

# Yggdrasil - Development of an improved embedded system education platform

Degree programme : BSc in Electrical Engineering and Information Technology | Specialisation : Embedded Systems  
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Yggdrasil is the upcoming embedded development platform for students at the Bern University of Applied Sciences. It aims to simplify learning by unifying the existing development boards into one combined product. With the interchangeable Asgard and Midgard processor boards, students can use the same set of peripherals on Yggdrasil in different environments. This allows learning state-of-the-art concepts of low-level development and modern Linux and Android programming.

## Motivation and Goals

Currently, a separate development board is used for each class at the Bern University of Applied Sciences. This becomes very time-consuming, as students need to be introduced to every new platform. Further, the current boards are not suitable for transportation. Therefore, a new compact and cost efficient programming kit that can be used in all classes needs to be developed.

## Realization

Prior to the bachelor thesis, the hardware development was started. The thesis then focused on the following subjects:

- Bringing up the hardware
- Development of a software library to interact with peripherals
- Creation of templates and example projects
- Writing of a website with guides, explained examples and hardware documentation on how to use the platform

The library and all examples are available in the programming languages C and C++. Rust development is directly supported by the development environment.

## Results and outlook

A processor board for low level development (Midgard) and a more powerful one (Asgard) for Linux and Android were successfully manufactured. In addition, a base board named Yggdrasil was designed to carry

the processor boards. Yggdrasil features a 800 x 480 pixel True Color Display, two joysticks, five environment sensors, user LEDs and buttons as well as different connectors. These connectors allow attaching of Grove sensors, Raspberry Pi Shields, Pmod extension boards and much more. Instead of a custom processor board, it is also possible to plug Toradex Apalis modules into the board slot on the bottom side.

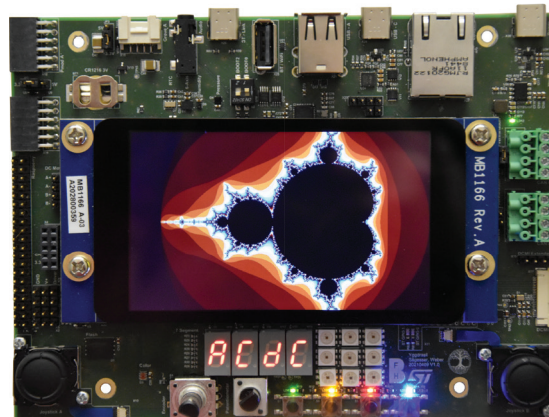
The Yggdrasil development platform will be used in at least two classes for Linux and Android programming. It is also up for discussion to be used in five additional classes for embedded C and C++ development.



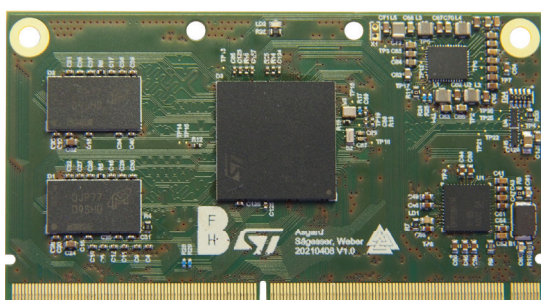
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Yggdrasil



Asgard



Midgard