Non-Invasive Detection of Sudden Infant Death Syndrome (SIDS) Through Recurrent Neural Networks

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The project's purpose was to code and train an artificial intelligence model, as well as to make an auxiliary device that monitors infants in their sleep to prevent cases of Sudden Infant Death Syndrome (SIDS) from turning fatal. To do so, a parabolic concentrator with a specially designed and fabricated amplification circuit was used to record the subject. The resulting audio data was cleaned up through a special adaptive noise reduction and feature extraction algorithm, which filters out excessive background noise, as well as extracts key frequencies from a Fourier transform. This filtered audio data was then fed into a custom-coded recurrent neural network model which had been previously trained on large amounts of recorded breathing data. This neural net's purpose was to identify each inhale and exhale from any other unknown noise. Each occurrence of detected respiratory activity was then fed into statistic inference algorithms that detect dangerous trends in the breathing. The entire model achieved 92.5% accuracy on continuous data and had a 10 second response rate on sudden stops of breathing. Because of the compatibility of my model with many off-the-shelf devices like Android phones and the Raspberry Pi, deployment on them is a very feasible future development.

Awards Won:

International Council on Systems Engineering - INCOSE: Certificate of Honorable Mention

IEEE Foundation: IEEE Foundation Third Place Award $400

Samvid Education Foundation: Geno Third award