



User Manual

Version: 1.0

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Date:

January 29, 2024

Table of Contents

1. Introduction	3
1.1 Purpose	3
1.2 System Overview	3
2. Hardware Devices	3
2.1 Impax Buddy	3
3. Getting Started	4
2.1. Desktop app Installation	4
2.1.1 System Requirements:	4
2.1.2 Downloading the application	5
2.1.3. Installing impax-dashboard	5
2.1.4 Troubleshooting Tips	6
2.2. Setup	7
2.2.1 App Configuration	7
• For Team Managers/Coaches/Physios..etc:	7
• For Players:	9
2.2.2 Hub Configuration	10
2.2.3 Buddy Configuration	11
Power On Procedure	11
4. Features and Functions	13
4.1 Sidebar Menu	13
4.2 Player Management	14
4.3 Manager's Profile	16
4.4 Buddy Connectivity	17
4.5 Live Dashboard	18
4.6 Team Analytics	20
4.7 For Players: Player Analytics	21
4.8 For Players: Player's Profile	22
5. Start Recording Impacts	23
6. Advanced Options	24
7. Troubleshooting	25
7.1. Common Issues	25
7.2. Frequently Asked Questions	26
8. Contact Information	27



1. Introduction

1.1 Purpose

This user manual provides detailed instructions and guidelines for users of Impax, a cyber-physical product involving Impax Buddy, Impax Hub, and Impax Dashboard. This manual will help users understand the system, set it up correctly, and utilize its features effectively.

1.2 System Overview

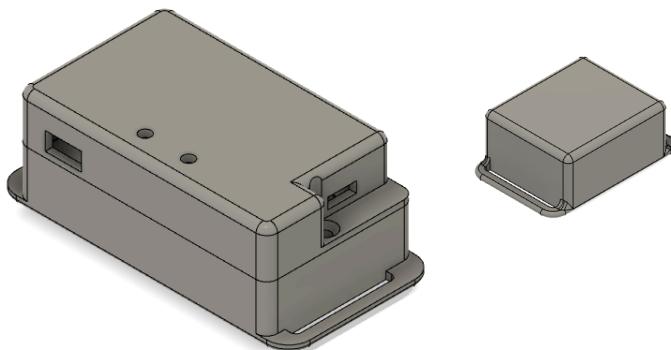
The product integrates Impax Buddy, Impax Hub, and Impax Dashboard to provide a comprehensive solution for head impact monitoring and tracking. Impax Buddy is a wearable device worn on the head of the athlete, which sends real-time information on impacts. Impax Hub is the central device that connects and syncs all the components. Impax Dashboard is a user-friendly cross-platform desktop application to view the real-time effects and further analyze the data from Impax buddies. These components work together to help protect athletes from developing brain disorders due to the cumulative effects of subconcussive impacts.

2. Hardware Devices

Impax system integrates two hardware components:

- Impax Buddy
- Impax Hub

2.1 Impax Buddy



2.2 Impax Hub



**IMPAX
HUB**

3. Getting Started

Follow the steps below to get started with Impax.

2.1. Desktop app Installation

2.1.1 System Requirements:

Platform	Operating System	Minimum RAM	Processor
Windows	Windows 7 and later (x86 and amd64)	512 MB	Intel Pentium 4 or later with SSE2 support
macOS	macOS 10.10 and later (64-bit)	512 MB	Intel 64-bit processor
Linux	Ubuntu 12.04 and later, Fedora 21, Debian 8 (ia32/i686 and x64/amd64)	512 MB	Intel Pentium 4 or later with SSE2 support (Recommended)

2.1.2 Downloading the application

- Visit the official website of [impax](#) and navigate to the Downloads section.
- Choose the appropriate version for your operating system (Windows, macOS, or Linux) and click on the download link.
- Save the installation file to a location on your computer.

2.1.3. Installing impax-dashboard

- **Windows:**

- Locate the downloaded installation file (e.g., impax-dashboard-setup.exe) and double-click on it.
- Follow the on-screen instructions in the installation wizard.
- Specify the installation directory and any additional preferences, if prompted.
- Once the installation is complete, you can launch impax-dashboard from the Start menu or desktop shortcut.

- **MacOS:**

- Open the downloaded installation file (e.g., impax-dashboard.dmg).
- A new window will appear with the impax-dashboard application icon.
- Drag the impax-dashboard icon to the Applications folder.
- Once the copying is complete, you can find impax-dashboard in the Applications folder or Launchpad. Double-click on it to launch the application.

- **Linux:**

1. Make the AppImage file executable:

- Using the GUI:
 - Right-click on the AppImage file and go to "Properties."
 - In the "Permissions" tab, check the box that says "Allow executing file as program" (or similar wording).
- Using the terminal:
 - Open a terminal and navigate to the directory containing the AppImage file.
 - Use the command `chmod a+x <appimage_filename>` (replace `<appimage_filename>` with the actual name of the file).

2. Run the AppImage:

- Double-click the AppImage file: This will usually launch the application directly.
- Run from the terminal: Type `./<appimage_filename>` in the terminal and press Enter.

2.1.4 Troubleshooting Tips

- Ensure that your system meets the minimum requirements mentioned earlier.
- Verify that you have downloaded the correct installation file for your operating system.
- If you face compatibility issues, check if there is a newer version of impax-dashboard available that supports your OS version.
- Make sure you have all the necessary dependencies installed on your system. Refer to the impax-dashboard documentation for any specific dependencies required.
- If you are facing errors related to missing libraries or dependencies, try installing them using your package manager or by following the instructions provided in the impax-dashboard documentation.
- If the application fails to launch or crashes, try restarting your computer and launching impax-dashboard again.
- If the issue persists, check the impax-dashboard support channels or forums for further assistance.

2.2. Setup

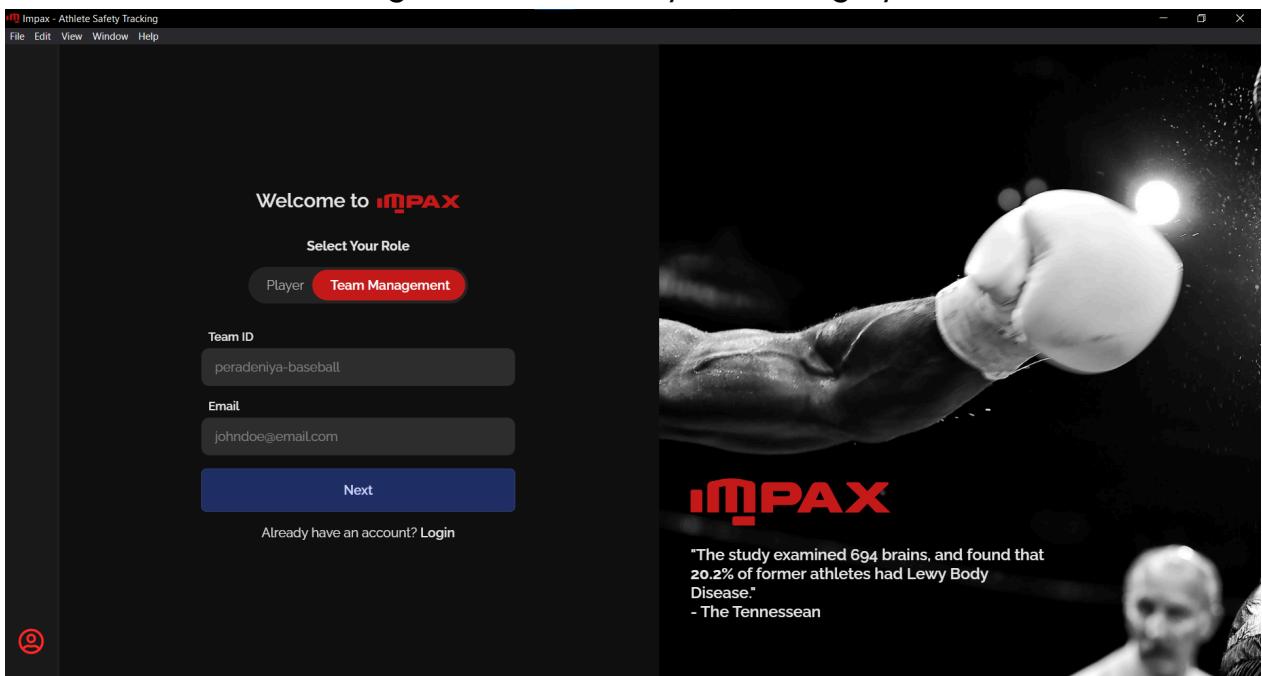
Instructions for setting up the product after installation.

2.2.1 App Configuration

- **For Team Managers/Coaches/Physios..etc:**

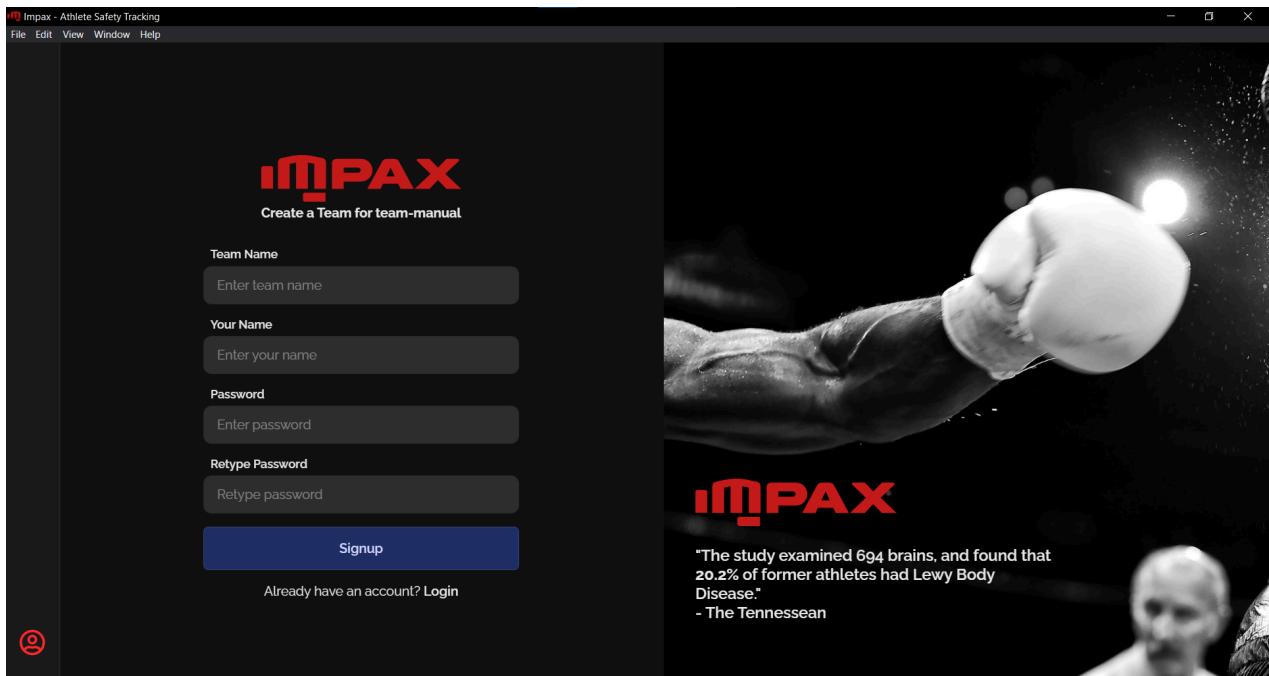
Account Creation

The app's landing screen consists of a signup form for managers and players. Ensure that "Team Manager" is selected if you manage your team.



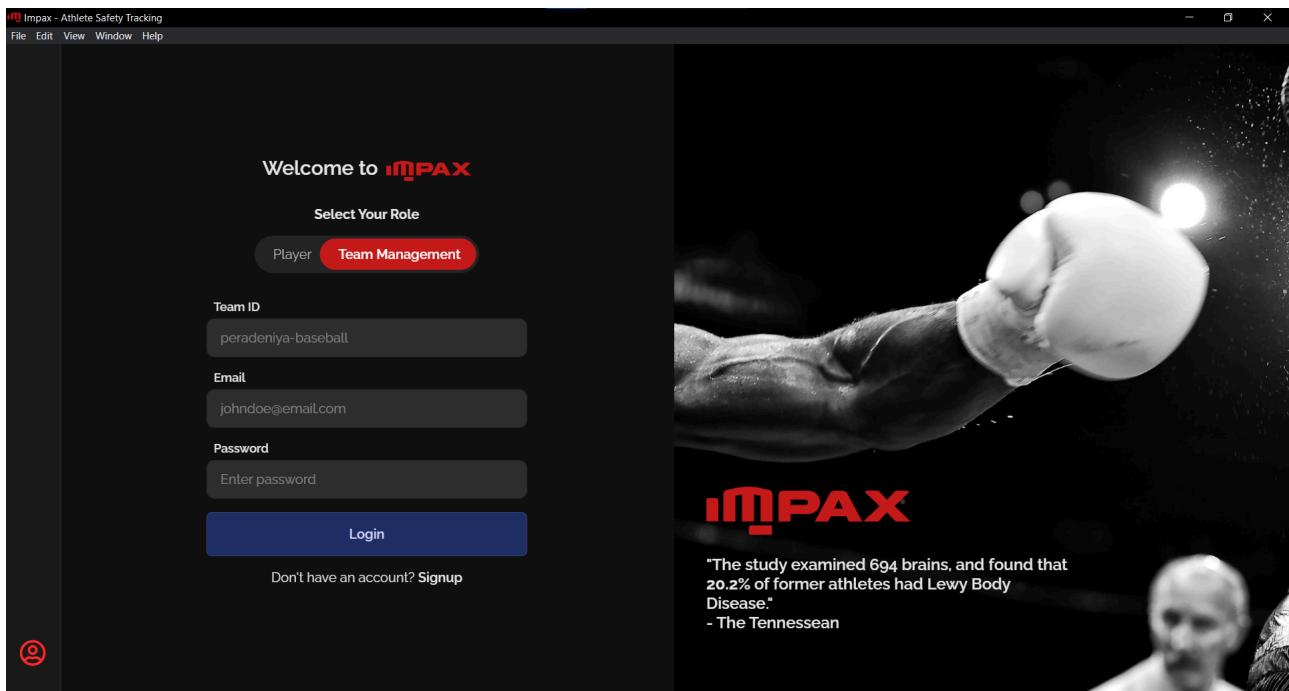
Team manager sign-up screen

Create an account for your team by selecting a suitable Team ID and your email address to sign up as a manager for that team. If the team ID is available, you'll be directed to the team creation screen, where you can enter additional details of the team.



Team manager additional information screen

After filling out the form, click on the Signup button. Impax will send you a verification email to verify your email address. Once email verification is completed, your account will be successfully created. You can now log in..

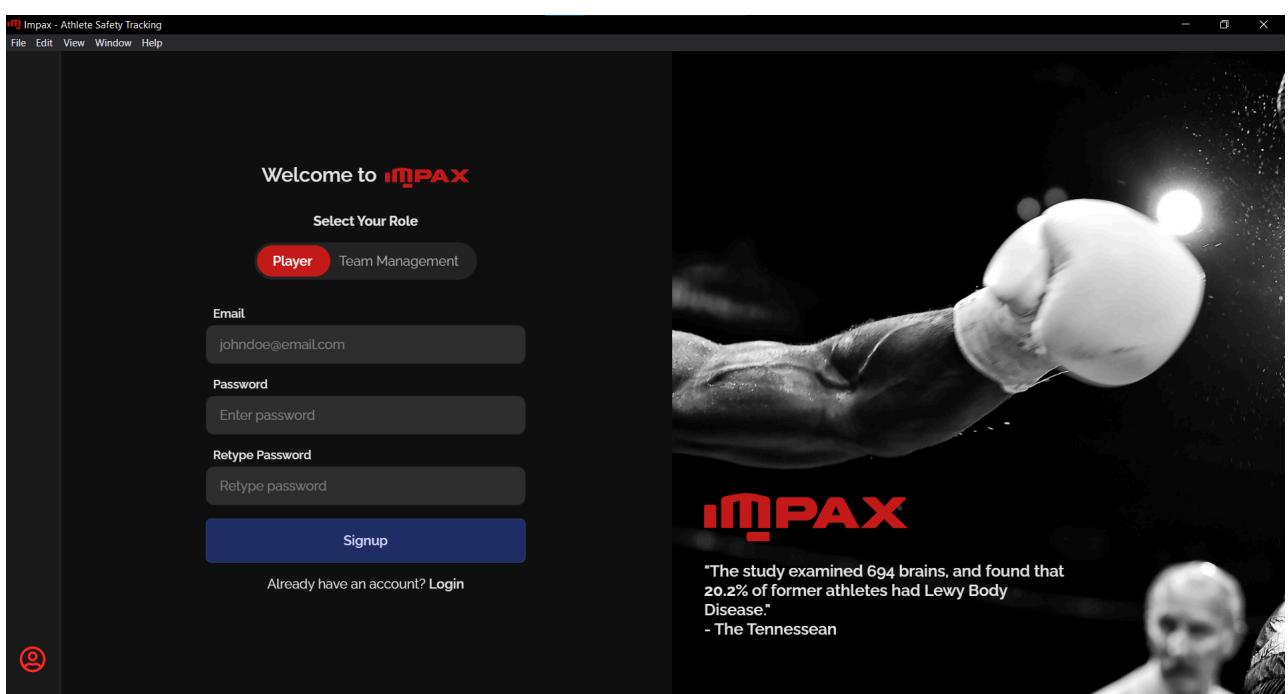


Team manager login screen

- **For Players:**

Impax is meant to be used primarily by team managers, coaches, physios, etc. Managers and players can then view and analyze the collected data on impacts. Hence, for players make sure that your team has an impax account, and you have been added to your team.

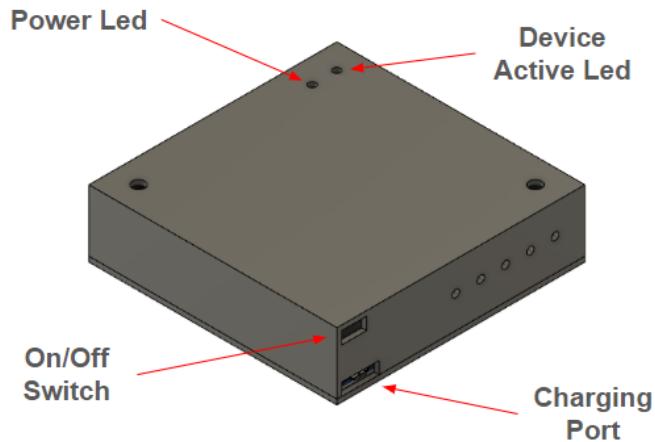
To create a player account, open the app and click on the “Player” button with the label “Select your role”.



Player Signup Screen

Once you have submitted the form, you'll receive a verification email from Impax. Verify your email to log in and access your account.

2.2.2 Hub Configuration



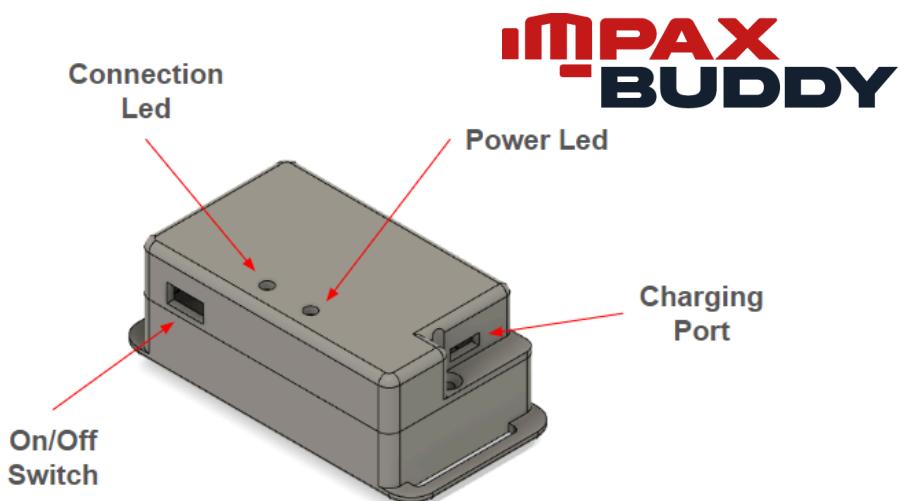
Before Power On

- Before powering on ImpaxHub, ensure it has a sufficient battery charge. The device can operate for approximately 4 hours on a fully charged battery. If the battery is low, recharge it using (the provided power adapter.)

Power On Procedure

- Turn on the power button.
- Wait until both LEDs on the hub are turned on. This process may take a few moments.
- **Important:** It is crucial to keep ImpaxHub in a location with minimal disturbances and as centrally located as possible between your devices and dashboards for optimal communication.

2.2.3 Buddy Configuration



Before Power On

- Before powering on Impax Buddy, ensure it has a sufficient battery charge. The device can operate for approximately 8 hours on a fully charged battery. If the battery is low, recharge it using (the provided power adapter.)

Power On Procedure

- Turn on the power button
- Wait until both LEDs are turned on and stable. This process may take a few seconds. (Connection Indicator will only turn on if the hub is turned on and is within the signal range)

Impax Buddy Direct Attachment to Head

Impax Buddy was designed to be attached to the headgear of an athlete, however, it is also possible to attach it directly by using elastic bands.



Attaching the Impax Buddy to the Head Guard.

The Impax Buddy is designed to support multiple sports such as boxing, cricket ..etc. The smaller of the two devices on the Impax buddy should be set at the top of the head, while the other device can be kept anywhere convenient for the player. Some examples of the configurations are given below

Attachment to Cricket Helmet



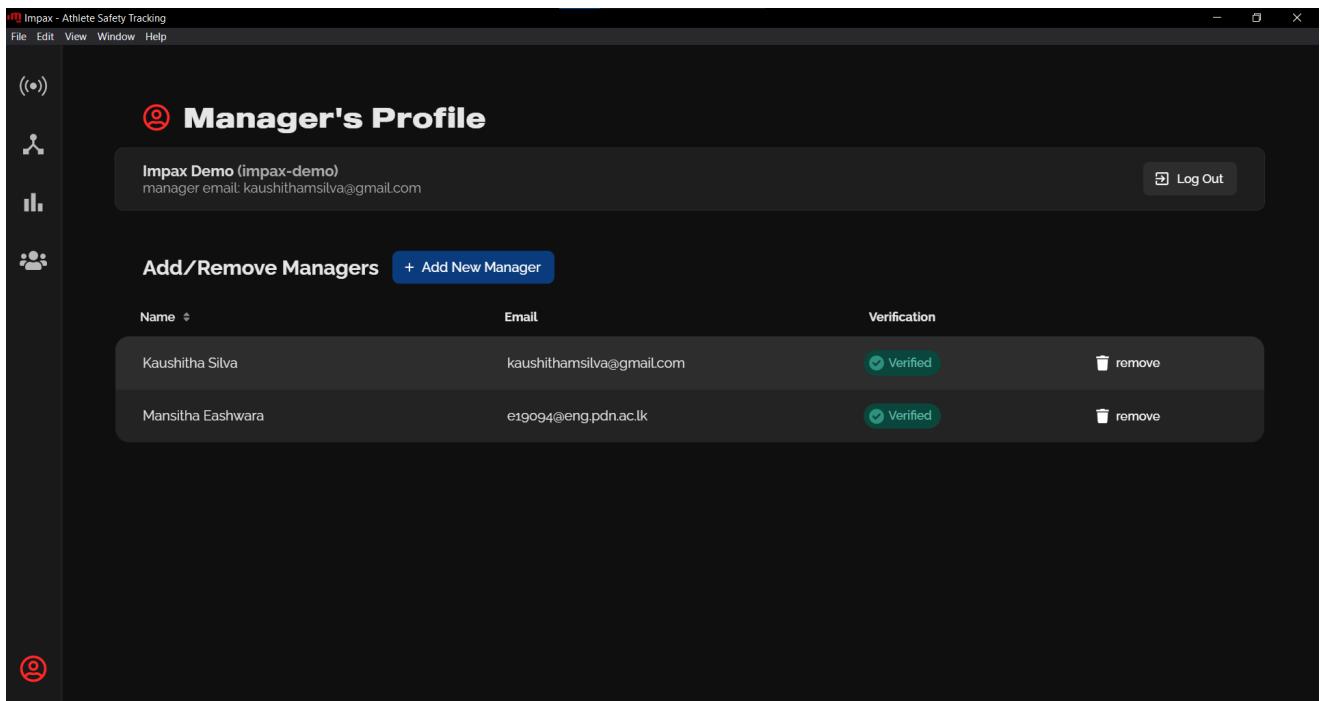
Attachment to Boxing Headguard



4. Features and Functions

This section includes the core features of Impax. This will help you to navigate through the dashboard and configure the application prior to recording impact information.

4.1 Sidebar Menu



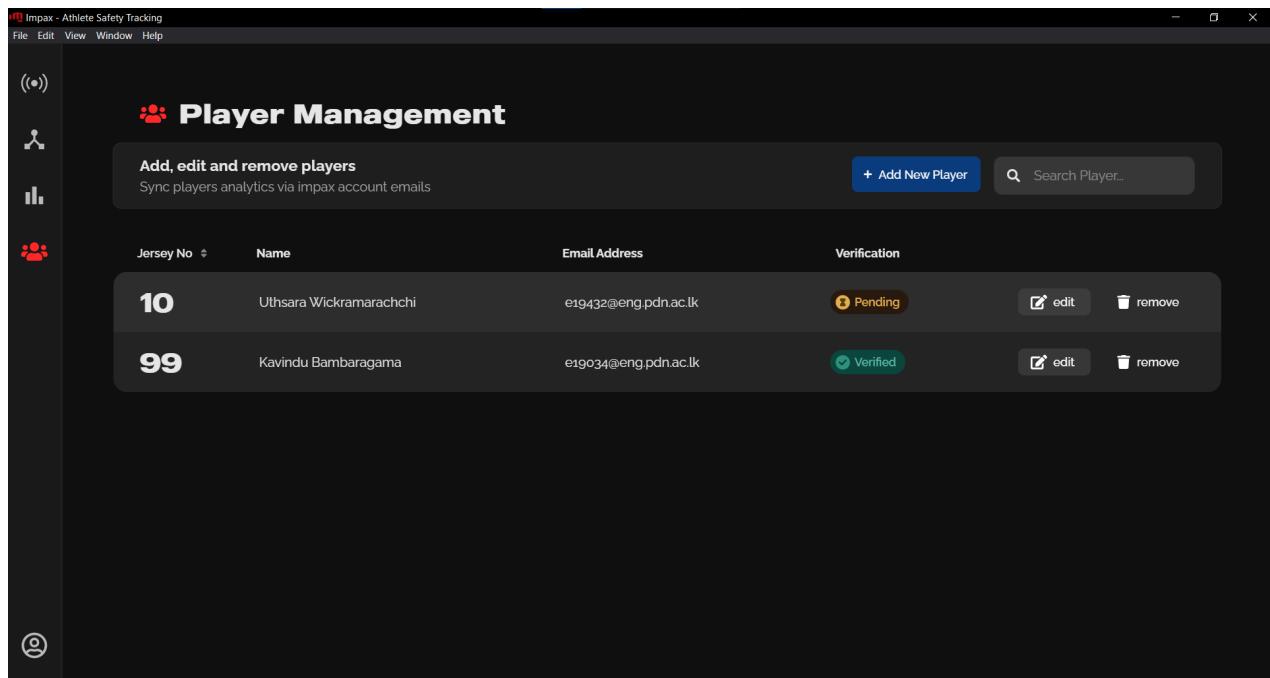
The sidebar menu consists of the following sections in order (from top to bottom):

- 1. Live Dashboard** – Requires connection to Impax Hub
Real-time Impact monitoring of players during an ongoing session
- 2. Buddy Connectivity** – Requires connection to Impax Hub
Displays the connectivity of the Impax buddies, Impax hub, and features to map players to Impax buddies.
- 3. Team Analytics** – Requires an Internet Connection
View impact history and analytics of past sessions recorded.
- 4. Player Management** – Requires an Internet Connection
Add/Edit/Remove players from the team.
- 5. Manager's Profile** – Requires an Internet Connection
View team information, manager..etc

4.2 Player Management

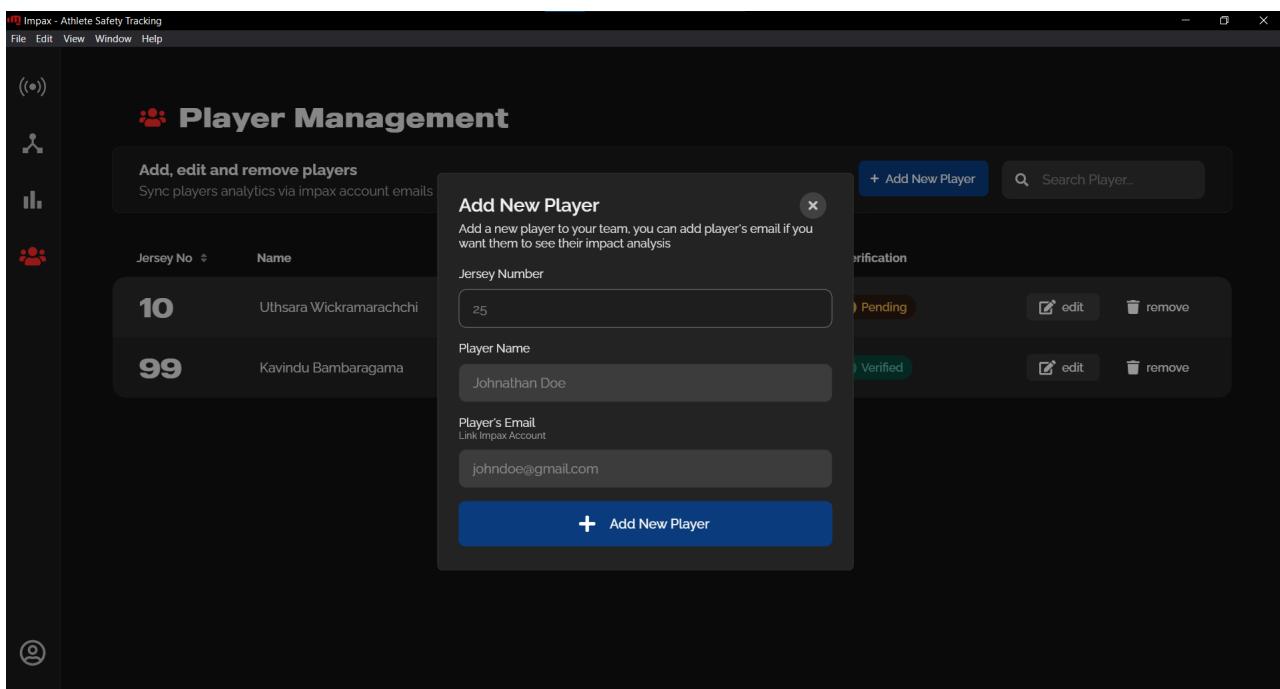
Add/Edit/Remove Players

Once logged in, click the team icon on the left sidebar to visit the player management screen.



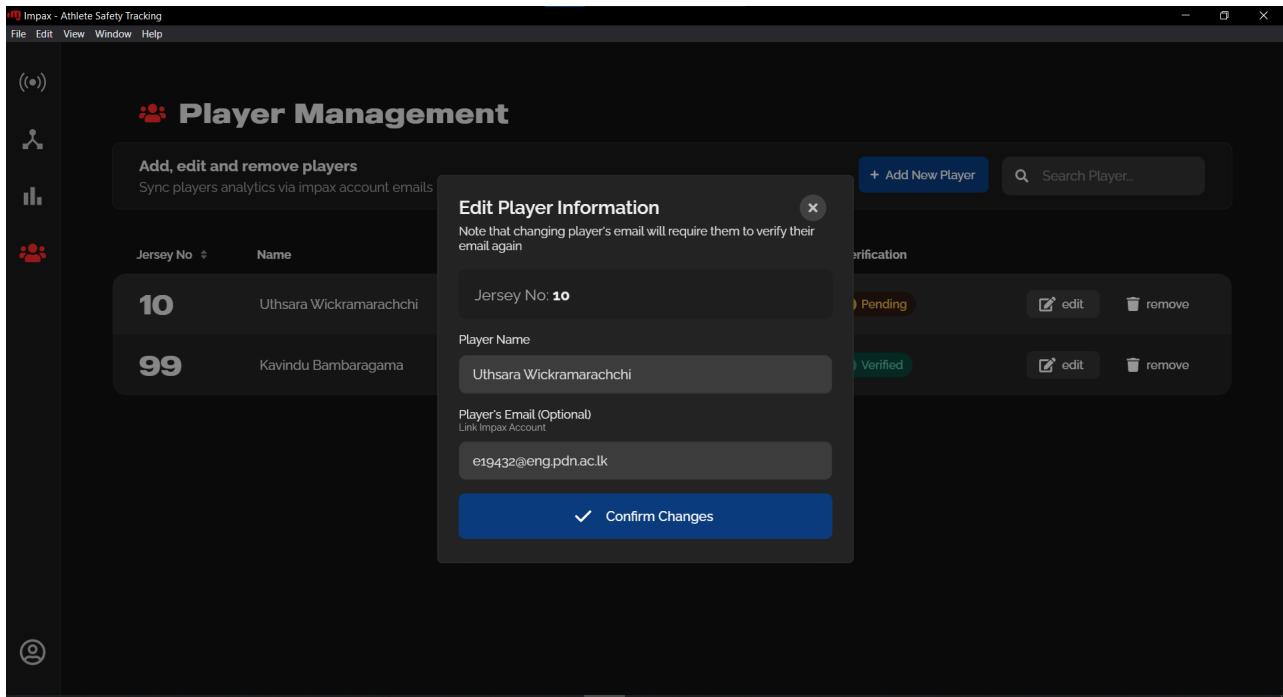
Player Management Screen

New players can be added by clicking on the add new player button, which will open a dialog box as shown below.



Add New Player Dialog Modal

Provide a unique jersey number for the player, along with their name and personal email address. The player will be immediately added to the team; however, a verification email will be sent to the player. Once the player verifies their email address, they can view and analyze their impact records.



Edit Player Dialog Modal

You can edit player information by clicking on the edit button on the row of the concerned player. Note that the jersey number cannot be edited; to change it, remove the player from the team and add them again.

4.3 Manager's Profile

Add/Remove Team Managers

The screenshot shows the Manager's Profile page with the title "Manager's Profile". At the top right is a "Log Out" button. Below the title, it says "Impax Demo (impax-demo)" and "manager email: kaushithamsilva@gmail.com". On the left, there are icons for users, charts, and other settings. The main area is titled "Add/Remove Managers" with a "+ Add New Manager" button. It lists two managers: "Kaushitha Silva" (email: kaushithamsilva@gmail.com) and "Mansitha Eashwara" (email: e19094@eng.pdn.ac.lk). Each entry has a "Verified" status indicator and a "remove" button.

Manager Profile: Add/Remove Managers

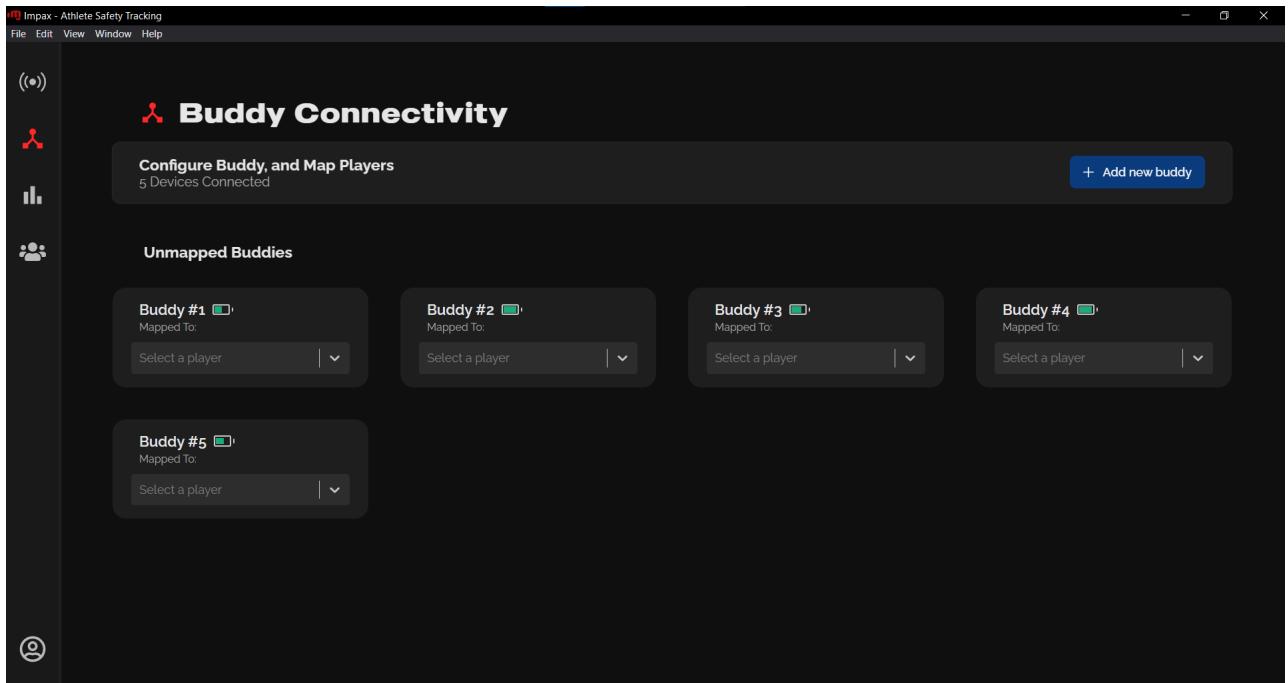
You can invite another manager of your team to the same team created above by clicking on the profile icon at the left bottom of your screen and clicking on the add new manager button.

The screenshot shows the Manager's Profile page with the "Add/Remove Managers" section. A modal window titled "Add New Manager" is open. It contains instructions: "Add a new manager to your team, once added manager can create their account under your team id". It has a "Manager's Email" input field containing "johndoe@gmail.com" and a blue "Invite Manager" button.

Add New Manager

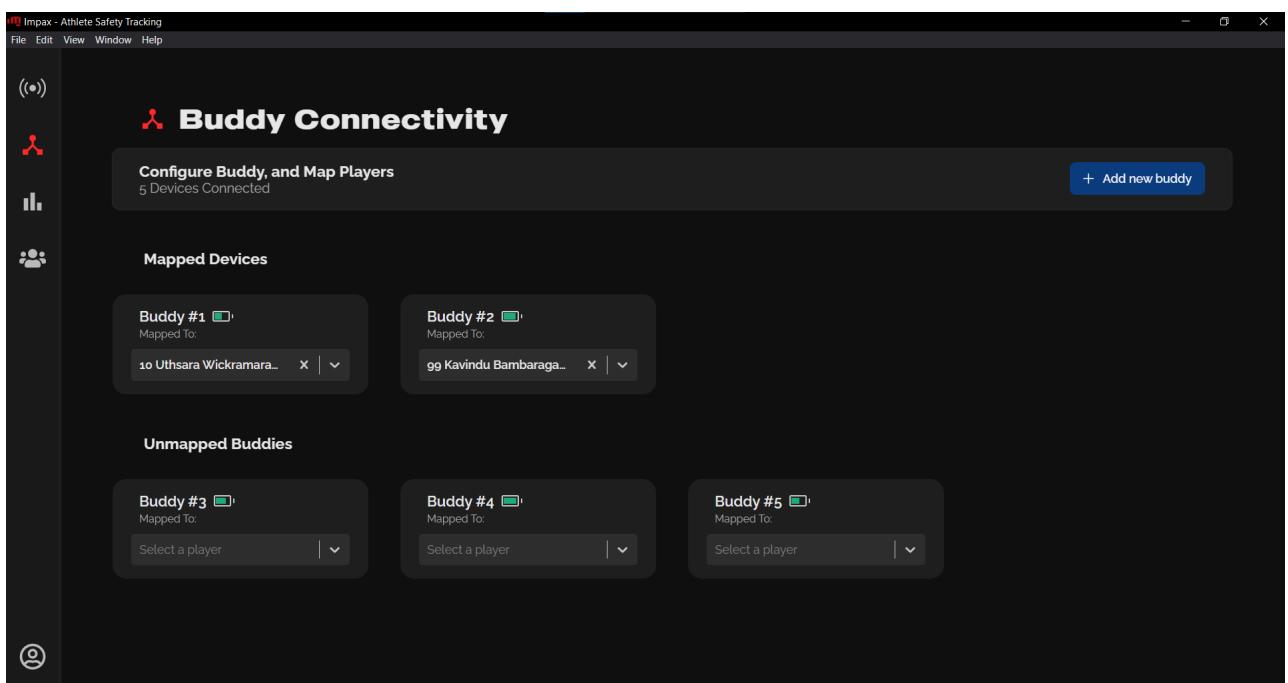
4.4 Buddy Connectivity

The screen allows you to check the connectivity of impax buddies and their battery status. Once your buddy is active, it will show under unmapped buddies, meaning that the data gathered from the buddy is still not mapped to a player.



Buddy Connectivity Screen

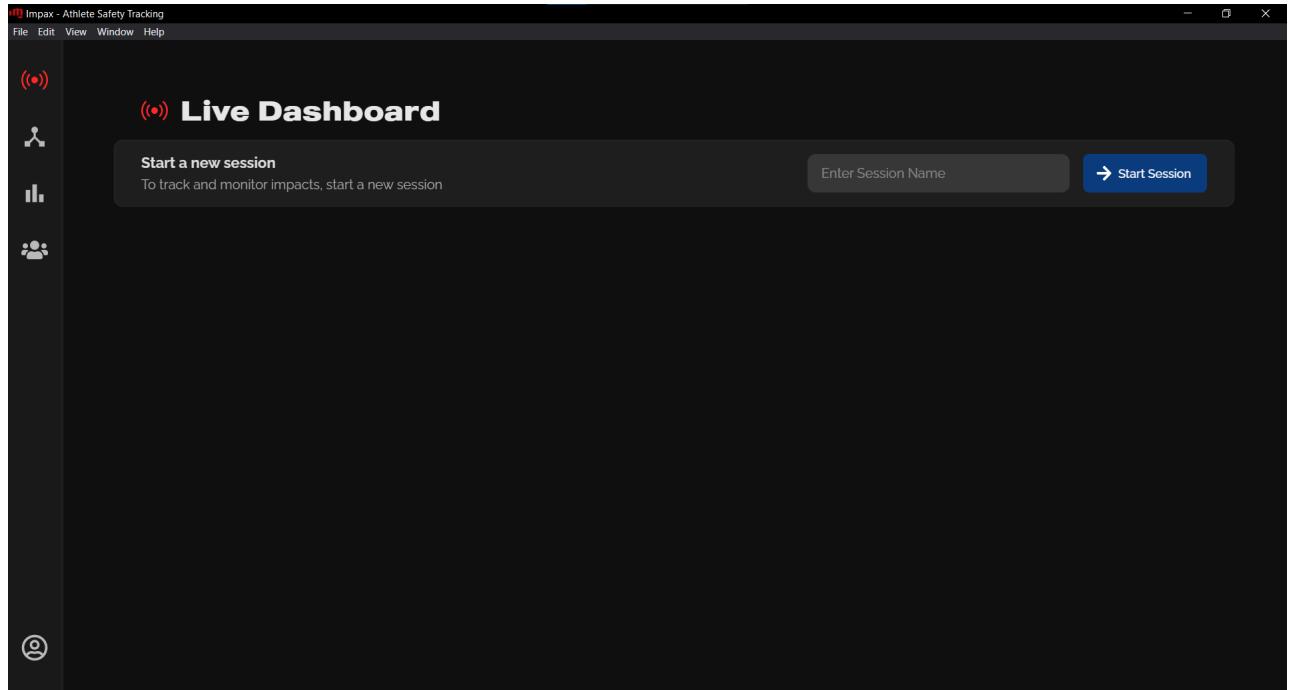
By clicking on the select a player on the respective buddy, you will be able to map active buddies to a player. Once a buddy is mapped, it will appear under the mapped buddies section.



Mapped Buddies

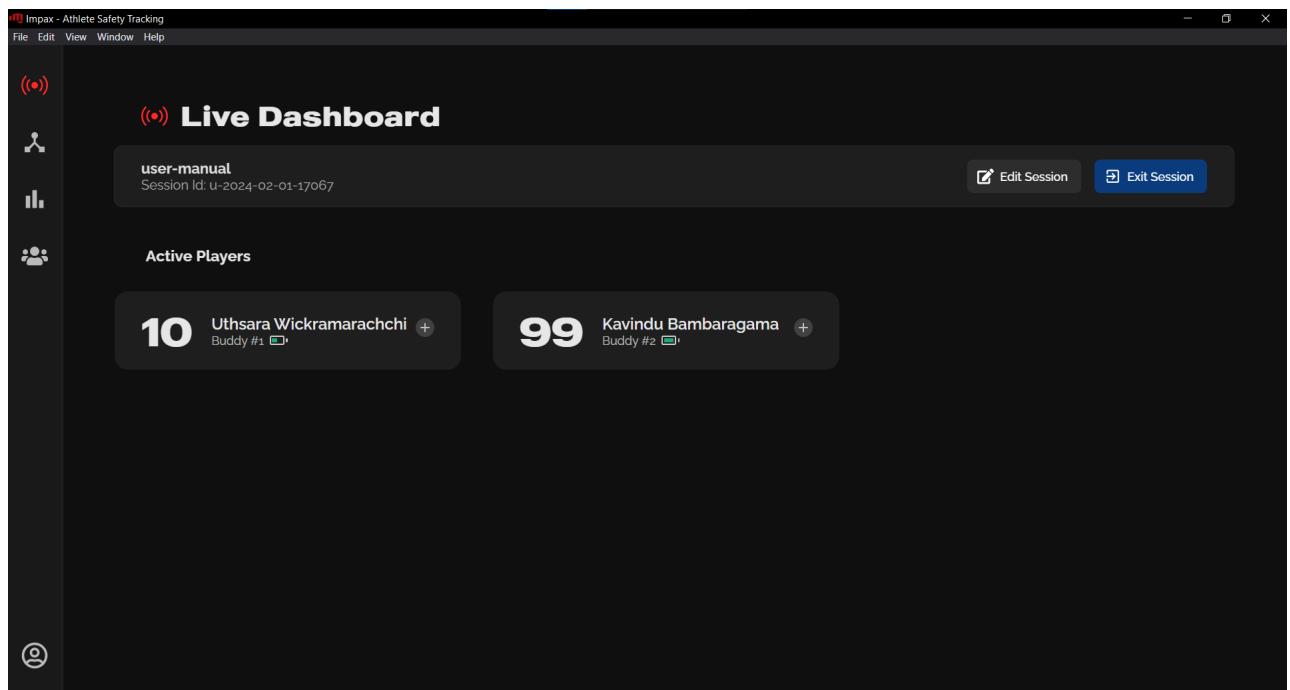
4.5 Live Dashboard

To start a session, go to Live Dashboard by clicking on the left top icon on the sidebar. You will be prompted to enter a session name and start the session.



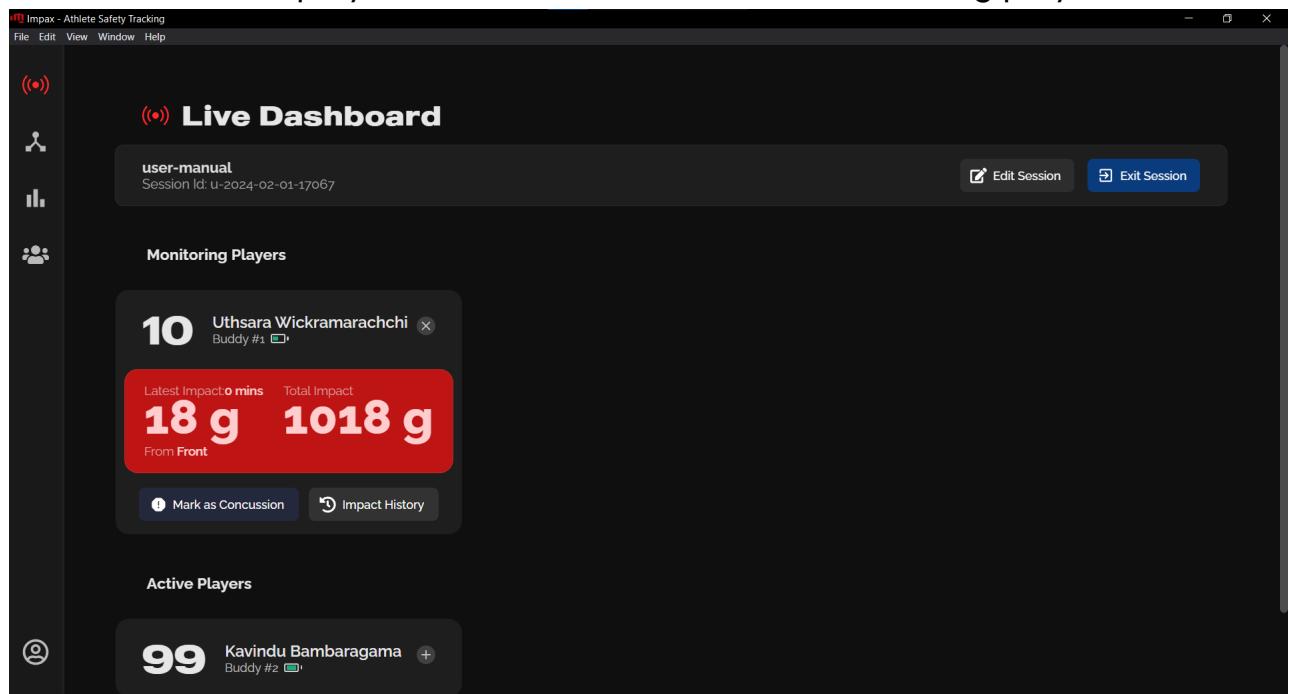
Live Dashboard Screen

Once a session has been started, you will see the active players with buddies mapped.



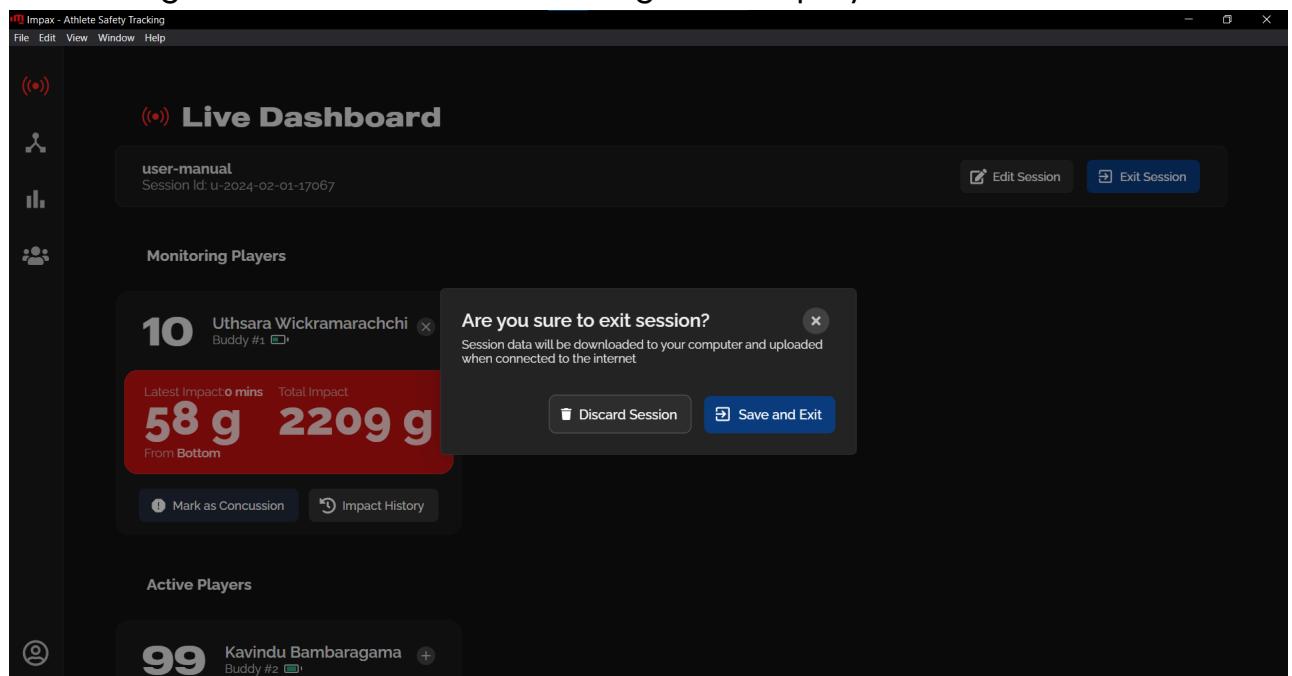
Active Session: Active Players Section

To start monitoring impacts click on the “+” icon on the right of the player’s name. The added player will now be shown under “monitoring players”



Active Session: Monitoring Players Section

You can add any number of players as monitoring players. Furthermore, to stop monitoring click on the “x” icon on the right of the player.

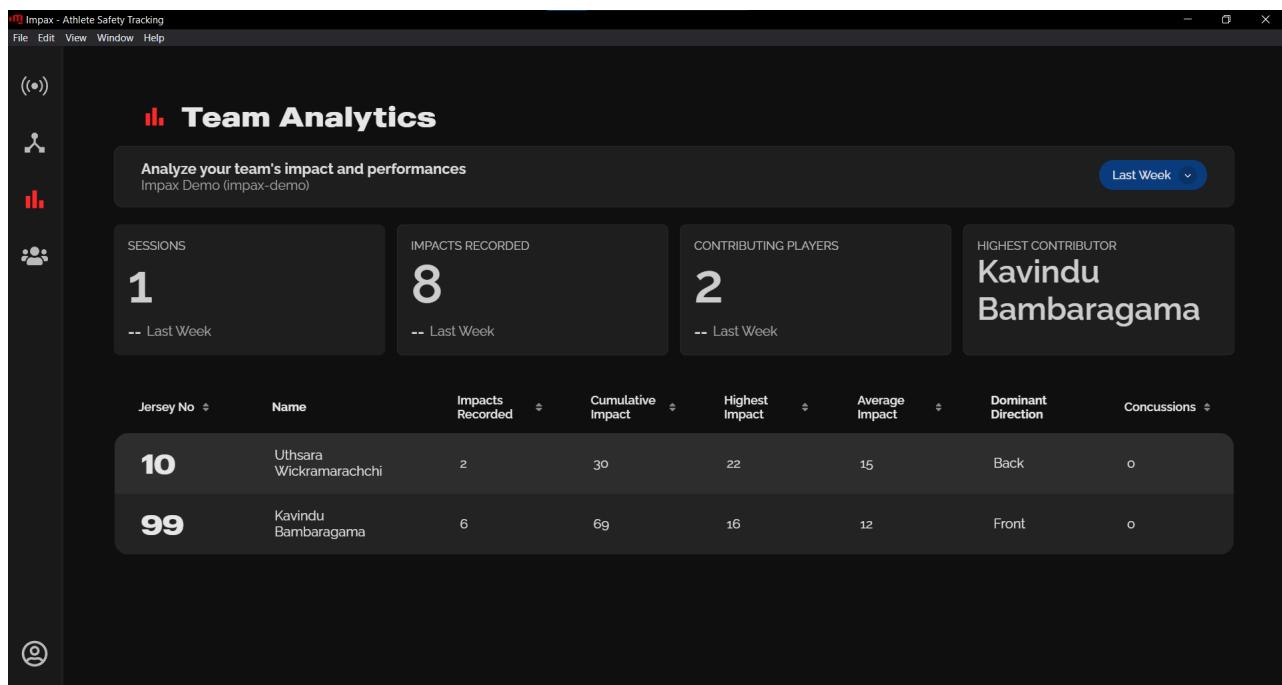


End Active Session

To exit and end the session, click on the exit session button on the top right. You’ll be prompted to either save or discard the session.

4.6 Team Analytics

To display the analytics of the impact data gathered from the session, click on the bar-chart icon on the sidebar.



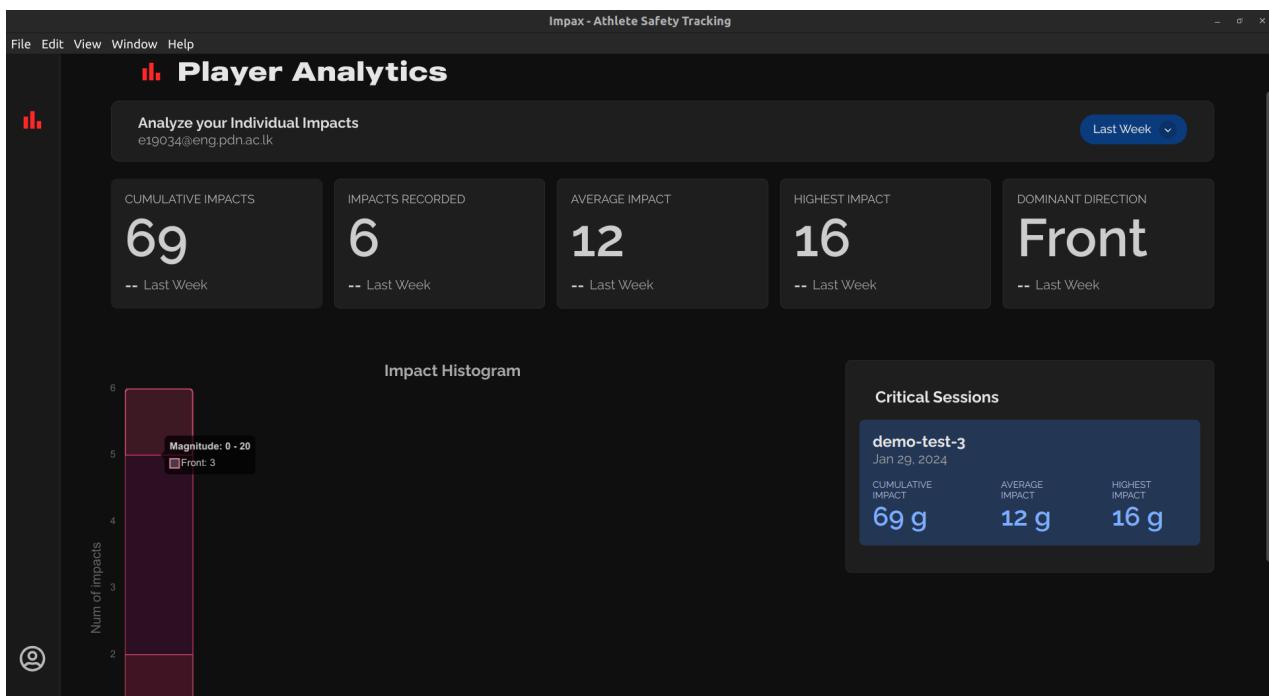
Team Analytics

The top section with the four cards consists of the summary of the team's impacts during a selected time period. The time period can be changed by clicking on the top right button.

The table consists of data from each team member. The table can be sorted by Jersey No, Impacts Recorded, Cumulative Impact, Highest Impact, Average Impact, and the number of concussions detected.

4.7 For Players: Player Analytics

To view the player's analytics, first sign in with your player account and click on the bar-chart icon on the sidebar.



Player Analytics

The top section with the four cards summarizes the player's analytic data during a selected time period. The period can be changed by clicking on the top right button.

The histogram represents the distribution of impact data along with the direction.

The critical sessions section represents the three sessions in which the player had the most cumulative impacts.

4.8 For Players: Player's Profile

To view the player's profile, first sign in with your player account and click on the user icon on the sidebar

The screenshot shows the 'Player's Profile' section of the application. At the top, there is a header bar with the application name 'Impax - Athlete Safety Tracking' and a menu bar with options: File, Edit, View, Window, Help. Below the header, a sidebar on the left features a user icon. The main content area is titled 'Player's Profile' with a subtitle 'Add, remove your teams'. It displays a message 'player email: e19034@eng.pdn.ac.lk' and a 'Log Out' button. The central part of the screen is titled 'My Teams' and contains a table with three rows:

Team ID	Team Name	Verification	Action
team-demo	Team Demo	Verified	✓ Accept ⚡ Deny
impaxfinal	impaxfinalname	Verified	✓ Accept ⚡ Deny
impax-demo	Impax Demo	Verified	✓ Accept ⚡ Deny

Player Profile

You can accept and deny team invitations via the My Teams table action buttons.

5. Start Recording Impacts

To start recording impacts follow the following steps,

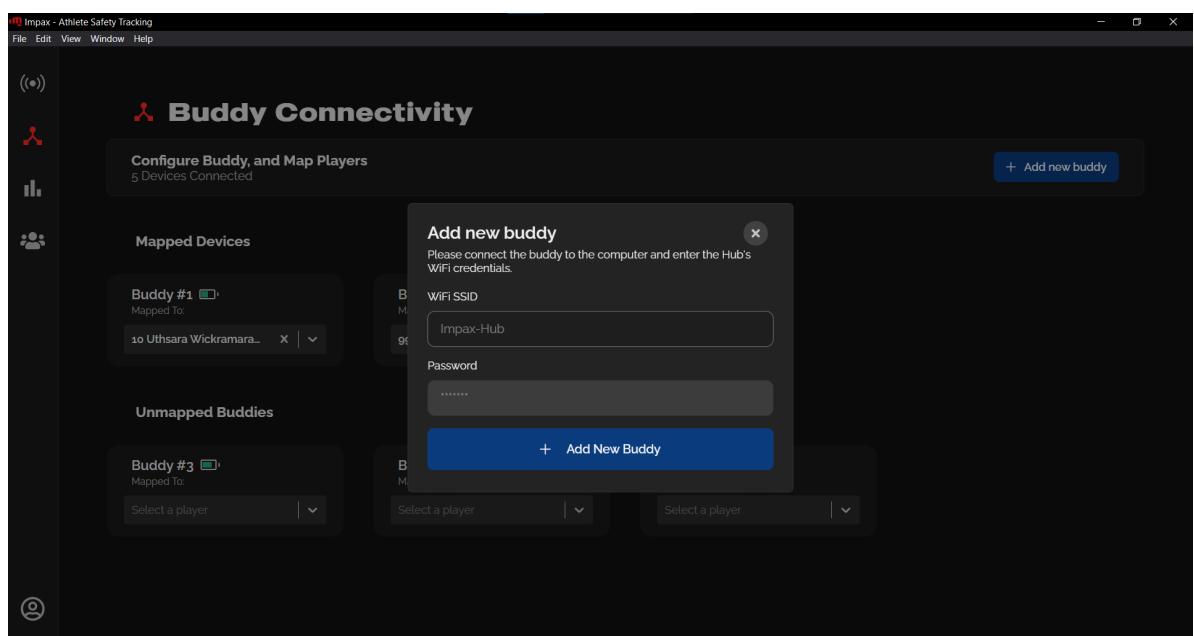
1. Turn on the Impax Hub
2. Wait and check whether the active device LED has turned on.
3. Turn on the buddy device(s)
4. Wait and check whether the connection LED has turned on.
5. Open the Impax dashboard on your personal computer
6. Login, and make sure that all your team members are already added to the team. You will require an internet connection for this step. However, if you had logged in previously, you can skip this step.
7. Connect your PC to the wifi access point of the Impax Hub. (This will be by default named "Impax") The password of the WiFi is printed on the impax hub
8. Go to the "Buddy Connectivity" screen using the sidebar navigation
9. Map the Impax buddy-ids with the jersey numbers of players who will be wearing the Impax buddies.
10. Go to the "Live Dashboard" screen using the sidebar navigation
11. Give your session a name and click on Start Session
12. A list of cards of active players will be displayed
13. Click on the plus icon to the right of the active player to start monitoring the real-time impacts of that player.
14. In case a concussion is detected, click on the mark as concussion button
15. Once the session is over, click on the end session on the right corner of your screen.
16. If you want to save the session for further analysis, click on the save and exit buttons, else the session will be discarded.
17. Connect your dashboard to the internet whenever possible
18. To analyze the impacts, go to the "team analysis" screen using the sidebar navigation

6. Advanced Options

- Purchasing new buddy

On purchasing a new buddy, it will NOT connect to the impax hub by default, this is the default behaviour to ensure data security.

To add a new buddy, turn on the newly purchased impax buddy and plug it into your PC using the USB cables provided, go on to the "Buddy Connectivity" screen and click on the "Add New Buddy" button. You will be presented with a dialog box where you have to type in the WiFi SSID and the password. Once the form is submitted, a success message will appear and the buddy's connection LED will turn on.



Buddy Connectivity: Add New Buddy

7. Troubleshooting

7.1. Common Issues

1. Installation Issues:

- Check if your operating system and hardware meet the minimum system requirements for the Impax dashboard.
- Ensure that your internet connection is stable during the download and installation process.
- If the installation process is interrupted, try to restart it. If the problem persists, consider downloading the installation file again.

2. Connectivity Issues:

- Check if your internet connection is stable and fast enough for real-time data transmission.
- Make sure that the Impax buddies are charged and turned on.
- If you're having trouble connecting the buddies, try to restart them and the impax-dashboard app.

3. Real-Time Monitoring Issues:

- If the dashboard is not updating in real-time, and the connectivity with the buddies.
- If the dashboard freezes or crashes, try to restart the app. If the problem persists, consider reinstalling the app.

Remember, if you're unable to resolve an issue, don't hesitate to contact the support team for assistance. They're there to help! 😊

7.2. Frequently Asked Questions

- **Q: How do I install the Impax dashboard on my computer?**
 - A: You can download the installation file for your operating system from the official website of Impax and follow the on-screen instructions in the installation wizard. For more details, see section 2.1.3
- **Q: How do I map Impax buddies to players in my team?**
 - A: You can go to the Buddy Connectivity screen in the impax-dashboard app and select a player for each active buddy. For more details, see section 4.4
- **Q: How do I monitor the real-time impacts of players during a session?**
 - A: Go to the Live Dashboard screen in the impax-dashboard app and start a session with a name. Then, you can add the players you want to monitor by clicking on the plus icon next to their names. For more details, see section 4.5
- **Q: How do I view and analyze the impact data of past sessions?**
 - A: You can go to the Team Analytics screen in the impax-dashboard app and select a time period to view the summary and statistics of the team's impacts. You can also go to the Player Analytics screen to view the individual data of each player. For more details, see sections 4.6 and 4.7
- **Q: How do I add or remove team managers or players?**
 - A: You can go to the Player Management screen or the Manager's Profile screen in the impax-dashboard app and click on the add or edit buttons to create or modify the accounts of team members. For more details, see sections 4.2 and 4.3.

8. Contact Information

For any issues or inquiries, feel free to reach out to us through the following channels:

- **Email:** impax.kmksh@gmail.com
- **Phone:** +94 701236988

Our team will try our best to reply to your inquiry as soon as possible.