

Street Sounds

Design Exploration Seminar



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अभिकल्प विद्यालय

Guide: Prof. Ravi Poovaiah

Akshat D Hyanki
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17U130019

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Digital Signature
Akshat D Hyanki (17u130019)
12-Aug-22 01:06:26 PM

Akshat D Hyanki
17U130019
IDC School of Design, IIT Bombay

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Approval Sheet

The Design Exploration Project, titled “Street Sounds” by Akshat D Hyanki, roll number 17U130019 is approved in partial fulfillment of the Bachelors of Design Degree at IDC School of Design, IIT Bombay.

Internal:

Guide:

Digital Signature
Ravi Poovaiah (081011)
16-Aug-22 08:11:06 PM

External:

Chairperson:

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Abstract

People from all around the world travel, work or do some things daily. These events happen in a lot of different places and have various sounds associated with them.

The sources of these sounds may be natural, machine-made, or produced by humans.

There are many different elements corresponding to the origination of these sounds and how they are produced.

In this project, I will document and analyze sounds produced by various sources, which will finally map the sounds during different times.

Scope of the Project

This project aims to recognize, find, record, categorize, and analyze 'Street Sounds' in India. The research involves studying street sound by first hearing and recording it and then looking at it from other sources such as the internet, books, etc.

Since it is impossible to document everything, the project research will be restricted to a reasonably busy street near my home. This will include the video documentation of the location at different times of the day, followed by its analysis. The analyzed data will then be experimented with for its representation.

Research

1. Sound

Let us first start by understanding what sound is.

In physics, the sound is a vibration that propagates as an acoustic wave through a transmission medium such as a gas, liquid, or solid.

In human physiology and psychology, the sound is the reception of such waves and their brain's perception.

Sound waves can travel through solids, liquids, and gases, but they cannot travel through a vacuum (a place with nothing in it).

Sound can travel through water faster than through air; and even faster in solids like stone, iron, and steel.

2. Elements of sound

Pitch is the highness or lowness of a sound. It is how humans hear different frequencies.

The number of vibrations per second determines the frequency of a sound.

The intensity of a sound is how much sound energy goes through a square meter in one second. Sound waves with higher amplitude (bigger vibration) have higher intensity. The intensity of a sound is higher closer to the sound source. Farther away, it's less intense.

Loudness is how people sense the intensity of sound. Loudness depends on sound intensity, sound frequency, and the person's hearing.

3. Noise

Noise is unwanted sound considered unpleasant, loud, or disruptive to hearing.

From a physics standpoint, noise is indistinguishable from desired sound, as both are vibrations through a medium, such as air or water. The difference arises when the brain receives and perceives a sound.

4. Sonorous Materials

Electron bonding in some materials is highly delocalized due to its very low electronegativity. This means that when struck, the electron cloud moves extremely easily - there is very little energy dissipated. This allows the incoming kinetic energy to be easily propagated as a form of disequilibrium - a wave that in turn produces sound.

5. Street Sounds

There is no such definition of street sounds. The literal meaning that everyone would be able to think of is the sounds produced by different sources in the street during a day or over a period of time.

Many factors affect what sounds can be or are heard during a particular time of the day. This usually happens because there is a culture or a routine that most people follow daily, which generally leads to a similar course of action during the day.

This also depends on the type of place, location, time, etc., which would lead to different documentation and analysis of the pattern of sound produced.

Some examples that people can instantly think of, if asked, might be sounds of vehicles, people walking, talking, construction, etc.

6. Mapping

The idea of mapping the sound or noise pattern can determine the amount of noise pollution in a specific place or area.

The mapping also allows the determination of the sources of noise or sound and the time it is produced to help control its pollution. This data collection can eventually help map the noise pollution patterns for a more extensive area, which would help prevent it.

Analyzing the sounds can also be done to observe and classify the different types of sound patterns produced in a particular place.

Documentation Method

- 1) Recording short static videos of around 5-10 mins of the chosen location during different times of the day (morning, evening, and night).
- 2) Watching the documented videos then identifying and categorizing sounds produced by different sources.
- 3) Noting observations based on who, why, how, when, etc.
- 4) Mapping the different sounds produced by the various sources with respect to the time of the day and the reasoning for it.

<https://youtu.be/W3a9iZrUGwI>

This is the YouTube link for the video compilation shot for reference of the project.

The clips in the video are sped up to 6x.

Identification and Classification

a. Type: Repeating, Loudness

b. Function: Time

c. Means: Source

- According to Time of the Day

1) Morning

Wind

Vehicle – Bikes, Cars, Cycles

(Engine, Tire, Ignition, Brake)

Vehicle horn

People talking, shouting

Object falling

Sound of leaves moving due to the wind

People's footsteps

2) Evening

Vehicle – Bikes, Cars, Cycles

(Engine, Tire, Ignition, Brake)

Vehicle horn

Birds chirping

People's footsteps

People talking, shouting

An object falling, hitting

Wind

3) Night

Vehicle – Bike, Cars, Cycle

(Engine, Tire, Ignition, Brake)

People's footsteps

People talking

Vehicle horn

Insects buzzing

Garage shutter

- **According to the Loudness of the sound**

1) Loud

Vehicle (Engine, Tire, Ignition, Brake)

Garage shutter

People shouting

Vehicle horn

2) Soft

Falling object (far away)

People's footsteps

Birds chirping

Insects buzzing

People Talking

Wind

Leaves moving due to the wind

- **According to the repetition of the sound**

1) Very Often

Insects (Night)

Birds chirping (Daytime)

Vehicles

2) Often

Horn

People walking

Leaves

3) Rare

People talking

Object falling

Garage shutter

- **According to source**

1) Natural

Insects

Birds chirping

Leaves

Wind

2) Mechanical

Vehicles

Horn

Garage shutter

3) Human

Talking, Shouting

Footsteps

4) Falling objects

Analysis

According to time of the day:

Different street sounds can be heard at different times of the day. There are various reasons and sources for the origination of these sounds. The analysis and inferences are based on the time of the day the video has been shot. The classification was divided into three parts of the day, and then the different sounds that can be heard were noted down.

- 1) Wind – This is more dependent on the weather rather than the time of the day. But since weather changes daily in different places, the sounds that originate from this in that particular place affect the type of sounds you might hear.
- 2) Vehicles (cars, bikes, cycle) – People tend to follow a daily culture due to having jobs, running errands, or doing some work. People commute using many different types of

transport. Typical jobs usually start during the morning hours and finish in the evening. Although there is no accurate fixed timing for this, there can only be an estimation of the vehicles' movement. The sounds that are produced by vehicles are therefore affected by it. During the morning, when people tend to go to work, and during the evening, when people return home from work, the amount of sound that can be heard from these sources is slightly higher.

- 3) People's footsteps, talking – Throughout the day, many people walk to places generally because the work they have can be completed nearby. When people walk, they either walk alone or in groups. Footsteps are common in both situations, the sound of which can be heard quite clearly. People moving in groups tend to talk to each other, which is not quite audible, but you can still hear some of it.

4) Sound of leaves – When the wind blows softly, leaves in nearby trees start moving, and due to it, a specific sound is produced, which is quite pleasing to listen to. This also depends on the weather, and there might be other objects or things that would be affected and produce sounds by the wind's blowing.

5) Object falling – Objects can move by forces of nature like wind, etc., or by human actions. Both these result in the origination of sound that the objects when they come in contact with a surface or other object.

6) Insects buzzing, Birds chirping – These phenomena are common and can be found almost anywhere with greenery. Time is also not a very big factor here. The only difference between these different species that produce these sounds is that they come out for a particular part of the day. For example, insects buzz mostly during the night-time, and birds chirp during the day-time.

7) Garage shutter – Again, this phenomenon does not take place during a fixed time of the day. Whenever someone closes or opens his shop nearby, this sound can be heard.

According to the Loudness of the sound:

Loudness is a factor that is affected by the distance at which it is heard. The analysis and inferences are taken based on the video shot for documentation.

The classification is divided into loud and soft. Although many sounds can be heard at different levels, the division is done on how often and loud the sound is heard.

1) Loud – Sounds like vehicle (engine, tire, ignition, brake), garage shutter, people shouting, and vehicle horn were put into this category. Although proximity was a factor here, most of these sounds were heard loud and clear in the documentation.

Multiple sounds of vehicles can be heard simultaneously, which makes it louder. The contribution of the sounds

produced by engine and ignition was higher than that of brakes and tires. The vehicles' horn sounds, especially the bigger ones, are supposed to be loud for the people around them to hear it clearly and hence the classification. Even though the vehicle might be a little far away from the listening point, the sound is very much audible. The increase in the number of vehicles honking at the same time only increases the noise.

Opening and closing a garage shutter is one of the tasks where the sound produced is distinguishable and audible from a distance.

- 2) Soft – Sounds that were quite hard to be heard were put into this category. Although some of these sounds were clear and could be recognized, their intensity was relatively low compared to other louder sounds in the surroundings. Proximity is also a factor, so sounds that might be loud close but were heard from afar in the documentation were put here.

Falling objects are one such example. The sound of an

object falling might be loud when close to you, but since during the identification, the only times these sounds were heard were from a far distance, it is categorized as soft. People's footsteps can be heard clearly but were soft enough to be barely heard. In this case, the number of people walking might affect the loudness, but the sounds were relatively quiet since the place was not very crowded. Also, people talking follows the same theme as above. Birds chirping and insects buzzing were put in this category because they could be barely heard in the video footage background. At first inspection, it won't be audible if not listened to with accuracy.

The wind is one natural phenomenon that, in some cases, might be very loud or soft. Since the wind blowing intensity was not very high in this case, the sounds of wind blowing were relatively weak. Also, the leaves moving in nearby trees due to the wind could be heard quite clearly. But since the wind's intensity was relatively low, the sound of the leaves moving was also quite soft.

According to the repetition of the sound:

These inferences were made based on how many times a particular type of sound can be heard in a specific period. Although there might be uncertainties because you cannot predict the repetition of sounds, it is bound to change daily for a period.

The classification has been done in three parts -very often, often, and rare.

- 1) Very Often – Sounds that were heard many times in breaks or went on for an extended period in a single go were put into this category.
- 2) Often – Sounds that were heard quite frequently were put into this category.
- 3) Rarely – Sounds that were heard maybe once or twice in the noted period were considered in this category.

According to the source of the sound:

Sources of the origin of these sounds can be categories into natural, human-made, or mechanical.

- 1) Natural – Sounds that are produced by nature are considered in this category.
Birds chirping, the sound of the wind blowing, leaves moving due to the wind, and insects buzzing can be heard in the documentation. These are neither mechanical nor produced by humans. They are a part of nature and can be said to natural origin.
- 2) Mechanical – Sounds that are produced mechanically are put under this category.
Vehicles are machines, so the sound they produce comes under this. Horns are a part of vehicles that also produces sound mechanically.
When garage shutters are open or shut, the sound they produce comes from the mechanism they use.

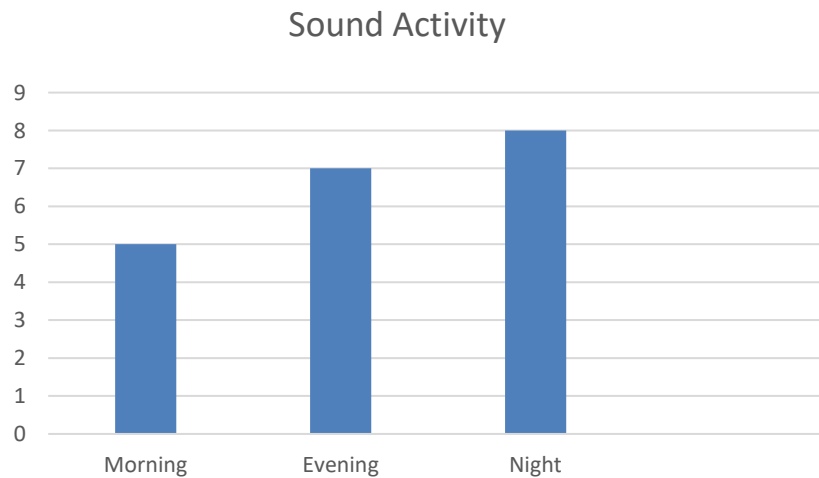
- 3) Human-made – Sounds produced by humans like when they talk or walk put under this category.
- 4) The sound of an object falling could not be categorized under any of these three categories since neither is it naturally produced nor made by humans. There are also no mechanisms involved. The sound of falling objects can be heard when an object falls and hits the ground or hits another thing. This does not satisfy any of the above hence is uncategorized.

Co-relation between different factors

1) Time and Sound Activity

The following chart shows the approximate sound activity with respect to the time of the day. Although this changes every day, the estimation is taken according to the video footage used for documentation. More crowd activity leads to more sound activity which means whenever people are the most active will have the most sound activity.

We can see that morning has the least sound activity and night has the most.



2) Time and Loudness

Loudness is more or less dependent on the crowd or activity during a particular time of the day. More activity leads to louder sounds in some cases.

3) Source and Loudness

Some sources contribute to louder sounds than other sources. Examples are vehicles, horns, etc.

4) Source and Sound Activity

This is pretty direct. More and different sources mean more sound activity.

Conclusion

The study of street sounds can help people get an idea of the place's activity during different times.

Although the data gathered in this might not be 100% percent accurate due to the ongoing pandemic and how it has affected the place's activity, documenting this for multiple days would lead to more precise data and space analysis.

Since not every day is the same, it is tough to predict a specific place's sounds at a particular time.

There have been some studies of noise to control noise pollution in places with excessive noise. Mapping them can help the government to help control noise in public areas if required.

References

The video was shot in the street nearby a market area in a housing society.

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