Diagnosis of Respiratory Diseases Through Physiological Sound Analysis

Mohan, Sachin (School: Horizon International High School)

The core objective of this research is to revolutionize the diagnosis of respiratory ailments, through digitalizing the traditional stethoscope. The physiological sound data of the lungs from the digitalized stethoscope can be collected and used in artificial intelligence computation to derive an accurate diagnosis from the trends in data analyzed. The design and development of the medical diagnosis involved amalgamating both software and hardware components. A traditional stethoscope head-piece was converted into a digital instrument by collecting the sound harvested by the stethoscope and passing it through a microphone and pre-amplification circuit. The audio data was passed through a filtering algorithm which removed background noise and formatted the data to be suitable for analysis by a deep learning model. The deep learning neural network trained on a medical sound dataset, identified patterns in the audio data and was able to deliver a diagnosis with a high accuracy rate. The tests conducted showed that the deep learning diagnosis model achieved accuracy rates of 84%, higher than the diagnosis validity of a general practitioner 72% and can successfully identify different sets of respiratory ailments based on their physiological sounds. The research validated the possibility for respiratory ailments to be diagnosed based on physiological sounds and vital signatures by leveraging the current technology's computing power harnessed by artificially intelligent systems. This will allow for autonomous diagnosis as well as be able to provide doctors with clearer concise visualizations of their patient's conditions.