



T2 2025 Project 3: Athlete Wearable Technology

ReflexionPro

BY

REDBACK OPERATIONS



Redback Operations

Redback is a student-led innovation company within Deakin University's Capstone program, dedicated to building real-world technology solutions across sectors such as health, energy, and wearable tech. The company brings together data, hardware, and software to create practical, scalable platforms that solve meaningful problems.

Operating under the guidance of industry and academic mentors, Redback focuses on delivering innovative IoT-driven solutions that bridge the gap between technology and fitness. Projects are driven by purpose, technical excellence, and real-world impact.



Company's Mission and Objectives

Mission

Redback is committed to revolutionizing the fitness experience through the development of state-of-the-art connected devices that enhance both the enjoyment and effectiveness of physical activity. At the core of this mission is a focus on innovation, injury prevention, and continuous improvement. Each project is designed to make training smarter, safer, and more engaging, empowering individuals to reach their fitness goals through intelligent, data-driven solutions.

Key Objectives

- Create smart, scalable tech that tackles real-world fitness challenges.
- Turn complex data into clear, actionable feedback.
- Build user-friendly, privacy-focused, and lasting solutions.
- Enable students to lead and learn through real-world tech development.



ReflexionPro

ReflexionPro is an athlete-focused wearable technology project designed to bridge the gap between **performance data and personalized training**. By integrating data from smart devices like wearables and fitness trackers, ReflexionPro delivers tailored fitness analytics, helping athletes train smarter and safer.

This platform analyses key physiological indicators such as **VO₂ max, heart rate, and training load**, offering insights that support injury prevention and optimize performance.

ReflexionPro is not just a tracking tool—it's an intelligent companion that adapts to the athlete's needs, empowering them with meaningful data, personalized plans, and actionable feedback.



What is VO₂ Max?

VO₂ Max (short for Maximal Oxygen Uptake) is the maximum amount of oxygen your body can use during intense exercise. It's a key measure of cardiovascular fitness and aerobic endurance.

Why It Matters:

- The higher your VO₂ Max, the fitter and more efficient your body is at delivering oxygen to muscles.
- It helps assess an athlete's endurance capacity, training progress, and overall fitness level.
- Used to personalize training plans—especially in endurance sports like running, cycling, and rowing.

So Basically:

VO₂ Max is like your body's "engine size" — the bigger it is, the more fuel (oxygen) it can burn, and the better it performs under pressure.



Company Objectives

- 1. Real-World Innovation:** Redback is committed to creating technological solutions that address real-world challenges, from health monitoring to energy efficiency.
- ◆ **2. Empowering Human Performance:** Through platforms like ReflexionPro, Redback aims to empower athletes and users with smart, data-driven tools that enhance training, recovery, and long-term performance.
- ◆ **3. Advanced Analytics & Predictive Insights:** Redback leverages cutting-edge technologies like wearable data, AI models (e.g., VO₂ max, FTP), and ML analytics to turn raw data into actionable recommendations.
- ◆ **4. User-Centric Design:** Committed to delivering tools that are not just powerful but also intuitive and accessible, ensuring a smooth and insightful user experience for athletes across disciplines.
- ◆ **5. Sustainability & Long-Term Impact:** Redback builds scalable, responsible technologies with long-term societal impact in mind—especially within health tech, energy, and performance monitoring sectors.



Tasks To Do

Backend Team Tasks

1. Review and reject inappropriate pull requests that rewrite the whole repo
2. Use code scanning tools to remove open credentials/hardcoded secrets
3. Implement and expand **unit tests** for backend methods
4. Integrate and optimize **Firebase authentication methods**
5. Review **OAuth implementations** and **SQLite/database usage** for improvements
6. **Implement data anonymization** for sensitive user data
7. Collaborate with **PenTest team** to implement security recommendations
8. Prepare and maintain a **development/testing environment** for Penetration Testing (PenTest)
9. Ensure backend endpoints for **Login Page** are fully functional
10. Add **Last Synced Timestamp** endpoint/data for syncing
11. Help frontend team with backend integration as needed



12. **Integrate with data warehouse database** instead of using cloud DB (as per latest requirement)
13. Document **backend API** and architecture on Docusaurus

Frontend Team Tasks

1. Identify and revert **damaged features** from conflicting PRs
2. Re-implement **lost or broken features** caused by old PRs
3. Refactor **dashboard layout** for better usability and user experience
4. Integrate **UI with Firebase Auth** and backend endpoints
5. Assist backend team in testing **frontend-backend integration** (login, data retrieval)
6. Implement **Light/Dark mode toggle** (adaptive themes)
7. Add **Last Synced Timestamp** display on dashboard
8. Link athlete performance metrics with **weather/environmental data** (wind speed, humidity, temperature)
9. Document frontend features and changes on **Docusaurus**



Data Analysis Team Tasks

1. Ensure **cross-validation** is performed for all models (existing and new)
2. Expand datasets and **retrain/refine** existing predictive models
3. Build predictive models for:
 - **Running Duration** (inputs: distance, elevation gain, pace curve)
 - **Cycling Duration** (similar inputs)
4. Develop models for:
 - **Fatigue prediction**
 - **Injury risk assessment**
 - **Recovery time estimation**
5. Correlate **environmental factors** (wind speed, humidity, temperature) with athlete performance metrics
6. Analyse **personal activity metrics** to identify fitness patterns
7. Prepare **visualizations and summaries** for integration with the dashboard
8. Document **analysis methods**, model results, and lessons learned on **Docusaurus**



Cross-Team / Miscellaneous Tasks

1. MVP planning and prioritization across all teams
2. Work with cybersecurity team to review and integrate code scanner results
3. Coordinate with AppAttack X Redback Penetration Testing collaboration



Github Repositories

Frontend is: <https://github.com/Redback-Operations/reddback-fit-web>

Backend is: <https://github.com/Redback-Operations/reddback-fit-backend>

Data analysis: <https://github.com/Redback-Operations/reddback-fit-sports-performance>

How to Run the ReflexionPro Website on Your Computer

- **Open Terminal**
- **Clone the repository**
git clone https://github.com/Redback-Operations/reddback-fit-web.git
- **Navigate to the project folder**
cd reddback-fit-web



- **Install required dependencies**

npm install

- **[Optional] Kill any process using the default port (5173)**

If the site doesn't open, run:

npx kill-port 5173

- **Start the development server**

npm run dev

- **Open the site in your browser**

<http://localhost:5173/>