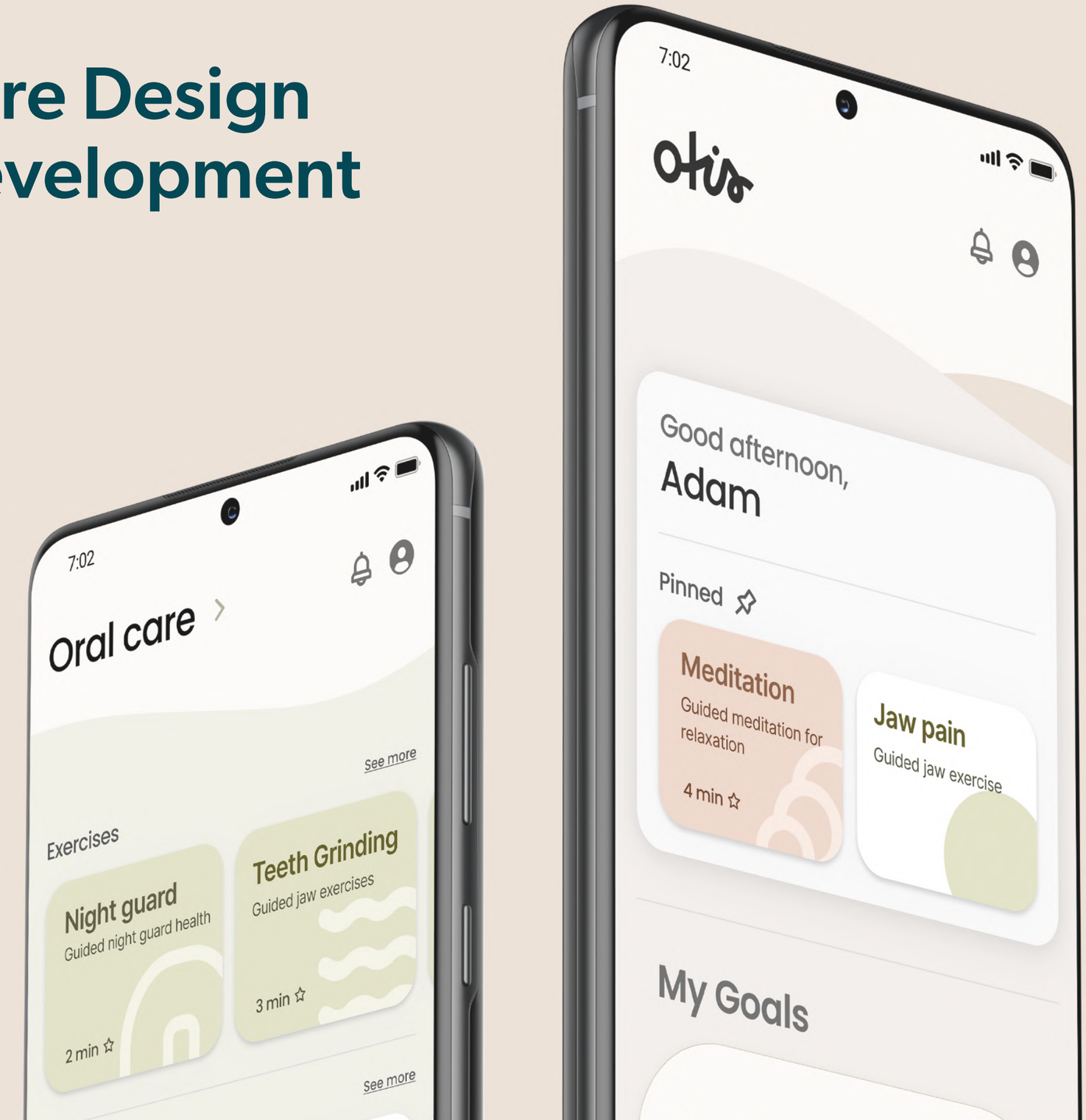
Software Design and Development

2023

BRASH



Software Projects

Velavu

Smart & Easy Asset Tracking Software

Front End
Web App (React, Mapbox, MQTT Client)
Mobile App (React Native, Mapbox, MQTT Client)

Back End
Rest API (AWS API Gateway)
Authentication (AWS Cognito)
Lambda Functions (AWS Lambda)
Database Integration (DynamoDB)
MQTT Broker (AWS IoT)
Static file storage (AWS S3)

Firmware
C
Wirepas
BLE

The idea behind Velavu — an award-winning startup — arose when the two founders noticed a gap in the asset management and tracking industry. The founders of Velavu saw the opportunity to create a solution that seamlessly integrates both systems under one platform.

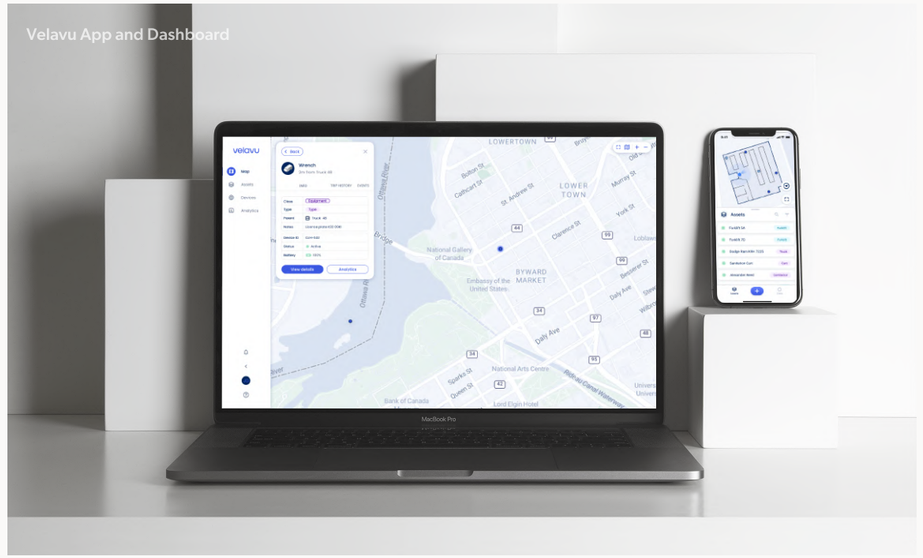
A Smooth Digital Experience from the Cloud

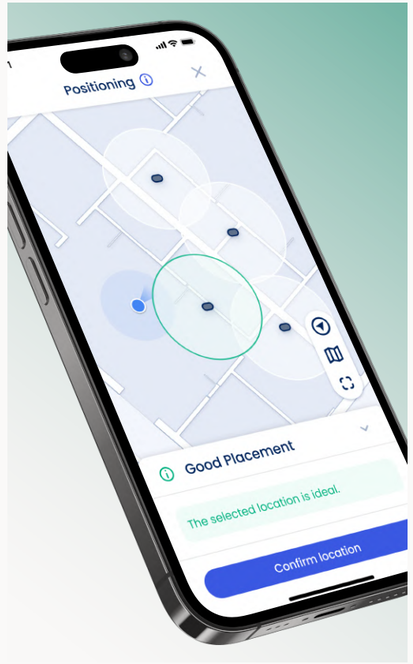
Our software developers created Velavu to operate over a cloud-based web app and mobile app, enabled by tools like AWS solutions (AWS API Gateway, AWS Cognito, AWS lambda, AWS S3) that provide excellent performance, security, and scalability. Working alongside our UI/UX designers, our software team created an intuitive dashboard that users can access and manage from anywhere.

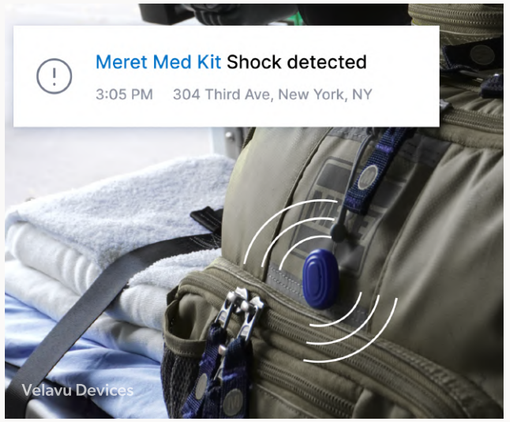
Reliable Device Performance Across Environments

Our firmware engineers meticulously crafted the internal hardware on the full suite of devices in the Velavu ecosystem to provide a reliable and robust performance with integrations like NFC, Wirepas Mesh, GPS, and LTE, to ensure a seamless set up and transition between tracking indoor, outdoor and moving environments.

Brash's work with Velavu perfectly exemplifies the end-to-end solutions our team provides, taking the conceptual and transforming it into market-ready products, intuitive software, and a fully branded business.







Otis

Wellness Smart Phone Application

Front End
UX/UI
Mobile App (SwiftUI,
AVFoundation,
MobileVLCKit, Core NFC
Google Sign-In for iOS and
macOS, Facebook SDK)

There's a strong correlation between dental health, mental health, and our overall well-being. The founders at Otis partnered with Brash to expand their dental e-commerce company by creating a wellness mobile app to directly help people live better lives, reduce the impact of Bruxism, and improve their oral care and self-care routines.

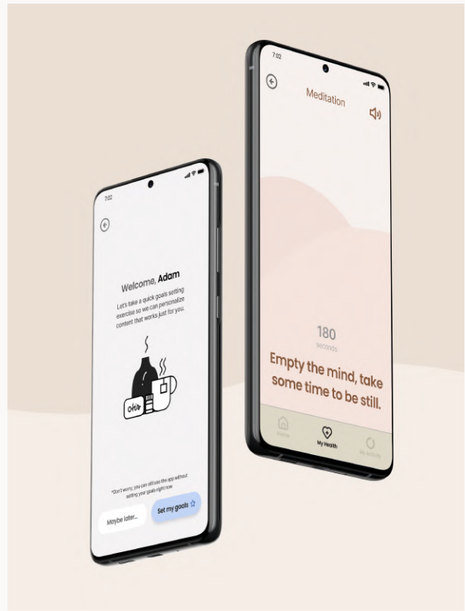
Mobile App with a Calm and Focused Experience

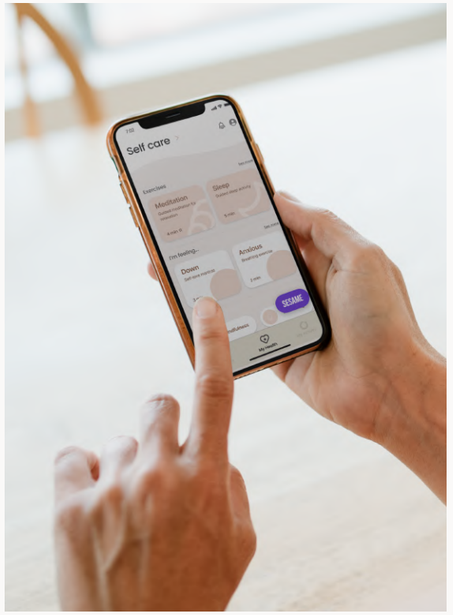
The mobile app we designed for Otis considers how to engage audiences without compromising the app's focus—helping people set healthy routines using exercises, rewards, and progress tracking. Set up against a visual background that feels simple and calm, the planning and analysis of the UX required a lot of thought beyond functionality — incorporating the psychology of design needed to encourage users to set and maintain care goals without feeling shamed or overwhelmed by the app's many features.

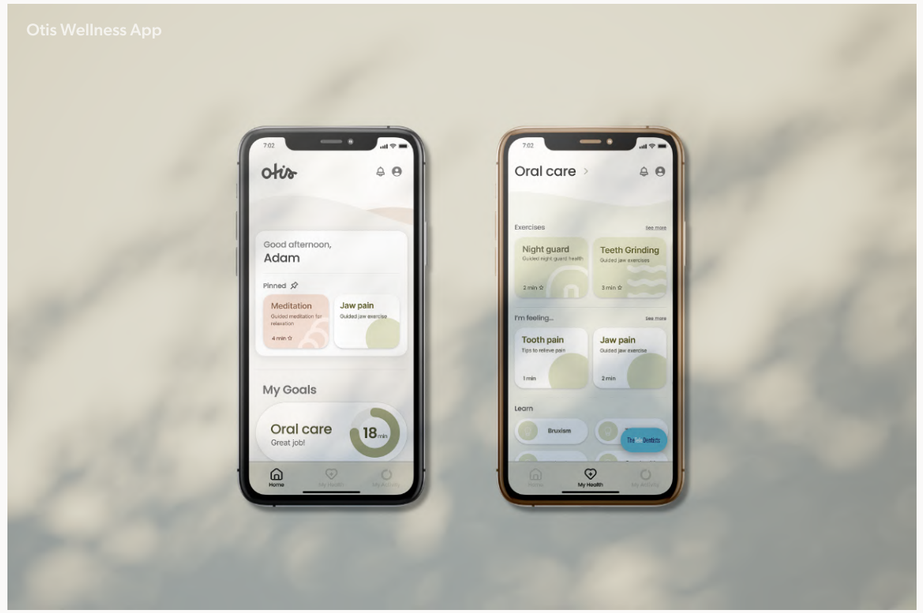
Welcoming User Interface with Soft Design

The UI we designed has an intentionally soft design language— featuring muted colours, rounded buttons, iconography, and a chosen font reflecting the same. Our designers carefully considered the curvatures of the letters, spacing, and the distinguishing lines and marks over the letters to remain minimal to maintain the user's focus on the app's purpose, improving their health in a safe digital space.

Combining the talents of both our design and software team, we created a mobile app with a calming and easy-to-use experience that considers how to inspire audiences to take better care of their health.







Veba

IOT Baby Milk Tracker and App

Front End
UX/UI
Mobile App (React native, Redux, SQLite)

Firmware
Bluetooth

As a mother and an executive in the tech industry, the founder behind Veba saw the opportunity to create a solution that would make the monitoring of milk and formula easier, safer, and more efficient for parents and caregivers.

UI/UX and the Mobile App made for Baby Safety

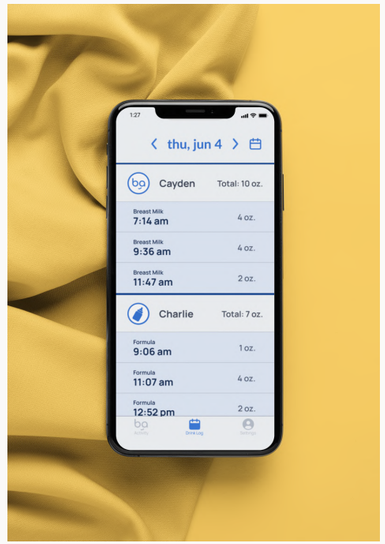
To compliment these IoT tracking devices, our software team built a mobile app that is not only eye-catching, but our UI/UX design also provides optimal usability and seamless communication between the app and the custom hardware. Our team developed the mobile app using React Native, Redux and SQLite, and built custom algorithms that have been integrated into the hardware and software architecture to enable the safe and effective quality assessment of milk.

Firmware made for Parent Sanity

Taking into consideration the typical (and profound) sleep deprivation a parent undergoes caring for an infant, we implemented key functionality to ease the mental load through firmware development. The safe milk temperature sensors and automatic feeding detection built into the devices required constructing advanced algorithms and codifying rules into a state machine to then implement into our firmware. Resulting in automatic digital records and alerts with the mobile app via Bluetooth communication.

Our partnership with Veba required our full design and engineering services to develop the monitoring devices, the supporting mobile app, and the branding and custom website development.

Veba App



Atomic Form

Cloud Based NFT Display Software

Front End
Display App (C, C++, Go, SDL, OpenGL, GRPC, ffmpeg, cURL)
Web app (Svelte, Firebase, Metamask)

Back End
Authentication (Firebase Authentication)
Lambda Functions (Cloud Functions)
Database Integration (Firestore)

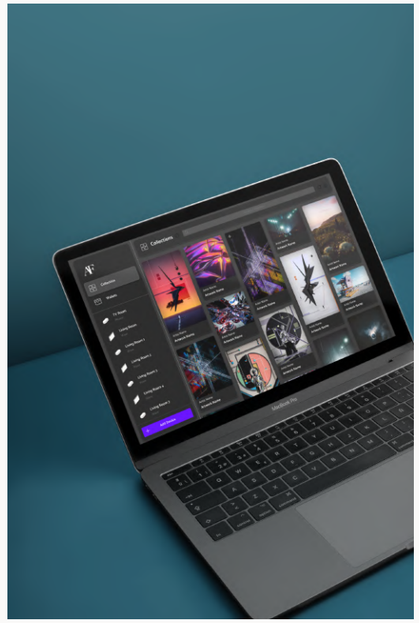
Firmware
Embedded Linux (debian)
C/C++
Python
Accelerometer drivers
I2C
SPI

Atomic Form partnered with our team to craft a high-end digital display and a casting box that directly connected to blockchains like Ethereum. Brash produced the hardware and software needed to securely link the Atomic Form network directly to the blockchain, but also built the ability to authenticate the NFTs and link them straightaway with the artist and the customer on two types of display devices.

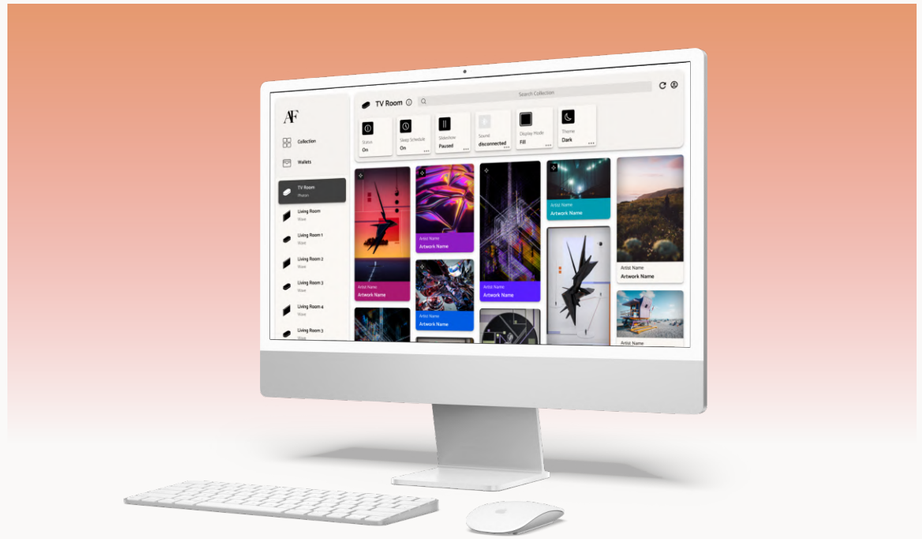
An Intuitive Web Interface and a Serverless Back End

We built the web interface as the main tool for the user to manage their NFT collection and Atomic Form devices, supported by a serverless back end. These enable the real-time syncing between the web app, the display, and with the user's blockchain wallet for instantaneous updates on the chosen Atomic Form display device. While the display is mostly managed through the web app, we created and optimized the software running on their devices for low-power consumption, and still controllable with physical buttons for basic device function and through an accelerometer to switch from portrait to landscape display mode.

Brash provided end-to-end services for Atomic Form's products — complete with a web app, display device app, and the necessary UI/UX needed for their customers to easily curate and display their NFT collection.



Atomic Form Device UI



Atomic Form Web App

Domono

Consumer Focused App for POV Camera

Front End
UX/UI
Mobile App (SwiftUI, AVFoundation, MobileVLCKit, Core NFC Google Sign-In for iOS and macOS, Facebook SDK)

Firmware
Python
Tornado
GStreamer

Inspired by activist movements, the founders at DOMONO saw an opportunity to create a product that not only facilitates filming viral videos but also provides a safety net to discreetly record tense encounters or potentially dangerous situations.

Simplicity Created from Complicated Firmware

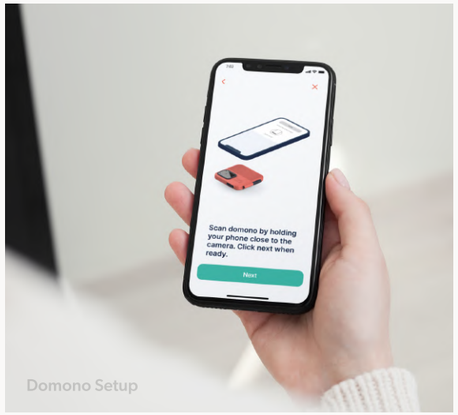
Project requirements included a small and removable recording device that can clip onto your person. To make this possible, our firmware engineers designed the PCB with a custom electronic PCBA that integrates the camera and the processor — facilitating the camera's functionality and optimizing the complicated circuitry to create the smallest form factor while still ensuring a robust performance and battery life.

Stylized User Experience with the Mobile App

The device works in cohesion with a mobile app developed by our team of software developers that enables users to initiate recordings and access a variety of advanced features such as camera filters for a stylized experience using tools like SwiftUI, AVFoundation, MobileVLCKit, Core NFC to build out the user-friendly front-end experience.

Our turnkey product development work with DOMONO included hardware, firmware, mobile app development, website, and branding services.

Domono App



Domono Setup

Domono

Kenwave Technologies

Software for Infrastructure Workers

Front End
Web App
Desktop App

Back End
Rest API
Authentication
Lambda Functions
Database Integration
Containerized Analytic Script
Static File Storage

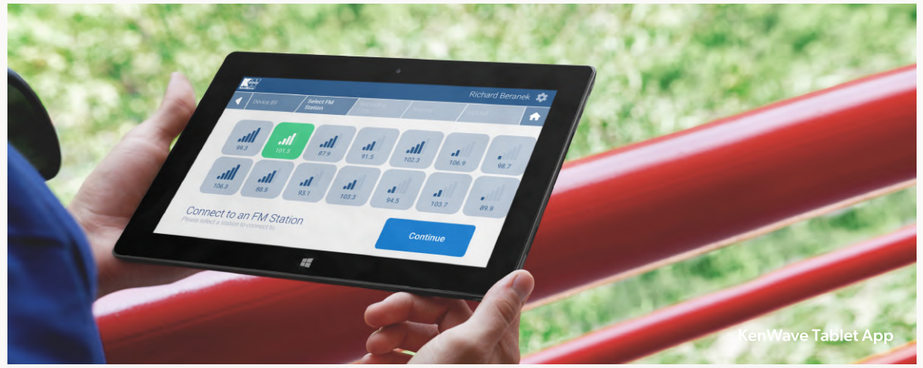
Firmware
Python
Embedded on RasPi
GPS
Audio Hat
Websocketz

KenWave Solutions developed a unique pipe inspection technology that uses advanced sound, temperature and pressure measurements to provide data on pipe systems and their surrounding conditions. KenWave hired Brash for several of our engineering, software, and programming services to build on top of their proprietary technology:

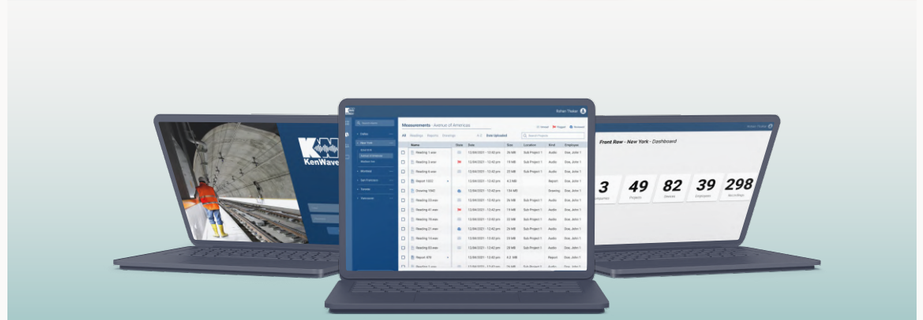
The Development of a Field Data Acquisition Unit (DAQ)
Attached to a tablet, this device takes in signals from sensors within pipes, then processes and visualizes that data on a dashboard along with meaningful analysis. Our team developed the hardware, and corresponding software using React, Mapbox; and Electron, React, Node.js, Mapbox, websockets respectively.

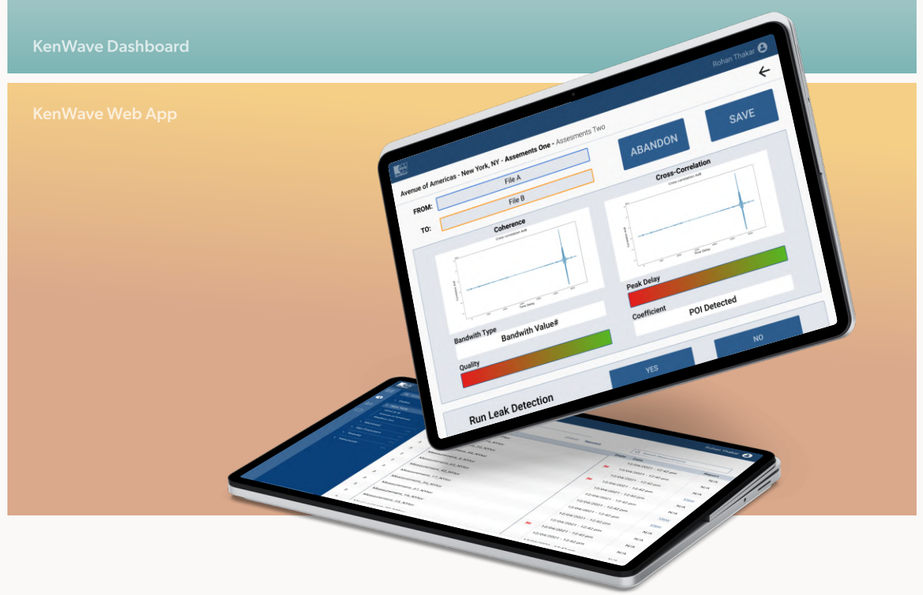
Firmware and PCB Design for a Robust Performance
Our engineers also crafted the firmware and PCB design needed to operate seamlessly in extreme temperatures, while our software developers created a robust backend using REST API (AWS API Gateway), authentication (AWS Cognito), lambda functions (AWS Lambda), database integration (DynamoDB), containerized analytic script (AWS EC2), and static file storage (AWS S3).

All work was completed with our Industrial designers and UI/UX designers facilitating an intuitive user experience from beginning to end across hardware and software.



KenWave Tablet App


KenWave Dashboard



KenWave Web App

Software Services

UI UX

User Interface (UI) and User Experience (UX) design are often used interchangeably, but they are different design practices that work in tandem with another. The UX designer maps out the user's entire journey through a product; the UI designer then takes the mapped out UX journey and visualizes every aspect of it, including all the individual screens and touch points that the user might encounter.

Brash's software and design teams work closely together to craft digital products that are not only functional but consider the holistic experience of the user while incorporating company branding to ensure an intuitive, cohesive, and visually pleasing experience. Over the years, we've developed thoughtful digital interfaces that accomplish both seamless use and stunning visual design that captures user attention — including a robust scheduling and drug interaction database web/mobile app for anesthesiologists; an easily customizable asset and inventory database and tracking dashboard; as well as mobile apps linked to custom IoT devices in the B2B and B2C electronics space.

Services
User Research
Market Analysis
Sketching & Wireframing
System Architecture
Information Flow
User Interface Design
User Experience Design
Component Design
Brand Design Guidelines
User testing, Interactive
Prototyping Web Design
Mobile App Design
Product Animations
Product Visualizations
Video Editing

Tools
Figma
Sketch
Axure RP
Proto.io
Adobe Creative Cloud
(Photoshop, Illustrator, XD, Indesign)
Miro
Keyshot
Webflow
Editor X
Wix

Front End Development

Front end development is essentially digital bridge building, marrying the creative vision with the technology needed to make your software, mobile app, or website a functional masterpiece. Focusing on the experience of the user, front-end developers produce the client-side of websites and applications — coding the layout, appearance, navigation, and anything else a user interacts with on the site.

Previous work in this space includes developing cloud-based web/mobile apps for IoT devices in the asset tracking space, medical technology, consumer electronics, and defence. Our programmers are well-versed in a variety of languages, frameworks, and tools, offering technical expertise and solutions catered to the specific needs of our clients — whether it's integrating Shopify e-commerce tools, building a website in Wordpress or Wix, or creating a mobile app to monitor the health and well-being of patients remotely, we can create a professional and smooth experience across all platforms and digital devices.

Services
Mobile App
(iOS, Android)
Web App
Desktop App
(macOS, Windows, Linux)

Languages
TypeScript
JavaScript
Python
C, C++, C#
Objective-C
Swift
Java
Kotlin
GraphQL
CSS/SCSS

Frameworks
React
React Native,
Flutter
Svelte
Vue.js
Bootstrap
Tailwind CSS

Libraries
Redux
WebGL
three.js
Mapbox

Testing
JUnit
Jest
Go testing
XCTest
kotlin.test

Back End Development

The back end of any website, app or software solution is responsible for essential behind-the-scenes functions, such as the processing, storing, and retrieving of data from a centralised database; payment processing; push notifications; and any system integrations needed. Back-end developers program all the components that users can't see that power the operations of any software solution or website.

Our developers work closely with our front-end team to produce robust applications and APIs to support mobile and desktop clients; optimize scalable distributed systems in the cloud; and implement streamlined DevOps that allow for rapid continuous integration and deployment of new code. Our team is experienced with serverless architectures; backend services like Docker containers and container orchestration, Kubernetes; and cloud platforms like Amazon Web Services (AWS). Brash developers can program in multiple back-end languages and frameworks such as Python, Node.js, and always assess the right technical approach needed to best align with your vision — creating digital products with clean, well-documented code to scale with increased user traffic .

Services
Authentication
API development (REST, GraphQL)
Database Management (relational, NoSQL)
Cloud Function
Data Pipeline
IoT
Static file hosting
Containerization and cluster management
Payment integration
pub/sub service
Push notifications
Hosting and Domain management
Socket and Websocket server
Migration management

Languages
Python
JavaScript
Java
C#
SQL
GraphQL

Frameworks
Serverless
Node.js
Express
Django
Flask
Spring
.NET
MongoDB
MQTT
Apache Kafka
Docker,
Kubernetes,
socket.io, Stripe API, Shopify API

Libraries
AWS
Azure
Firebase

Firmware

The in-between of hardware and software, firmware is a type of software embedded directly on a piece of hardware, like a microchip, that enables device function. Firmware lives and runs directly on the hardware but operates in the background — not interacting with users — for low-level device control and machine functions such as a computer detecting its hard drive or video card.

Our engineers and developers have considerable experience developing and maintaining the firmware for a wide range of chipsets including Nordic, STM32, embedded Linux and Atmel architectures. Client work in this area has included optimizing firmware for performance and power efficiency for wearable devices, and the integration of peripherals and sensors, such as an accelerometer, temperature and humidity sensors, and gyroscopes for clients in a wide range of industries. Our proven success in firmware implementation stems from a deep understanding of both hardware and embedded design, bringing both together to debug and optimize hardware by considering various factors like component placement, size, weight, and user intention.

Services
Bluetooth Low Energy (BLE)
WiFi
Mesh Networks
UART
GPS
NFC

Hardware
Raspberry Pi
Accelerometer
Temperature + Humidity
Gyroscope
IMU
Altimeter
Range sensors
Motion sensors,
Audio HATs
GPS Dead Reckoning Board

Languages
C
C++

Architectures
STM32
Nordic
NXP IMX

AI & Machine Learning

On a broad level, Artificial Intelligence (AI) and Machine Learning (ML) are similar, both intended to simulate human thinking and behaviour by leveraging robust data sets and advanced algorithms to perform these human-like tasks. Machine Learning takes it a step further by enabling digital systems to learn from the data they collect performing task(s), adjusting to experience, and self-correcting with the introduction of new data.

At Brash, we have developed several different AI/ML based applications. Some examples include processing and predictions using sensor data, training deep neural networks for recommendation systems, and customizing ChatGPT. We build and validate custom AI/ML models, ensuring a seamless operation and integration of AI/ML algorithms into cloud/mobile/or edge infrastructure for a fully functional solution. An example of recent work, we developed custom algorithms for the firmware of an IoT device that attaches to baby bottles to detect and automatically track whether a baby is feeding. This included in-depth academic research and codifying milk safety best practices from the likes of the World Health Organization into a state machine that could be implemented in the firmware — and do all the thinking for a sleep-deprived and stressed-out parent.

Services
Chat Bots
Computer + Machine vision
Recommendation Engines
Analytics
Monitoring

Frameworks
TensorFlow
PyTorch
GPT-3
ML Kit
Keras

Languages
Python
Java Script

Libraries
Numpy
Pandas
Matplotib
Sci-Kit
OpenCV

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