**Overview of Real-time Operating Systems for embedded devices**

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**Abstract:** Real-time OS are very useful for embedded devices, home automation, aviation. This paper describes well known real-time OS such as Zephyr OS, FreeRTOS and GNU/Linux. Their features will be compared. The paper performs the Overview task of PhD thesis.

**Keywords: risc-v assembly, avr assembly, operating system**

1. **Introduction**

Real-time operating systems can be used for embedded devices management,smart home automation, for civil or military aviation – for optical devices and weapon controls management. Real-time operating system manages devices with that has:

→ limited resources

→ limited time to complete task

→ sensors for communication

Target of the paper is to explore and describe features of well-known RTOS such as: FreeRTOS, Zephyr and Armbian GNU/Linux.

**2. Material and Methods**

Programming languages for real-time os development are C or

Assembly language. Usage of assembly language gives more

control of current task execution. For every RTOS will be

analyzed:

→ Short description

→ Supported virtualizators

→ Supported Instruction set architectures

→ Embedded device whitch is supported by the os

**3. Results**

FreeRTOS, Zephyr and Armbian OS are analyzed and compared. Virtualizators for x86 simulation are shown. For every OS is shown supported device

**4. Conclusions and future work**

Analyzed operating systems are written in C and they support RISC-V architecture

because of C. But when requirements for the RTOS are OS to be much faster and

more useful for RISC-V projects then exists need to develop truly RISC-V assembly-

based OS. That is main target of my PhD thesis.

**References**:

1. A practical introduction to real-time systems for

undergraduate engineering

2. FreeRTOS Documentation, 2023

3. Zephyr Documentation,2023

4. Armbian Documentation,2023

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1. PhD Theme: Methods and Tools to develop a assembly-based operating system for embedded devices [↑](#footnote-ref-2)