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In Collaboration with

UNIVERSITY OF WESTMINSTER

**HarmonySync**

**Deep Learning-Based Automatic Violin Music Transcription System**

A dissertation by

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## ABSTRACT

Teaching methods in music lessons are commonly structured involving instructors, who do not offer students practicing individually timely feedback. This puts a negative twist on the method since the students cannot follow or correct their learning in real-time. Current AMT systems are incapable of offering feedback instantaneously, and they can only be applied to learning environments that are diverse and learning levels as well. This project fills this gap by implementing a real-time AMT system that transcribes notes correctly and provides the feedback required for a great music learning experience.

To achieve real-time recognition of music notation for sounds, this system employs signal processing combined with some criteria inherent to deep learning. First, the model of transcription is learned from the volume of samples of a given set of instrumentations. Before feeding the input in the model, there are a few pre-processing steps to be carried out, which involve the elimination of noise and estimation of Pitch level.

A review of the initial performance of the AMT system shows a transcription with high accuracy for different instruments and a processing with minimal latency, making the feedback real-time. According to early testing carried out with music students and educators, the integrated system results in a substantial improvement in practice efficiency by providing practical feedback in real-time to inform the student of errors that need correction.

### **Subject Descriptors :**

Applied computing -> Arts and humanities -> Sound and music computing

Computing methodologies -> Artificial intelligence -> Machine learning approaches -> Deep learning

**Keywords:** Automatic Music Transcription, violin transcription, deep learning, CNN-LSTM, music information retrieval, audio signal processing, feature extraction, music education, real-time transcription, violin note recognition