

Heart Murmur Detection/Classification System Using Cochlea-Like Pre-Processing

W. Ahmad,¹ M. I. Hayee,¹ Glenn Nordehn,² S. Burns,¹ and Janet. L. Fitzakerley²

¹*Department of Electrical and Computer Engineering,*

²*School of Medicine, University of Minnesota Duluth*

According to the most recent report of American Heart Association (AHA), heart disease, stroke and other cardiovascular diseases continue to remain not only the no.1 killer of Americans but also a major cause of permanent disability among American workers. Recently, many research efforts have been carried out to apply artificial intelligence (AI) to auscultation based method for rigorous detection/classification of heart murmurs but accuracy rates are not always high. All of the proposed AI techniques rely on converting the heart sound to an electrical signal and processing that signal to optimize the AI for murmur detection and classifi-

cation. However, all these techniques fail to recognize that the electrical signal coming out of the cochlea is very different than the electrical signal coming out of the microphone or any other electrical sensor which is commonly used for converting heart sound to electrical signal. In this research paper, we want to take a novel approach to pre-process the electrical heart sound signal before it goes to AI for murmur detection/classification by altering the electrical signal in a similar way as is done by the human cochlea before sending the signals to the brain. Our hypothesis is that cochlea like pre-processing will change the spectral contents of the heart sound signal to enhance the murmur information which can then be efficiently detected and classified by AI circuitry. Using this approach, we plan to develop an AI based system for heart murmur classification/ detection with success rate comparable to that of an expert cardiologist.