KNOTIX

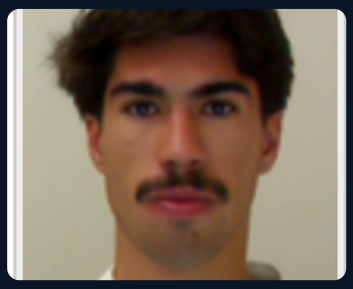
INTEGRATED BIOMETRIC AND TECHNICAL WEARABLE FOR SAILING

R TEAM

Candeias

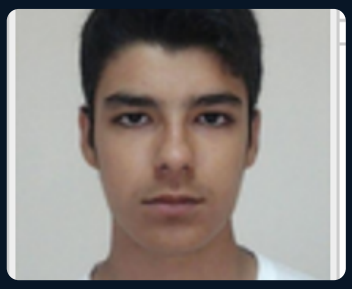
ware development

lem Analysis



Miguel Duarte

- Software/Hardware development
- Real world tests



Gonçalo Lopes

- Hardware development
- WebSite/Blog

Hugo Chen

- User interface
- WebSite/Blog

world tests

Video production

Poster

R PARTNERS

Instituto Superior Técnico

ng high-level academic guidance, engineering resources, and nced validation labs to support complex biometric and signal processing architecture.

Portuguese Sailing Federation

The national official sailing authority. Offering professional athl real-world nautical telemetry test cases, Olympic-grade coa insights, and dynamic sea trials.

OJECT DETAILS

C ADVISOR

SCIENTIFIC CO-ADVISOR

COORDINATOR

MENTOR

uís Caldas
Superior Técnico

Prof. Teresa Vazão
Instituto Superior Técnico

Prof. Luís Caldas Oliveira
Instituto Superior Técnico

Nuno Barreto
Portuguese Sailing Feder

OBLEM & OUR MISSION

PROBLEM

iometric Data Disconnect

erformance sailing currently suffers from a **"data disconnect"**. oat telemetry exists, there is no integrated way to correlate an s physiological strain with specific technical maneuvers.

synchronized, high-fidelity logging, post-race debriefs remain ve. Coaches and athletes cannot objectively analyze how fatigue directly impacts the efficiency of a tack or jibe, leading ed opportunities for optimization in training and competition.

◎ OUR MISSION

Evidence-Based Training

Moving beyond **"gut feeling"** to evidence-based training.

Success for Knotix means providing the precise data synchroniz required to transform a subjective post-race debrief into a tech evolution, shortening the learning curve for athletes and optimiz performance through high-fidelity logging.

W IT WORKS (1/3): HARDWARE & ECG

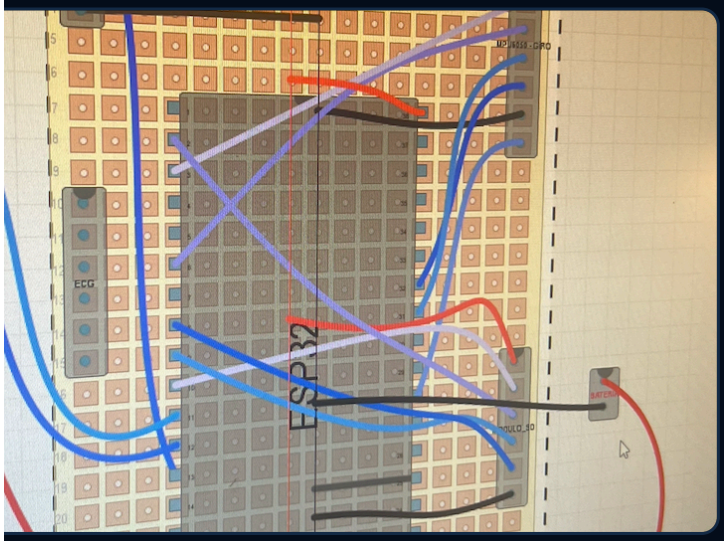
lity Biopotential Logger

eyond consumer-grade smartwatches that only provide ow-frequency heart rates.

ted Knotix wearable integrates a custom **Analog Front-End** o capture raw electrocardiographic (ECG) waveforms directly ng sailor.

capture enables high-fidelity HRV analysis to measure vous system fatigue.

W IT WORKS (2/3): ARCHITECTURE



Store & Forward Architecture

Engineered with a robust Store & Forward approach, the system extreme environments where active cloud connectivity is impos

- **Dual-core ESP32 Processor:** Efficiently manages multi-sens
- **10Hz Telemetry:** Logs GPS position, speed, and IMU body po
- **Zero Packet Loss Guarantee:** Saves high-frequency biomet directly onto an internal SD Card.

W IT WORKS
): ANALYTICS

ssion Sync

, a user-friendly haptic interface triggers a localized high-
Fi Access Point directly from the device.

essly transfers synchronized CSV logs containing
GPS, IMU, and ECG data directly to smartphones or
analytical debriefs.

Y TECHNICAL CHALLENGES

%

Loss Allowed

rdware algorithms specifically to maintain
G timestamps even during extreme physical
and continuous seawater splash.

THE MAIN OBSTACLE

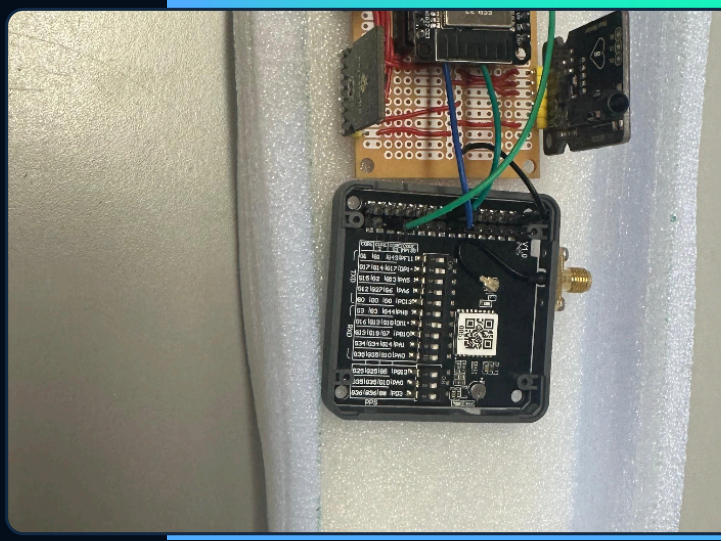
Capturing Biometrics on Open Water

The principal challenge lies in the **continuous capture of ECG sig** highly dynamic saltwater environments.

Athletic perspiration, extreme wave splashes, and high G-forces generate severe motion artifacts. We resolved this through integ

active analog filtering inside our front-end architecture.

AL SETUP ARCHITECTURE



egration

dated prototype is ultra-compact, lightweight, and
l to anchor securely to a racing life jacket or technical harness.

ized, hermetically-sealed impact protective outer casing.

grade gaskets ensuring total dynamic water seal.

exible hydro-resistant biosensors with minimal friction.

Y CHOOSE KNOTIX?

ific Precision

Highly Cost-Effective

Purpose-Built Design

...ne Precision

...raw high-frequency ECG wave
...s allowing detailed HRV analysis, which
...ible with standard optical heart-rate

Highly Cost-Effective

Delivers professional telemetry at a fraction of the cost of existing industrial sports performance solutions.

Purpose-Built Design

Specifically developed for sailors, seam
combining IMU orientation, GPS tracking
biological inputs out of the box.

...TURE IMPROVEMENTS

...& Ergonomics

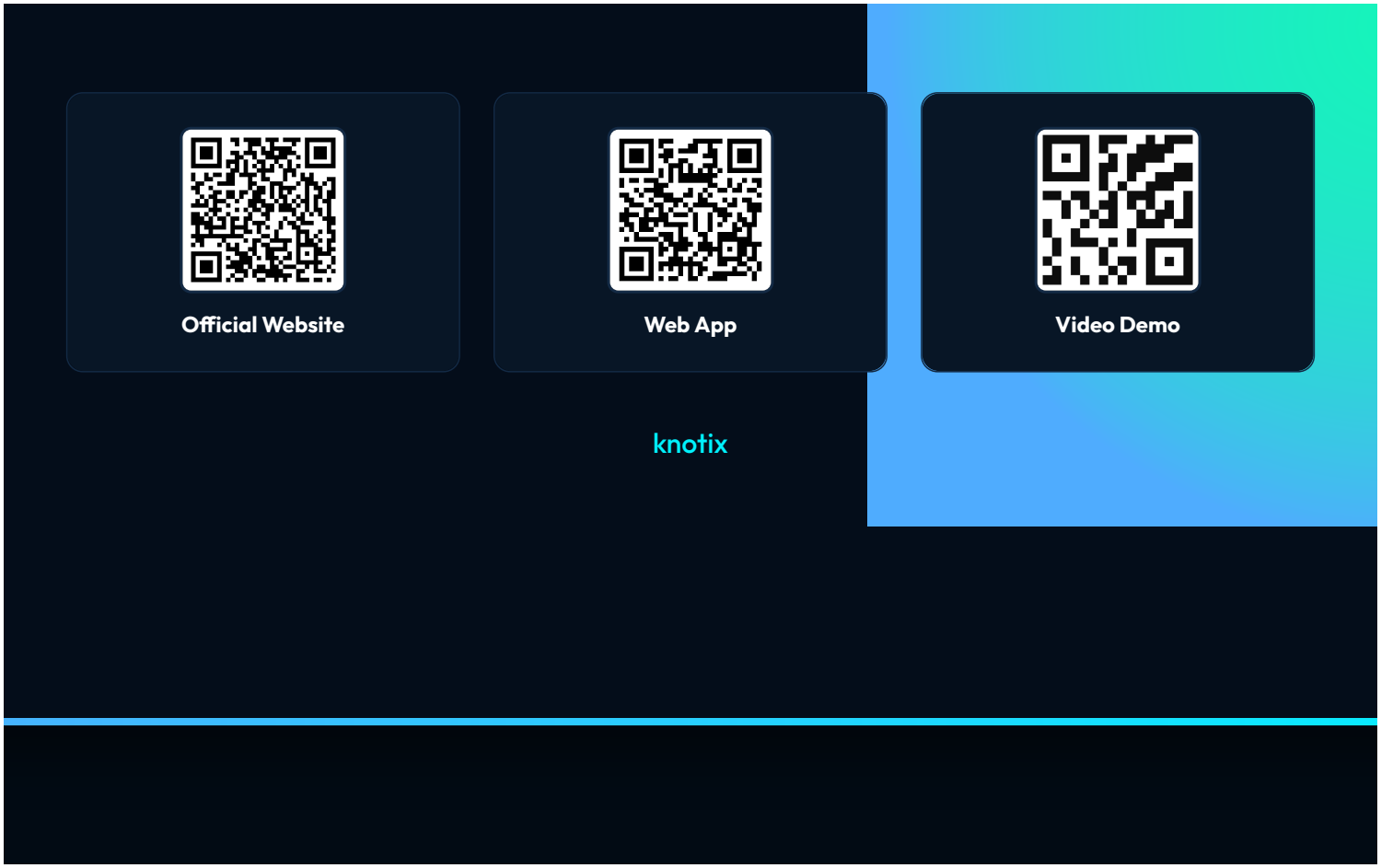
...ng hardware revisions, our focus lies on maximizing long-term
...ase of operation, and structural marine defense.

...rective:

...ning the daily athletic training cycle by minimizing external cords and
...ports to safeguard against long-term corrosion.

- **Wireless Qi Charging:** Integrating magnetic inductive charg
eliminate external power ports entirely, reducing corrosion r
- **Volume Reduction:** Reducing casing profile dimensions by
allow completely unobtrusive integration inside technical ve
- **Automated Cloud Sync:** Enhancing local Wi-Fi to auto-uplo
telemetry runs instantly to an intuitive analytics platform via

THANK YOU!


Official Website
Web App
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knotix