AimFocus® for Edge AI and IoT Software Design

AimFocus Integrated AI Software Development Platform

USAI Co., LTD independently developed an integrated software platform, AmiFocus. AmiFocus allows software developers and AI scientists to benefit from the flexibility of integrated hardware development. We take many years to develop AmiFocus, which allows users to adapt and use USAI's hardware architecture through software or algorithm code without the need for hardware expertise.

In addition, AmiFocus platform is not limited to a specific development environment, but integrates general software development tools and optimized open source libraries to allow developers to focus on algorithm development. Although AmiFocus is independent of the Vivado ™ design suite that supports programming in hardware code, it can enhance the hardware by packaging hardware modules into software-callable functions Developer productivity. This means that developers can adjust their hardware architecture according to their requirements without having to change to a new chip.


AmiFocus Integrated Software Platform

AmiFocus - System Stack

AmiFocus is built on a stacked system architecture. This architecture can be seamlessly applied to various open source standard development systems and set up the environment. The most important thing is that it contains a large number of standard function libraries.

The base layer is AmiFocus target platform, which consists of a circuit board and pre-programmed I/O. **The second layer** is the core development kit of AmiFocus, which contains the open-source USAI runtime library to manage the movement of data between different domains. It includes subsystems, the upcoming AI engine in Versal ACAP ™, and necessary external host. In addition, this layer contains core development tools such as compilers, analyzers, and debuggers. Although USAI provides a world-class design environment, these tools are designed to integrate seamlessly with industry-standard build systems and development environments.

The third layer is to provide more than 400 optimized open source applications in 8 AmiFocus function libraries, including AmiFocus basic linear algebra subroutine library (Basic Linear Algebra Subroutine, BLAS), AmiFocus Solving library, AmiFocus security library, AmiFocus frame visual library, AmiFocus data compression library, AmiFocus quantitative finance library, AmiFocus data library and AmiFocus AI database. Software developers can use standard application programming interface (API) to implement hardware acceleration by these libraries.
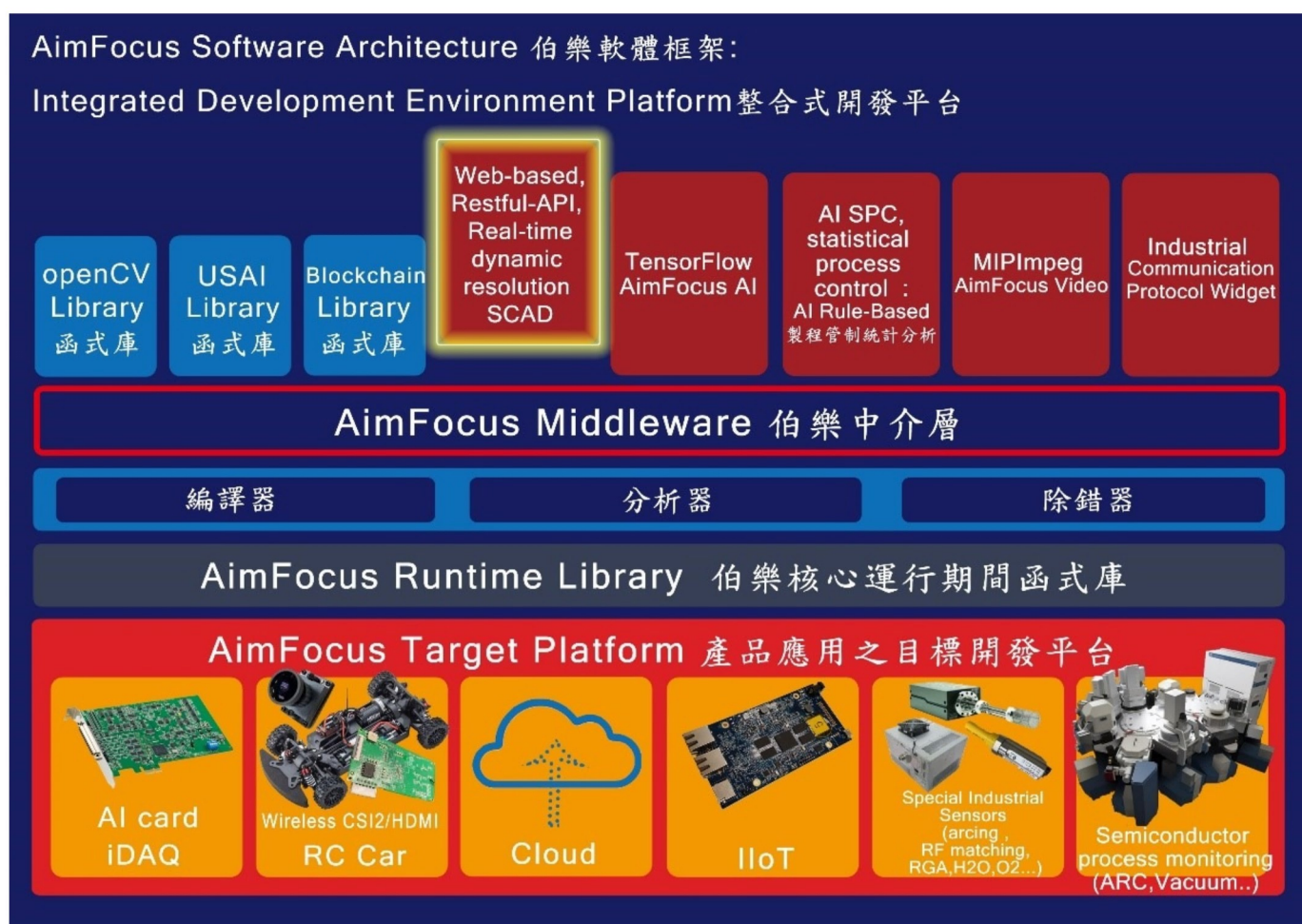
AmiFocus system architecture

The fourth and most revolutionary layer of AmiFocus is the "AmiFocus AI", which integrates a Domain Specific Architecture (DSA). The DSA is configured with Xilinx hardware, making it easy for developers to optimize and program using industry-leading frameworks such as TensorFlow and Caffe. AmiFocus AI provides a tool chain that can complete optimization, compression, and compilation operations in minutes, and efficiently run pre-trained AI models on Xilinx components. In addition, it provides dedicated APIs for deployment from the edge to the cloud, enabling industry-leading inference performance and efficiency. Xilinx is also about to launch another DSA called the AmiFocus Video, which encodes directly from FFmpeg and provides an ultra-simple and extremely powerful end-to-end video solution. DSAs provided by partners include Illumina integrated with GATK for genetic analysis, BlackLynx integrated with ElasticSearch for big data analysis, and proprietary DSAs currently used by Xilinx customers.

## AmiFocus – Patented AI Selector

In AmiFocus, the AI module selector is the most important patented technology. It selects the appropriate AI module for training by inputting data dimensions, types, ranges, and requirements. Vertically integrated AI applications are the end of development. This module can meet the needs of users to achieve vertical integration.
Users do not need to re-explore suitable AI acceleration hardware platforms and AI software model training. The company will use the existing USAI deep learning hardware acceleration platform as the basis to continuously accumulate the development experience of AI vertical integration applications and train AI models. With the gradual increase of AI training models, it will be able to solve a series of business problems and further improve operational efficiency without the need for companies to build AI acceleration hardware and maintain AI models internally.

AI software and hardware are vertically integrated with each other and can play the effect of one plus one greater than two. With our "AmiFocus AI" module, we can even achieve the goal of highly vertically integrated hardware, software, and business intelligence. In addition, the function of extracting data analysis also provides a variety of neural networks for tasks, and the weights of these neural networks are derived from deep learning by machine learning frameworks such as Tensorflow. This project aims to provide AmiFocus as a solution. This framework is based on different cases and data input. In addition to intelligently selecting plug-in modules automatically, the functions provided by the AI plug-in module also cover training through deep learning. Coming image recognition model, data analysis model. AmiFocus is built on heterogeneous integrated AI chips for development, and will eventually be a large platform for integrating software, hardware, business, and community.

AmiFocus SSD Demo(A)
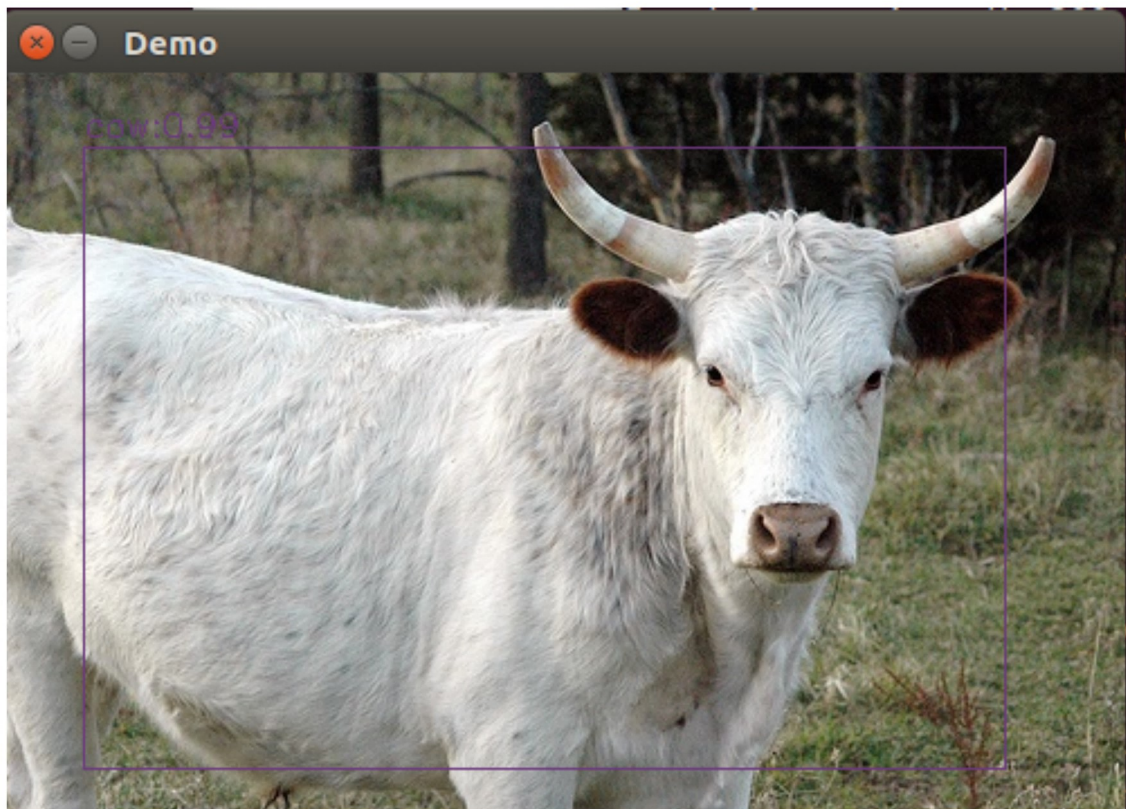
AmiFocus SSD Demo(B)

AmiFocus - Developer website

USAI Co., LTD will also launch a developer website dedicated to AmiFocus to facilitate users to obtain examples, courses and reference documents, and at the same time as a community space to contact AmiFocus developers. This site will be managed by USAI, AmiFocus experts and enthusiasts. 。

AmiFocus – Product Information

AmiFocus unified software platform supports software developers, increasing the efficiency of dedicated hardware without the need for new dedicated chips. This platform can be used for USAI development board free of charge, and can be downloaded from the official website.