TECHNOLOGY LICENCING OPPORTUNITY

DNoiseNet: Deep learning-based active noise control in construction sites and other noisy environments

Technology Details

University of Manitoba researchers have developed a technology called DNoiseNet that leverages cutting-edge deep learning techniques to improve the performance of active noise cancellation. Unlike traditional methods that are limited to specific frequency ranges and linear noise characteristics, DNoiseNet is capable of dynamically adapting to the complex and changing noise patterns found in environments like construction sites, vehicle interiors, and airplane cockpits. The system's architecture incorporates a recurrent neural network (RNN) component, allowing it to remember long-term data patterns, thus providing superior noise cancellation performance. Extensive parametric studies show that DNoiseNet outperforms conventional ANC methods in terms of root mean square error and noise attenuation metrics.

Applications

Construction Industry & Transportation Sectors: Implementing DNoiseNet on construction sites can significantly enhance worker safety and productivity by minimizing distracting noise levels, leading to improved mental health and performance. Integration in vehicles can provide a quieter cabin experience enhancing comfort and reducing fatigue during travel.

Technology Benefits

Construction sites and other noisy environments contribute to excessive external noise, which adversely affects human mental health and work performance. Studies indicate that prolonged exposure to high noise levels can lead to issues such as increased blood pressure, insomnia, and cognitive impairments. Traditional active noise control (ANC) systems often rely on linear filters, which struggle to efficiently address the high nonlinear and nonstationary nature of various environmental noises. DNoiseNet presents an innovative deep learning-based active noise controller specifically designed to overcome the limitations of traditional ANC systems. By employing advanced mathematical operators—including atrous convolution, pointwise convolution, nonlinear activation filters, and recurrent neural networks—DNoiseNet effectively learns and adapts to multi-level temporal features of unwanted noise in real-time. The system utilizes a single sensor approach to generate anti-noise signals that can significantly reduce unwanted noise levels, enhancing the working and living conditions in challenging environments.

Development Stage

DNoiseNet has undergone parametric and comparative studies demonstrating its effectiveness in controlled environments. The technology has been tested to show improvements in noise cancellation performance. DNoiseNet needs to be tested in actual operational settings, such as live construction sites or during vehicle operation.

Patent Status:
US Patent (US 12,087,265 B2; issued 10 September 2024).

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