Title:

"Immersive Soundscapes: Enhancing Dragonfly Auditory Representation through Phase Modulation Synthesis and Field Recordings"

Download Link (*I Wish I Was a Dragonfly.mp3*): https://drive.google.com/file/d/1_LZHnmEmqb98c99j2may_315DgoZuA33/view?usp=sharing

Abstract:

This paper explores the innovative integration of phase modulation sound synthesis with field recordings to enhance the auditory representation of dragonflies in a soundscape composition. The composition, titled *I Wish I Was a Dragonfly*, aims to offer listeners a unique auditory experience that immerses them in the perspective of a dragonfly, juxtaposing the natural sounds of these insects with sound synthesis enhancements. By blending sounds created by phase modulation synthesis with the original recordings, the study not only augments the auditory texture but also aims to highlight the subtle yet significant role of dragonflies within our ecosystems.

The Role of Dragonflies in Ecology and Environmental Challenges:

Dragonflies, with their vibrant appearance and agile flight, play a crucial role in the ecology of their habitats. They are not only vital predators of mosquitoes and other small insects helping to regulate populations of potential pests, but they also serve as indicators of environmental health due to their sensitivity to changes in their aquatic and terrestrial environments (Dijkstra, 2006).

However, the ecological importance of dragonflies is increasingly threatened by environmental changes. In Europe, the loss of wetlands - a critical habitat for the aquatic nymphs of dragonflies - has led to significant declines in dragonfly populations (Lindh, 2020). Wetlands are being drained or degraded due to agricultural expansion, urban development, and climate change. This loss of habitat not only affects dragonflies but also disrupts the broader ecological balance, as these insects are integral to the health of many ecosystems.

Phase Modulation Synthesis: Enhancing the Dragonfly's Acoustic Presence

In this composition, phase modulation sound synthesis was employed not to replace but to complement the natural recordings of dragonfly sounds. The synthesized sounds were designed to enrich the existing natural dragonflies wing recordings, creating a fuller and more immersive auditory experience. Through this approach, the composition encourages listeners to imagine how the world might sound from a dragonfly's perspective or how a dragonfly could sound by blending reality with artistic interpretation. This technique adds depth to the soundscape piece, offering a unique sonic lens that aims to enhance the listener's connection to the natural world.

Artistic and Technical Challenges

Creating a seamless integration of synthetic and natural sounds presented both artistic and technical challenges. The goal was to use sound synthesis to enhance the natural recordings without compromising their authenticity and extend the dragonfly's vocabulary which is not audible by humans. I have experimented with various synthesis techniques before deciding to work with PM to ensure that the final composition was both rich and immersive, while adding new dimensions to the listener's experience.

Phase modulation (PM) sound synthesis is a powerful synthesis technique that allows for the creation of complex sounds. It involves altering the phase of a waveform in a way that changes the perceived pitch or timbre of the sound (Roads, C. 1996). This modulation results in complex harmonic structures that can also be used to emulate natural sounds or create entirely new sonic textures. As it is particularly effective at generating sounds with a wide range of harmonic content, it is ideal for imitating some of the subtle and intricate noises found in nature.

The piece *I Wish I Was a Dragonfly* traces the journey of a dragonfly as it transitions from the serene quietness of wetlands to the acoustically complex conditions of an urban environment. It begins with raw recordings of dragonfly wing sounds, capturing the delicate rustles and whirs of these insects. As the piece progresses, these natural sounds are gradually enriched through the use of Phase Modulation and blend with urban field recordings to create an artificial sonic landscape.

Conclusion

This composition exemplifies the dynamic potential of sound synthesis in enhancing our auditory connection to the environment. By inviting listeners to engage more deeply with the natural world through an innovative fusion of natural and synthetic sounds, the composition enhances the auditory experience and deepens our appreciation of the delicate acoustic balance within our ecosystems. Through the careful blending of these elements, the composition serves as both a celebration of the dragonfly's role in the environment and a reminder of the intricate soundscapes that surround us.

References

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