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Visualization of Sounds AuVi

Design Research Seminar Project Report

Guided By
Prof. Ravi Poovaiah

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Interaction Design

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Indian Institute of Technology Bombay

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Interaction Design, Master of Design

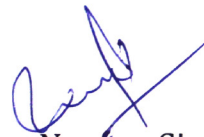
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Declaration

I declare that this written document represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources.

I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission.

I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

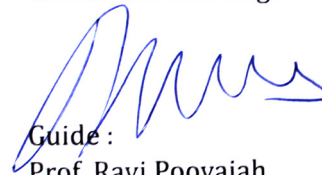


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May 27, 2016

Approval Sheet

The project titled 'Visualization of Sounds' is approved for partial fulfilment of the requirement for the degree of 'Master of Design' in Interaction Design at Industrial Design Centre, IIT Bombay.



Guide :
Prof. Ravi Poovaiah

Date : 21-6-2017

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Abstract

The project started with the idea of stitching audio and visual together in a way to explore locations with the help of both sound and images. To visualise the information or the sounds, the first attempt was to capture the places, both through camera and a recorder.

For one month across three cities, images and audio was collected. The aim was capture the essence of different place across Delhi, Mumbai and Dehradun, for example; the famous markets of Delhi, the Mumbai local and the temples of Dehradun. These places keep within themselves the essence of these regions.

The attempt is to empower users in a way where they can identify the locations on the basis of the sounds. Thus they will be able to map these sounds in a better way. In future such systems can help locate areas on the web when only audio feed is available. This would give way to research in areas of geo tagging where anyone can upload a local sound and tag it to a specific location on the map. This would help to create immersive audio guides where people can go around a city collecting audio clue and thus exploring the city using the image suggestions and then finding those places in real world.

Introduction

Dehradun is a small city in the lower Himalayas. It is situated in the Doon valley and is also the capital of the State of Uttarakhand. It is surrounded by the Shiwalik hills. The main shopping area in Dehradun lies in the heart of the city known as Paltan Bazaar. The daily hustle bustle of the market streets have been the same since decades and it has become part of an identity of Dehradun. Such locations were captured across Delhi also and thus the essence of these places were recorded which later would help in identifying these areas.

The idea is to visualise the locations using sound as the trigger. The primary need is to start by attaching unique ambient sounds to corresponding images or just collect sounds and later try to tag them to geo locations.

This project is dedicated to tourists and explorers who want an experience that helps them explore a city or a place with only sounds as an input. This would create an engaging environment where each sound clip will represent an area in the city. This would help in creating a large database of such sounds and images.

The start - Places

The data collection was divided into three regions - Dehradun, Delhi and Mumbai. I started with narrowing down on what areas to capture.

The search ended with the idea of capturing the markets. local markets are the places where city people gather in large amounts and do shopping and socialize. One can see all walks of life at these markets. This gives ample opportunity to capture various sounds that these markets have. The yelling hawkers, the honking vehicles, children playing etc.

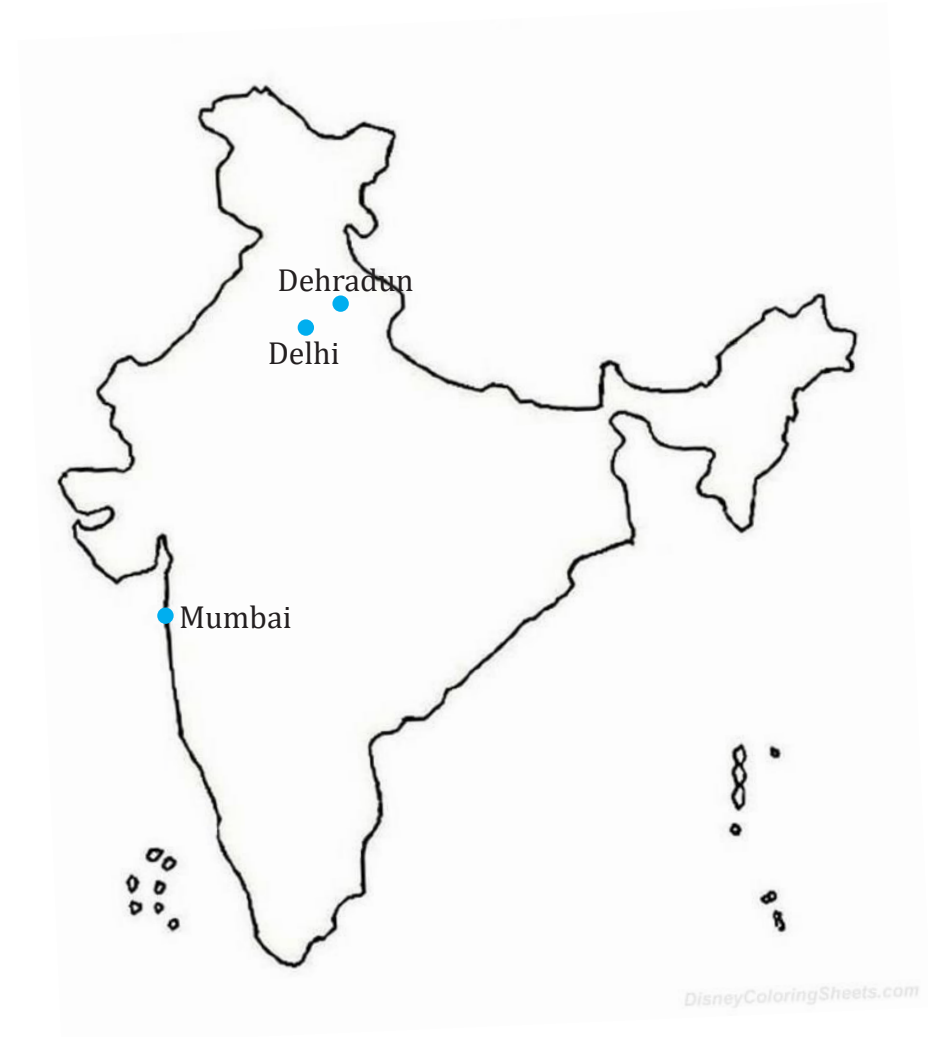
Following areas were captured in total :

Dehradun - Paltan Bazaar, Shiv Mandir

Delhi - Palika Bazaar, Delhi metro, lajpat nagar market

Mumbai - Local train

Random sounds - Rain, dhol instrument





Dehradun

Dehradun sounds

Dehradun is a city with a population of 578,420 as per Census India 2011. The city is famous for its picturesque landscape and milder climate. Once a very quiet city, now abuzz with traffic at every corner. After becoming the capital of the new found state of Uttarakhand, the place has become a political hub. There has been an explosion of buildings and more infrastructure.

There are many places to see around Dehradun which are hardly 5 to 10 kilometers away from the centre of the city. I picked the spot that most people visit on weekends and that is the famous Paltan Bazaar. Ample opportunities here to interact with the local people and record the activities. I used my Canon 1200D DSLR camera and my phone as a recorder and roamed around the place collecting images and recording the numerous intertwined sounds. The mornings are usually low volume with deserted streets but as two wheelers are allowed inside the market for a certain time of the day, the volume of the market increases due to honking and the shouting hawkers and pedestrians bumping onto each other. Evenings observe the highest frequency of sounds with the hawkers and road side stalls shouting their last bargain of the day.

Data collected - Images and Sound clips



[Shiv Mandir](#) is an old temple located at Mussoorie road at about 12 kilometers from the Dehradun. The temple is dedicated to Lord Shiva. Bhandaara is organised daily for pilgrims where prasad is distributed to them. The temple doesn't accept any donations from the devotees. The place is very peaceful with rhythmic ringing of the huge brass bells hanging from the temple ceiling that creates a spiritual environment. The prayers of devotees along with the ringing bells created that I always wanted to capture during my school years. The hot tea that is served as prasad is delicious. Overall a good place to visit and offer prayers once in a while. The volume of this area remains almost the same for the entire day altered by the ringing bells and sometimes from the temple stereo playing devotional songs.

Data collected - Images and Sound clips





Delhi

Delhi sounds

Delhi the capital of India. A mishmash of everything possible. I have been to Delhi a lot of times. Sometimes for work and sometimes for leisure. But this time I had a goal to capture the sounds of the famous streets of Palika Bazaar where one can find all the brands that exist in the world under one roof, whether original or not, all upto the buyer. The market is dominated by electronic items and clothing. The market is both underground and in the open. The crows is unbearable during weekends. This market also attracts many foreign tourists as it is known for its cheap prices. The underground market has very less noise as compared to the open one. The traffic roads are adjacent to the market hence there is high noise pollution. The stall owners keep shouting prices non stop attracting possible customers. The volume of the entire market remains unchanged throughout only a bit less in the mornings and late evenings. The underground market observes low volumes of sound intensity throughout the day.

Data collected - Images and Sound clips



[Lazpat Nagar market](#) is a typical Indian bazaar, with a mix of roadside stalls, shops, food kiosks and mehendi sellers, applying intricate designs on customer's palms. The market is crowded on all days except Monday. During afternoon there is quite a chaos all around with sound intensity rising high with the adjacent traffic and the noise inside the market. As evening approaches the environment starts to calm down a bit because of people who leave to reach their homes early.

Data collected - Images and Sound clips



[Delhi Metro](#) is the world's 12th largest metro systems in terms of both lengths and number of stations. Now the metro has more than 20 lakh people travelling everyday. People from all walk of life use this commute daily. The sounds are very familiar inside the metro with friends chatting, office goers discussing and the whoosh sound of metro cutting through the platforms and tunnels. The rhythmic male and female voices announcing the arrival of platforms and other public announcements becomes a part of daily travel. The sound intensity increase when high rush platforms are reached such as Rajeev Chowk and there is near silence during early morning and late night when the crowd is minimum. Delhi metro has become an identity and the sounds we hear in it and around it have also become a part of Delhi.

Data collected - Images and Sound clips





Mumbai

Mumbai sounds

[Mumbai local train](#) is the pulse of Mumbai, its bloodline. Trafficking more than 7 million people daily across Mumbai it is one of the busiest commuter rail systems in the world. The crowd at the platforms at rush hour and the immediate urgency to get on and off the local is uncanny. It is not much loud on the platforms only when a train arrives the chaos starts and the sound intensity reaches its height. It is mostly less volume during wee hours of morning and late night but most of the time during the day its noisy. However this is part and parcel of life here in Mumbai as the local network is responsible for the economic development of Mumbai as it ferries all the working class every day of the year.

If possible it should be avoided during peak hours of the day of one doesn't wants to get into any type of accident.

Data collected - Images and Sound clips

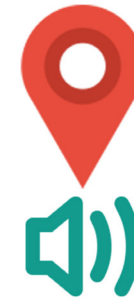


The ideas

Discovering audio clips

So I had numerous ideas in mind to execute this project by utilizing the collected data. The main motivation was to how to use sound as an identifier. Using **Geotagging** one is able to adding geographical identification metadata to various media such as a geotagged photograph or video.

The idea was to attach audio to specific locations and one can find the audio when the location is reached. In this was different audio clips can be attached to different locations and thus different areas can be explored. Users will be able to listen to audio clips left by other users on that location. The idea was discarded as it was not novel enough to pursue and was discarded. Many websites like Soundcloud already provide such features where users can geotag the sounds.

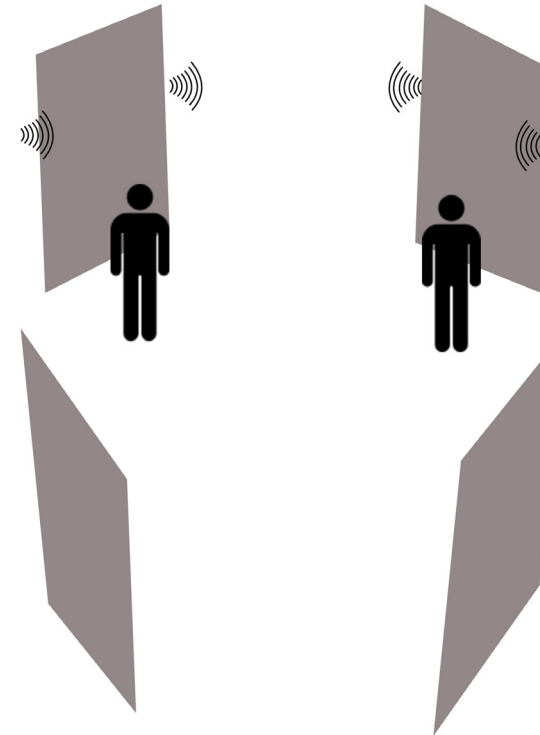


Audio clips are attached to different locations and once the user reaches the location he can listen to the audio.



Exploring images with ambient sound

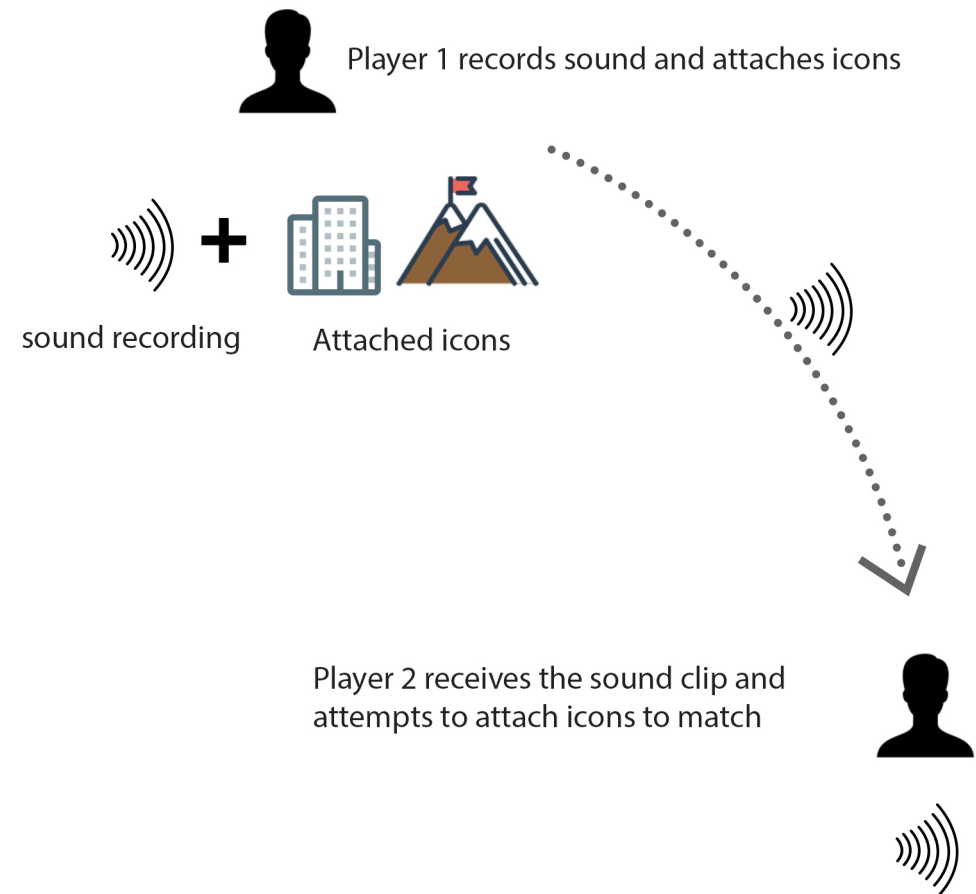
There would be a large room with various images about different locations on the wall. When the user comes closer to an image, a sound clip of that place's environment is played in the background. This would create a sense of being at that location and identifying the location with the audio. This type of setting would work best in exhibitions and museums in giving users and visitors a rich experience of the location without even visiting. However, the idea required big space and infrastructure therefore was kept aside.



Audio visualisation game

A game where one player will record the sound at a given location and attach some icons to it which describe its environment in the best way. The player then sends the audio file to a friend who has to understand the sound and then try to visualise it by attaching icons as per his own understanding of the recording and environment. If the icons match the player wins the game. In this way the game will help in building a database with various sound recordings and their visualisation with the help of icons.

It was understood that the game would require much time to understand the domain technology and audio processing that was kept aside for the given time period.



Final concept

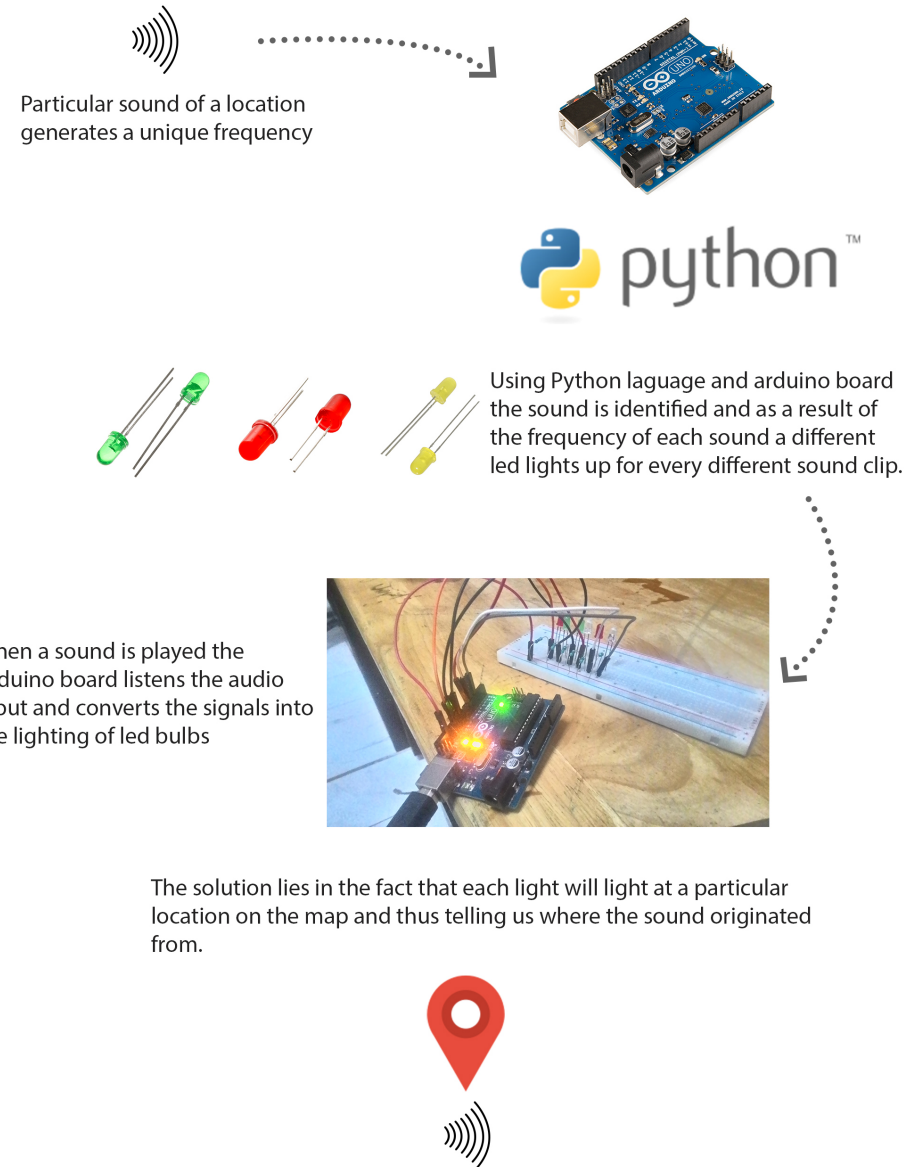
AuVi - Visualising location with audio

The idea is that if we have an audio recording we can actually find out the geo location of that recording. The sound is thus visualised in the form of geolocation along with images of that location on the map. The initial testing of the concept was achieved by using a Arduino board and python programming language. If executed broadly this system can help in visualising any ambient sound and finding its location accurately on the map.

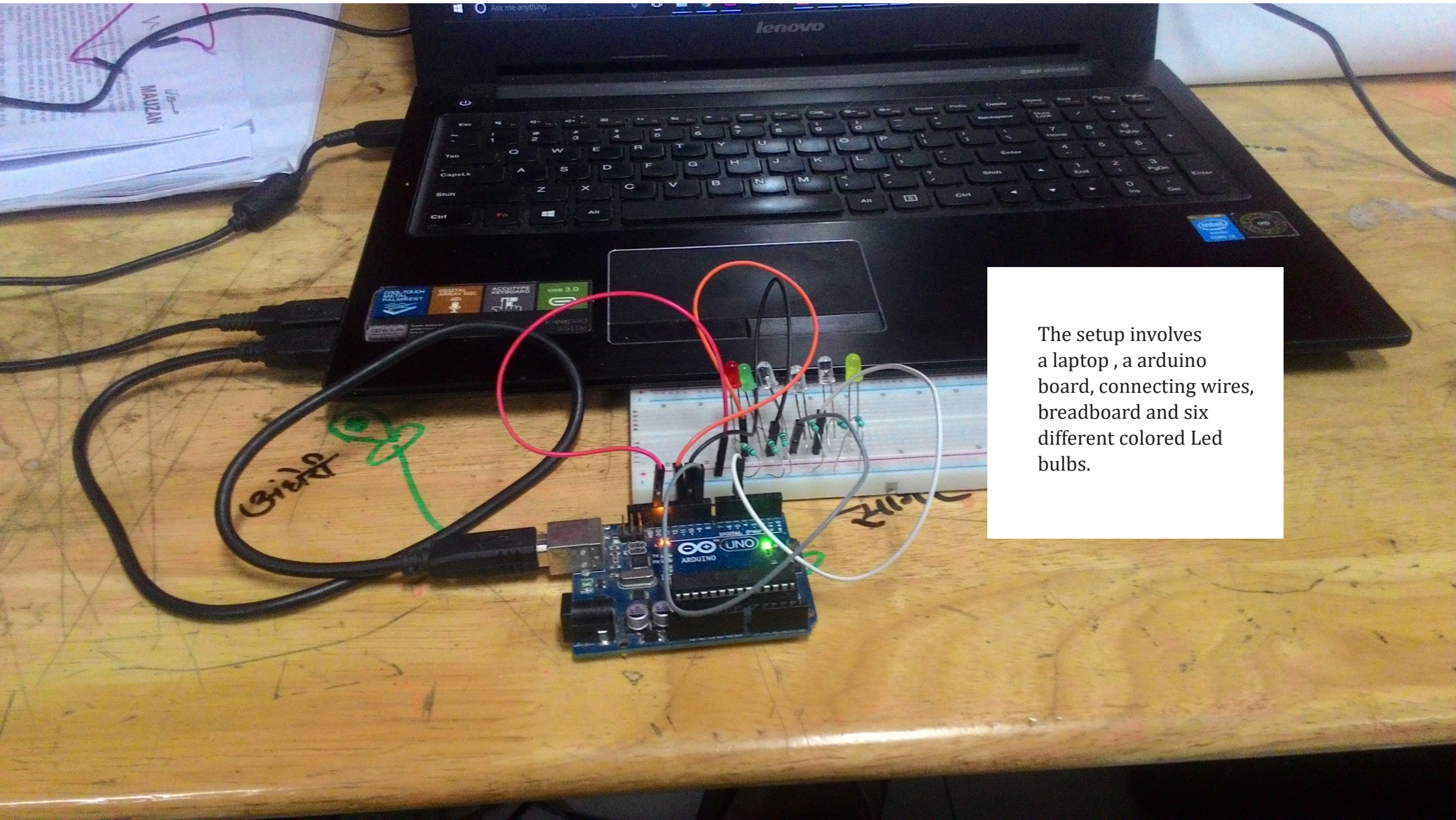
For achieving this a small map can be built with lights on top of various locations. Each light would be tied to a particular sound frequency. When audio clip matching that frequency is played, the clip gets visualised as the location on the map.

Also different photographs of various places can be put up on the wall and the ambient sound related to any of the location can be played. The photograph having relation to the sound clip will get illuminated.

This is very cheap to execute and it can help in building systems that can process sounds and tell about where the sound originated. In understanding the traffic in a city or in geography this system can be applied. A city map can be structured on the basis of what areas generate what kind of sounds.

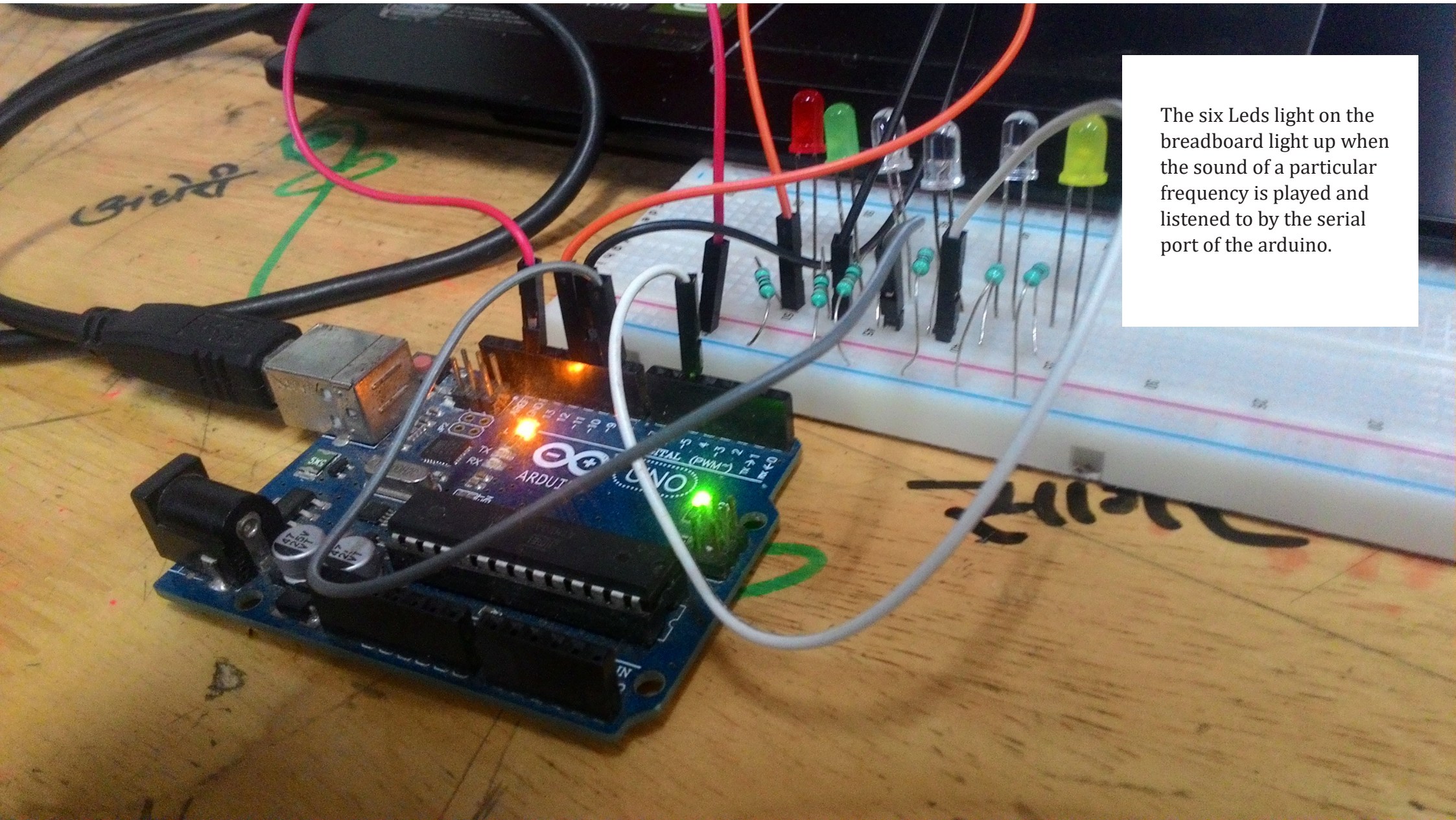


Auduino circuit



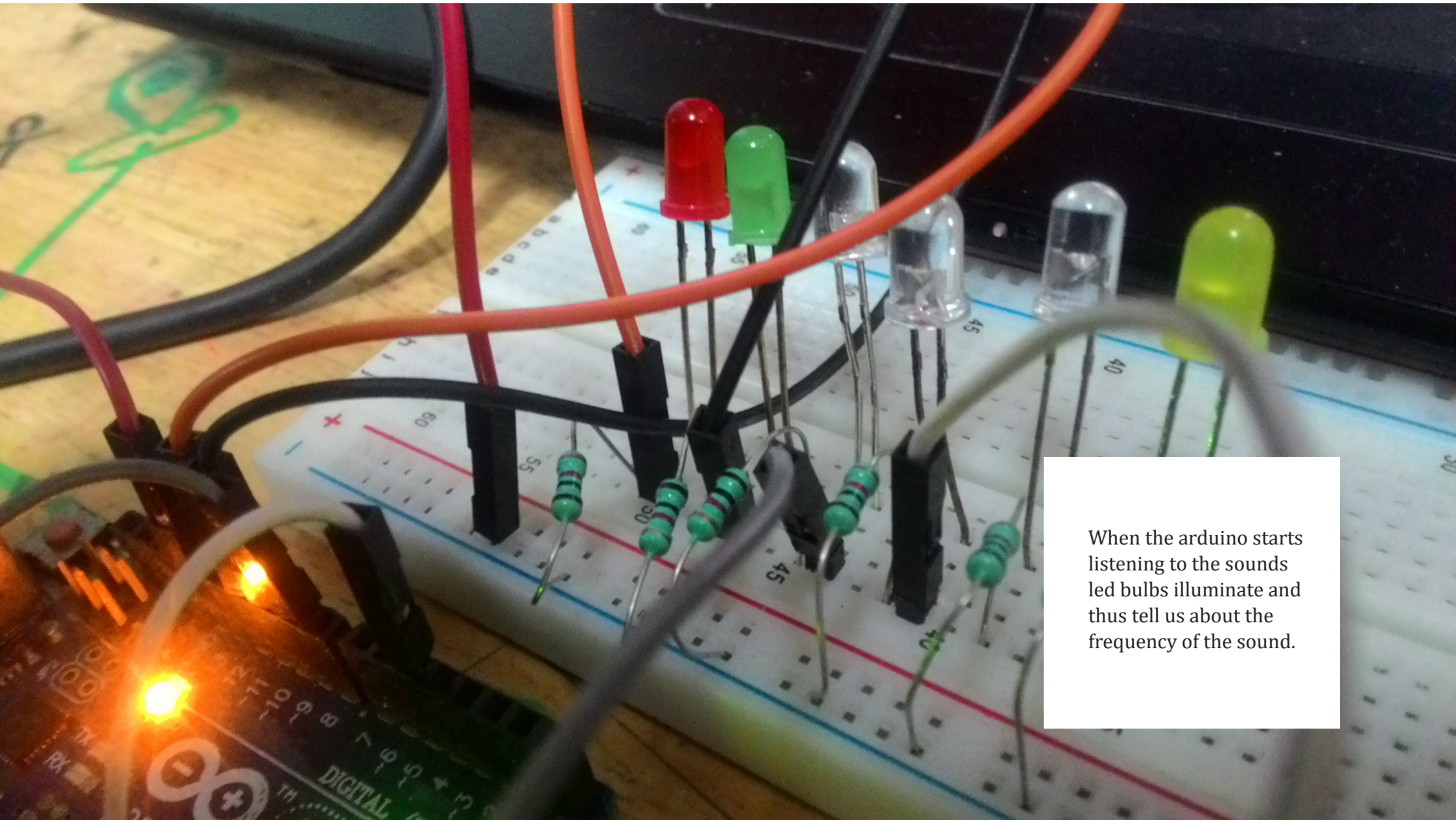
The setup involves a laptop, a arduino board, connecting wires, breadboard and six different colored Led bulbs.

Auduino circuit



The six Leds light on the breadboard light up when the sound of a particular frequency is played and listened to by the serial port of the arduino.

Auduino circuit



When the arduino starts listening to the sounds led bulbs illuminate and thus tell us about the frequency of the sound.

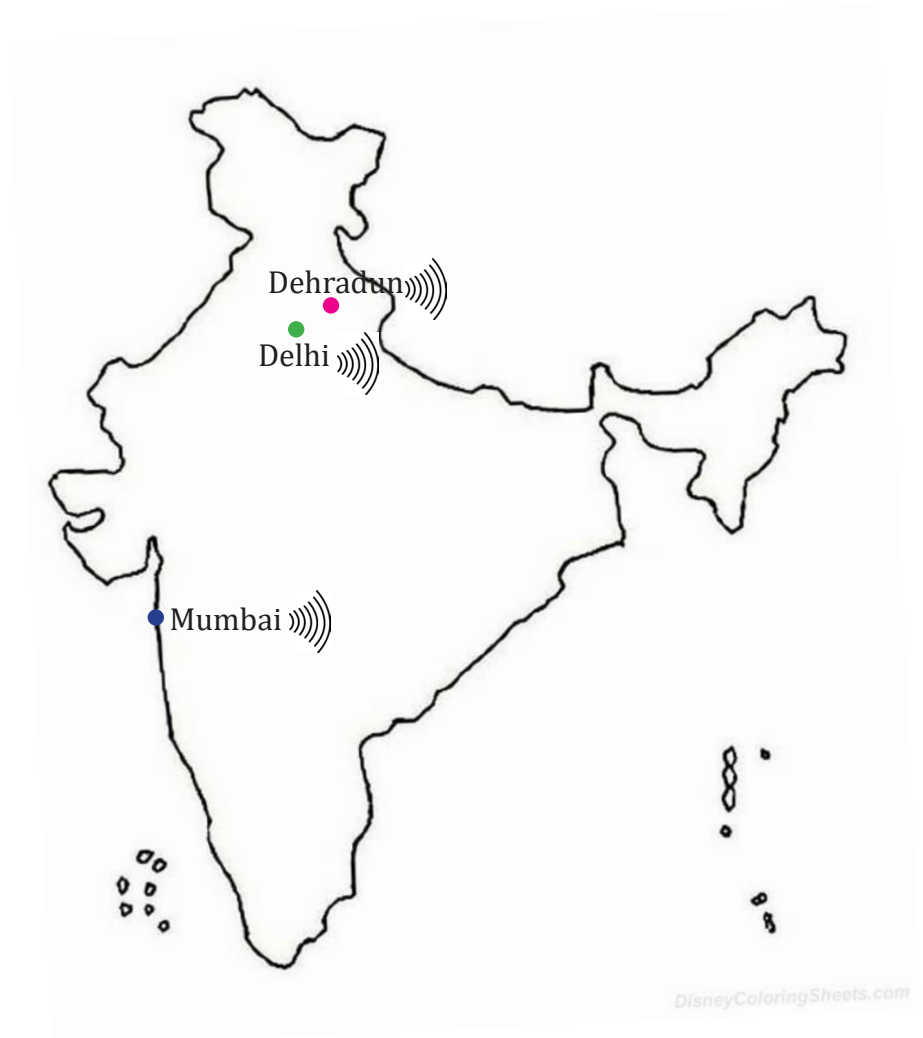
Concept video

Here you can see the circuit connected with the computer and the python code running on the background. When sounds are made the led lights start glowing and also when 'Hello' is spoken the lights immediately illuminate.

Conclusion

A sound can tell us about many things. One can experience sound not just as an audio but as a visual too. Geo tagging sounds is very common nowadays but having a system which can identify locations and map them with any given sound gives us more knowledge about the place. This increases our knowledge horizon and can be used in teaching students about geography in a more enriching way.

Mapping sounds to locations using AuVi would be fun and educating. One can take audio files of many cities in India and on playing them each sound can lead us to the place from where it originated. This way I have tried to create a system to help users find more creative ways to visualise sound and use the information for exploration.



**DRS report
by Naveen Rawat**