Master's thesis internship
# Research, development, implementation and evaluation low power techniques on RTOS.

INTRODUCTION

VERHAERT is an SME with a clear focus on innovation and development of new products for international customers in various sectors. We offer a broad range of product development services, from business consultancy to series production.

Current markets are still suffering from the energy crisis and different news flashes come up with drastic numbers of energy consumed by large scale software projects such as ChatGPT or other AI applications.

On the other hand most computers are used for simple tasks whereas the actual cpu is doing *nothing* most of the time. In the picture on the left the CPU is used on an average of 14% ... what about the other 86%. Can the power be reduced in that time, and what would be the impact? Can you guesstimate the effect of all PC's worldwide consuming 86% less power? Or the equivalent of billions of electronic devices using microcontrollers running an RTOS?
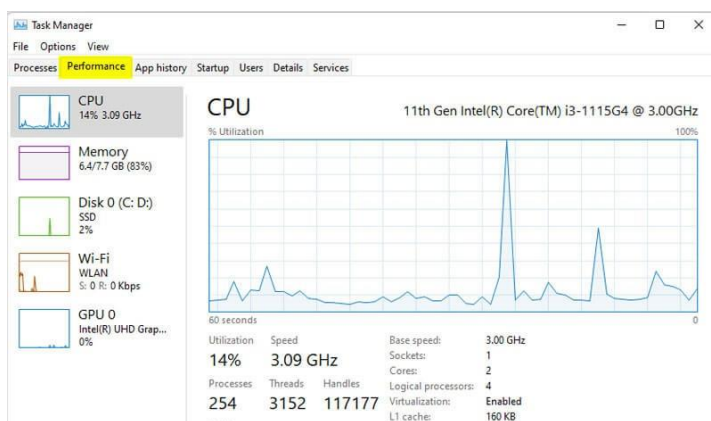
SCOPE OF THE INTERNSHIP

Where do you come into play? During this hands-on internship, you will develop a practical application on microcontrollers running RTOS-es such as FreeRTOS or Zephyr and evaluate the power reduction modes.

- ESP32 running ESP-IDF (FreeRTOS)
- Nordic running

The application will be an existing application and will be modified to lower the power consumption as much as possible. How low can we go with:

- Active MQTT session over Ethernet/WiFi
- Retain state and security context at all times
- measured performance equivalence and/or motivation / work-around for performance loss.

As outcome we expect the following:

- Have an understanding of the impact to activate low power features in the idle task of an RTOS.
- Have an understanding on hardware requirements to optimize this further
- Have numbers that express the impact on energy consumption using these techniques
- Have an understanding on how to estimate the required effort to reach specific power consumption restrictions
- Have an understanding on which power consumption criteria require specific hardware.
- Have a re-evaluation of the same application used with a newer SDK

Low Power Consumption

YOUR PROFILE

- You have a keen interest in embedded digital applications.
- You have knowledge of C/C++
- You are eager to go to the bottom of things
- You have experience with mcu's and device drivers

OUR OFFER

Next to an in-depth and practical experience with low level microcontroller programming, we offer you a view within an inspiring and innovative company, a very pleasant atmosphere and professional coaching.

COACHES

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