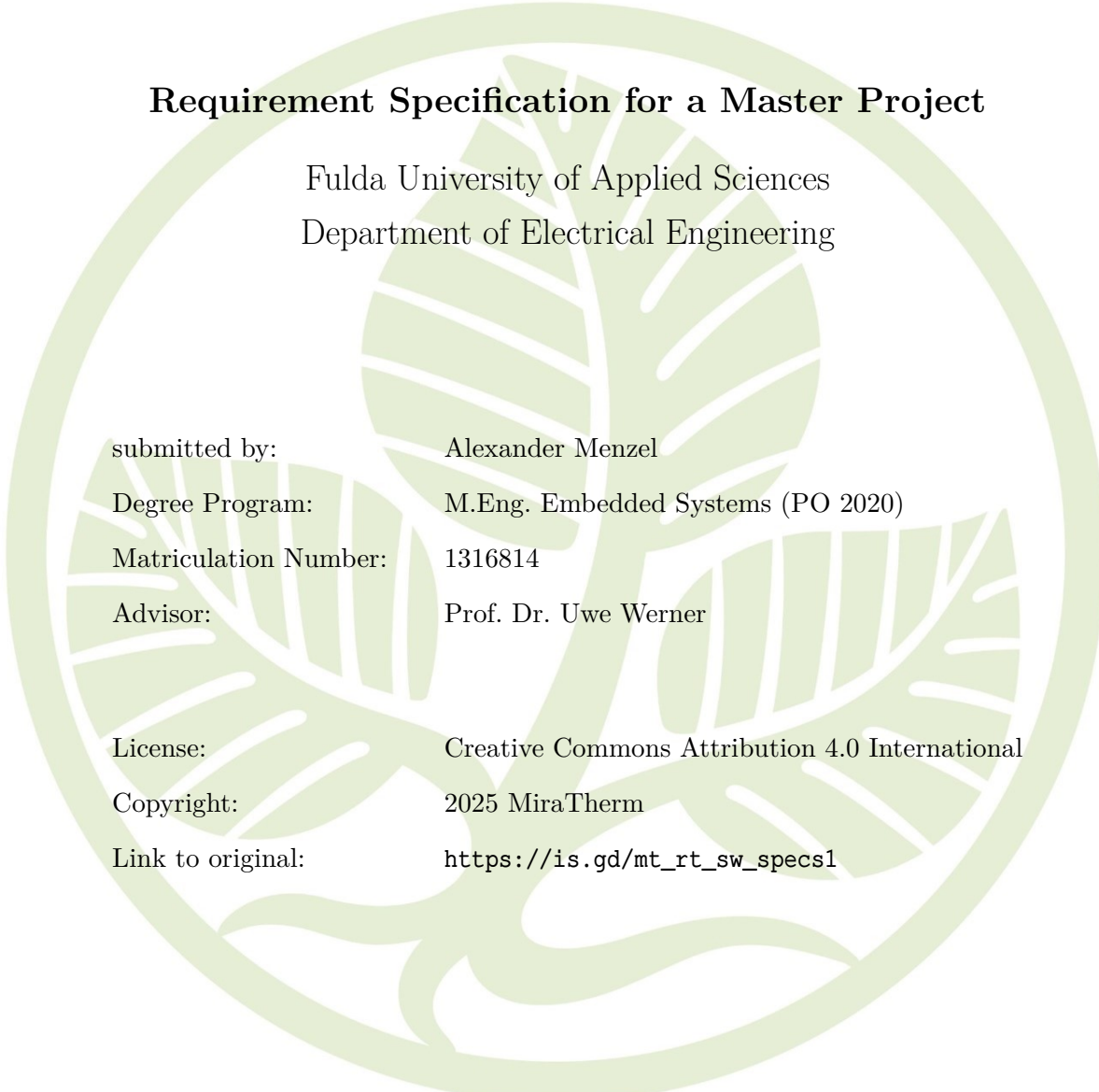


MiraTherm Radiator Thermostat Software Specification

Requirement Specification for a Master Project

Fulda University of Applied Sciences
Department of Electrical Engineering

The logo of the Fulda University of Applied Sciences is a large, light green circular emblem. Inside the circle is a stylized tree with a thick trunk and several large, rounded leaves. The leaves have a white outline and a light green fill, with white veins. The trunk is a simple vertical line with a few horizontal branches at the base.

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Contents

Change Log	1
1 Introduction	2
1.1 Document Purpose	2
1.2 Project Context	2
2 Requirements	3
2.1 Functional Requirements	3
2.2 Non-Functional Requirements	3
3 Time plan	4
4 Concept	5
4.1 Solution approach	5
4.2 Hardware requirements	5
List of Abbreviations	6

Change Log

Table 1: Document Change Log

№	Date	Version	Changed Chapters	Change Type	Editor
1	27.10.2025	1.0	All	Initial version	A. Menzel (AM)

Change ~~test~~text

Add test

Test note

Test highlight

[AM 1]
v1.0: Ex-ample change

[AM 2]
v1.0: Ex-ample ad-dition

[AM 3]
v1.0: Ex-ample comment

[AM 4]
v1.0: Ex-ample highlight

1 Introduction

1.1 Document Purpose

This document describes requirements specification for software of a Micro Controller Unit (MCU) based radiator thermostat. This software should implement basic consumer functions and will be used as a base for research, development and production of smart heating controllers or thermostats.

1.2 Project Context

The master project will be realized as part of a bigger interdisciplinary development named “MiraTherm Radiator Thermostat”, which includes the following areas:

- **Mechanics:** Development of the thermostat’s power transmission mechanism for proper function with commonly used radiator valves, followed by the design of an enclosure.
- **Control algorithms:** Engineering of control algorithms to be used by the thermostat.
- **Electronics:** Development of the thermostat’s Printed Circuit Board (PCB) and its integration with mechanical components.
- **Software:** The subject of this work, development of the thermostat’s software and its integration with PCB components.

2 Requirements

2.1 Functional Requirements

REQ 1:

REQ 2:

2.2 Non-Functional Requirements

REQ 3:

REQ 4:

3 Time plan

The master project will presumably have the duration of 13 Calendar Weeks (CWs), which are divided into:

- CWs 44-45: Software requirements analysis.
- CW 46: Software architecture design.
- CW 47: Design of software interfaces.
- CW 48: Implementation and tests of software drivers.
- CWs 49-51: Implementation and tests of program logic.
- CWs 52-02: Paper writing.
- CWs 03-04: Final review and submission of the paper.

4 Concept

4.1 Solution approach

4.2 Hardware requirements

To ensure a certain degree of independence from the PCB design, the software will be developed using a development hardware set, that resembles the final PCB in terms of components and interfaces.

4.2.1 Hardware block diagram

4.2.2 Required equipment

- **P-NUCLEO-WB55** - MCU development board with Matter standard support
- **STLINK V3 or V2** - debug probe
- **eQ-3 eqiva Model N** - Radiator thermostat with a C300 3V motor and gear box for disassembly (available)
- **DRV8833** - Motor driver module
- **1.3" OLED Display incl. SH1106** - Display with an embedded driver
- **KY-040** - Rotary encoder
- **Buttons**
- **Connecting wires**
- **Breadboard(s)**

List of Abbreviations

CW	Calendar Week
MCU	Micro Controller Unit
PCB	Printed Circuit Board