

ABSTRACT

News about the original shooting occurred in crowded places. As in (22/3/2024). There was a mass shooting at the Crocus Moscow City Hall, Russia by a group of people that killed many people. This is the reason that this research is necessary and very helpful for the military and civilians in finding the position of the perpetrator based on the detection of gunshots. The sound direction detector on the gunshot is one of the innovations that can determine the target, know about location information, and can be used as a means of communication.

Beamforming Minimum Variance Distortionless response (MVDR) is one of the techniques in determining localization in gunshot sound. This method can be used as a source of additional information that is more precise, by minimizing the variation of the noise component. This aims to improve localization performance as well as accurate Post-Processing tracking.

This research was conducted based on observations of sound in Gunshots. The results of the observation are in the form of sound samples that will be minimized and varied so that the sound obtained is clearer with the Minimum Variance Distortionless Response (MVDR) method, the purpose of this study is to achieve a closer position estimation, by optimizing the advantages of the method. In this study, we will discuss specifically about Minimum-Variance-Distortionless-Response (MVDR) with Signal to Noise Ratio (SNR) and Mean Square Error (MSE) as accuracy parameters. The results show that a microphone distance of 0.5λ produces the best performance with the highest SNR (38.53 dB), the lowest MSE (81% lower than other distances), and the smallest angular shift (within $\pm 10^\circ$ tolerance range).

Keywords: *Direction of Arrival (DoA), Gunshot locater, MVDR, localization, SNR, MSE*