

## Decoding Brain Wave Patterns for Speech Recognition in Individuals with Speaking Disabilities

KHPKK Kariyawasam<sup>1#</sup>, RALU Ranasinghe<sup>1</sup>, and RMM Pradeep<sup>2</sup>

<sup>1</sup> Department of Computer Science, Faculty of Computing, General Sir John Kotelawala Defence University, Sri Lanka

<sup>2</sup> Department of Information Technology, Faculty of Computing, General Sir John Kotelawala Defence University, Sri Lanka

<sup>#</sup>39-bse-0011@kdu.ac.lk

Decoding and predicting words from brain wave patterns is an area of growing interest, with numerous methodologies and machine learning techniques being developed to achieve this. However, despite the introduction of various tools and approaches—such as convolutional neural networks (CNNs), support vector machines (SVMs), and advanced noise reduction techniques—the challenges associated with these methods remain underexplored. This study aimed to identify and analyze the key challenges in predicting and decoding words using brain wave patterns. Our methodology involved identifying relevant keywords, selecting standard academic databases like IEEE, Google Scholar, and Elsevier, and critically reviewing the most pertinent research papers. Through a comprehensive analysis. The study highlighted the most common challenges faced by researchers in this domain, such as individual variability in brain wave patterns and the limitations of current machine learning models. Our findings underscore the need for further research and development to overcome these challenges, ultimately enhancing the communication capabilities of individuals with severe speech impairments.

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