

# Hiking Band: User Manual

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# 1 Introduction

The purpose of this document is to provide Hiking Band users the required information to successfully launch, configure and utilize the core functionalities of the Hiking Band system. The system consists of two applications: the Raspberry Pi Web Application and LilyGO T-watch smartwatch hiking application. This document contains a section for each application and a section for communication between applications.

A test plan has been included for both applications for the purpose of detailing to QA specialists how it can be verified that the application works as intended. Additional information for testing can be found from the Software Requirements Specificatin (SRS) and Design Report.

## ! Important

It is important to highlight, however, that the SRS document may contain optional features that have not been implemented in the proof-of-concept version.

- All non-optional features listed in SRS as MUST are available.
- Features listed as SHOULD are implemented, but implementation may differ from SRS specification. - Features listed as MAY are optional and may or may not be available in the proof-of-concept version.

## 2 LilyGO T-Watch Hiking application

The LilyGO T-Watch Hiking application is a proof-of-concept (later in this section PoC) smart-watch application for tracking hiking trips. The application uses LilyGO T-Watches BMA423 accelerometer to track step count and LilyGO T-Watches M8/M6 GPS Module to track the travelled distance. Average speed is computed by recording the start time of the hike and calculating average speed from tracked distance and hike duration. Users can also view information from past hikes in the Past Sessions view and synchronize clock time from GPS time in the settings view.

### 2.1 Requirements

Before getting started, make sure that you have the following hardware components:

- LilyGO T-Watch V2
- A Raspberry Pi 3B+ with a Linux-based OS
- A USB-A to micro-USB cable

#### Tip

While the LilyGO hiking application officially supports V2 of the LilyGO T-Watch smart-watch, the application MAY also work on V3 with configuration changes. The configuration changes are detailed in the design report. Note that V3 is not officially supported and compability with V3 is not guaranteed.

## 2.2 Tutorial

This section introduces the basic functionalities of the LilyGO T-Watch.

### 2.2.1 Turning on the smartwatch

To turn the smartwatch on or off, press PEK-button for multiple seconds.



Figure 1: LilyGO PEK button

### 2.2.2 Toggling smartwatch screen

To toggle smartwatch screen on and off without shutting the smartwatch off, press the PEK button shortly.

### 2.2.3 Starting a hiking session

To start a new hiking session:

1. In main view press 'Session view' button

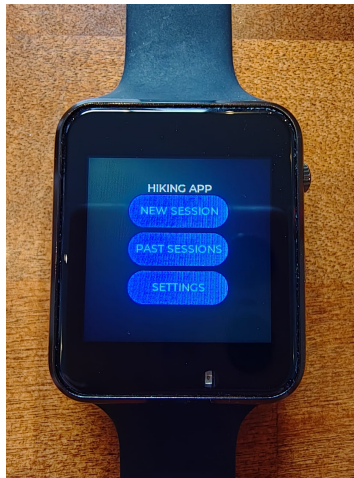


Figure 2: LilyGO main view

2. In Session view press 'Start' button



Figure 3: LilyGO session view before start button is pressed

To end a hiking session:

1. Navigate to 'Session view'
2. Press 'Stop' button

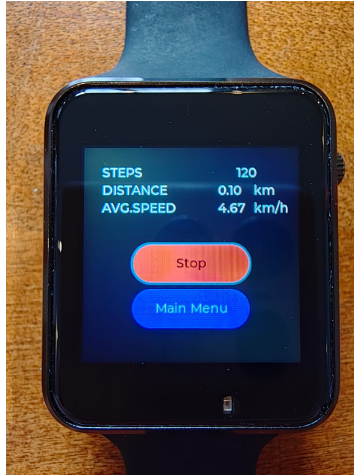


Figure 4: LilyGO session view after start button has been pressed

#### Tip

While a hiking session is active, you can:

1. Navigate to other views in the smartwatch application
2. Toggle the touch screen on/off with the PEK-button

### 2.2.4 Viewing past hiking sessions

To view past hiking sessions:

1. Navigate to past session view from the main view

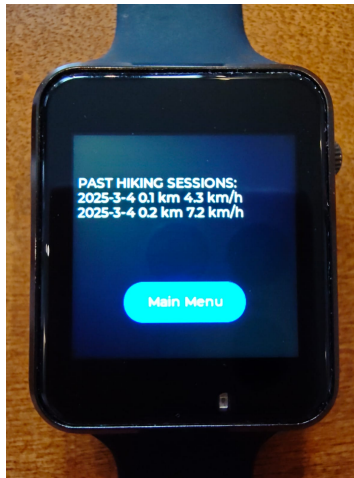


Figure 5: LilyGO past sessions view

**i** Note

If there are no previous session, a prompt will indicate that no hikes have been recorded. Otherwise past sessions will be listed.

### 2.2.5 Managing settings

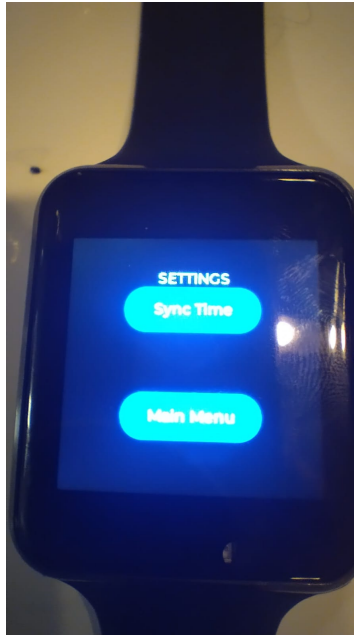


Figure 6: LilyGO session view after settings button has been pressed

The settings view will include all possible configurable settings. Currently it includes the option to “sync time”. This button can be used to correct the offset of the smartwatch.

## 2.3 Test plan

At this PoC stage the, test plan relies on manual testing. The functional requirements of the smart watch listed as MUST requirements in the SRS documentation can all be tested manually. A comprehensive list of testable features have been collected to the following subsections. These collections should assist the QA specialists in implementing suitable tests to verify that the functionalities work as intended. This section assumes that the QA specialist is performing black-box testing, i.e. testing a then functional and non-functional requirements on system or acceptance test level.

### 2.3.1 Navigation

- User can navigate from main view to:
  - session view
  - past sessions view



- settings view
- user can navigate back to main view from all other views

### **2.3.2 Session view**

- When user presses start - button
  - application begins tracking user's movement and incrementing step count
  - the session data is displayed on the view, including
    - \* step count
    - \* distance
    - \* average speed
  - the session data is updated at maximum within 2 seconds when user is in active movement.
  - the start button turns red and the button label changes to “stop”
- When user presses stop - button
  - applicatin stops tracking user's movement
  - the stop button turns blue and the button label changes to “start”

### **2.3.3 Past sessions view**

- The past session view contains information on stored sessions
- For each session the following information is shown:
  - date of the session
  - traveled distance
  - average speed
- the watch stores at maximum five past hike sessions
- if five hiking sessions have been recorded, the oldest entry will be overwritten when the next session begins
- if no sessions have been recorded, the past sessions view will show a prompt instructing no data is available

### **2.3.4 Settings view**

- When “Sync Time” button is pressed the time offset should correct.

## 3 Raspberry Pi Web Application

The purpose of the web application is to store data from hiking trips to persistent memory and to display data in the web application views. The web application has been designed for Raspberry Pi3B+ board with a Raspian Operating System. The Web Application requires a internet connection to work properly, as it uses external dependencies for styling.

### 3.1 Tutorial

This section details the functionalities the web application provides once it is running locally. Navigate to the application with you browser. By default Flask applications run in port 5000 on localhost. By typing `localhost:5000`(or `127.0.0.1:5000`) to your browser, you should land on the main view.

#### 3.1.1 Main view

The main view has two navigational buttons:

1. Button **Show all hikes** navigates to a view that shows all hikes
2. Button **Configure Bluetooth** navigates to a view in which the bluetooth connection can be configured

The main view additionally visualizes selected data from past hikes:

1. Last hike taken
2. Average values for all hikes in persistent memory
3. Hike with the longest distance
4. Hike with the fastest average speed

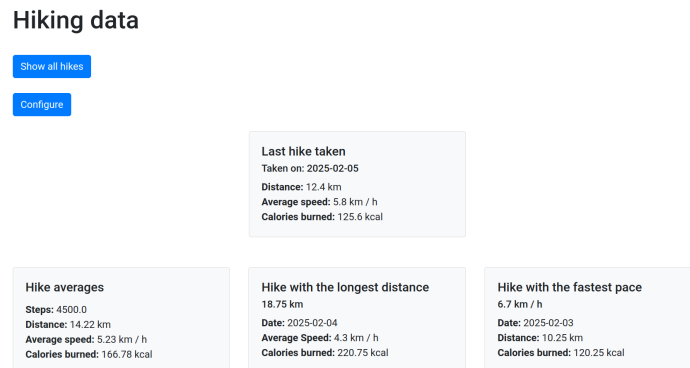


Figure 7: Web application main view

### 3.1.2 Past hikes view

The past hikes view includes a table that lists all past hikes in persistent memory. For each hike the following information is shown:

- ID (automatically generated for the database)
- Date
- Distance
- Steps
- Calories
- Average Speed

Each table row also includes a **Delete** button, that allows the user to delete the hike in question.

Past hikes

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| id | date       | distance | steps | calories | avgspeed | Delete entry           |
|----|------------|----------|-------|----------|----------|------------------------|
| 2  | 2025-02-02 | 15.5     | 4200  | 200.5    | 4.1      | <a href="#">Delete</a> |
| 3  | 2025-02-03 | 10.25    | 2800  | 120.25   | 6.7      | <a href="#">Delete</a> |
| 4  | 2025-02-04 | 18.75    | 5000  | 220.75   | 4.3      | <a href="#">Delete</a> |
| 5  | 2025-02-05 | 12.4     | 6000  | 125.6    | 5.8      | <a href="#">Delete</a> |

Figure 8: Web application past hikes view

Pressing Delete opens a confirmation Monad. By pressing delete, the action is confirmed. By pressing cancel, confirmation Monad is closed and no action is taken.

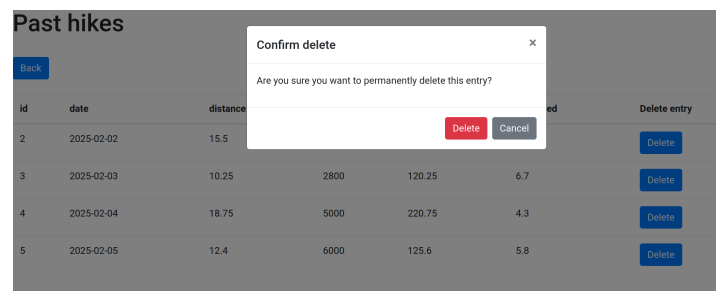


Figure 9: Web applicatoin confirm deletion

### 3.1.3 Configuration view

In the configuration view user can

- pair a new LilyGO T-Watch device with the Web Application
- Synchronize data from the LilyGO T-Watch to the persistent data storage on the Web Application

#### 3.1.3.1 Pairing a new device

Before pairing, the configuration view indicates that no T-Watch has been paired with the Web Application

## Bluetooth config

In this view you can setup the Hiking Watch Bluetooth connection.

### Instructions

- To setup a connection to your Hiking watch, press 'Setup new Hiking Watch'
- To synchronize data once connection has been setup, press 'Sync data from Hiking watch'

Please note that both operations may take some time. Do not close or refresh the browser window while the operation is ongoing.

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**Device:** None  
**Status:** please setup device  
**Mac Address:** None

[Setup new Hiking watch](#)

---

[Sync data from Hiking watch](#)

Figure 10: Configuration view, no device paired

To pair a new T-Watch, first ensure that the T-Watch is turned on. Then click the ‘Setup new Hiking watch’ link. A spinner indicates that an operation is ongoing. Do not leave the view while the spinner is visible

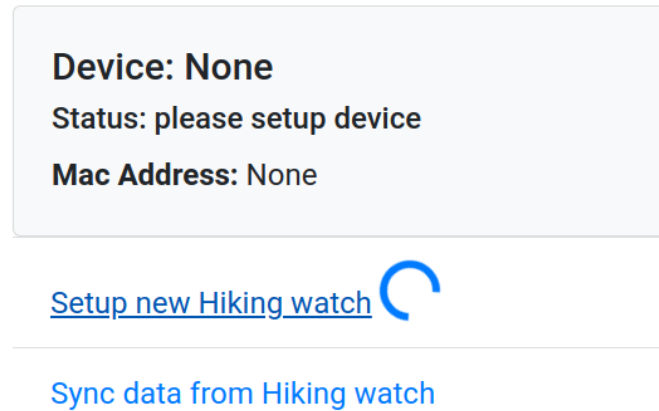


Figure 11: Pairing a new device in progress

If the pairing succeeds, the connection information is shown in the card element and a notification of successful operation is shown.



Figure 12: Pairing a new device succeeded

If the pairing fails, user is notified with a warning alert.



Figure 13: Pairing a new device failed

### 3.1.3.2 Synchronizing data

To synchronize hiking data from the LilyGO T-Watch to the persistent local storage of the Web Application, press the 'Sync data with Hiking watch' link. A spinner indicates that an operation is now ongoing. Do not leave the view while the spinner is visible.

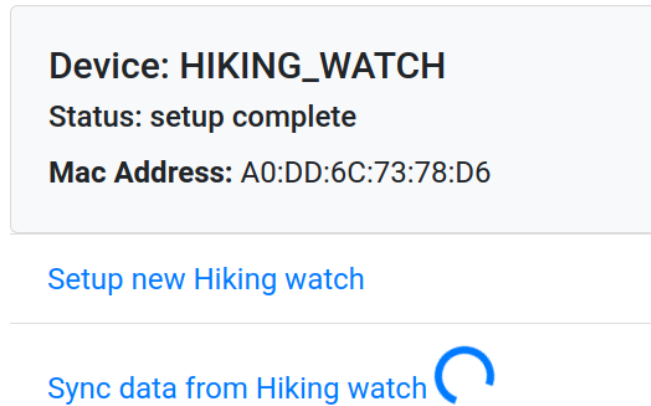


Figure 14: Data synchronization in progress

If the transfer succeeds, a notification will be shown.



Figure 15: Data synchronization succeeded

In case of failure, a warning notification is shown and some information on the cause of the failure MAY be shared.



Figure 16: Data synchronization failed

## 3.2 Test plan

At this proof-of-concept stage the, test plan relies on manual testing. A comprehensive list of testable features have been collected to the following subsections. These collections should assist the QA specialists in implementing suitable tests to verify that the functionalities work as intended. This section assumes that the QA specialist is performing black-box testing, i.e. testing a then functional and non-functional requirements on system or acceptance test level.

### 3.2.1 Main view

- The main view contains navigation buttons to
  - hikes view and
  - configuration view
- The main view additionally contains some key information from past sessions:
  - The last recorded session
  - The session with longest travelled distance
  - The session with fastest average speed
  - Averages for step count, distance, average speed and burned calories all sessions
- If no data is in database, data cards are rendered and indicate that no data is available.

### 3.2.2 Hikes view

- The hikes view contains a table of past hikes
  - data is correctly shown in the table
  - data with missing values is displayed correctly
  - empty table is displayed correctly
- Each row contains the following information
  - id
  - date
  - step count
  - distance
  - average speed
  - burned calories
- additionally each row contains a Delete button from which the selected entry can be deleted

- pressing the delete button activates a modal in which user is asked to confirm deletion
- after confirmation, entry is deleted and the user is redirected to the hikes-view

### 3.2.3 Configuration view

- When a LilyGO T-Watch has not been paired, the card element indicates that no device has been paired
- When user clicks the ‘Setup new hiking watch’ a spinner element is rendered indicating that an operation is ongoing
  - If the pairing succeeds user is redirected to the configuration view and an alert element is shown indicating success
  - If the pairing fails, user is redirected to the configuration view and an alert element is shown indicating failure
- When user clicks the ‘Sync data from Hiking watch’ link, a spinner element is rendered indicating indicating that an operation is ongoing.
  - If data synchornization succeeds, user is redirected to the configuratoin view and an alert element is shown indicating success
  - If data synchronization fails, user is redirected to the configuratoin view and an alert element is shown indicating failure

## 4 Communication between devices

The web application handles communication between the devices. Please follow the instructions in the section discussing [Web Application configuration view](#) to pair the Hiking watch with the web application and to synchornize hiking data to the persistent local data storage on the web application.

### Note

Remember to turn the Hiking watch on before initiating communication between the devices.