UNIVERSIDADE DE SÃO PAULO
FACULDADE DE FILOSOFIA, CIÊNCIAS E LETRAS DE RIBEIRÃO PRETO
DEPARTAMENTO DE COMPUTAÇÃO E MATEMÁTICA

GABRIEL CARVALHO SILVA

An IoT Smart Scale Proof of Concept for Smart Homes

Ribeirão Preto–SP

2025

GABRIEL CARVALHO SILVA

An IoT Smart Scale Proof of Concept for Smart Homes

Versão Original

Dissertação apresentada à Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto (FFCLRP) da Universidade de São Paulo (USP), como parte das exigências para a obtenção do título de Mestre em Ciências.

Área de Concentração: Computação Aplicada.

Orientador: Cléver Ricardo Guareis de Farias

Ribeirão Preto–SP

2025

Gabriel Carvalho Silva

An IoT Smart Scale Proof of Concept for Smart Homes. Ribeirão Preto–SP, 2025. 45p. : il.; 30 cm.

Final Paper submitted to the Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto da USP, as part of the requirements for obtaining a Bachelor's degree in Computer Science.

Supervisor: Cléver Ricardo Guareis de Farias

1. IoT. 2. Embedded Systems. 3. Event-driven Architecture.

A minha avó, Maria Daria Rocha.

Acknowledgements

Agradeço ...

“RAAAWR // (Totoro)

Abstract

This is the english abstract.

Keywords: iot. smart home. event driven. face recognition. smart scale.

List of figures

List of tables

List of abbreviations and acronyms

TODO	TODO

List of symbols

Γ	TODO

Summary

Introduction

0.1 Theoretical Background

0.1.1 The Internet of Things and Smart Homes

0.1.2 Smart Scales

0.2 The Smart Scale project as an architectural and technical Proof of Concept

0.3 Objectives

1

Method

1.1 Project definition

1.1.1 Functional Requirements

1.1.2 Nonfunctional Requirements

1.1.3 Overrall Design

1.1.3.1 Infrastructure

ESP32 and equipment raspberry pi placeholded by laptop (docker)

1.1.3.2 Architectural Patterns

DDD and event driven

1.1.4 Design of the edge layer

1.1.5 Design of the fog layer

1.1.6 Design of the cloud/hub layer

1.2 Tests and Performance Analysis

1.2.1 Processing Performance

1.2.2 Usability Performance

2

Results

2.1 Smart Scale Measurements

2.1.1 Data Serialization

2.2 Smart Scale Face Recognition

2.2.1 Method comparison

Euclidian distance X cosine & neural net vs basic moment calculation

2.2.2 Handling Privacy

2.3 Dashboard data visualization

2.4 System integration

3

Discussion and Future Work

3.1 Extensions to the PoC

3.2 Applications to the Internet of Medical Things

3.3 Applications to Husbandry

4

Conclusion

Appendix

A

Quisque libero justo

B

Nullam elementum

Annex

A

Morbi ultrices rutrum lorem.

B

Fusce facilisis lacinia dui