MITACS Globalink Research Internship Project Report

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I have worked on the research project titled *Sound Source Localization of an Urban Noise Nuisance – The Ranchlands Hum* with Dr. Mike Smith, Professor, Department of Electrical and Computer Engineering, University of Calgary as a Globalink Mitacs Intern. I am currently pursuing my final year in the Computer Science and Engineering Department of PES University, Bangalore, India.

During the course of my internship I had the opportunity to work on an android application which detects the presence of a sporadic low frequency hum that has been plaguing the residents of the Ranchlands Community of Calgary referred simply as the *Hum Application.* During this period I went through the work done by previous MITACS interns and understood the expectations and goals of my supervisor. I strengthened my concepts on Digital Signal Processing which is a very diverse and intellectually stimulating field with a wide variety of applications and got my hands dirty with the android application.

During this short period of time from May 2016 to August 2016 (a little under 3 months), I could make additions to the application which are listed down below:

1. Added functionality to calibrate the internal microphone of an inexpensive android device using an industry grade external microphone. *Explained in more detail in "Calibration of an Android Microphone".*
2. Added functionality to change recording settings by creating a preferences activity to match user settings. This activity provides the user with the ability to indicate:-
    a. The start time of the recording.
    b. The end time of the recording from start.
    c. How often to record
    d. Duration of the recording
    e. Threshold above which to record.
    f. Whether to use calibrated values from file
    g. Store original sound
    h. Turn GPS On / Off (With the users' consent).

    This is explained in more detail in *"Recording Preferences Settings".*
3. Added the ability to store all previous recordings and play them from within the application.
4. Ability to upload recorded data to a remote secure cloud database – This functionality requires internet and the recorded data can be uploaded to an online database.
5. Ability to generate the Spectrogram of an audio file remotely (on a server) implemented using Python.
6. Ability to store a recorded sound to be independently accessed using the Android device's graphical user interface.
7. Distributed the code into functions for easier understanding.