

The AAEON Board that Lets AI Maintenance Drones Fly

Industry: Telecommunications

Product: PICO-KBU4

Introduction

With the advent of the Internet, and especially since the introduction of high-speed wireless networks, we're now more connected than we've ever been – connected to each other, connected to our jobs, connected to channels of entertainment, and connected to almost every piece of information ever created.

As a result, we can achieve more and enjoy a level of convenience that would have seemed unimaginable only a generation ago. This connectivity has become so integral to our lives that many of us can't accept it being disrupted in any way.

To keep wireless Internet services running properly, telecommunications companies have to check their wireless antenna towers regularly and quickly carry out any necessary maintenance work. For years, these checks have been performed by workers climbing the towers to manually inspect cables and systems, but this work is time-consuming, costly, and potentially dangerous.

Additionally, companies have to minimize the scope and number of Internet dead spots, and for years, this has meant teams of workers driving around and checking signal strength in different locations. Not only is this inefficient, but it can also produce misleading results as tests have to be conducted at street level and some locations are completely inaccessible.

To overcome the issues presented by these conventional approaches to maintenance, a leading Asian telecommunications company wanted to invest in a series of drones. It has long been recognized that these unmanned machines have the potential to complete maintenance work more safely, effectively, and cost-efficiently than human workers.

Customer challenges

Drones have been on the market for years and are now available in an extensive range of specifications. Despite that, until very recently, it hasn't been possible for a drone to perform the complex range of tasks required for this application, and there are still a number of significant challenges to be overcome.



Navigation

The drones for this application need to be able to autonomously navigate their way to antenna towers and then hover in a series of pre-determined positions while checks are carried out. They also need to have a built-in ability to avoid obstacles such as buildings, trees, or other communications or electricity towers.

Checks and Tests

The drones need to be fitted with signal test pattern devices to assess the strength of 4G signals and also high-frame-rate cameras to carry out checks on the integrity of cables and system platforms; the images and data collected by these devices then have to be passed on to workers on the ground. To handle all of these tasks, the drone needs a motherboard with a powerful CPU.

Power Consumption

To keep project costs down and ensure in-air maneuverability, drones need to be small, meaning that space for batteries is limited. Since a large amount of available power is needed to keep the drone in the air and operate cameras and testing equipment, it's essential that the machine is fitted with a low-power-consumption SBC.

AAEON is one of the IoT industry's most innovative companies. With its ability to integrate new technologies into its product range, it was able to develop a compact SBC with strong AI capabilities.

AAEON's solution

AAEON is regarded as being one of the embedded controller industry's most innovative companies, and its ability to incorporate new technologies into its product range meant it was quickly able to develop a PICO form factor SBC with a high-power, low-energy-consumption 7th Generation Intel[®] Core™ i U series processor.

In addition to its advanced CPU, the [PICO-KBU4](#) also features up to 16GB DDR4 SODIMM memory, two GbE LAN ports, M.2 B and E keys, a GPIO, and an IO interface that includes USB, COM, HDMI and LVDS ports.

With its impressive specifications, the PICO-KBU4 can instantly communicate with a cloud server, enabling AI solutions for both navigation and system checks.

Navigation and Obstacle Avoidance

The PICO-KBU4 supports GPS technology, which means drone operators can program the machine's route before letting it take off, and specific locations for testing can be assigned as waypoints.

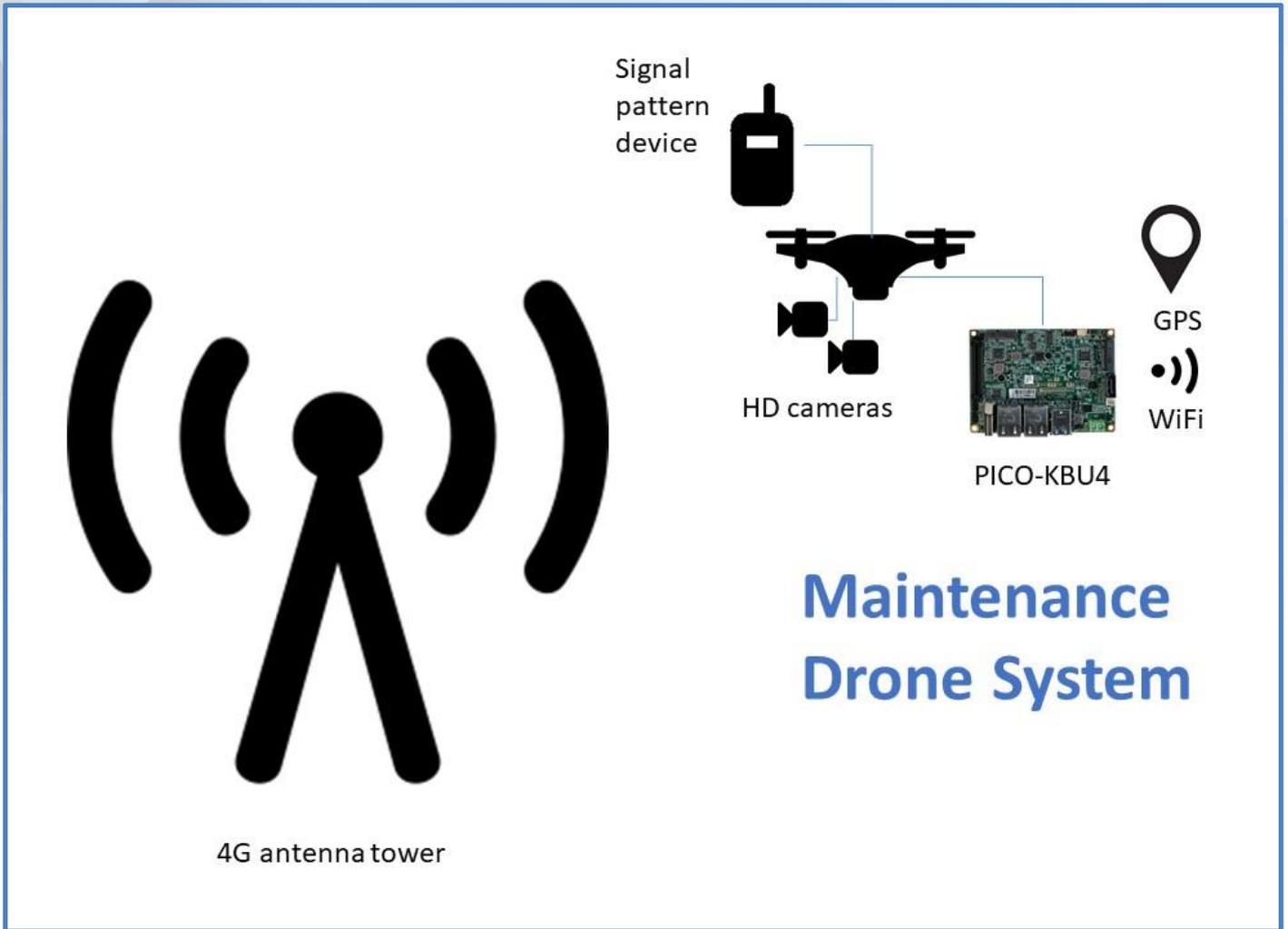
The PICO-KBU4's AI capabilities and pair of GbE LAN ports mean operators don't need to worry about obstacles in the machine's flightpath. Fitted with two HD cameras, the drone can survey its surroundings, almost immediately identify barriers and potential danger spots, and autonomously take evasive action.

Tests and Checks

Using their cameras, the drones carry out visual checks of antenna tower systems and cables and relay images to operators on the ground via a WiFi or Bluetooth connection.

At the same time, their AI programming allows them to perform autonomous tests. The power of the PICO-KBU4 and AAEON's expertise in working on AI solutions means the drones are able to very accurately spot problems and then send an alert to operators.

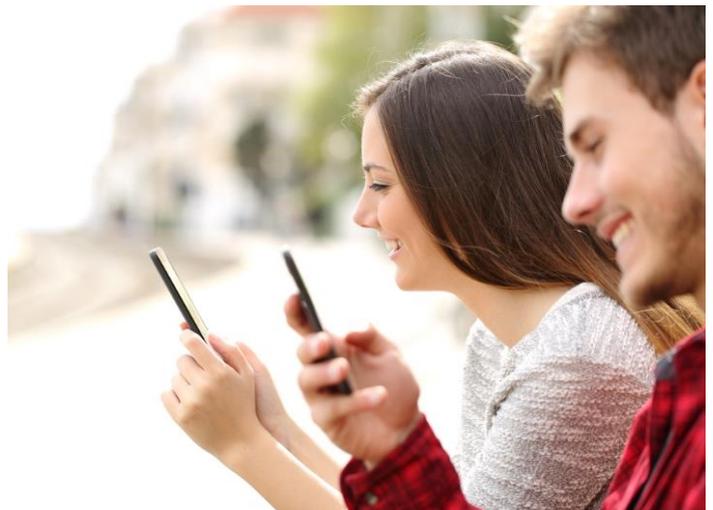
When drones arrive at the waypoints for 4G signal strengths, they use the PICO-KBU4's DIO to activate their signal test pattern devices.



Impact

With AAEON technology at the heart of their new test and inspection drones, the telecommunications company is able to check its infrastructure without having to risk employees' safety by sending them up skyscraping antenna towers. Thanks to the improved accuracy of 4G signal strength tests, the client can also now improve signal coverage, ensuring that its customers enjoy a more reliable service than ever before.

Improved service and faster, safer, more cost-effective maintenance operations – with the PICO-KBU4, anything's possible.



About the PICO-KBU4

Fitted with a 7th Generation Intel[®] Core™ i processor and featuring up to 16GB DDR4 SODIMM memory, the PICO-KBU4 has the computing power to handle applications previously only possible with much larger motherboards. Its market-leading pair of GbE LAN ports enable the use of two HD cameras, and with its GPIO, two COM ports, two USB3.0 ports, and two USB2.0 pin headers, it can connect to and control a range of sensors.

A 0oC~60oC operating temperature range, HDMI and LVDS ports, SATA slot, and M.2 B and E keys for extra storage and WiFi / Bluetooth connectivity make this an extremely flexible SBC, and customers can expand the already impressive IO interface by adding a custom-made daughter board via an optional board-to-board interface.



ABOUT AAEON

Established in 1992, AAEON has become one of the leading designers and manufacturers of advanced industrial and embedded computing platforms. Committed to innovative engineering, AAEON provides Industry 4.0 integrated solutions, hardware and intelligent automated services for premier OEM/ODMs and system integrators worldwide, as well as IoT solution platforms that seamlessly consolidate virtual and physical networks. Reliable and high quality computing platforms include industrial motherboards and systems, industrial displays, rugged tablets, PC/104, PICMG and COM modules, embedded SBCs, embedded controllers, network appliances and related accessories. AAEON also offers customized end-to-end services from initial product conceptualization and product development through to volume manufacturing and after-sales service programs. It is also committed to continuously redefining and harmonizing the management and development processes of the industry.

With its constant pursuit of innovation and excellence, AAEON became a member of the ASUS group in 2011, enabling the company to further strengthen its leadership, access advanced technology from ASUS, and leverage resources from within the group. AAEON is poised to offer more diversified embedded products and solutions at higher quality standards to meet world-class design and manufacturing demands in the years to come.

AAEON is an Associate member of the Intel[®] Internet of Things Solutions Alliance.