Millions of people worldwide suffer from epilepsy, which is a neurological condition and non-communicable disease (Shoeibi et al., 2021). People with all kinds of epilepsy experience a much lower quality of life because seizures are not currently able to be predicted easily. The goal of this project is to create a deep learning-based seizure detection model that can predict epileptic seizures in real time using electrocardiogram (ECG) data that can be adapted and implemented into a wearable device. Despite advancements achieved by current machine learning models, problems including false positives, noise interference, and restricted real-time prediction skills still pose a big problem (Ghassemi et al., 2019). Long Short-Term Memory (LSTM), an advanced deep learning technology, is being used to address these issues. According to my preliminary findings using an EEG dataset (Venkata 2018), the Convolutional Neural Network (CNN) and LSTM models both achieved F1 scores of about 0.97 and 0.95, respectively, showing promising performance. However, when it came to managing temporal patterns and reducing false positives, the LSTM model performed better overall and showed more promise. As a result, it is more suitable for real-time seizure prediction as it would cause less distress on the patient. By using noise reduction approaches like Discrete Wavelet Transform (DWT) and Tunable-Q Wavelet Transform (TQWT), this approach aims to improve prediction accuracy and minimize false positives. The overall goal of this project is to create a wearable device that can identify seizures early enough for patients and caregivers to take preventative measures, improving the safety and quality of life for those who have epilepsy. With the long-term goal of creating a reliable, real-time seizure

prediction system, this study will evaluate and enhance the model through several experiments using various datasets.

Keywords: Epilepsy, Seizure Detection, Deep Learning, EEG, ECG, Wearable Devices, Machine Learning, Noise Reduction, LSTM