

EpiSave: Pioneering Precision in Epilepsy Management Through AI-Driven Seizure Prediction and Remote Care - Case Study

Executive Summary

AEye Technologies' EpiSave is a pioneering AI-driven platform designed to transform the management of epilepsy, a chronic neurological disorder affecting over 70 million people worldwide. With an innovative combination of mobile and web applications, along with advanced 3D brain mapping and real-time monitoring, EpiSave addresses critical challenges in epilepsy care. This case study highlights EpiSave's impact on improving accessibility, reducing costs, and enhancing treatment precision for epileptic patients to improve their overall treatment journey.

Introduction

Epilepsy affects over 70 million individuals globally, with 12 million of these cases occurring in India alone. The disparity between the number of epilepsy patients and the available neurologists—approximately 2,500 in India—exacerbates the problem. Approximately 60% of epilepsy cases remain undiagnosed, and 33% of patients live with uncontrolled seizures. This situation underscores the urgent need for effective, accessible, and personalized epilepsy management solutions.

Challenge

Managing epilepsy presents significant challenges due to the disorder's complexity and unpredictability. Traditional methods involve a lengthy and cumbersome process that includes booking appointments, navigating hospitalizations, and undergoing extensive treatments. Patients often face difficulty securing timely consultations and experience long waiting periods for diagnoses and treatment, which can span from several weeks to months. The process includes repeated hospital visits, costly medications, and, in severe cases, surgery. These challenges are particularly pronounced for patients residing in remote or underserved areas, who struggle with access to specialized care. Additionally, the traditional approach to monitoring and managing seizures is often invasive, requiring continuous hospitalization and trial-and-error medication adjustments, which contribute to the overall burden on patients and healthcare systems.

Solution: EpiSave by AEye Technologies

AEye Technologies developed EpiSave to address these challenges with a comprehensive AI-powered approach:

1. Mobile and Web Application Integration:

- **Mobile App for Patients:** Patients use the mobile app to upload their comprehensive medical history, including diagnostic reports, medication records, and other relevant documents. This facilitates remote consultations, reducing the need for frequent hospital visits and allowing for more flexible and accessible care.
- **Web App for Healthcare Providers:** Doctors utilize the web app to access patient histories, monitor progress, and provide consultations remotely. This integration ensures that healthcare providers can make informed decisions and offer timely interventions based on complete and up-to-date patient data.

2. AI-Based Modular Ambulatory VEEG:

- **Advanced Seizure Prediction:** The platform leverages deep learning algorithms to analyze EEG signals in real-time, predicting seizures with high accuracy and enabling timely interventions.
- **3D Brain Mapping:** EpiSave's 3D brain mapping visualizes seizure origins and patterns, aiding in precise diagnosis and treatment planning. This technology helps in identifying the exact location for surgical intervention, reducing the need for invasive procedures.
- **Integrated Video Monitoring and Pose Estimation:** By syncing EEG data with video recordings, EpiSave correlates seizure activity with physical symptoms. AI-based pose estimation provides insights into seizure severity and type, enhancing treatment accuracy.
- **Personalized Treatment Plans and Remote Monitoring:** EpiSave recommends tailored treatment plans based on comprehensive data analysis and provides continuous remote monitoring with real-time alerts for caregivers and healthcare providers.

Benefits

- A. Enhanced Patient Care:** EpiSave has substantially improved patient care by reducing the need for frequent hospital visits. Patients benefit from remote consultations, early seizure detection, and personalized treatment plans, leading to a significant reduction in hospitalization and associated costs.
- B. Improved Access to Care:** The platform has enhanced accessibility for patients in remote and underserved areas, bridging the gap between them and specialized healthcare providers. The mobile app facilitates easy communication and management, addressing geographical and logistical barriers.
- C. Increased Diagnostic Accuracy:** The integration of 3D brain mapping and AI-driven analysis has enhanced the accuracy of seizures' diagnosis and localization. This precision allows for more targeted and effective treatment plans, reducing the need for invasive procedures and optimizing patient outcomes.
- D. Efficient Healthcare Management:** Healthcare providers benefit from improved diagnostic tools, efficient remote monitoring capabilities, and data-driven

decision-making. The platform supports the management of multiple patients, optimizing treatment strategies and improving overall efficiency.

- E. Cost Reduction:** By minimizing the need for prolonged hospitalizations and invasive procedures, EpiSave has led to a significant reduction in treatment costs. The platform's ability to provide remote care and personalized treatment plans also contributes to cost savings for both patients and healthcare systems.

Results

- A. For patients:** The platform has improved seizure prediction accuracy by 85%, allowing for timely interventions and reducing severe episodes. The need for hospitalizations has been reduced by 60%, thanks to effective remote monitoring and consultation. Overall, patient engagement and adherence to treatment plans have increased by 70%, leading to better management of epilepsy and enhanced quality of life.
- B. For healthcare providers:** EpiSave has increased diagnostic accuracy by 75% through 3D brain mapping and AI analysis. The time spent on remote patient management has decreased by 50%, allowing providers to handle more cases efficiently. The platform's data analytics tools have provided actionable insights, enhancing treatment optimization and decision-making.
- C. For healthcare system:** EpiSave has resulted in a 40% reduction in overall treatment costs by minimizing hospitalizations and invasive procedures. The platform's scalability and cloud-based infrastructure ensure cost-effective management for large patient populations, while its enhanced care and monitoring capabilities have led to a 30% improvement in patient outcomes and satisfaction.

What Stakeholders are Saying?

"EpiSave has effectively transformed the way we approach epilepsy care. The precision provided by the 3D brain mapping and AI-driven seizure prediction has significantly enhanced our diagnostic accuracy. This platform not only saves time but also ensures that our patients receive personalized, effective treatment without the need for constant hospital visits. It's a game-changer for both clinicians and patients alike."

- **Neurologist and EpiSave Early Adopter**

"The deep learning algorithms and 3D brain mapping used in EpiSave represent the cutting edge of AI in healthcare. By analyzing EEG signals with such precision, the platform not only predicts seizures more accurately but also provides actionable insights for better treatment planning. It's exciting to see how AI can drive real-world improvements in patient care."

- **Data Scientist and AI Expert**

Global Impact and Future Plans

EpiSave is poised to make a significant global impact by addressing the needs of epilepsy patients worldwide. The initial focus is on expanding the platform's reach across India, where there is a substantial population of epilepsy patients with limited access to specialized care. Following this, AEye Technologies plans to scale EpiSave to other countries with high epilepsy prevalence, including the USA, and eventually extend its application to other neurological disorders. By leveraging the platform's advanced AI capabilities and data-driven approach, EpiSave aims to revolutionize the management of neurological diseases, improving patient outcomes and healthcare efficiency on a global scale.

Conclusion:

EpiSave by AEye Technologies represents a revolutionary advancement in epilepsy care. By combining mobile and web applications with sophisticated AI-driven tools such as 3D brain mapping and real-time monitoring, EpiSave addresses the critical challenges of accessibility, cost, and treatment precision. The platform not only enhances the quality of care for patients but also empowers healthcare providers with advanced diagnostic and management capabilities. With its ability to streamline the treatment process and offer remote care solutions, EpiSave is poised to make a significant impact on the lives of millions affected by epilepsy worldwide, transforming the standard of care and offering new hope for improved patient outcomes.