ABSTRACT

Compressive Sensing (CS) is a method that enables simultaneous sampling and data compression processes, aiming to expedite computation time while minimizing the required bandwidth for transmitting data through media. The applied compression enhances data storage efficiency on storage media and maintains data quality after undergoing a well-compressed data reconstruction process. Nowadays, Compressive Sensing has found widespread application in various fields, including the health sector. Progress has been made in acquiring essential information through small devices like the Internet of Things (IoT), enabling swift and real-time disease diagnosis and subject (patient) monitoring.

Previous research (Circular Shifted) has successfully found a new way to build a *sensing matrix* / *measurement matrix* in the CS process dynamically using the *first lead* data as a reference for the observed data. The SNR results obtained are significantly consistent compared to the *sensing matrix* / *measurement matrix* built using a *random sensing matrix generator*. However, the disadvantage of this method is that sometimes the SNR value obtained is still below the SNR generated using the *random sensing matrix generator*, and the processing time is still much longer than using the *random sensing matrix generator*. The current research (Vertical Shifted) has successfully developed the previous research where the SNR results obtained are better than before and can even beat the SNR results obtained from the sensing matrix using a *random sensing matrix generator*, as well as the *processing time*.

The test conducted in this study used secondary data from Physikalisch Technische Bundesanstalt (PTB) with patient codes S0010V1, S0035V1, S0045lV1 and MIT-BIH Arrhythmia Database with patient codes 123mV5, 223mV1, 233mV1. From the experiments conducted, the calculation results obtained where the *Vertical Shifted sensing matrix* is **44%** superior to the *random sensing matrix* and **25%** better than the *Circular Shifted sensing matrix* in patient S0010remV1, **41%** better than the *random sensing matrix* and **21%** of the *Circular Shifted sensing matrix* in patient S0035remV1, and **33%** better than the *random sensing matrix* and **46%** of the *Circular Shifted sensing matrix*. In patient 123mV5, the Vertical Shifted sensing matrix is better than the *random sensing matrix* by **58%** and **85%** of the *Circular Shifted sensing matrix*, better than the *random sensing matrix* by **46%** and **60%** of the Circular Shifted sensing matrix in patient 223mV1, and **174%** better than the *random sensing matrix* and **346%** of the *Circular Shifted sensing matrix*.

Keywords: Compressive Sensing, Sensing Matrix, Random Sensing Matrix Generator, Circular Shifted Sensing Matrix, Vertical Shifted Sensing Matrix