Advancements in Active Suppression Techniques for Reducing Transformer Noise
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Intrusive transformer noise in Bossone 604A
No clinical damage, but hinders productivity and well-being
Background sounds unconsciously redirect our attention via auditory processing [1]

Objective
Develop a software program to analyze active noise and phase it out via active noise cancellation.

Design Inputs

Constraints
Universal Accessibility of Transformer

Requirements
R1 - Sound Level
○ Reduction of at least 3dB
R2 - System Temperature
○ Maintain Temperature of at most 30 Degrees Celsius

Objective
Develop a software program to analyze active noise and phase it out via active noise cancellation.

Key Components:
Electret Microphone
Amplifier MAX446
- Takes in Raw Sound
Arduino Uno + Software
- Filters and Transforms Raw Sound
Subwoofer
- Outputs New Composite Sound
Computer
- Software Development and Verification

Solution

Verification Testing

Verification Test 1 (Frequency Generation Accuracy) - Pass
Verification Test 2 (Sound Output Check) - Pass
Verification Test 3 (FFT Accuracy) - Pass
Verification Test 4 - Software Automation and Integration with Hardware
Solution Active? No Yes
Avg Measured Sound (dBA) 52.4 55.7
Difference from Solution being Non-Active 0 3.3

Verification Test 5 - Component Temperature Check
Component Average Measured Temperature (°C)
Arduino/Microphone 23.7
Subwoofer 25.6

Conclusion and Societal Impact

Impact:
- Benefits students and researchers in the lab by improving noise exposure
- Design is applicable for different use settings (MRIs, HVAC systems)

Future Plans:
- Improvements to software processing and memory capabilities
- Market for commercial use and patent approval

Acknowledgements
Dr. Mark Schafer, Dr. Kurtulus Izzetoglu, Dr. Marek Swoboda, Dr. Joseph Sarver, Dr. Wan Shih, Dr. Jaime Dougherty, Claire King, Dr. Amy Throckmorton

References