



Customer Success Story

Modernizing a Remote Patient Monitoring (RPM) App for an EKG Recording Smart Device

AliveCor®

Customer: Alivecor

Country: United States

Industry: Healthcare

Our Role: Software Product Engineering

About the Client

AliveCor, Inc. is a privately held healthcare company, headquartered in Mountain View, California. It is known for its range of IoT-enabled, smart devices that capture EKG (Electrocardiogram) recordings and transmit EKG rhythms to the smartphone or tablet. The devices aim to transform cardiac care with early detection of atrial fibrillation (AF), normal sinus rhythm, and 28 other abnormalities in EKG. All smart devices by the company are FDA approved and are used by patients at home and providers at care organizations. AliveCor is recognized by FastCompany as 2018's most innovative company in Artificial Intelligence.

80 M

ECGs recorded to-date

98%

accurate sensitivity detection for
atrial fibrillation, bradycardia,
and tachycardia

97%

accurate specificity detection
for atrial fibrillation,
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The Situation

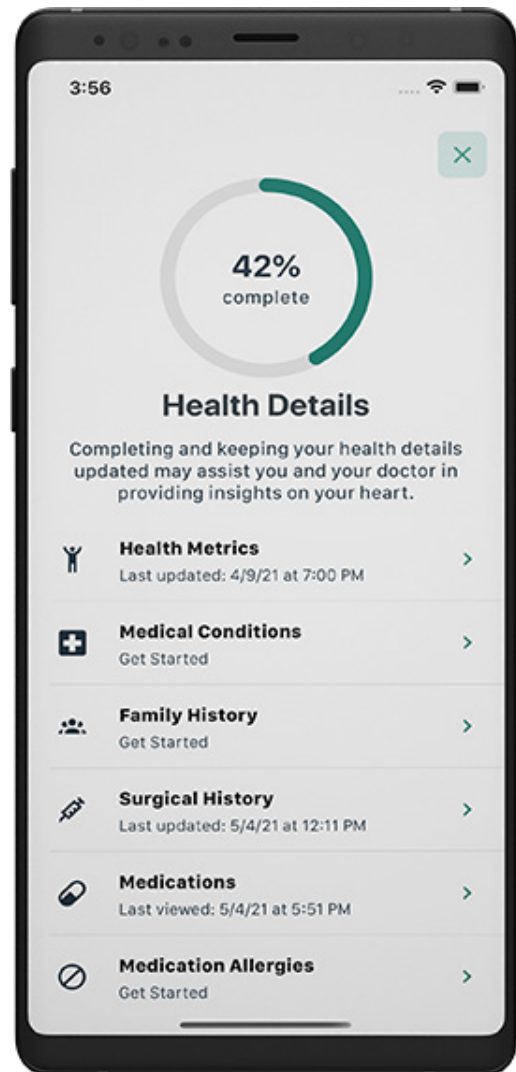
AliveCor's smart devices have electrodes to sense and transmit EKG rhythms to the smartphone. The client already had an app that integrates with the smart device to collect and view EKG recordings. However, their app needed modernization with respect to its features, technology, and user experience.

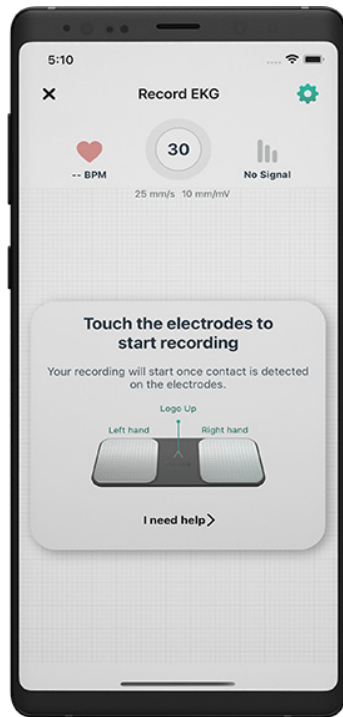
AliveCor reached out to Daffodil for revamping the existing app with a new set of features, to bring detail and accuracy in the EKG report, update the legacy code with the latest technology, improve the user experience of the app, etc. The existing apps were built on Java and Objective C while the requirement was to update it with Kotlin and Swift. The key requirements were:

- To implement major feature updates including enabling the app to detect approx 30 abnormalities in EKG (which were previously limited to 5).
- To improve visibility of 6-lead EKG reading on the app along with some other UX fixes.
- To comply with FDA and HIPAA standards for remote care monitoring. Due to team AliveCor's stringent compliance requirements, team Daffodil had to pay attention to every minute detail of data interoperability and data privacy.

The Solution

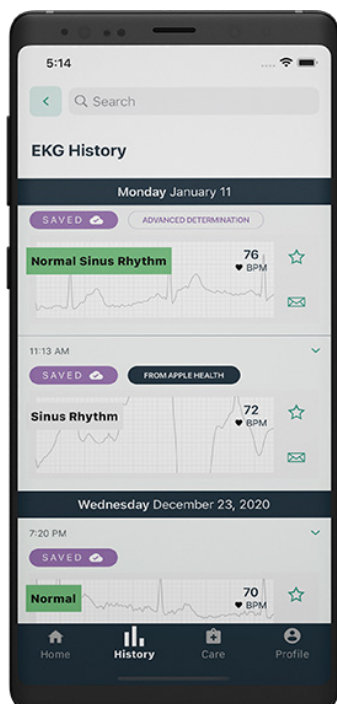
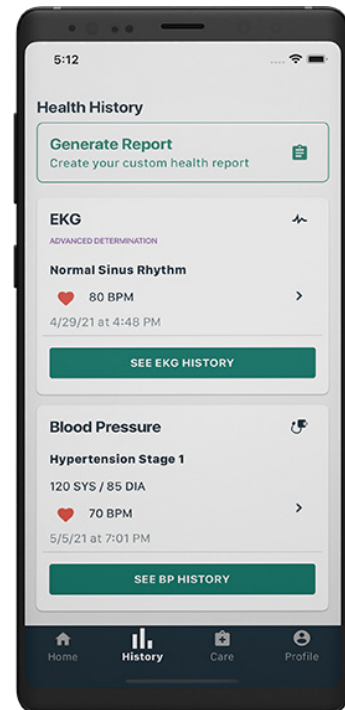
The inception stage of development had been challenging for team Daffodil as it required auditing and optimizing the existing codebase for modernizing the entire app. As a result, a number of UX updates and performance fixes were done in the existing version of the app. The team closed all technical debt tickets (additional rework by the technical team), upgraded the database from SQLite to Room, improved graph pixelation (EKG reading), etc.





In the newer version of the app, Kotlin (for Android) and Swift (for iOS) were used as the core languages for development. The team integrated Atrial Fibrillation (AF) logic (an algorithm created by the client which monitors irregular and often rapid heart rate that occurs when the two upper chambers of your heart experience chaotic electrical signals) into the app that enabled it to analyze and predict over 30 heart-related abnormalities from a 6-lead EKG reading. The app now predicts heart abnormalities such as normal sinus rhythm, atrial fibrillation, bradycardia, tachycardia, etc. on the basis of EKG rhythms received from smart devices.

Previously, the app allowed users to manually add their blood pressure details within the app and keep a track of it. In the newer version, users were allowed to maintain a health diary, add and track various health vitals which include blood pressure, blood sugar, cholesterol, medication, symptoms, weight, etc. These health vitals can either be added manually into the app or through Apple Smart Watch or Wear OS by Google.



In addition to this, the app now supports a medication adherence feature that sends a reminder to the patients to take their medicine on time. Users can also share their EKGs with family or caregivers in the form of a PDF file. This PDF file can be viewed, emailed, or downloaded to maintain a history of ECG recordings.

The Impact

The client has been extremely satisfied by the way Daffodil has executed the entire project. The client was able to launch the solution in a timely and desired manner as Daffodil ensured that the deliverables were provided on time while maintaining the utmost quality. The devices use machine learning to detect the three most common arrhythmias—atrial fibrillation, bradycardia, and tachycardia—with 98% sensitivity and 97% specificity. This gives patients and physicians a fast and highly reliable insight into health.



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Technology Stack



- Objective C
- Swift
- Java
- Kotlin
- Room database

About Daffodil

Daffodil Software is a software engineering partner to 100+ organizations across the globe and has been helping them in making their software products more robust, teams more productive and processes more efficient. Our ability to look beyond technologies to deliver innovative solutions with scale and speed has been lauded by our clients as well as the tech community worldwide.

Since our inception, we have invested in organic growth; building on our engineering capabilities, organizational processes, and culture required to deliver a truly collaborative ecosystem for solving technology challenges. At the core of Daffodil lies a culture rooted in innovation, learning and a result-oriented mindset.

Awards & Accolades

GRANDVILLE, USA

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