|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Project Title** | The 9 Sines Audio Denoising Radio | | | | | |
| **Track** | Engineering & Applied Sciences | | | | | |
| **Supervisor** | Dr. Samah El-Shafiey | | **Mentor Name** | | Dr. Samah El-Shafiey | |
| **Team Name** | The 9 Sines | | | | | |
| **Team Members** | Yousef Khaled | Mariam Sherif | | Abdelrahman Hatem | | Lyan Ahmed |
| Eslam Fathy | Khaled Hamed | | Abdelrahman Ahmed | | Sarah Sameh |
| **Problem Summary** | 150 words. | | | | | |
| **Methodology** | **Wavelet Transform (WT)** is an effective method for audio denoising, particularly using the Threshold algorithm, which compresses noise in digital signals. **WT** consists of Continuous Wavelet Transform (**CWT**) and Discrete Wavelet Transform (**DWT**). **CWT** analyzes data in both time and frequency domains, using a scalable window to move across the signal. DWT is more precise, using discrete scales and translations based on powers of 2.  Audio denoising combines Partial Differential Equations (**PDEs**) with wavelet thresholding. The heat equation smoothing signal while soft thresholding modifies wavelet coefficients. The process involves adding Gaussian noise to the original signal, computing Signal-to-Noise Ratio (**SNR**) and Root Mean Square Error (**RMSE**), and applying the wavelet transform to decompose the signal. Threshold values are calculated, and wavelet coefficients are adjusted using soft or hard thresholding before reconstructing the signal.  Finite Impulse Response (**FIR**) and Infinite Impulse Response (**IIR**) filters are digital filters used for signal processing. **FIR** filters have a finite duration impulse response, while **IIR** filters have an infinite duration. Fast Fourier Transform (**FFT**) efficiently computes the Discrete Fourier Transform (**DFT**), reducing complexity and speeding up spectrum analysis. Denoising with those filters involves convolving input signal with the filter's impulse response, improving SNR. | | | | | |
| **Achievements and Skills Gained** | 1. **Text.** | | | | | |

|  |  |  |
| --- | --- | --- |
| **Project Title** | | The 9 Sines Audio Denoising Radio |
| **Main Results** | High Quality Figures | |
| **Discussion and Conclusion** | | Text. |
| **References** | | * Kumar, Nishant. (2013). Optimal Design of FIR and IIR Filters using some Evolutionary Algorithms * J. Jebastine, B. S. Rani (2012), “Design and implementation of noise free Audio speech signal using fast block least Mean square algorithm”, Signal & Image Processing : An International Journal * <https://github.com/youefkh05/The_9Sines> |
| **Future Work and Suggestions** | | Text. |
| **Group Photo** | |  |