



PROBLEM

RISE IN TEMPERATURES

According to the International Labor Organization (ILO), global warming has led to a growth in injuries and health complications related to strenuous working conditions.

SELF-REPORTING RISKS

Current methods such as self-reporting and basic skin temperature checks are not accurate enough to detect health crises before they occur.

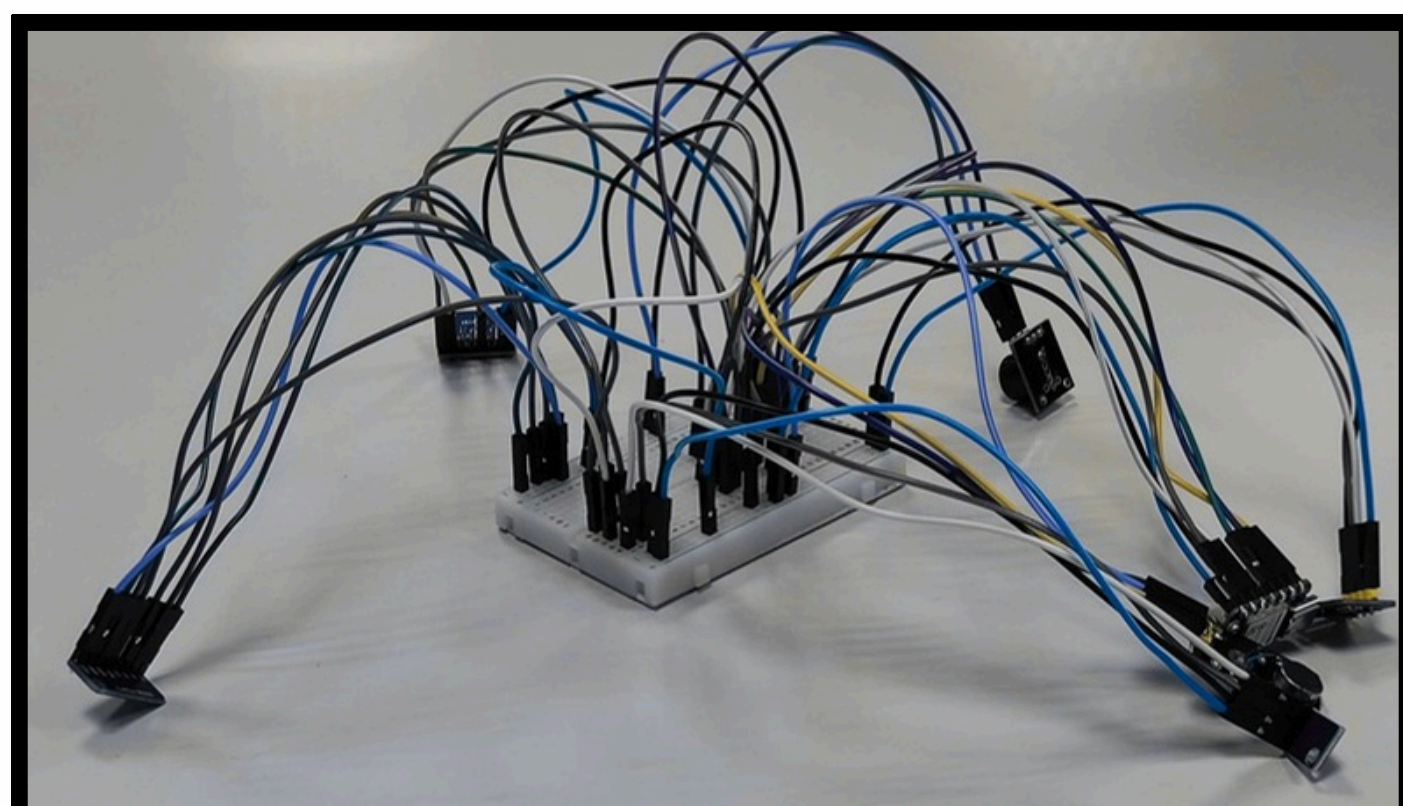
INVASIVE SOLUTIONS

Other solutions, such as Bodytrak (an in-ear device), are invasive and conflict with the use of safety helmets. They can impede on-site communication and generally face lower acceptance among industrial workers.

BENEFICIARIES

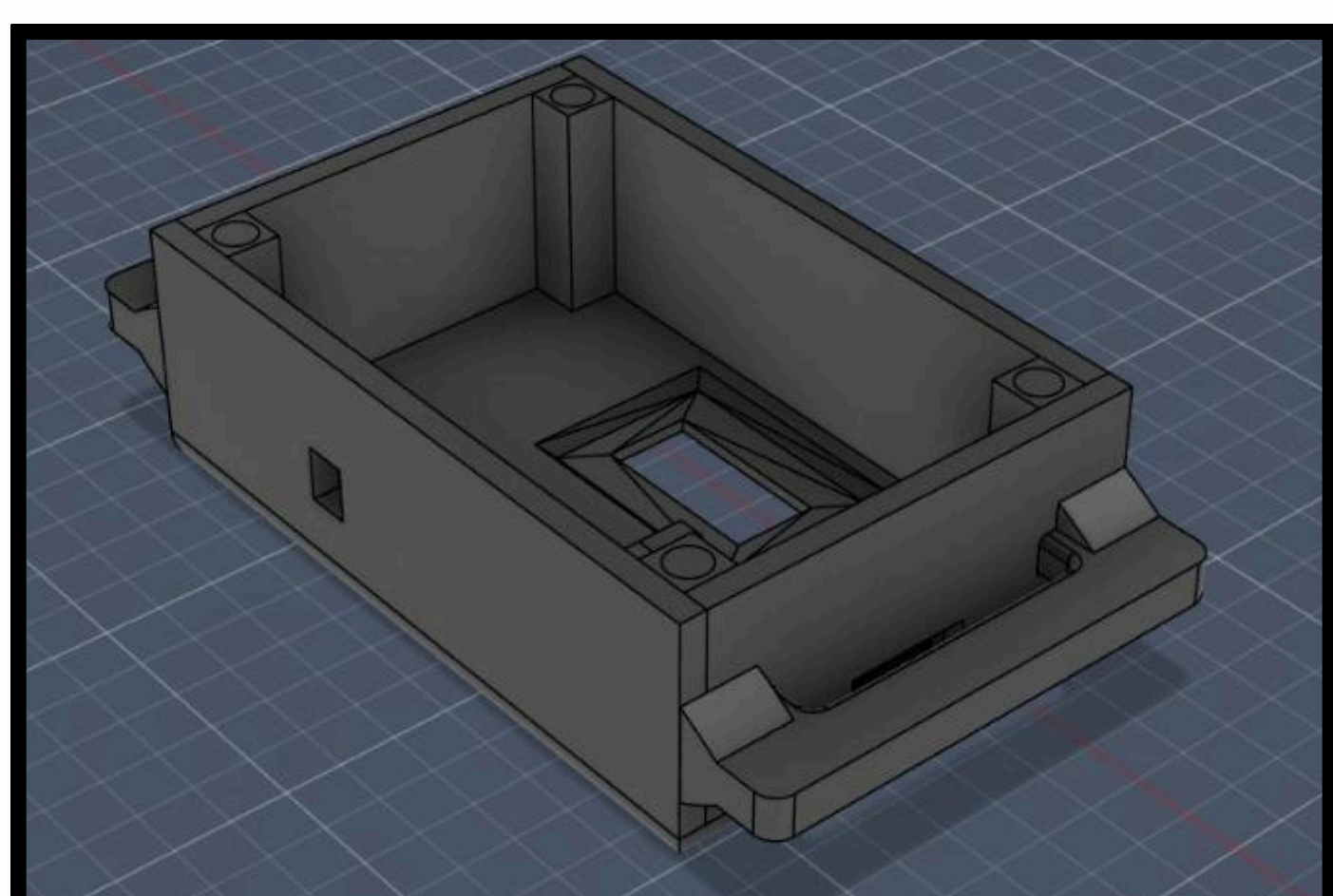
- CONSTRUCTION WORKERS
- MAINTENANCE PERSONNEL
- INDUSTRY WORKERS
- ATHLETES
- FIREFIGHTERS
- MILITARY PERSONNEL

DEVELOPMENT



By focusing on functional and ergonomic refinement, the enclosure successfully evolved through three 3D-printed PETG iterations, incorporating a comfortable curved face, reinforced lateral arms for adjustable straps, and brass inserts for wear-free maintenance.

Concurrently, the hardware development successfully integrated all biometric sensors and actuators into a single system, ensuring individual data integrity through independent calibration and streamlining the development timeline by leveraging existing Arduino IDE libraries.



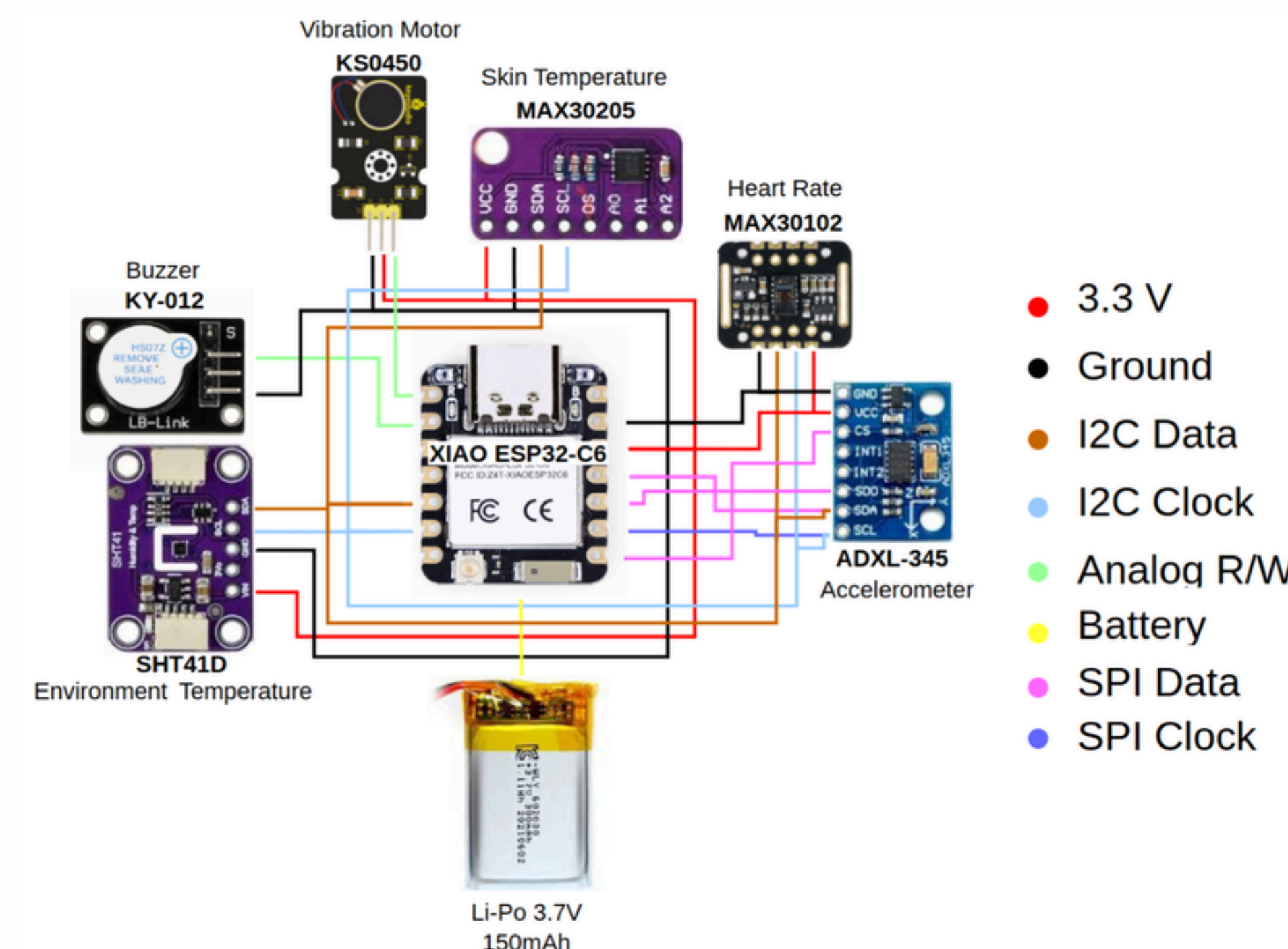
OUR SOLUTION



ThermBand is a smart chest/rib device designed to protect workers from extreme heat. It monitors heart rate, body, and ambient temperature in real-time, calculating thermal risks to trigger preventive audible and vibrational alerts. Shift data is easily downloaded via USB-C to an analytical web Dashboard.



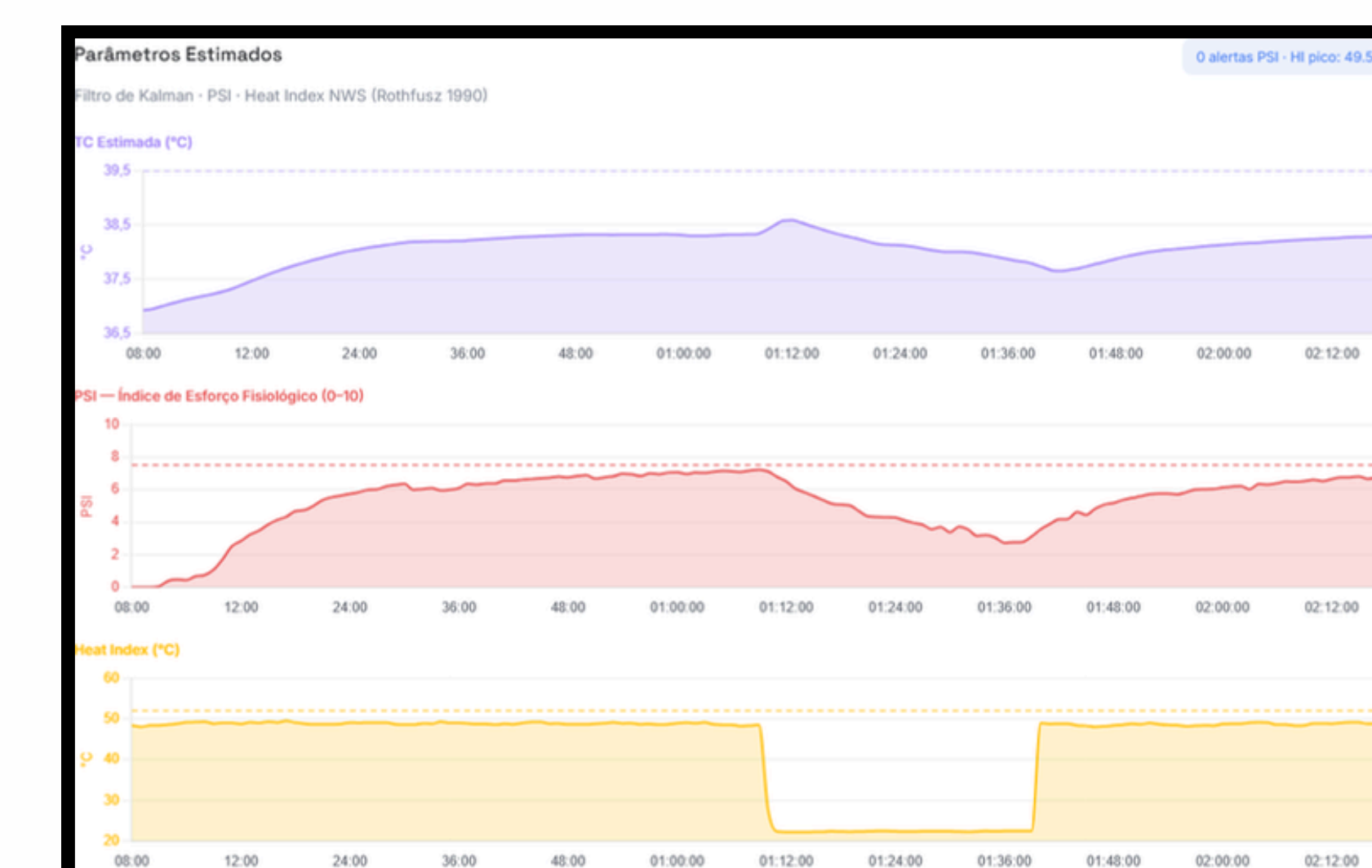
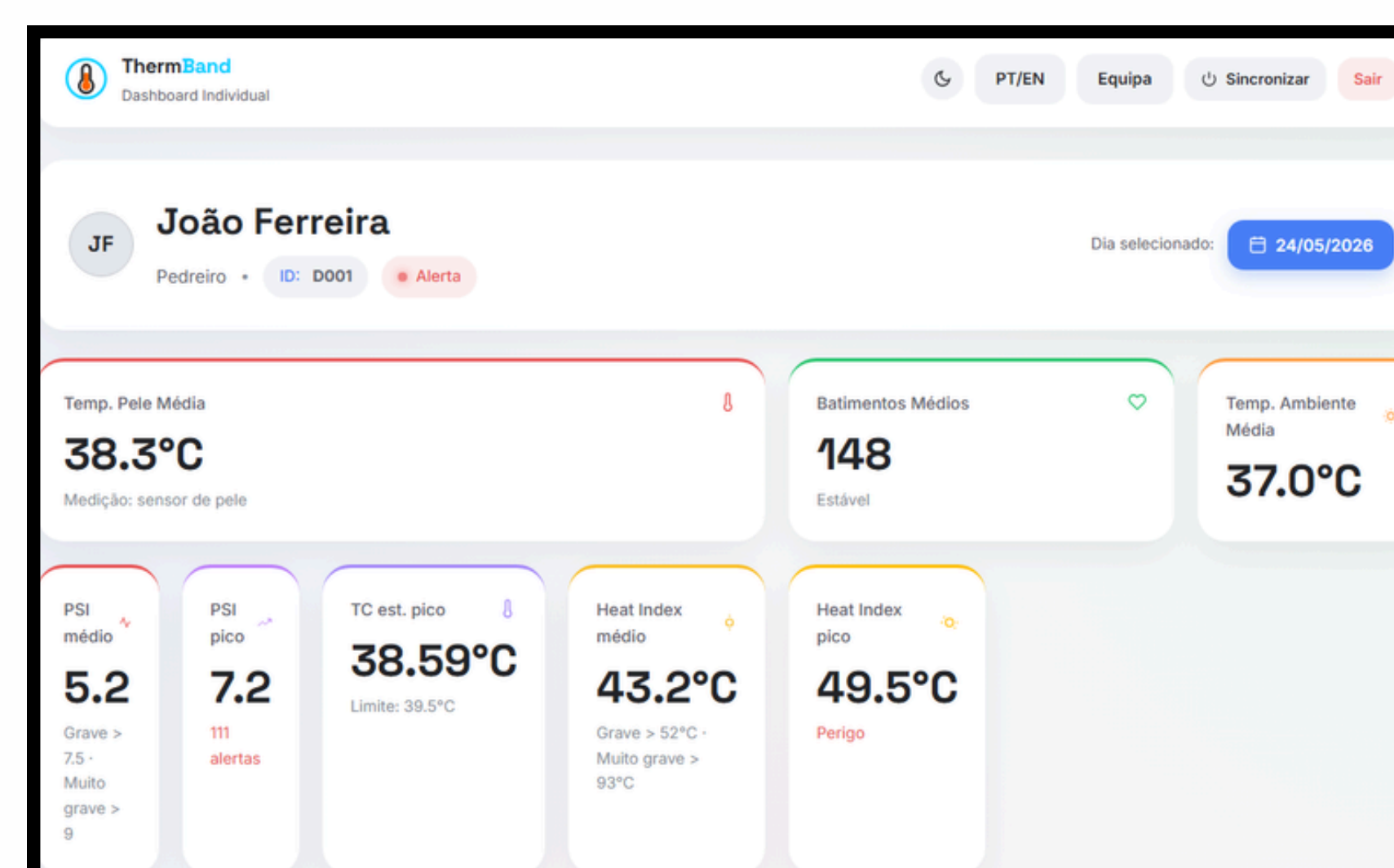
- Dimensions: 67x45x30 (mm)
- Modular and Integrated Design
- Easy to use (Single USB-C Connection)
- Custom Made Secure Database



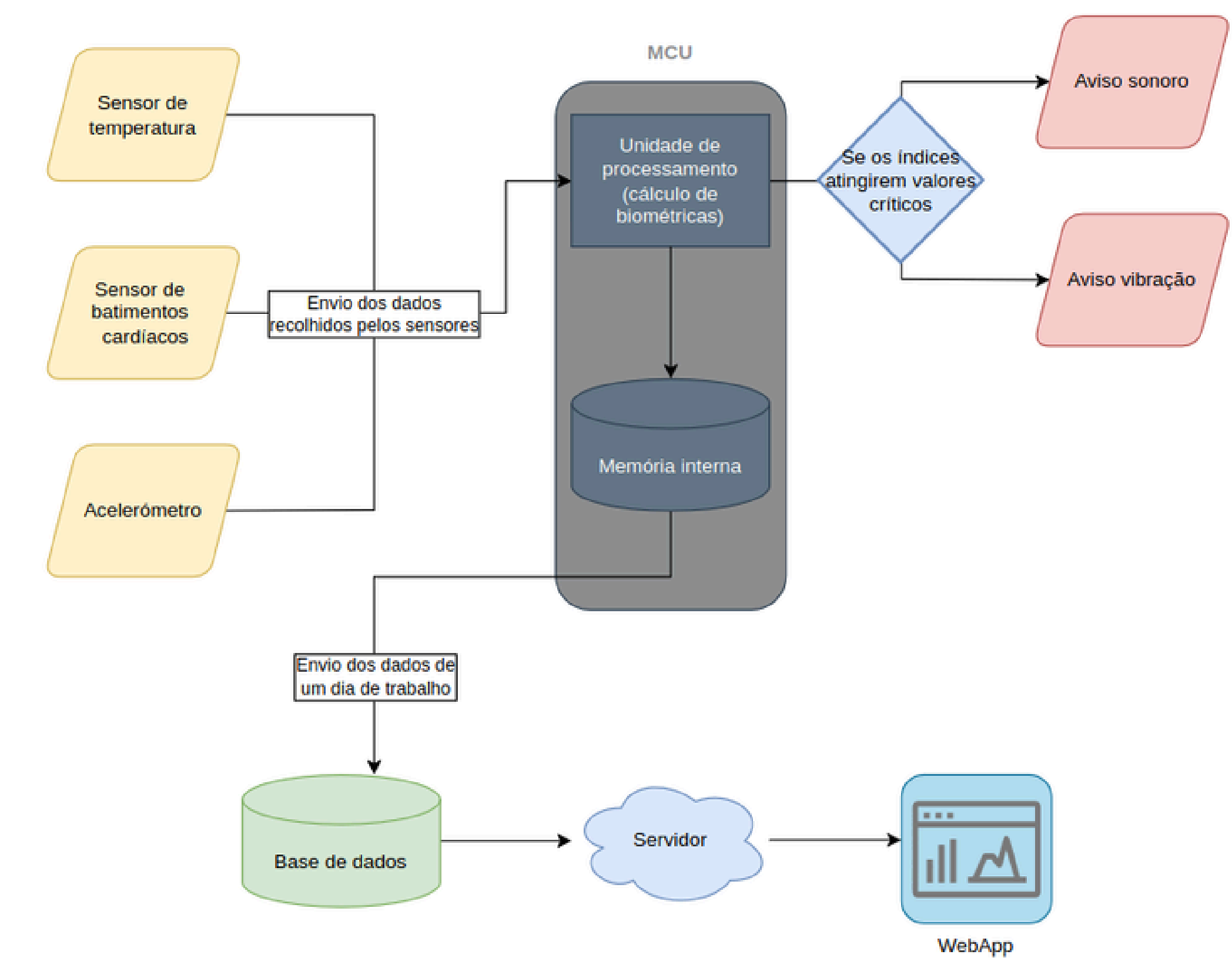
ALGORITHMS AND WEBAPP



We have developed a robust backend system that accurately estimates core body temperature, achieving a competitive 0.38°C RMSE using the "Prospie" dataset to calculate Physiological Strain and Heat Indices. Complementing this algorithm, we established a secure data infrastructure via the IST Sigma server, featuring seamless USB-C synchronization and an intuitive management dashboard that provides real-time health monitoring, automated safety alerts, and comprehensive historical data analysis to ensure worker safety.



Fluxo lógico



RESULTS

PARTNERS VALIDATION

- **Problem Relevance:** 4/5 — High priority in operational contexts.
- **Risk Reduction:** 5/5 — Exceptional potential to reduce heat strokes and workplace accidents.
- **Value Over Current Methods:** 5/5 — Far superior to standard practices (e.g., empirical breaks, water distribution).
- **System Performance:** 5/5 — Webapp is highly user-friendly with flawless data transfer.
- **Algorithm Performance:** 5/5 — On par with the latest research and scientific data.
- **Future Adoption & Integration:** 3/5 — Growing interest during summer, heavily dependent on wearable comfort.

USERS VALIDATION

- Prototype Comfort during an 8 hour shift: 4/5
- Weight and lightness of the prototype on the body: 3/5
- How freely does the device allow the movement necessary for daily work: 4/5
- How easy and intuitive is the process of putting the device and adjusting it: 3/5
- How would you evaluate the compatibility of the device with the obligatory Individual Protection Equipment: 5/5 .

