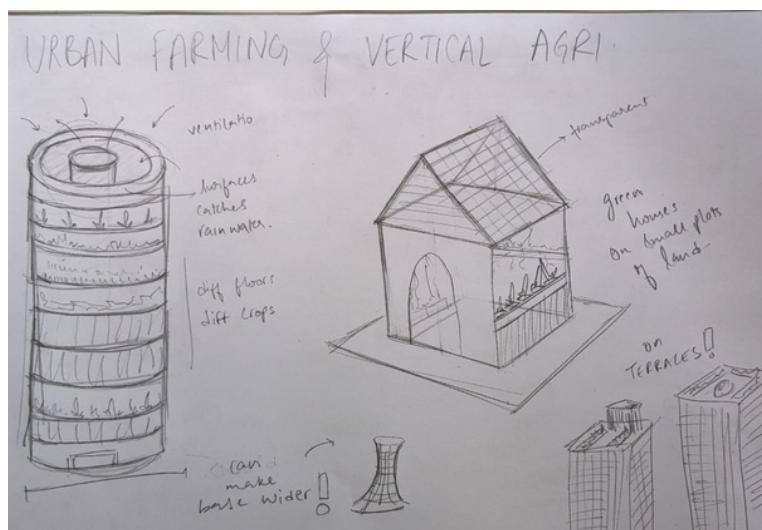
Sure there's BookMyShow and stuff like that but they have limited events showing on them. The events I'd like to stress on are NGO drives, industry related workshops and meets, small business fairs, book fairs, the lesser known ones are the ones that people need to discover. It can help people find new people, communities and even interests.

All these events usually get spread through word of mouth but what if we had a whole feed catered to your interests. For those who are new to Bangalore it can give you the easiest way to reach the location, you can choose based on economic fares too.

With the help of this app you can host events with the help of more experienced people too. This app can land you some internships as well and help you network.

A feature I was thinking of providing was certification for all volunteering activities. This can be a motivation for students and young adults looking to finesse their resumes/portfolios.

*This is linked to the sdg's in terms of creating more wholesome communities fostering human bonds and improving the quality of life in cities. It attracts people from outside to come and experience the city life and boosts tourism as well. (Goal11)*

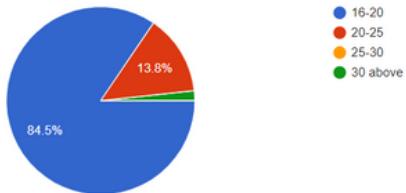


# Survey.

I recently took a survey regarding this, about 60 people answered it and here are the results. People seem to want more activities to do in their citing to inculcate strong bonds and form real human connections.

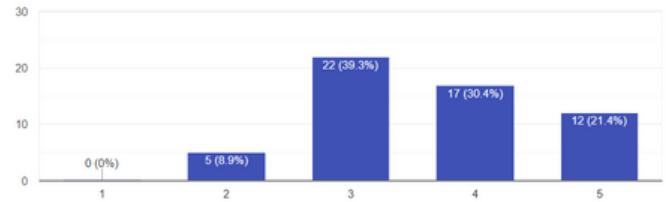
What age group do you belong to?

58 responses



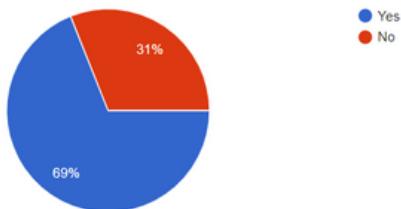
Are you currently staying in Bangalore? If yes, how happening is this city?

56 responses



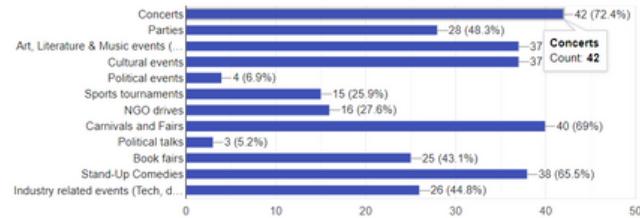
Have you ever been bored in your city and had no idea what to do?

58 responses



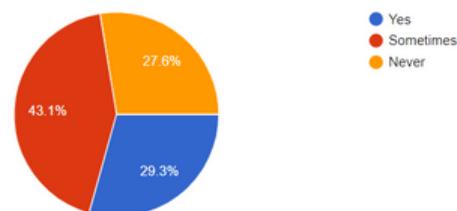
What kind of events would you be interested to attend?

58 responses



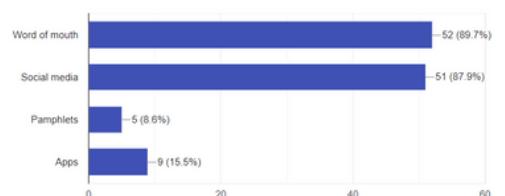
Have you ever had trouble looking for new interesting restaurants?

58 responses



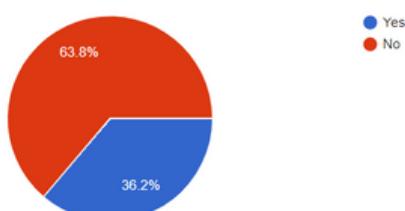
How do normal find out about events?

58 responses



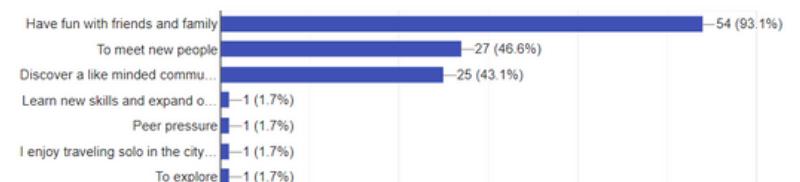
Are there any events you've wanted to host but didn't know how to?

58 responses



Why do you attend events?

58 responses



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# FINAL ART, DESIGN AND CONCEPT

Submission 3

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# Concept Notes.

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## ARTISTIC VISION:

The iteration I chose was the Public Bus services one.

The first day of the process making, I was a little confused as to which iteration to pick so I spent the day researching a little more, at the end of the day I finalised. I will be putting in all the research I did on this day as well. (*submitted all my notes physically please refer to see if there is any doubt*)

The vision was to draft a project proposal and raise awareness about how the maintenance of public transportation is being neglected. The proposal highlights the problems that the service is facing with ample statistics and about 7 solutions to combat it.

To raise awareness I made a zine. I figured that to get to people it needs to speak to them. So I have 3 situations that most of us would have seen or faced. I have some statistics to call for action and a poster on the back if you open the zine to further my point.

A comprehensive explanation of the poster would be as follows.

At the bottom we can see people and children from various backgrounds, this is to signify that people from all ages use public bus services. Above them there are chains to signify that these people, a lot of the time, come from lower economic backgrounds so public transport, bus in particular, is their only means to go about their daily activities. Be it children from government schools or elders going to work.

The textures I used on top are burnt paper that shows the state of public buses, in shambles. I put dust to show the increasing pollution, which will get resolved if we started switching to sustainable means (public transit!). There is a cracked tree bark that symbolises that the bad image of public transportation is causing a divide between people as well, also nature getting hurt.

The colours are to catch the eye and the deep warm hues create a warlike feel, to show the anger and frustration of the public.

The proposal of course highlights the SDG which is sustainable cities and communities by offering a solution on the sustainability of cities. Not to mention having people from different backgrounds in one place travelling helps us feel united as a community.

The zine is a call of action to bring together people and tell them what's happening. The first scene in the zine depicts discrimination with public transport playing a role to signify the associations we subconsciously make. The second scene is to highlight traffic congestion and the third is to depict normalisation of overcrowding.

## EXECUTION PLAN:

The execution plan is also highlighted in my project proposal, a public-private partnership and funding by the government.

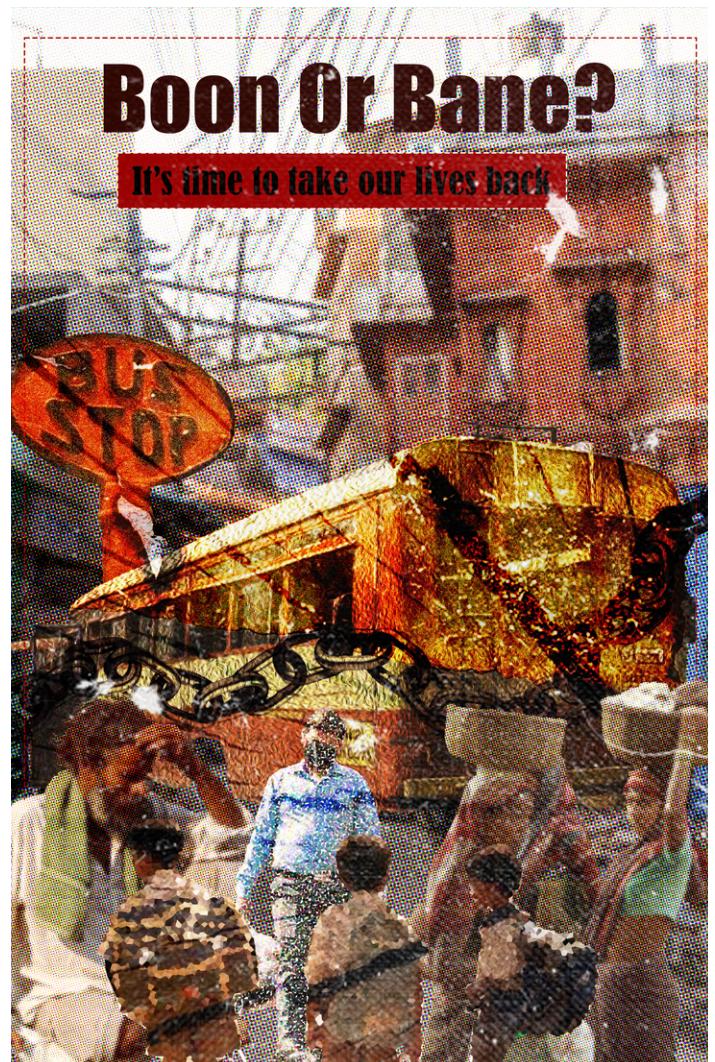
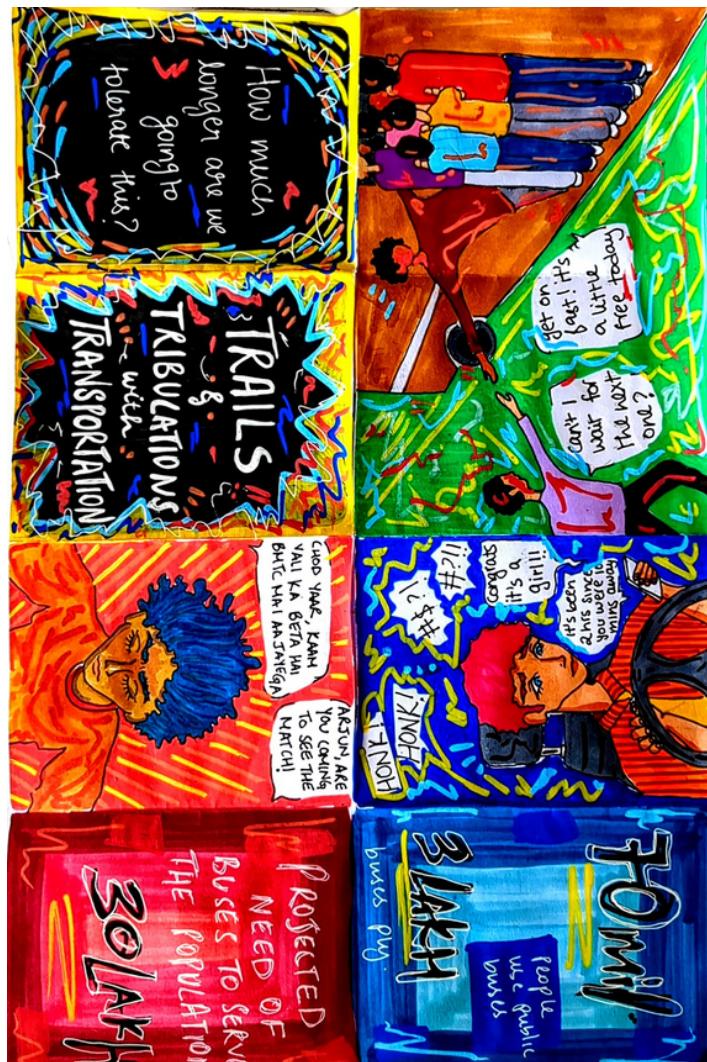
The only resources I need are money, accountability and discipline to carry out the plan.

More practically, for my projects I used google docs for compilation, Maya for the 3D rendering, Photoshop for the poster, and basic stationery items for the rest. All the research material is cited and submitted.

## IMPACT:

The intention was to educate people on what the current condition of the public bus system is and hopefully get them to raise their voice against this issue, have changes to be implemented after/before elections, have our representatives notice and take accountability for their negligence.

The proposal has all the ways they could fix it. The impact it could have is lowering pollution levels, reducing traffic congestion, having a better image of public buses, making our cities more sustainable and our communities more united.



# Display and Proposal.

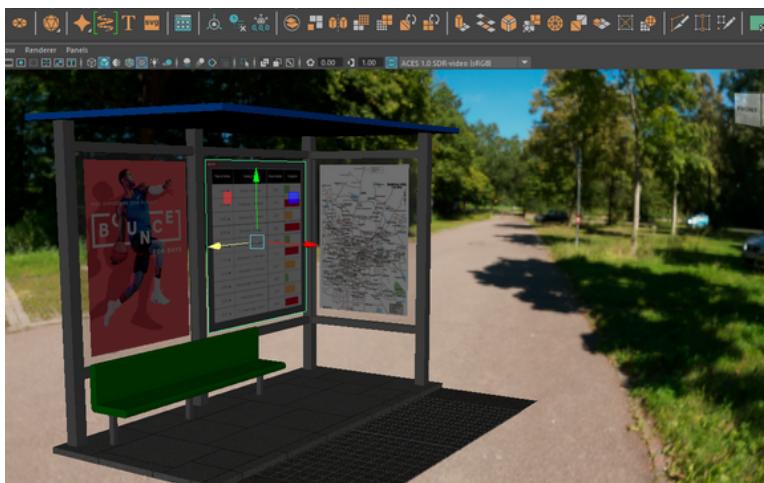
REPORT

Time of Arrival	Starting Point	Route Number	Congestion
12:00 ▲	Majestic - Yalahanka	298A	
12:00 ▲	Shivajinagar - Whitefield	678A	
12:05 ▲	Electronic City - Hebbal	123B	
12:03 ▲	KR Market - JP Nagar	333C	
12:06 ▲	Indiranagar - Koramangala	777A	
12:30 ▲	Malleswaram - BTM Layout	342B	
12:40 ▲	Marathahalli - HSR Layout	655C	
13:00 ▲	Basavanagudi - Banashankari	444B	
13:05 ▲	Yeshwantpur - Peenya	212A	
13:07 ▲	CV Raman Nagar - Domlur	555A	

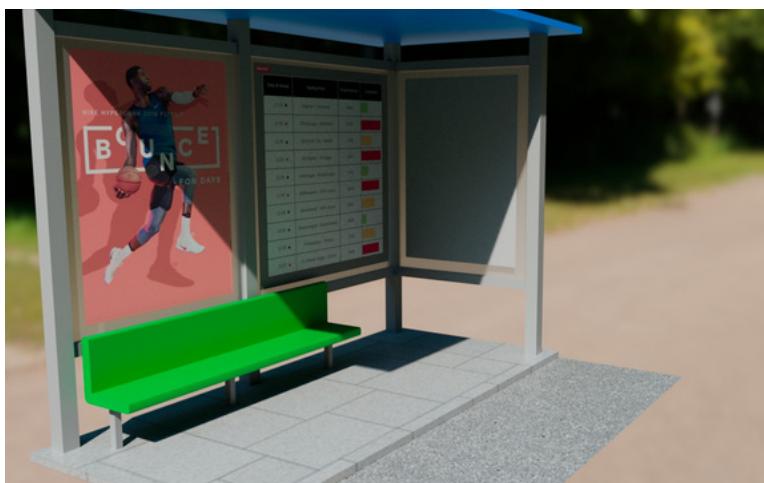
A closer look at the display.

The drop down at the time of arrival section let's you know when the bus for the same route arrives next.

There is a report button on top outside the display, it's on the screen, it is to be pressed when the display stops working so someone can come fix it.



The display allows you to see the route, route number, time of arrival, and the population congestion inside the bus.



The first one is the model and it has the Bangalore map on the side with the place you are currently at circled so you have a sense of space, due to a technical glitch the map hasn't been rendered in the second picture.

# PROJECT PROPOSAL

## *Trials and Tribulations with Public Transportation*

Performance of Understanding 2023

Anagha Rao

### **Defining The Problems:**

India being the most populous country in the world right now, hosting about 1 billion people, surprisingly has an underwhelming response to improving its public bus facilities considering 70 million people use them every day. According to the Water Resource Institute, 46% of the motorised trips in Bangalore were made by buses.

In China, we see that for every 10,000 people we have 60 buses plying; however, in India, for every 10,000 people only 4 buses are employed! This is an outrageous problem. No wonder overcrowding is a huge predicament. People are seen hanging out of buses, even going as far as using other vehicles to support themselves.

The problems don't end here. Buses not arriving on time makes them very undependable. The reason why the Indian public transportation system is in shambles is because the State Transport Undertakings (STRUs) have made very little profit. Why? The fare prices aren't up to date with the inflation prices in fuel. There is also overstaffing in buses, with 5 employees per bus. With the money they're losing here, half their budget is displaced.

The Government is supposed to revise its policies and reimburse the STRUs but the process is so slow they practically owe 17,000 crore rupees to the 56 STRUs over the country currently. This leaves the STRUs for no choice but to borrow money and the interest rates make the situation worse.

The annoying part is the government doesn't care! The last published performance review of these state-run buses was in 2017. They are trying to finalise their FY18 and FY19 now. Public transport gets less than 1% of the budget made for road transport and highways. Clearly some awareness needs to be raised.

## **Proposing The Solutions:**

Keeping in mind that our aim is to meet our SDGs, I am going to consider that I will receive funding for my proposal.

1. **Public-Private partnerships:** Introducing this will make the government take accountability and ensure improvements will be seen since private companies don't want to be associated with loss.
2. **Introducing displays in buses and bus stops:** I have illustrated in my 3D render how the displays in the bus stop will look like. A machine with the conductor that allows for tap and pay of tickets similar to the metro also should be implemented making it easier to obtain tickets and resolving the hassle of picking out change out of your wallet praying it doesn't fall down in the process. This way the conductor doesn't lose his/her job as well. We can also minimise the waste of paper as the tickets will be digitised. Of course the option of paying with cash will reside but we must aim to remove it eventually.
3. **Subsidising fuel rates and easing taxation on buses:** By doing this we can obtain more profits and make efforts to increase the maintenance as well. Increasing maintenance will improve the image of public transport.
4. **Re-routing:** We must have provisions like a small display at the divers quarters to make the driver take the best possible routes to minimise fuel loss.
5. **Fares:** The prices of the fares must keep up with the inflation in fuel rates.
6. **Increasing the frequency of buses:** By doing this we can reduce overcrowding.
7. **Increasing the number of buses:** Solves over staffing and caters better to the population needs.

Once an improvement is seen in the conditions, and people see buses as a viable alternative, we can have a small amount of tax on owning private vehicles so as to drive people to use public transport more.

These are the 7 solutions I propose keeping in mind the state of public transportation in India and its potential to bring massive positive changes to our cities, communities and economy. Although these problems won't go away completely we can hope to see a good change.

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# FINAL REFLECTION

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This 11 day long journey was quite the experience. I learnt particularly to build patience, research and dig deeper because it's never enough, there's so much to know. Also having better time management because on the second last day I barely scrapped through and made the submission on time, owing to the amount of work I had.

The first day I went through all the papers. The ones that stood out to me were the first, second and third. I was coming up with ideas as I read. The dragonfly one I was thinking of making like a dress up event where everyone could come dressed up as various insects. It would be a fair with games food and of course a talk on the importance of the topic. For the ageing thing I thought of making a game that could foster bonds between grandparents and their grandchildren or maybe making the perfect old-age home.

I ended up picking the SDGs because of the sheer amount of topics it covered and also gave room to solve many practical problems in our society. As the days went by I came up with iterations, did a lot of research, It's like when you think you're finally done with setting the context, new points appear, which is very cool but at times tiring. I was in two minds while making my final project because I couldn't decide on what iteration to pick. I switched from public bus services to the community app to urban agriculture back to public bus services. I realised I should stick with it to the end and that's why my concept of presentation in the end changed as I decided to draft a proposal and make a zine to convey my idea visually instead of making an app. I figured raising awareness was better than making an app when it already exists. Besides there are a lot of people that don't have access to smartphones as they are from lower economic backgrounds. Hence the inception of the idea.

I understood the importance of being mindful as I had to make my 3D render twice because it got deleted on the first time due to a malfunction in the app and I hadn't saved my work at that point in time. It led to a few setbacks but it all turned out fine in the end.

My concept focuses on making the society we live in a more sustainable and better place. Traffic congestion, the first time I read about it in the news actually shocked me. I also connected to it on a personal level considering that I commute for about 3 hours every day. Good public services bring communities together and lessen the divide among people and enable more wholesome interactions. We get accustomed to the diversity and can gain wider perspectives.

Making basic public services available in its best capacity can only be a dream every country seeks but to get there we must start somewhere. Raising our voices, being aware and keeping our leaders accountable is key to ensuring we get what we are promised and we get what we pay for.

All in all, I am satisfied with the way my project has turned out. I used photoshop for the first time, it was fun to experiment with the blending modes and filters to make the poster. I will definitely explore the app more.

I have always wanted to make a zine but I never got the opportunity to do it, this was the perfect one, it was very cool to see it when all of it finally came together, that is, opening the zine to see a poster. The 3D model on Maya was what I learnt in GSK it was nice to use a newly acquired skill for this assessment.