Paper id	BMEiCON2022-001
Title	A Low-Cost Digital Stethoscope For Normal and Abnormal Heart Sound Classification
Author	Sorawit Khoruamkid
Paper topics	

Abstract
Heart disease is a major problem in most deaths. To conquer this situation, heartbeat sound analysis is a convenient method for diagnosing heart disease. Heartbeat sound classification remains a challenging problem in heart sound division and feature extraction. A stethoscope is a medical device widely used by physicians to listen to the heartbeat. An acoustic stethoscope operates on the chest piece to the ears of the listener. The main problem is in listening to heart sounds that the low signal level and are difficult to be analyzed. Adding electronic circuitry and software to acoustic stethoscopes will strengthen the heart rate signal and can minimize error analysis of the state of the patient's heart. Machine learning is used to efficiently analyze and classify heart sounds.Convolutional Neural Network (CNN) models and Support Vector Machine (SVM) with feature extractors were effective methods and were used in this research. First, the Phonocardiogram (PCG) files are fragmented into pieces of equivalent length. Then, we convert the PCG files to a spectrogram. The spectrogram images are fed into a convolutional neural network and support vector machine. The best result is using an Inception V3 model with the CNN classifier which has an accuracy of 0.909, with 0.948 sensitivity and 0.869 specificity.