Hiking Band: Software Requirements Specification

Course: ELEC-E8408 Embedded Systems Development, Aalto University
Members: Holappa, Heidi & Lundén, Jaakko-Juhani & Rislakki, Tuomas
Group: I

Table of Contents

1 Introduction

1.1 Purpose

The purpose of this document is to list and provide context and considerations for the Hiking Band product.

The document MAY provide overview level of the used integration methods for the system. However, the main scope of the specifications SHOULD be targeted towards the actual use case.

1.2 Definitions, acronyms and abbreviations

The specification follows the requirement level keywords defined in RFC 2119:

Keyword	Description for the specification
MUST	Absolute requirement for the specification
MUST NOT	Absolute prohibition of the specification
SHOULD	Can be ignored with valid reasons
SHOULD NOT	Can be implemented with valid reasons
MAY	Optional, extra

1.3 Context Diagram and Overview

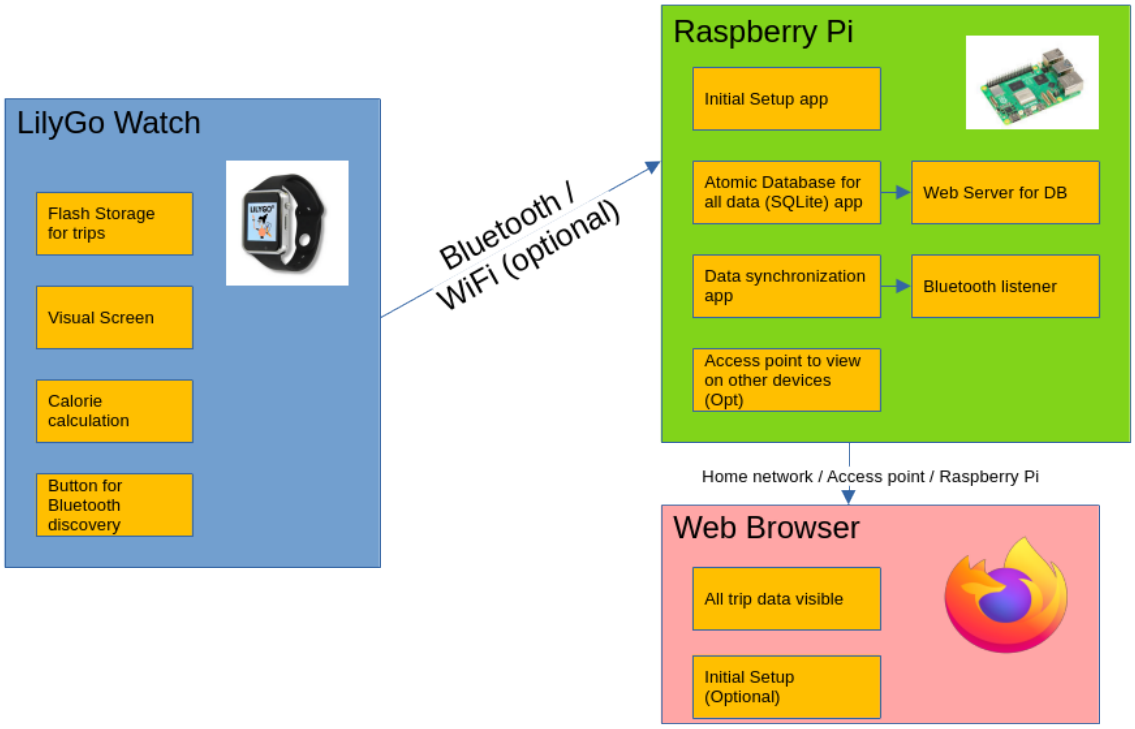

Figure 1: Initial Consept Overview

2 Specific Requirements

2.1 Functional Requirements

This subsection contains the functional requirements for the Hiking Application prototype. As the prototype consists of both LilyGo - application and the Web application to present tracking data, the functional requirements gather requirements for both of these.

2.1.1 LilyGo application: Start & stop hiking sessions

The system MUST allow user to start a hiking session

The system MUST allow user to stop a hiking session

The system MAY allow user to continue stopped hiking session

2.1.2 LilyGo application: Recording multiple hiking sessions

The system MAY allow user to record multiple hiking sessions to smartwatch memory

2.1.3 LilyGo application: Record steps count and convert into travelled distance during the session

While hiking session is active, the system MUST record steps count

While hiking session is active, the system MUST convert steps count into travelled distance after each step

2.1.4 LilyGo application: Display this data on a smartwatch screen

While hiking session is active, the system MUST display step count on display

While hiking session is active, the system MUST display travelled distance on display

While hiking session is not active, the system MAY display step count and travelled distance for last session on display

2.1.5 Synchronize and store data with RPi via Bluetooth

The smartwatch application MUST be capable of sending hiking data via Bluetooth to the web application on RPi

The smartwatch application MUST be able to connect to RPi with hard coded MAC address

The smartwatch application MAY be able to connect to RPi with Bluetooth discovery

The smartwatch application MAY be able to connect to RPi with Wi-Fi discovery

2.1.6 Calculate estimated amount of calories burned during the session on RPi

The system MUST calculate estimated amount of calories based on travelled distance

2.1.7 Web application: Initialize Web UI and show last session statistics (travelled distance, step count and burned calories)

The system MUST display travelled distance, step count and burned calories for last session

The system MUST contain a list of past sessions

The system MUST display a list of past sessions including date, travelled distance, step count and burned calories for each session

The system MAY provide detail view for a chosen session where additional session information is presented

The system MAY provide delete feature for removing past sessions from persistent memory

2.2 System interfaces

This subsection expands and defines the frontends of the Web Application and LilyGO functionalities defined in Functional Requirements.

The User interfaces section lists the characteristics between the software and the user.

The Hardware interfaces section lists the characteristics between the hardware and the software.

The Software interfaces section lists the characteristics between different software and applications within the system.

2.2.1 User interfaces

The LilyGO interface user MUST be able to interact with the functionalities:

- “start a hiking session”
- “stop a hiking session”
- “display step count on display”
- “display travelled distance on display”
- “record step count”
- Enable BlueTooth capabilities

The LilyGO interface SHOULD follow the given interface layout:

The Web UI interface user MUST be able to interact with the functionalities:

- “display a list of past sessions”
- “display the last session”

The Web UI interface SHOULD follow the given interface layout:

2.2.2 Hardware interfaces

The LilyGO application MUST use the touchScreen FT6336 using the pinout defined by LilyGO hardware:

- SDA: 23 pin
- SCL: 32 pin
- Interrupt: 38 pin

The LilyGO application SHOULD use the BMA423 using the pinout defined by LilyGO hardware:

- Interrupt: 39 pin

The WebUI HTML layout MUST fit in a computer screen.

2.2.3 Software interfaces

The LilyGO application SHOULD use LilyWatch maintained TTGO_TWatch_Library for the pin definitions and driver implementation

The Web application SHOULD use SQLite to store synchronized data locally on the RPi

The Web application SHOULD use SQLite to store its information

2.2.4 Communications interfaces

The synchronization SHOULD be able to happen only after initial setup between RPi and LilyGO

The synchronization via BlueTooth between RPi and LilyGO MUST happen via BlueTooth v4.2 or below

The WebUI MUST use http protocol within a local TCP/IP network.

The RPi MUST be able to connect to a local network OR host its own access point to view the WebUI

2.3 Performance Requirements

2.3.1 MUST have acceptably long data synchronization

2.4 Design Constraints

2.4.1 MUST use atleast predefined hardware

- The system MUST use T-Watch V2 or V3
- The system MUST use raspberry pi 2, 3 or 3+
- The system MAY use other hardware

2.5 Software-system Attributes

2.5.1 MUST be able to log reliably

- The system MUST log and save the current activity in periodically