UNIVERSITY OF ZAGREB
FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING
and
UNIVERSITY OF APPLIED SCIENCES KONSTANZ

MASTER THESIS No. 1536

Enhancement of sensor mesh functionality with application on sleep tracking

Bruno Vunderl

Konstanz, June 2017

Master thesis

Conclusion of Master Degree

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at the

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and

Hohschule Konstanz
Technik, Wirtschaft und Gestaltung

Topic:	**Enhancement of sensor mesh functionality with application on sleep tracking**
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UNIVERSITY OF ZAGREB
FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING
MASTER THESIS COMMITTEE

Zagreb, 6 March 2017

MASTER THESIS ASSIGNMENT No. 1536

Student: **Bruno Vunderl (0036455534)**
Study: Computing
Profile: Computer Engineering

Title: **Enhancement of Sensor Mesh Functionality with Application on Sleep Tracking**

Description:

The focus of this project is enhancement of functionality, reliability and sensor accuracy of an intelligent bed that monitors human sleep. The scope of the project includes the implementation of an application layer protocol and network communication between the embedded system in the bed and remote server. Furthermore, the implementation possibilities of data preprocessing, filtering, and automatic sleep analysis are explored and tested. The system is tested and evaluated in the Ubiquitous Computing Laboratory at the Hochschule Konstanz University of Applied Sciences.

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Authors Declaration

Unless otherwise indicated in the text, references are acknowledged below. This report:

Enhancement of sensor mesh functionality with application on sleep tracking by Bruno Vunderl on DD.MM.YYYY

is entirely the product of my own scholarly work. Thise report has not been submitted wither in whole or part for a degree at this or any other university or institution. This is to certify that the printed version is equivivalent to the submitted electronic one.

Konstanz, DD.MM.YYYY

Bruno Vunderl

Contents

Symbols, Units and Abbreviations

HTTP Hypertext Transfer Protocol

1 Introduction

To help readers get better acquainted with the topic, introduction is divided into four sections. First section covers general motivation and relevance of the project. Next section describes state of technology, market and consumer trends at the time thesis was published. Following section lays out project goals and defines the scope they will be tackled on. In the last section, project structure is outlined so that readers can easily navigate through this thesis.

1.1 Motivation

Concentration, motivation, mood and physical fitness are just some of subjective quality of sleep <ADD REFERENCE>.

1.2 Technology, market and trends

At the time this thesis was published a trend

1.3 Goal and scope

1.4 Project outline

TODO

2 Conclusion

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Bibliography

[Haase, 2008] Haase, O. (2008). *Kommunikation in verteilten Anwendungen: Einführung in Sockets, Java RMI, CORBA und Jini (German Edition)*. Oldenbourg Wissenschaftsverlag, 2., überarbeitete und erweiterte auflage. edition.

Enhancement of sensor mesh functionality with application on sleep tracking

Abstract

The focus of this project is enhancement of functionality, reliability and sensor accuracy of an intelligent bed that monitors human sleep. The scope of the project includes the implementation of an application layer protocol and network communication between the embedded system in the bed and remote server. Furthermore, the implementation possibilities of data preprocessing, filtering, and automatic sleep analysis are explored and tested. The system is tested and evaluated in the Ubiquitous Computing Laboratory at the Hochschule Konstanz University of Applied Sciences.

Keywords: sleep tracking, embedded systems, sensor meshes, sleep analysis

Primjena senzorskih mreža na praćenje ljudskog sna

Sažetak

Tema projekta je unaprjeđenje funkcionalnosti, pouzdanosti i preciznosti rada inteligentnog kreveta koji prati ljudski san. U sklopu projekta implementira se aplikacijski sloj te ostvaruje mrežna komunikacija između ugradbenog sustava u krevetu i udaljenog računalnog servera. Nadalje, rad istražuje i testira implementaciju preprocesiranja podataka, izrade podatkovnih filtera i automatske obrade i analize podataka o snu. Sustav se testira i evaluira u Laboratoriju za sveprisutno računarstvo pri Hochschule Konstanz University of Applied Sciences.

Ključne riječi: praćenje sna, ugradbeni sustavi, mreže senzora, analiza sna