Apexon

MEDICAL TECH COMPANY REVOLUTIONIZES TREATMENT FOR CHRONIC DISEASE

Apexon brings bioelectronic solution to life with digital app and framework

This company is a bioelectronic medical technology company transforming the standard of care for chronic disease.

In the United States, peer-reviewed research estimates that 2.2% of the population suffers from essential tremor (ET). For a long time, there were only two ways to treat ET: a partially-effective prescription or brain surgery.

This medical technology company took a radically different approach — an electrotherapy-based nerve stimulating wristband with comprehensive monitoring and diagnostics. To complete the customer experience side of the solution, the company engaged Apexon in 2020 to build out a companion mobile app and patient portal, engineer a telemetry data pipeline and set up a secure development environment.

- **Founded in 2013 by two members of Stanford's Neuromuscular Biometrics department**

- **Received $51M Series C funding to support launch of the new biometric solution**

- **Re-thinking treatments for chronic disease**

THE RESULTS

KEY OUTCOMES

MOBILE APPLICATION DEVELOPMENT

Out of 72 repository (aka repos), reverse engineering was completed for 31 apps in addition to current feature development

SHIFT LEFT TESTING

Automated testing enabling Shift Left

CODE-ON-DEMAND (COD)

Automated pipeline enabling developers to deploy code on demand

REGULATORY COMPLIANCE

Enabled unit testing for other vertical (patient portal) so that it can clear the FDA regulatory requirements

TESTING REQUIREMENTS

Enabled linting and code coverage in unit testing for multiple repos

SAMD

Technical writing for FDA compliance enabling software-as-a-medical-device (SaMD)

OPERATIONAL EFFICIENCY

Code merge, DevOps pipeline improvements have developed capability to push the code in an automated way in less than one working day - manual processes used to take four to five days

DIGITAL HEALTH JOURNEY

Enabled the patient journey on portals, apps and data, and device analytics using Google Analytics

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OUR METHODOLOGY

THE DIGITAL LIFECYCLE

Apexon works with companies across the digital lifecycle.

GO DIGITAL

LAUNCH & EXPERIMENT

BE DIGITAL

AUTOMATE & ACCELERATE

EVOLVE DIGITAL

BE INTELLIGENT & AUTONOMOUS

Enable digital adoption in a quick, and agile manner

Build digital infrastructure and foundation for enterprises to scale

Leverage data engineering to make strategic decisions and get digital right every time

Developed a digital roadmap, UX and brand guidelines for multiple web and mobile applications.

Used Apexon's BLE framework accelerator to speed the development of an Android companion mobile application for their new solution.

Implemented Jenkins pipeline for the patient portal and other AWS services using CloudFormation and Jenkins.

Developed a framework for telemetry data pipeline using AWS IoT Gateway and other services.

Worked with the company's product owners to develop wireframes for future applications, including a provider portal.

Moved all development work to AWS Workspace. Implemented security and privacy policies to adhere to the PHI and other security compliances.

DIGITALLY ACCESSIBLE, USER-FRIENDLY DATA

As the company was developing its new solution, it realized that it needed help in certain areas to complete its product vision. Most critically, the organization needed to make the data from the device digitally accessible and user-friendly for both patients and physicians. These requirements included:

- Providing a way to connect to and measure patient tremor intensity from the IoT device and capture respiration belt sensor data

- Expertise with Bluetooth interfaces and communication protocols

- Support for next-gen devices and new product launches

- Consolidation of code development for multiple companion applications with similar functionality for different clinical therapy devices (USB, UART and BLE)

- Accelerating development and V&V (verification and validation) cycle time for BLE device interface

- Addressing inefficiencies in DevOps activities of CI/CD, cloud infrastructure, test automation and configuration management as well as framework development for health device(s)

- Data security and privacy policy implementation in accordance with PHI and other security compliance requirements

- Minimal documentation to start and setup the project without having any prior knowledge to the multiple applications

- Managing more than 30+ repositories

BUILDING THE BIOELECTRONIC DEVICE WEB PATIENT PORTAL & APP MANAGEMENT TOOLS

The company was introduced to Apexon based on its digital work with other life sciences and medical device companies. As a result, it felt Apexon had the expertise that the company needed to complement and complete its development effort.

The scope of Apexon's engagement focused on building out the bioelectronic device web patient portal and app management tools and framework. Some of the specific deliverables included:

Development of the Patient Portal for the Device

To allow patients to easily rate daily therapies, set daily goals, check history, access product information and help, and contact support. The portal also included a Google Analytics dashboard which tracked each patient's journey.

Creation of the Device Companion Application and IoT BLE Interface

Allows the patient to start the therapy session from a companion app, enabling the collection, analysis and presentation of the patient and device data.

Development of the Tremor Engine Application

For collecting IMU data from motion sensors at 100Hz. The application also included an algorithm to measure the patient's tremor intensity.

Use of the BLE Framework

To develop a configurable simulator capable of managing messaging protocol (standard and custom) defined between the device and the companion mobile app.

Development of the Android Application Platform

A conceptual platform approach to consolidate all companion applications into one reference app with libraries to support multiple devices. The platform facilitated easy configurations and utilized a library approach for communications and sensor interfaces.

Implementation of a Telemetry Data Pipeline

Using AWS IoT Gateway and other services.

CI/CD Framework Using Multi-Branch Jenkins Pipeline

For fully automated firmware testing on real company's health device(s).

Implementation of Security and Policy Practices

By moving all development work to AWS Workspace and adhering to PHI and other security compliance requirements.

AWS SERVICES USED

Amazon Simple Storage Service	AWS Support	Amazon Lightsail
AWS IoT	Amazon Elastic Compute Cloud	Amazon ElastiCache
Amazon Relational Database Service	AWS Data Pipeline	Amazon CloudWatch
Amazon Simple Notification Service	AWS Data Transfer	Amazon DynamoDB
AWS WAF	Amazon API Gateway	Amazon Elasticsearch Service
AWS CodePipeline	AWS Key Management Service	Amazon Simple Queue Service

Amazon Simple Storage Service · AWS Support · Amazon Lightsail · AWS Lambda · Elastic Load Balancing · AWS IoT · Amazon Elastic Compute Cloud · Amazon ElastiCache · AWS Config · Amazon EC2 Container Registry (ECR) · Amazon Relational Database Service · AWS Data Pipeline · Amazon CloudWatch · AWS Secrets Manager · AWS X-Ray · Amazon Simple Notification Service · AWS Data Transfer · Amazon DynamoDB · Amazon Simple Email Service · AWS Kinesis · AWS WAF · Amazon API Gateway · Amazon Elasticsearch Service · AWS CloudTrail · Amazon CloudFront · AWS CodePipeline · AWS Key Management Service · Amazon Simple Queue Service · Amazon WorkSpaces

Apexon

Apexon is a pure-play digital engineering services firm focused on helping companies accelerate their digital initiatives from strategy and planning through execution. We leverage deep technical expertise, Agile methodologies and data-driven intelligence to modernize systems of engagement and simplify human/tech interaction.

We deliver custom solutions that meet customers' technology needs wherever they are in their digital lifecycle. Backed by Goldman Sachs and Everstone Capital, Apexon works with both large enterprises and emerging innovators — putting digital to work to enable new products and business models, engage with customers in new ways, and create sustainable competitive differentiation.

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