**Company: Breathe Music**

**Contact: Ryan Emerson**

**Briefly describe the idea or problem and discuss why this project is relevant and timely.**

This exciting and challenging project involves the use of a GAN to simulate songs for use within a larger AI system.

This is an interesting opportunity for a capable student to explore some of the latest developments in deep learning to help build a cover song recognition system.

An effective cover song recognition system is essential for artists to be paid the royalties they deserve -- an unsolved problem on the scale of billions of dollars globally.

**What are the specific aims of this project?**

Every song can be turned into a “spectrogram” which is a visual representation of an audio source. Spectrograms are essential when it comes to working with audio in musical recognition and other fields. As such an audio problem is turned into an abstract computer vision problem.

Research practical applications of autoencoders. Explore the possibilities and limitations of using an autoencoder to simulate music. Use an autoencoder to generate spectrograms corresponding to realistic cover songs. Use generated spectrograms to improve performance of Breathe Music’s cover song recognition system.

**What specific methodologies/skills/software are most important for this project?**

Python, Generative Deep Learning, PyTorch, specific aspects of Digital Signal Processing, Creative Problem Solving.

**Do you envisage any barriers that may impact on the objectives of this project? For example, availability or access to data based on the current pandemic/working from home.**

We don’t envision any barriers but do consider the following to be important:

* Access to GPU computation,
* Confidence in approaching a multi-disciplinary problem,
* Patience to work through technical difficulties.
* We are willing to provide support throughout the project with a prepared dataset, mentorship and possibly computation resources.

**Are there any eligibility requirements to undertake this work?**

An NDA with Breathe Music Limited would be required in order to undertake the project.

**Is the project suitable for a part-time student?**

Preference for full-time but based on number of allocations it could be possible to offer one project as part-time.

**Any other comments?**

This is one of two projects involving generative modelling at Breathe Music. There is a possibility for a position at Breathe Music after successful completion of the project.