Final Application Project Report

Developers
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Device Name: Cloyster

Platform: Android

Project Title: EnviroMod

Project Pitch:

This application allows the user to generate tones using amplitude and frequency modulation with accelerometer data. Using location services, the tone color of the generated sounds will be different in every place through a GPS-based seeding generator. By turning the tablet around in various positions, the user can create interesting and rich sounds with the push of a button. Users can also record and upload their recordings to a server and listen to previous recordings.

Platform Justification:

We chose android because it has extensive documentation for its location and GPS implementation. There was also more documentation and examples for the android flavor of libPD, the library used for sound generation. libPD encapsulates a Pure Data patch, which is a programming language for sound generation.

Key Features:

The application is divided into three main activities, accessible from the launch screen. The first activity, New Recording, allows the user to generate and record sound using frequency and amplitude modulation synthesis. Recordings are uploaded to a server, which is accessible at http://www.austinpetrie.com/enviromod/. The second activity allows users to listen back to previous recordings that are saved offline. The third activity is a help screen which offers a description of the application as well as a basic description of frequency and amplitude modulation synthesis. The help screen also features an animated visualization of the sound synthesis techniques.

Testing Methodologies:

In order the test the app, we tried EnviroMod in several different locations in order check the location services and its effect on sound timbre. To ensure the optimal sound quality

for sonic generation, we tested an extensive number of coefficients and multipliers for frequency and amplitude modulation coefficients. We also gave the app to several friends to get their input on what sounds were interesting and what didn't sound very good.

Usage:

The user first arrives at the welcome screen which displays three options: New Recording, Saved Recordings, and Help. In order to use the New Recording activity, the user first types in a name for a new sound file. A new sound file cannot be recorded without entering a sound file name. Next, the user has the option to choose between FM and AM synthesis using the toggle switch at the top of the screen. To generate sound, the user can press and hold "Play Sound On Hold" for short sounds, or toggle "Permanent Sound" for continuous sound creation. The user can tilt the device to manipulate the different sonic parameters and to create new sounds. The carrier frequency parameter is mapped to the X-axis of the accelerometer, the modulator frequency is mapped to the Y-axis, and the modulator depth is mapped to the Z-axis. When the user is ready to record, they can press the "Record" button, and "Stop" when they are finished recording to upload the sound to the server. Using the Saved Recording screen, the user can listen to previous recordings that have been saved offline. Every sound file recorded is uploaded to our server, which contains all sounds that have been recorded on every version of EnviroMod. Users can visit http://www.austinpetrie.com/enviromod/ to hear all EnviroMod sounds.

Lessons Learned:

After learning how to use and implement intents, activities, and layouts for the Android project, setting up our app was relatively simple. We had never used external libraries before, but we soon became familiar using LibPD. Though Matthew had some previous experience using Pure Data, programming a PD patch that received the correct data from Android and synthesized sound was difficult. We learned how to properly create a PD patch which generates both frequency and amplitude modulation synthesis. We learned that using LibPD is relatively simple once a synthesis patch has been created in the proper way. The patch receives messages through the function like PdBase.sendFloat("inlet_name", sendValue). This function call allowed us to contain all sound synthesis to the PD patch, which left the issue of calculating the proper values for coefficients in Android. We learned how to use Android's location services as well as motion sensor data, and used the information to calculate values to send to PD. One major issue we encountered was handling location permission requests. We spent a significant amount of time figuring out how to properly request the location services and check to ensure that permission has been granted. After many application crashes, we figured out that we should approve location services in the main launch screen, and then location data is requested and gathered on the creation of our New Recording activity.

We also learned how to save files offline and how to upload them to a server, which was new to our group.