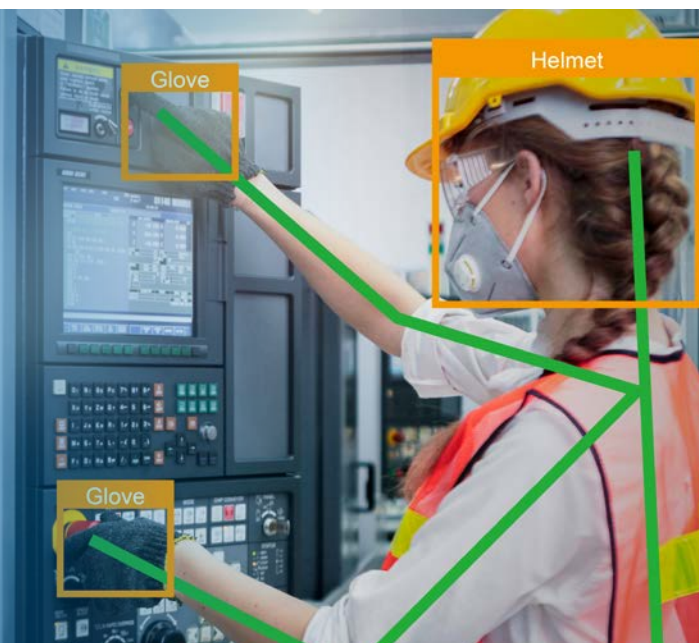


// CASE STUDY

Enhance Factory Operator Safety with AI Technology



At a Glance

Industry Manufacturing

Location Taiwan

Summary

Hardware



Inference

AIR-020 with NVIDIA Jetson Xavier NX

Software



Operating System

Ubuntu 20.04

SDK/Toolkit

CyberLink FaceMe, NVIDIA JetPack

Workplace safety is vital to protect employees from hazards and other dangers that may occur in the workplace. The Liberty Mutual Workplace Safety Index reported that for every \$1 a company invests in workplace safety, the result amounts to a \$4 return on investment. Our customer was looking for a vision AI solution that can help the manufacturing manager ensure operational safety while also improving efficiency and productivity with two specific objectives:

- To check if an operator is wearing personal protective equipment (PPE) such as cap, wrist strap, and mask properly
- Employee clock-in and secured area control

Challenge

The development team installed IP cameras at the entrance and around the factory floor to capture real-time images. A powerful edge AI system was required to enable factories to clock in whole groups of employees, grant permissions for working zones, and ensure that anyone attempting to operate specialized machinery is wearing proper safety attire, with no excessive idle time. Additionally, an alert will be immediately sent to the manager if there are any abnormalities among personnel as they operate crucial equipment.

Architecture Diagram

Factory Operator Safety

AIR-020



Solutions

Advantech collaborated with CyberLink to implement AI-based facial recognition technology for seamless access control and securing restricted areas, while another ISV partner contributed to PPE and idle time detection. To enable AI-based analytics capabilities, monitor assembly lines, and detect employee working efficiency in the production line, AIR-020, an ultra-compact, low-power AI inference device, supports 21 TOPS for real-time detection on the edge. It is built-in with the NVIDIA Jetson family and Yolo5 AI-trained models from an ISV partner, capable of processing images and detecting PPE and worker movement with low latency.

Featuring a small footprint of just 5.47" x 4.33" x 1.75", the AIR-020 AI box fits perfectly into an industrial environment with its support for wide-range 12-24V DC power input, -10 to 55°C operating range, and vibration and humidity resistance. The unit is equipped with extensive I/O ports for seamless camera, Wi-Fi, storage and multifunction module connections. Likewise, AIR-020 benefits from Ubuntu 20.04 enhanced security and stability, including a constant security patching process and kernel self-protection, stack-clash protection, and control-flow integrity features.

CyberLink supported Advantech from start to finish, from acquiring custom data and visualizing it, to training the deep learning model and testing it, adapting it, and validating the inference results directly on AIR-020. CyberLink FaceMe helped enhance outstanding image processing, issues related to poor lighting and image quality caused by environmental conditions, are resolved. It enables attendance management, access control, and restricted area control through facial recognition accurately securely, and sends real-time alerts to manufacturing managers.

Advantech collaborated with an ISV partner and CyberLink to provide integrated solutions, assisting our customers in seamlessly implementing AI technology into their applications. With supported trained AI models, it enhanced outstanding image processing, addressing issues related to poor lighting and image quality caused by environmental conditions. This enables accurate and secure PPE verification, attendance management, and access control through facial recognition, with real-time alerts sent to manufacturing managers.

Benefits

- Leverage solutions developed by ISV partners
- Reliable compact AI system designed to meet the demands of critical working environments.
- Ubuntu Image 20.04 and the latest built-in JetPack: convenient for AI development

Results

- Boosted operator safety and efficiency
- Managers free up time to focus on production planning and operations

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