LaTeX 2_ϵ-Vorlage von Matthias Pospiech

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Erklärung der Selbstständigkeit

Hiermit versichere ich, die vorliegende Arbeit selbstständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt sowie die Zitate deutlich kenntlich gemacht zu haben.

<Ort einfügen>, den <Datum einfügen> <Autor einfügen>

Contents

1 Introduction

1.1 Personal motivation

This thesis describes the analysis, enhanced design and implementation of an existing microcontroller based mesh solution [Kor09]. The current solution showed.

1.2 Research overview

2 Evaluation

2.1 Existing solution

2.2 Assumptions

2.3 Requirements

3 Hardware Design

3.1 RAM

- Harvard architecture
- RAM bus
- Latch

3.2 USB Serial Device

3.3 RFM12B Radio

3.4 Keyboard

4 Software Modules

4.1 UART

4.2 SPI

4.3 RFM12 Driver

4.4 Watchdog

4.5 Clock

4.6 Shell

5 Software Algorithms

5.1 Protothreads

Concurrently executing tasks
Problem: No operating system
"Traditional" embedded implementations are using state machines. Especially the existing thesis uses state machine based algorithms a lot, although the author does not mention this fact at all.

Alternatives:
- Heavyweight: Real Operating System. Enumarate them and compare ...
- Lightweight: Thread implementations. Problem: Each thread has its own stack which consumes a lot of memory.
- More Lightweight: Protothreads. Best compromise between classical state machines and real threads.

5.2 Ring Buffers

5.3 Half-Duplex Radio Access (Petri Net)

6 Network Stack

6.1 Layer 2a: MAC Layer

6.2 Layer 2b: Logical Link Control

6.3 Layer 3: Batman Routing

6.4 Layer 7: Application

7 Research

7.1 Simulations

7.1.1 Shell

7.1.2 Routing

7.1.3 Radio Transmission

7.2 Mesh evaluation

7.3 Results

8 Conclusion

Bibliography

[Kor09] Korniowski, Marek: *Projekt odpornej na awarie sieci komputerowej z transmisją danych w pasmach nielicencjonowanych* (2009)

List of Figures

List of Tables

Danksagung