Welcome!

Thanks you for your interest in NoiseTube! In this document we introduce the basic concepts and goals of the project, and, most importantly, we explain how you can contribute to this innovative research project.

Jesse Zaman
Introduction

Noise pollution is a serious problem in many cities. NoiseTube is a research project, started in 2008 at the Sony Computer Science Lab in Paris and currently hosted by the BrusSense Team at the Vrije Universiteit Brussel, which proposes a participative approach for monitoring noise pollution by involving the general public. The NoiseTube mobile app extends the current usage of mobile phones by turning them into noise sensors enabling citizens to measure the sound exposure in their everyday environment. Furthermore each user can participate in creating a collective map of noise pollution by sharing geolocalized measurement data with the NoiseTube community.

By installing the free app on your smartphone, you will be able to measure the level of noise in dB(A), and tag the measurements obtained (e.g. subjective level of annoyance, source of sound,...). When uploaded to the website (3G, WiFi or manually) you can check your sound trajectory on Google Maps.

Getting Started

Here we explain the basic features of the NoiseTube web application, accessible on http://www.noisetube.net.

Exploring the Web Application

The address of the NoiseTube web application is http://www.noisetube.net. If you go here you will be welcomed by the home page, as shown on Figure 1, which introduces the project. You can always go back here by clicking on the About link in the menu bar on top of the website. More importantly, using the menu bar you can navigate to the different parts of the website:

• People Here you can explore noise (pollution) exposure data contributed by different NoiseTube members. The list is sorted according to the number of contributions that have been made by each member. Clicking on a member’s name will take you to that persons ELog page where you can see his or her shared contributions.
Figure 1. NoiseTube web portal homepage

- **Tags** Here we present an innovative feature that allows you to navigate and search through the semantic space consisting of the manual and automatic annotations (tags) that have been associated with the noise exposure data we collect.
• **Download** Here you can download the NoiseTube mobile application to install on your phone. While not required it is recommend to first create an account (see below) before downloading the application.

• **Join!** Click here to create your own account and become a NoiseTube contributor.

• **Login** Once you have an account, click here to login to access the member-only website features,

• **Help** Click here to find the latest version of this user guide.

• **Publications** Here you can access the scientific papers that we have published about this project.

• **Team** Click here to find out who is behind the NoiseTube project.

**Creating an Account**

By clicking on the **Join!** Item in the menu bar you will be led to the sign-up form, shown in Figure 2.

Choose a username and a password and provide us with a **valid** e-mail address. Furthermore we like to know which kind of mobile phone you use (brand and model) so we can prioritise further development and testing of our mobile application for the most used phone models. Also please tell us where you live (city, country) so our system can associate your contributions with that place if the data is not geo-tagged already (through GPS or manually).

Finally, to protect NoiseTube from **spambots** and similar internet hazards we ask you to fill out the CAPTCHA field to prove that you are indeed a human being and not a computer program. You can do this by simply typing the “wavy” words/numbers that are shown. If they are not readable you can click on the buttons to either see a new pair of words or to hear them being pronounced.

After filling out the form, click the “Sign up” button.
Member-Only Web Application Features

After creating an account you can begin to explore the member-only features of NoiseTube. To do this click the Login button on the menu bar, type in your username and password and click the “Log in” button. In case you forgot your password there is a link you can click to receive a new password by e-mail.

Your ELog
After logging in you will end up on your personal ELog page. Taking inspiration from the term (we)blog, we came up with the concept of an environmental or exposure log, or ELog for short.

If you just created an account your ELog will still be empty but this is the place where you can see an overview of all the measurement sessions (called tracks) that you have contributed to NoiseTube. Figure 3, on the next page, shows a screenshot of an ELog with content. For each track a summary of the measurements is provided, including a loudness histogram, total duration, distance covered, average loudness, etc. Also different types of contextual tags associated with the data in this track are shown:

Location tags, time tags, social tags inputted by yourself, etc. Furthermore, if the track was recorded with GPS coordinates a small map will show the location where the track was made and a big map in KML format can be downloaded. Since
NoiseTube contributors have ownership over their contributions you can download the data (in JSON format) by clicking on the “Data” link and you are also free to delete any of your previously recorded tracks by clicking the “Delete” link. On the left side of the ELog page overall summary information is shown about your activity, frequently occurring tags and the daily distribution pattern of your exposure to noise. There is also a “Upload data” link that takes you to the page where you can upload tracks file recorded on your phone using NoiseTube Mobile. You can always go back here by clicking on the Your ELog link in the menu bar.

Figure 3. Personal environmental/exposure log or ELog

Your Profile
By clicking on the Your profile link in the menu bar you will end up on a page where you can edit your profile details (e.g. city/country, type of phone) and upload a personalised avatar picture.
Mobile Application

This section introduces NoiseTube Mobile, its technical requirements and how to download, install, configure and use it. Currently this application is available for the iOS and Android platform.

Downloading

Android Version
Distribution of the application (and all updates) happens through the Android PlayStore. Search for "Noisetube" in the PlayStore app on your Android phone

iOS version
Distribution of the application (and all updates) happens through the AppStore. Search for "Noisetube" in the AppStore on your iOS device.

Permissions
To function properly the NoiseTube Mobile application needs to have permission to use certain features of your phone. By default you will be asked to explicitly grant permission to record sound, access the network, use GPS, etc.
Using the Application

In this section we will explain how to use NoiseTube Mobile to measure and monitor the noise level in your daily environment.

Application Startup

To start the application go to your phone’s applications menu, and look for the NoiseTube App.

After starting the application, the main menu is shown (Figure 4). This menu provides 3 options:

- **Login** When connected to the internet, users can log in with their NoiseTube account. Users that are logged in will have all their measurements uploaded automatically.
- **Measure** When not connected to the internet, users can still use the NoiseTube app to measure sound levels using local storage. These files can be uploaded at a later time using the website.
- **Register** Provides information to users that are not yet registered on the website.

Join our community to visualise your noise measurements on a map and to contribute to city-wide noise maps from all over the world!

Register at:
http://www.noisetube.net/
Logging In

When you try to log in, the app will detect whether it can access the Internet and contact the central NoiseTube server. If this is successful the program will ask you to agree with the Terms of service (Figure 6), after which it will ask you to login by providing your NoiseTube username and password and clicking “Enter”, as shown on Figure 30. This is the username and password of the account you created on the NoiseTube website. Logging in is necessary to automatically send the data you record to the central NoiseTube web application to store them there for later consultation (i.e. through maps) or sharing with others.

Figure 7. Terms of service
Figure 6. Login prompt
Noise Measuring Interface

After logging in (or clicking the Measure button) the noise measuring interface, as shown by Figure 8, will appear on the screen of your phone. This is the main screen of the application.

In the top part of the screen you can see the noise level (loudness) you are exposed to in real time. The number that is shown is an $L_{eq}$ value measured in dB(A). This value is updated every 1-2 seconds and is computed by a signal processing algorithm in the application which uses the sound that is recorded through the microphone of your phone as input. Next to the noise level value a histogram shows the noise level variation during the last few minutes.

![Figure 8. Measuring interface](image)
Map View

The map view indicates the current user location. Noise measurements made will also be drawn on the map using circles that are colour coded based on the sound levels.

Figure 9. Map view
Tagging View

In the Tagging view, you can annotate (tag) the noise exposure measurements you are making with additional information (metadata). The purpose of this metadata is to augment the raw measurement values with meaningful information that facilitates data interpretation and informs the NoiseTube community. For example, you can indicate sources of noise (such as “traffic”, “airplane”, etc.) and describe your own subjective perception of the situation (e.g. “annoying”, “pleasant”, “loud”, …). However, these are just suggestions, the tagging system is totally open ended, which means you can use it to provide whatever kind of information you like.

To make an annotation, type any word or a number of words separated by commas. When you are done typing confirm by clicking on the “Tag” key. Once you have tagged a measurement a blue vertical line will appear in the histogram to mark it.

Figure 10. Tagging view
Best practices for noise measuring

There a few simple rules to properly use NoiseTube Mobile to measure your exposure to noise:

- Do not make measurement while the phone is in your pocket or purse, nor while you are making or receiving a phone call or typing a text message
- While making measurements try keep the phone in your hand, slightly away from your body, as shown on the figure below. Optionally you can point the microphone (usually at the bottom of the device) towards the suspected source of noise.
- You are entirely free to decide the times and places at which you make measurement, however minimum duration of 5 minutes is recommended.
- You can use NoiseTube Mobile indoors but because GPS most likely will not work.

Figure 11. Using NoiseTube in the street
Calibration

To achieve a reasonable level of accuracy the loudness measuring algorithm in the mobile application needs to be calibrated, ideally for each phone model. Currently the software has only been calibrated for a limited number of models (listed here: http://noisetube.net/download). The phone detects these models and will apply the correct settings accordingly.

This does not mean that you cannot or should not use NoiseTube Mobile on other phone models. It only means that we cannot guarantee that the L_{eq} values you will get will be accurate enough to compare with other data. Even so the data you should still allow you to see the variations in loudness you are exposed to at different locations and different times of the day.
Advanced Web Application Features

Exploring and interpreting of noise exposure data through tags

One way to explore the noise exposure data that is made available through NoiseTube is the tag exploration feature, accessible by clicking on the Tags link in the menu bar. As shown by Figure 12, this feature allows you search through and zoom in on parts of the entire NoiseTube dataset by selecting a set of tags or a “Scope”. With each selected tag you effectively zoom in on a small subset of the dataset. Tags can be removed from the set by clicking on the “x” link next to them in the “Scope” listing. The tags are grouped in different categories and come from both manual user input and automatic tagging classifiers can add additional contextual information concerning noise signal behaviour, user activity, weather conditions at the time of measurement, time markers (e.g. “evening”, “weekend”, “winter”, etc.) and location markers which are generated by reverse geo-coding GPS coordinates (e.g. “Paris”, “Rue Monge”, etc.).

At any point in your exploration you can download a map of the current dataset by clicking on the KML icon.

![Noisetube logo](image)

**Figure 12. Exploring noise exposure through tags**

**API**

The NoiseTube platform exposes a public web API which enables anyone to use NoiseTube data or widgets in third-party applications, websites or mash-ups. At [http://noisetube.net/api_overview](http://noisetube.net/api_overview) you can find documentation about this API.