ANDROID ENGINEERING CASE STUDY

Costa Rica Surf Guide

Android Engineering Portfolio

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An Android modernization case study spanning offline tide computation, classic navigation, Kotlin and Jetpack Compose, and weather visualization for Costa Rica's two coasts.

Open the public Android showcase

ENGINEERING CASE STUDY

A field guide built around offline tides

The project combines a long-running Android surf guide with a newer interface and forecast tools. Its core local workflow computes high and low tides for the reference station and draws tide charts for the selected date and interval. Beach browsing and weather products have distinct local and network requirements.

Original Android app

Java activities and XML layouts delivered the classic home, beach catalog, four regional lists, Google Maps, tide screens, gallery, and a historical Magicseaweed chart interface.

Modernization in place

Kotlin and Jetpack Compose added a modern entry point, navigation, beach browsing, and point forecasts. Bridges from the modern menu reopen existing classic activities. The local tide engine remains shared with the classic flow.

A second map product

NEW SWELL adds regional weather samples and hourly playback behind the historic Swell screen. It complements the separate Swell Forecast 2.0 beach forecast, which presents point values and hourly or daily detail.

Evidence in this portfolio

The 39 figures follow the curated public gallery order. They span multiple QA sessions and include functional screens, disabled or unavailable states, and historical UI. The screenshot manifest records the original files and hashes.

Offline
Reference-station tide computation

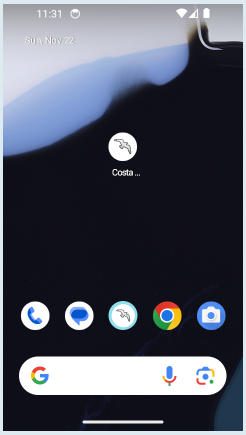
4 zones
Classic lists and map views

2 coasts
Regional weather visualization

SCREEN EVIDENCE

Launch and offline tides

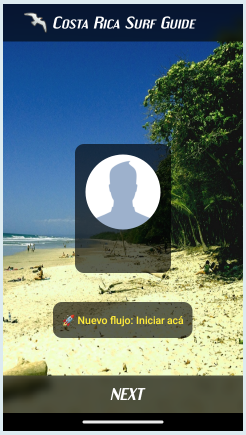
The Android launch path leads to local tide predictions and a weekly chart. QA compared the same daily predictions with Wi-Fi and mobile data disabled and opened the weekly graph offline.



01 / SPLASH SCREEN

Costa Rica Surf Guide in the Android launcher

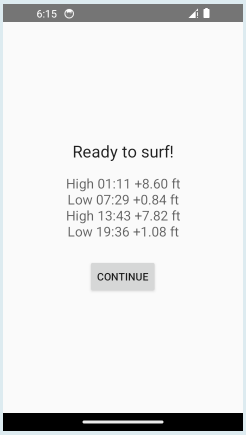
The Costa Rica Surf Guide shortcut on the Android home screen wallpaper before the app opens.



02 / SPLASH SCREEN

Optimized splash

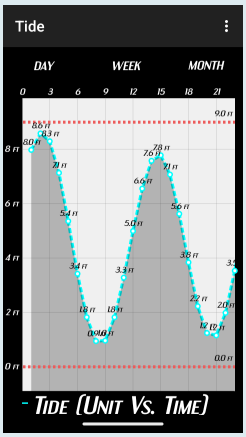
Optimized splash with the original photograph.



03 / TIDES

Offline daily tide prediction

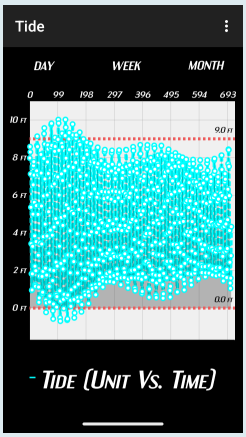
Four high and low tide predictions shown with Wi-Fi and mobile data disabled.



04 / TIDES

Offline weekly tide chart

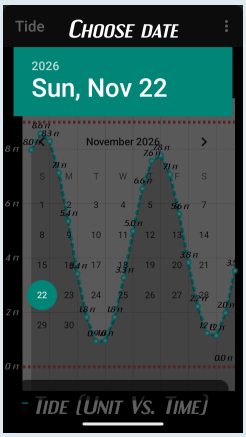
A week of tide heights is available without connectivity.



05 / TIDES

Monthly tide chart

The classic chart plots predicted tide heights across one month.



06 / TIDES

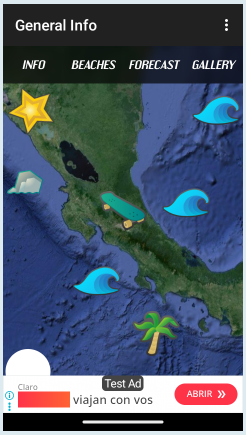
Tide chart date picker

The date picker changes the reference date for the classic tide chart.

SCREEN EVIDENCE

The original guide

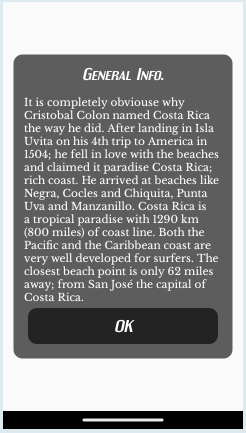
The classic home links to information, beach details, tide tools, and curated surf spots. Modern beach details resolve from the local catalog even when live conditions are unavailable.



07 / ORIGINAL HOME

Original app home

The legacy home presents the map and main navigation. The information panel provides introductory content.



08 / ORIGINAL HOME

General information panel

The original home opens a panel with general guide information.



09 / ITEM DETAILS

Roca Bruja · classic beach detail

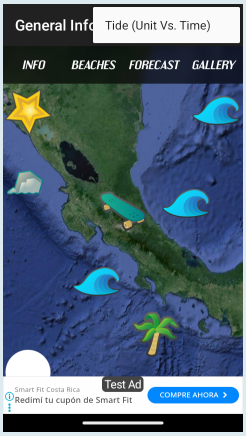
The classic detail presents a surf spot from the local catalog.



10 / ITEM DETAILS

Jacó beach detail offline

The beach profile remains readable without connectivity.



11 / ORIGINAL MENU

Classic tides menu

Classic Android controls expose the tide menu and curated surf spots.



12 / ORIGINAL MENU

Top 5 surf spots by zone

The classic shortcut groups selected surf spots by region.

SCREEN EVIDENCE

Four regions, two ways to browse

North Pacific, Central Pacific, South Pacific, and South Caribbean are the app's original zone labels. Classic lists and Google Maps use the zone selector to surface the corresponding beach entries and markers.



13 / FOUR ZONE LISTS

North Pacific

The classic list displays the local beach catalog for the selected zone.



14 / FOUR ZONE LISTS

Central Pacific

The classic list displays the local beach catalog for the selected zone.



15 / FOUR ZONE LISTS

South Pacific

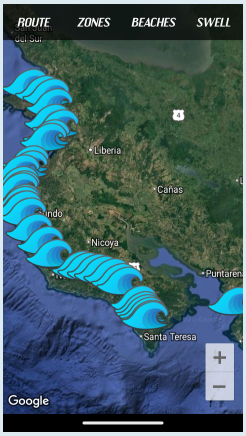
The classic list displays the local beach catalog for the selected zone.



16 / FOUR ZONE LISTS

South Caribbean

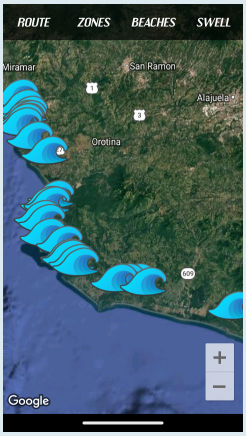
The classic list displays the local beach catalog for the selected zone.



17 / GOOGLE MAPS — FOUR ZONES

North Pacific

The classic Google Maps screen adjusts its camera and beach markers for the selected zone.



18 / GOOGLE MAPS — FOUR ZONES

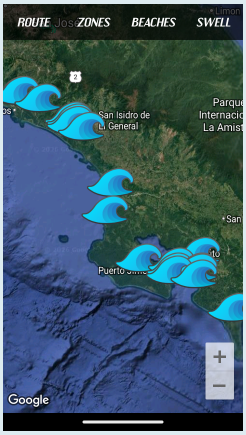
Central Pacific

The classic Google Maps screen adjusts its camera and beach markers for the selected zone.

SCREEN EVIDENCE

From classic maps to NEW SWELL

The classic Google Maps screen moves its camera and markers by zone. The Magicseaweed interface remains a historical entry point. Its provider failed to return usable charts during QA, while the native NEW SWELL link remained available.



19 / GOOGLE MAPS — FOUR ZONES

South Pacific

The classic Google Maps screen adjusts its camera and beach markers for the selected zone.



20 / GOOGLE MAPS — FOUR ZONES

South Caribbean

The classic Google Maps screen adjusts its camera and beach markers for the selected zone.



21 / HISTORIC SWELL

Magicseaweed Legacy · NEW SWELL shortcut

NEW SWELL below the unavailable-provider notice, with the period legend.



22 / NEW SWELL — WEATHER MAPS 2.0

SWELL · All Costa Rica

Swell samples across All Costa Rica, in m.



23 / NEW SWELL — WEATHER MAPS 2.0

WIND · All Costa Rica

Wind samples across All Costa Rica, in km/h.



24 / NEW SWELL — WEATHER MAPS 2.0

SWELL · Pacific

Swell samples across Pacific, in m.

SCREEN EVIDENCE

Weather maps on both coasts

NEW SWELL draws discrete color-coded samples on a bundled Natural Earth basemap. Its four layers cover swell, wind, hourly precipitation and sea-level pressure. Layer, coast and timeline changes reuse the available frames.



25 / NEW SWELL — WEATHER MAPS 2.0

RAIN · Pacific

Rainfall samples across Pacific, in mm / h.



26 / NEW SWELL — WEATHER MAPS 2.0

SWELL · Caribbean

Swell samples across Caribbean, in m.



27 / NEW SWELL — WEATHER MAPS 2.0

PRESSURE · Caribbean

Pressure samples across Caribbean, in hPa.



28 / NEW SWELL — WEATHER MAPS 2.0

Play · active playback

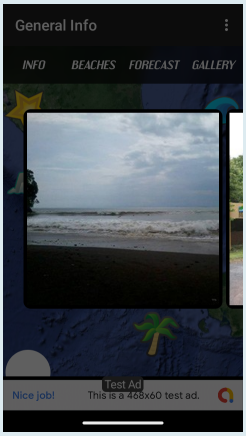
Active playback advancing the hourly forecast.



29 / GALLERY

Photo gallery overview

The modern gallery displays a grid of available photos.



30 / GALLERY

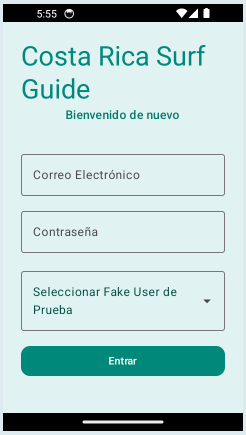
Classic gallery photo preview

A photo preview opens inside the classic gallery.

SCREEN EVIDENCE

Modern UI and point forecasts

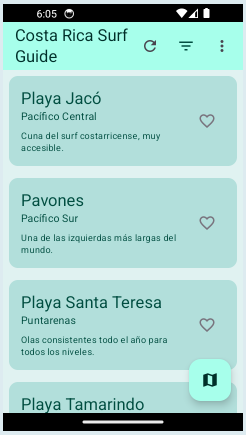
Compose provides modern entry and browsing and links back to the original zone selector. Swell Forecast 2.0 is a separate beach-level product. Jacó and Pavones served as QA reference locations.



31 / MODERN HOME

Modern entry screen

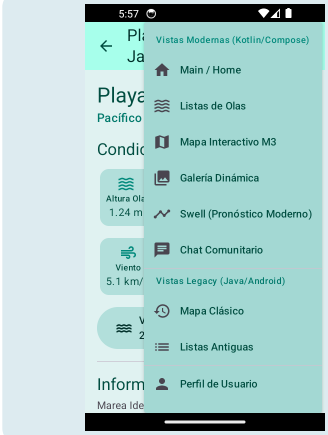
The modern entry screen leads to the current app experience.



32 / MODERN HOME

Beach directory

Browse Costa Rican beaches from the modern directory.



33 / MODERN MENU

Modern navigation

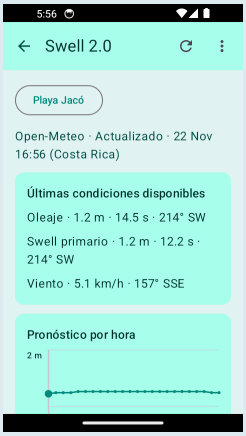
The navigation drawer groups the main features and legacy links.



34 / MODERN MENU

Modern menu opens classic zone selection

The modern menu links to the native classic zone chooser.



35 / SWELL — SECOND IMPLEMENTATION

Swell Forecast 2.0 in Jacó

The beach forecast summarizes swell and wind conditions.



36 / SWELL — SECOND IMPLEMENTATION

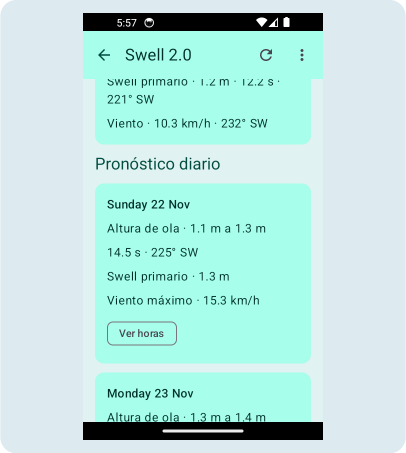
Pavones hourly forecast

The hourly chart shows how the forecast changes over time.

SCREEN EVIDENCE

Forecast detail and community

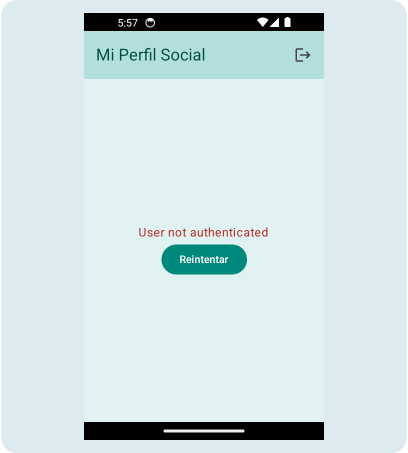
Daily forecasts complement the hourly view. The portfolio shows the profile signed out and the chat interface as inspected in QA. Account writes and message delivery were outside that run's test scope.



37 / SWELL — SECOND IMPLEMENTATION

Pavones daily forecast

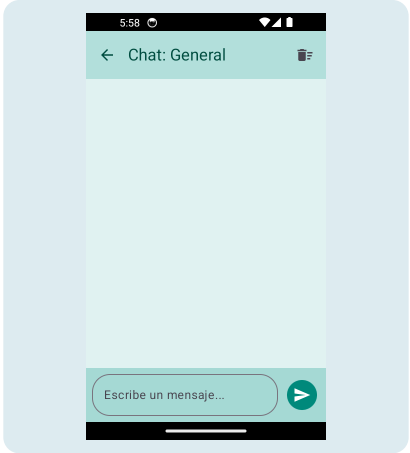
Swell Forecast 2.0 summarizes the point forecast by day at Pavones.



38 / PROFILE

Signed-out profile

The profile shows the available entry point with no active account session.



39 / CHAT

Community chat interface

QA verified the chat screen and its input controls without sending messages.

Two different forecast presentations

Swell Forecast 2.0 organizes forecast values around a selected beach. NEW SWELL organizes fixed geographic samples by coast, layer and valid hour. The app keeps separate navigation paths and visualizations for these uses.

Community integration

The Gradle configuration and repositories show Firebase Auth, Firestore, Storage and Messaging integrations. The screenshots establish the available UI and its observed state during QA.

Architecture, reliability and QA

Offline tide path

The bundled Java tide engine lives in slib. TideResultActivity loads the existing calculation through a ViewModel and a single-thread executor. The result passes to the classic home, while chart screens support local date and interval selection. QA recorded identical reference results online and offline.

Android boundaries

Java activities and XML host the legacy workflows. Kotlin, Compose and Material 3 power the modern screens. Hilt wires dependencies, Room persists the beach catalog and saved forecasts, and Retrofit and OkHttp support network-backed products. A catalog initialization fix closes a first-load race before detail lookup falls back to Firestore.

NEW SWELL data path

Open-Meteo Marine and Weather supplied up to 24 hourly frames during debug evaluation. The repository requests 14 marine and 28 weather sample points, validates their coordinates, groups values by UTC instant, and labels playback in Costa Rica time. The last valid response is cached per product. Playback supports play, pause, stop, manual stepping and speed control. Distribution builds disable live requests pending an authorized provider setup.

Startup and regression

The splash uses Android’s starting window and defers secondary UI and profile work until after the first drawing. On the Android 14 CRSG_Lite emulator, the median cold-start first draw moved from 2.949 s to 1.852 s in three runs per APK. The figure describes this emulator sample. The tide chart’s duplicate inflater setup was also removed and retested.

Recorded QA

ADB, UI Automator, Logcat and Gradle supported the audit. The original audit exercised 27 of 29 scenarios: 22 complete, five limited, and two pending. Seven unit tests passed. The follow-up covered 12 weather layer and region combinations, playback, reconnection, rotation and tide regression. No new ANR or crash appeared in the recorded post-install window.

Development status and services

Verified in the Android checkout

The classic guide and offline tide workflow remain present. The modern catalog and point forecasts were exercised on the emulator. NEW SWELL's debug evaluation confirmed both coasts and all four layers. The public showcase publishes static engineering evidence.

Remaining validation

The recorded scope leaves physical-device performance, authenticated community flows, purchases, route coverage and provider HTTP 429 and 5xx behavior open. Live distribution for NEW SWELL depends on a provider arrangement compatible with its use.

Professional software engineering services

- Android modernization with Java, Kotlin, Jetpack Compose and legacy interoperability.
- Offline-first Android workflows, local data persistence and resilient API integration.
- Android diagnostics, startup investigation, regression testing and reproducible QA evidence.
- Interactive mapping, data visualization and technical product documentation.

Contact and project links

Android engineering showcase

LinkedIn - Pablo Mora González

Patreon - Costa Rica Surf Guide

Repository evidence

Android slib, TideResultActivity.java, app/build.gradle, and weather/. QA QA_REPORT.md, NEW_SWELL_QA_REPORT.md, FIXES_APPLIED.md, and SPLASH-OPTIMIZATION.md. Website src/data/android-gallery.json and the corresponding original PNG files.