

Application Testing:

AI Vision for Water Quality Detection



The Application of Neural Computing Stick 2¹ Based on Intel® Movidius™ Myriad™ X for Water Quality Detection

Access to clean water is a rather difficult task for many people in this world. The test and confirmation of clean water sources usually require equipment test equipment and manual analysis of test result, and such condition can be rather limited in areas with difficulty in access to clean water. In this paper the engineers of network communication group of World Peace Industrial Group (WPIg) conducted actual tests with Intel® Neural Computing Stick 2 (Intel® NCS 2) and IEI Industrial Computer (iEi) to develop a simple and low-cost test method for water quality test in order to contribute to effective disease prevention and to save lives.

Water Quality Detection Scenario Testing System

The test system comprises of:

- Digital microscope with the cost of USD 100 or less which is easy to buy
- iEi Tank870 running on Ubuntu operating system.
- Intel® Movidius™ Neural Computing Stick 2 for real-time operation of machine learning and AI

Intel® solution can meet all hardware and software requirements during the entire AI process from training to deployment. For a startup company, the cost of establishing prototype is relatively low. On the other hand, AI training can be conducted free of charge via Intel® AI DevCloud, and anyone can register to use it.

The aforementioned object is an affordable option for the company cannot afford conventional expensive testing system. In this water quality test system, first we use microscope to capture an image of clean water, and then it will be compared with the sample of sewage. This system can immediately detect harmful bacteria and mark the contamination situation on the map. All these works can be done in real time.

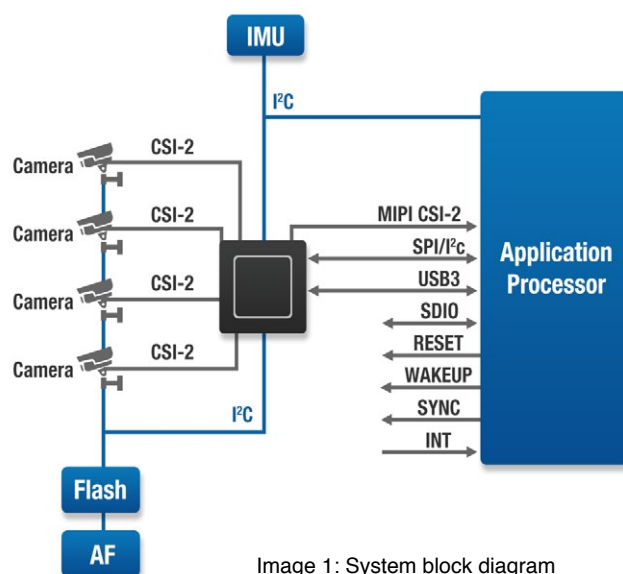


Image 1: System block diagram



Image 2 and 3: WPIg enginner actual test by using Intel® NCS 2 for water quality detection

Core Technology Advantages

1. More hardware acceleration of neural network

Intel® Neural Computing Stick 2 (Intel® NCS 2) is the latest Intel® deep learning inference development kit. They are included in an affordable U-disk board. This is the Intel® NCS 2 carrying our latest VPU (Vision Processing Unit)—Intel® Movidius™ Infinite X, including the on-chip neural network accelerator known as the neural computing engine. With 16 high performance kernels and exclusive hardware neural network accelerator, Intel® NCS 2 can provide 8-time performance enhancement as compared to the previous generation.

2. Software tool for accelerate deep learning inference

The OpenVINO™ toolkit published by Intel® is the default software development kit for performance optimization, integrated deep learning inference, and operation of Deep Neural Network of Intel® Movidius™ Vision Processing Unit (VPU). This toolkit supports a wide range of neural networks and Intel® NCS 2 hardware, and it can simplify deployment of a series of Intel® vision accelerator solutions; during this test, we use this toolkit to support more than 20 pre-trained models covering image classification, object detection, and image segmentation.

3. It can be developed on one platform and deployed on several platforms

With a kind of intermediate representative (IR) format, you can develop, test and deploy the same type of neural network on various deep learning processors, such as Intel® CPU, GPU, VPU, FPGA, etc., or you can deploy a model across iEi processors. IR concept can allow your operational models to use multiple frameworks to establish TensorFlow™, Caffe, MXNet, and other exchange formats such as ONNX. This kind of flexibility can support multiple frameworks, exchange formats, and hardware accelerators to become the modular architectures of the Intel® OpenVINO™ toolkit.

Notes:

- Intel® Neural Compute Stick 2 (Intel® NCS 2)
- [For more information on Intel® OpenVINO™](#)

Reference links:

- For more information related to IoT solution please refer to [WPIg Intel IoT Solution Aggregator Website](#).
- [For more information related to Intel® MRS](#) (Market Ready Solutions)
- [For more information related to Intel® RRR](#) (RFP Ready Kit)

Product specifications of actual test system scheme



Intel® Movidius™ Neural Computing Stick 2 (Intel® NCS 2)

- Exclusive neural computing engine
- 16 high performance SHAVE kernels
- Enhanced ISP supporting 4K
- New vision accelerator including stereo depth



TANK AIoT Developer Kit

- Intel® Generation 6/7 Core™/Xeon® Processor based on Intel® Q170/C236 chipset and DDR4 memory
- Supporting high resolution independent dual-screen access
- Abundant single-sided high speed I/O interface
- Built-in power connector on the board to supply power to the expansion card
- High flexibility of hardware expansion
- Pre-installed Ubuntu 16.04 LTS operating system
- Pre-installed Intel® OpenVINO™, Intel® Media SDK, Intel® System Studio, Arduino® Create software toolkit

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WPIG, as an Intel® IoT Solution Aggregator, is the best channel to offer the most diversified Intel® IoT solutions to address your business needs across multiple domains and applications. To play the role of IoT Solution Aggregator, WPI Group is capable to serve IT Systems Integrators and OT System Integrators in Asia and Greater China regions, bridge the overall end-to-end (Edge to Cloud) applications. To integrate IoT solutions and put Industrial ODM/OEM/ISV solutions on the shelf, more effectively support System Integrators to select suitable solutions and manage inventories. Moreover, assist in the establishment and cultivation of industry knowledge and use cases, promote various IoT applications and support to scale business through ecosystem partners' enablement.

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