Statement of Purpose - Julien Guinot

Interested in researching under Dr. Juan Pablo Bello (jpbello@nyu.edu))

For the past eight years, music has been a focal point of my life and captivated me by its technical and subjective nature. Recently, this passion has crystallized into a vivid interest in pursuing research at the crossroads of artificial intelligence and music. Technological advances in AI have a beneficial influence on creative processes, and music is no exception. I aim to deepen my understanding of Machine Learning and contribute to state of the art in high-level academia or industry research as a professional Music-oriented ML researcher. Thus my motivation to build upon my graduate degrees and research experience by undertaking a doctoral degree in computer science at NYU Tandon under Juan Bello's supervision.

Music has been my driving passion since high school. It seems almost instinctual to me that music should be intimately associated with my career, so in my third year of undergraduate engineering studies, I elected to specialize in acoustics to get as close as possible to music in a technical curriculum. I have COVID to thank for my interest in musical AI: While waiting for Australian borders to open to pursue my dual Master's degree, I discovered a new field: Machine Learning. At this point, I *knew* I wanted to combine the technical creativity of ML with the artistic creativity of music in my work. I am singularly fascinated by the unexplored alleys at the nexus of music and machine learning and the questions they prompt: how can ML catalyze and explain human creativity?

The idea of advancing the state of the art - the singular moment of knowing one has expanded human knowledge in a field that one is passionate about - draws me to research. I am in awe of and avidly curious about the advances in AI applied to creativity. The admiration I hold for these researchers compels me to conduct research with the level of innovation and standards held at NYU. By joining the Computer Science doctoral program, I hope to develop my research experience and explore topical and fascinating aspects of ML in a program that routinely outputs top-quality research. I am confident that pursuing this doctorate will prove a valuable step toward my long-term goal of researching ML applied to music in industry or academia. As an avid learner and a versatile musician, my research interests span a wide range of topics, many of which align perfectly with the research produced by Dr. Bello. I am highly interested in Automatic Music Transcription, (Polyphonic) F0 estimation, generative methods for music, audio source separation, and differential digital signal processing - all in the context of novel unsupervised and cross-modal learning methods. Following Dr. Bello's work and

having corresponded with him prior to submitting my application, I am eager to work under his supervision. His work on automatic music and drum transcription paves the way for studies on polyphonic sources. His papers on few-shot source separation, vocal ensemble F_0 estimation, and multi-modal language-music learning are directly related to my areas of interest and specific research ideas. These ideas are centered around but not limited to studying the singing voice through AI and the application of novel cross-modal generative methods to various tasks such as sample generation, harmony generation, and melody in-filling.

I am confident previous experiences and skills make me a perfect fit for this doctoral program. The most recent of my three previous research internships - delving into music tagging for recommender systems at Groover - has allowed me to develop research skills in the domains of Machine Learning while studying advanced ML topics. My curricula as an engineering student have given me insight into fields closely related to AI, research, and music: Machine Learning, Algorithms and data structures, statistics, and signal processing. While pursuing my classes in Australia during the pandemic, a 9-hour time difference made keeping up quite challenging. I persevered, obtaining the golden key award for academic excellence while following extra university ML courses I sought out for myself. In one research-project-based class, I undertook a project of my invention to classify vocalists using computer vision, for which I was top of the class. My three data science internships have allowed me to develop a set of essential technical skills for ML, including but not limited to: Python, TensorFlow, PyTorch, Librosa, C++, and Git. My passion for music and the knowledge domain that comes with it is also something I will bring to the table for this program. I believe it will provide a solid basis for my research. My diverse musical experiences in the past years will help me adapt to any research within the intersection of my interests and my supervisors'. It will also fuel the scientific curiosity on which my pride myself, and is central to any research degree.

For most of my higher studies, I've had the understanding that ML and Music were two areas that inspired me and motivated me to expand my knowledge and go above and beyond expectations. I now find myself in the thrilling position of knowing exactly how those puzzle pieces should fit together to fulfill me academically, professionally, and passion-wise in the future. I feel the path before me at NYU is the best for putting those pieces together. I look forward to my studies at NYU Tandon and the new challenges they will bring. I am confident that I will discover new passions, curiosities, and questions as I prepare for my hopeful career in ML & Music research.