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# Advantech Embedded IPCs Application Stories

Solutions from the Field



- ✓ In-vehicle
- ✓ Machine Automation
- ✓ Self-service Kiosk
- ✓ Facility Management
- ✓ Intelligent Transportation
- ✓ Display Control



# ADVANTECH

Enabling an Intelligent Planet

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# Table of Contents

## About Advantech Embedded IPCs

### Introduction & Selection Guide

<b>ARK-1300 Series</b> _____	02
Ultra Compact Focus Embedded IPCs	
<b>ARK-3200 Series</b> _____	04
Slim Embedded IPCs	
<b>ARK-3300 Series</b> _____	04
Compact & MIO Expandable Embedded IPCs	
<b>ARK-3400 Series</b> _____	06
PCI/PCIe Expandable Embedded IPCs	
<b>ARK-5000 Series</b> _____	06
PCI/PCIe Slot Expandable Embedded IPCs	
<b>ARK-VH Series</b> _____	08
In-Vehicle Embedded IPCs	

## Application Stories

### In-Vehicle

<b>MRT In-Car Video Surveillance System</b> _____	10
<b>Computer-Assisted Oversight for Driving Tests</b> _____	12
<b>Electronic Bus Fare Collection System</b> _____	14
<b>Taxi Passenger Information Center</b> _____	16
<b>Super Efficient Forklift-mounted Scanner</b> _____	18

### Machine Automation

<b>High-density Automated Warehousing</b> _____	20
<b>Putting Hustle into a Modern Postal Service</b> _____	22
<b>Pushing Semiconductor Machinery up a Notch</b> _____	24
<b>LCD Production Quality Control</b> _____	26

### Self-service Kiosk

<b>Saving Dollars with Self Service Gasoline</b> _____	28
<b>Automatic Vending Machines</b> _____	30
<b>Self-Service Supermarket</b> _____	32

### Facility Management

<b>New Efficiency for Excimer Laser Eye Surgery</b> _____	34
<b>Nurse Call Systems</b> _____	36
<b>Solar Energy Equipment</b> _____	38

### Intelligent Transportation

<b>City Security and Traffic Management</b> _____	40
<b>Highway Surveillance and ETC Service</b> _____	42

### Display Control

<b>Instant Broadcasts at International Airports</b> _____	44
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# Advantech Embedded IPCs

## Fanless Compact Embedded Computers, Ready for Versatile Applications

Advantech Embedded IPCs are designed to give developers fast, convenient and simplified solutions for industrial and embedded applications. The embedded design, rugged features and powerful computing technology deliver reliability and flexibility. These computers are targeted to satisfy customers looking for a robust and compact computing platform with an industrial design and built-in I/O to handle diverse applications.



### Reliable

#### Aluminum Casing

Designed with aluminum casing and fins, Advantech Embedded IPCs not only come with superior heat dissipation capability but also excellent corrosion resistance. This ensures the reliability in outdoor environments.

#### Fanless Design

Without rotating parts such as a CPU fan, system fan, or power supply fan, the compact Embedded IPCs are designed with extended MTBF and require very low maintenance.

#### Limited Internal Cabling

For general embedded computers, cables are used for wiring between connectors and CPU boards. These internal cables may increase the risk of system failure due to broken cables, loose contacts, or mistakes in assembly. But since connectors on Advantech Embedded IPCs are soldered directly on the PCB, the internal cabling inside every embedded computer chassis is strategically optimized.



### Ruggedized

#### High Tolerance to Shock and Vibration

Designed with onboard CPU, memory, flash and strengthened connectors, Advantech Embedded IPCs endure up to 50G of shock and 5G of vibration under operation, and are MIL-STD-810F compliant. For even greater resistance, DRAM optionally can be glued into position for use in environments specially prone to shock and vibration.

#### Superior Thermal Design

Advantech's Embedded IPCs are designed with heat pipes and aluminum thermal fins, supporting wide operating temperatures from -20 to 60°C. Advantech Embedded IPCs also come with low-voltage CPUs, industrial-grade components to meet mission critical applications.



### Easy Installation

#### Compact Size

Unlike the traditional IPC with sizeable chassis, Advantech Embedded IPCs are compact, slim and light-weight, saving space in working areas.

#### Multiple Mounting Options

To meet the demands of various applications, the compact Embedded IPCs come with multiple mounting options. From DIN-rail and VESA, to wall-mount and desktop, Advantech Embedded IPCs make an easy, hassle-free fit into your system.

# ARK-1300 Series

## Ultra Compact Embedded IPCs



ARK-1300 series embedded IPCs are ultra compact, powerful, and fanless systems designed for rugged and space-critical applications. This series provides integrators a scalable range of processors from Advantech SoC™ to Intel® Core™ 2 Duo, connectivity from multiple gigabit ethernet to wireless interfaces, and high-graphics capable systems. ARK-1300 series is perfect for automation control applications.

### Ordering Information

Part Number	Description
ARK-1310F-00A1E	EVA-X4150, VGA/4 x RS-232/422/485, ultra-compact embedded box IPC
ARK-1310L-00A1E	ARK-1310F w/o VGA
ARK-1360F-S1A1E	Intel® Atom™ Z510 1.1GHz with miniPCIe + 8 DIO + 2 COMs, ultra-compact embedded box IPC
ARK-1360F-S6A1E	Intel® Atom™ Z530 1.6GHz with miniPCIe + 8 DIO + 2 COMs, ultra-compact embedded box IPC
ARK-1382-S0A1E	Intel® Celeron® M ULV 423 1.06 GHz, ultra-compact embedded IPC
ARK-1382-S2A1E	Intel® Core™ Duo ULV U7500 1.2 GHz, ultra-compact embedded IPC

### Product Selection Guide



Model Name	ARK-1310	ARK-1360	ARK-1382
Features	Cost-effective, entry-level automation system solution	Cost-effective, Intel® Atom™ solution with MiniPCIe expansion slot	Multi-display solution for signage applications
Processor System	Processor	Advantech EVA-X4150	Intel® Atom™ Z510P 1.1 GHz / Z530 1.6 GHz
	System Memory	Onboard 64 MB DDR memory	Up to 2 GB DDR2 SDRAM SODIMM
Graphics	CRT	Yes (ARK-1310F-00A1E only)	Yes
	LVDS	18-bit LVDS (optional)	24-bit LVDS (optional)
	DVI	-	-
	TV Out	-	-
I/O Interface	Audio	-	High Definition Audio, Line-out, Mic-in
	Ethernet	2 x 10/100 Mbps	1 x 10/100/1000 Mbps
	Keyboard/Mouse	1 x PS/2	1 x PS/2
	USB	2 x USB 2.0	4 x USB 2.0
	eSATA	-	-
	Serial Port / Parallel Port	4 x RS-232/422/485	2 x RS-232
	Expansion	-	1 x MiniPCIe
	Wireless	-	-
Storage	Solid State Disk	One Type I/II CompactFlash card	One Type I/II CompactFlash card
	HDD	-	-
Power Requirements	Input Voltage & Type	DC 9 V ~ 24 V, AT	DC 12V ~ 24V, ATX
Certifications	EMC	CE, FCC, CCC, BSMI	CE, FCC, CCC
	Safety	UL, CCC, BSMI	UL, CCC
Dimensions (W x H x D)	189 x 41 x 130.6 mm (7.44" x 1.61" x 5.14")	189 x 41 x 130.6 mm (7.44" x 1.61" x 5.14")	189 x 41 x 130.6 mm (7.44" x 1.61" x 5.14")
Operating Temperature	w/ extended temperature CF card: -20 ~ 60°C	0 ~ 55°C	0 ~ 60°C

\* CRT is extended from DVI-I port by Y-cable

# ARK-3200/3300 Series



## Slim Embedded IPCs

ARK-3200 series embedded IPCs are designed in an ultra low profile aluminum housing (only 68 mm high) with rich I/O ports. The thermal engineering handles high chipset thermal dissipation without a fan. ARK-3200 series provides system integrators with a turn-key solution and a versatile application development path, without breaking the bank or missing time-to-market deadlines.



## Compact & MIO Expandable Embedded IPCs

ARK-3300 series embedded IPCs are compact size embedded systems with rich I/O functions. Low power consumption, flexible MIO expansions, and reduced size make the ARK-3300 series the best choice for controller applications. In addition, the flexibility of VESA mount, DIN mount, and wall mount enable the ARK-3300 series to be mounted in most scenarios. As a result, ARK-3300 series is a great choice for general controllers in industrial applications.

## Ordering Information

Part Number	Description
ARK-3202L-S6A1E	Intel® Atom™ N270 1.6 GHz compact embedded IPC
ARK-3202F-S6A1E	Intel® Atom™ N270 1.6 GHz with 5 x COM and 2 x MiniPCIe, compact embedded IPC
ARK-3360L-N4A1E	Intel® Atom™ N450 1.66 GHz, compact embedded IPC
ARK-3360F-N4A1E	Intel® Atom™ N450 1.66 GHz, compact embedded IPC
ARK-3360L-D5A1E	Intel® Atom™ D510 1.66 GHz, compact embedded IPC
ARK-3360F-D5A1E	Intel® Atom™ D510 1.66 GHz, compact embedded IPC
ARK-3390-1S1A1E	Intel® Core™ 2 Duo U7500 1.06 GHz, compact embedded IPC
ARK-3390-1S6A1E	Intel® Core™ Duo L2400 1.66G, compact embedded IPC
ARK-3399-1S1A1E	Intel® Core™ 2 Duo U7500 1.06G, compact embedded IPC
ARK-3399-1S6A1E	Intel® Core™ 2 Duo L2400 1.66G, compact embedded IPC

## Product Selection Guide



Model Name	ARK-3202	ARK-3360	ARK-3390	ARK-3399
Features	Cost-effective Intel® Atom™ N270 multiple function platform	Ultra low power consumption Intel® Atom™ fanless solution	Highly integrated multi I/O Intel® Core™ 2 Duo fanless solution	Intel® Core™ 2 Duo solution for signage/ embedded system control
Processor System	Processor	Intel® Atom™ N270 1.6 GHz	Intel® Atom™ N450/D510 1.66 GHz	Intel® Core™ 2 Duo LV 1.66 GHz/ Core™ 2 Duo ULV 1.06 GHz
	System Memory	Up to 2 GB DDR2 SDRAM SODIMM	Up to 2 GB DDR2 SDRAM SODIMM	Up to 2 GB DDR2 SDRAM SODIMM
Graphics	CRT	Yes	Yes	Yes
	LVDS	36-bit LVDS (optional)	18-bit LVDS (optional)	48-bit LVDS (optional)
	DVI	Yes	-	DVI-D
	TV Out	-	-	-
I/O Interface	Audio	Spk-out, Mic-in	High Definition Audio, Line-in, Line-out, Mic-in	Line-In, Line-out, Mic-in
	Ethernet	2 x 10/100/1000 Mbps	3 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps
	Keyboard/ Mouse	1 x PS/2	-	1 x PS/2
	USB	5 x USB 2.0	6 x USB 2.0	5 x USB 2.0
	eSATA	-	-	-
	Serial Port / Parallel Port	2 x RS-232, 3 x RS-232/422/485	1 x RS-232, 3 x RS-232/422/485, 2 x RS-422/485	1 x RS-232, 3 x RS-232/422/485, 2 x RS-422/485
	Expansion	Up to 2x MiniPCIe	1 x MiniPCI, 1 x MiniPCIe	MiniPCI
	Wireless	-	-	-
Storage	Solid State Disk	One Type I/II CompactFlash Card	One Type I/II CompactFlash Card	One Type I/II CompactFlash Card
	HDD	1 x 2.5" HDD bay	1 x 2.5" SATA HDD bay	1 x 2.5" SATA HDD bay
Power Requirements	Input Voltage & Type	DC 12 V ~ 24 V, ATX	DC 12V ~24V, ATX	DC 9 V ~ 34 V, ATX
Certifications	EMC	CE, FCC, CCC, BSMI	CE, FCC, CCC, BSMI	CE, FCC, CCC, BSMI
	Safety	UL, CCC, BSMI	UL, CCC, BSMI	UL, CCC, BSMI
Dimensions (W x H x D)	220 x 68 x 200 mm (8.66" x 2.67" x 7.87" )	264.5 x 69.2 x 137.25 mm (10.41" x 2.72" x 5.4")	264.5 x 69.2 x 137.25 mm (10.41" x 2.72" x 5.40")	264.5 x 69.2 x 137.25 mm (10.41" x 2.72" x 5.40")
Operating Temperature	w/ Extended Temperature HDD: 0 ~ 45°C & CF: -20 ~ 60°C	w/ Extended Temperature HDD: 0 ~ 45°C & w/ Extended Temperature CF: -20 ~ 60°C	w/ Extended Temperature HDD & CF: 0 ~ 55°C	w/ Extended Temperature HDD & CF: 0 ~ 55°C

\* CRT is extended from DVI-I port by Y-cable

# ARK-3400/5000 Series



## PCI/PCIe Expandable Embedded IPCs

ARK-3400 series embedded IPCs are ideal, application-ready system platform solutions. ARK-3400 series units come with two 2.5-inch HDD drive bays to meet large storage demands, flexible expansion with two PCI or PCIe alternative expansion slots, friendly, easy-access CF card, and removable HDD drive design. They support a wide range of input voltages, and are packed into small, rugged cases.



## PCI/PCIe Slot Expandable Embedded IPCs

ARK-5000 series embedded IPCs are designed for slot CPU boards; ARK-5000 series offer easy, modular, system expansion using PCI/PCIe slots. These embedded IPCs are ideal for applications involving machine automation, industrial plant, and cabinet integration.

### Ordering Information

Part Number	Description
ARK-3400F-S5A1E	Intel® Celeron® 370 (1.5 GHz), expandable compact embedded IPC
ARK-3400F-S0A1E	Intel® Celeron® 373 (1.0 GHz w/o L2 cache), expandable compact embedded IPC
ARK-3403-D5A1E	Intel® Atom™ D510 1.66 GHz, compact embedded IPC
ARK-3403-D6A1E	Intel® Atom™ D525 1.8GHZ, compact embedded IPC
ARK-3420F-S6A1E	Intel® Core™ 2 Duo L7500 1.6 GHz, expandable compact embedded IPC
ARK-3420F-S1A1E	Intel® Core™ 2 Duo U7500 1.06 GHz, expandable compact embedded IPC
ARK-3420F-U0A1E	Intel® Celeron® M 550 2.0 GHz, expandable compact embedded IPC
ARK-3440A-U4A1E	Intel® Core™ i5-520E 2.4GHZ, w/ AMT, function key
ARK-3440A-U5A1E	Intel® Core™ i7-610E 2.53GHz, w/ iAMT, function key
ARK-3440F-U4A1E	Intel® Core™ i5-520E 2.4GHZ, expandable compact embedded IPC
ARK-3440F-U5A1E	Intel® Core™ i7-610E 2.53GHz, expandable compact embedded IPC
ARK-5260F-D5A1E	Intel® Atom™ D510 1.66GHz, w/ VGA, 5 x USB, 4 x COM, Audio, 2 x PCI and 1 x PCIe X1 expansion slot, 2 x Mobile HDD Bay, expandable compact embedded IPC

### Product Selection Guide



Model Name		ARK-3400	ARK-3403	ARK-3420	ARK-3440	ARK-5260
Features		Cost effective Intel® Celeron® M solution with 2 PCI expansion and multiple I/O	Valuable Intel® Atom™ D510/D525 with PCI/PCIe expansion and dual SATA HDDs	High performance with PCIe expansion and dual SATA HDDs for image processing and surveillance	High performance Intel® i7 processor fanless computing platform	Valuable ultra low power platform w/ 3 x PCI/ 1 x PCIe expansion slot
Processor System	Processor	Intel® Celeron M 370 1.5 GHz/ Celeron M 373 1.0 GHz	Intel® Atom™ D510/ Intel® Atom™ D525 1.8 GHz	Intel® Core™ 2 Duo L7500 1.6 GHz/ U7500 1.06GHz/ Celeron M 550 2.0 GHz	Intel® Core™ i7 610E 2.53 GHz Intel® Core i5 520E 2.4 GHz Intel® Celeron SV P4505 1.86 GHz	Intel® Atom™ D510 1.66 GHz
	System Memory	Up to 2 GB DDR2 SDRAM SODIMM	Up to 2 GB DDR2 667 SDRAM SODIMM	Up to 4 GB DDR2 SDRAM SODIMM	Up to 4 GB DDR3 1066 SDRAM SODIMM	Up to 2GB DDR2 SDRAM SODIMM
Graphics	CRT	Yes*	Yes	Yes*	Yes*	Yes
	LVDS	48-bit LVDS (Optional)	18-bit LVDS (Optional)	48-bit LVDS (Optional)	24-bit LVDS (Optional)	-
	DVI	Yes*	-	Yes*	Yes*	-
	TV Out	-	-	-	HDMI	-
I/O Interface	Audio	Line-In, Line-out, Mic-in	Line-in, Line-out, Mic-in	Line-In, Line-out, Mic-in	Line-in, Line-out, Mic-in	Line-in, Line-out, Mic-in
	Ethernet	2 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps
	Keyboard/Mouse	-	-	-	-	1 x PS/2
	USB	6 x USB 2.0	6 x USB 2.0	6 x USB 2.0	6 x USB 2.0	5 x USB 2.0
	eSATA	1 x eSATA	1 x eSATA	1 x eSATA	1 x eSATA	-
	Serial Port / Parallel Port	2 x RS-232, 2 x RS-232/422/485 w/ autoflow control	2 x RS-232, 2 x RS-232/422/485 (Optional) w/ autoflow control	2 x RS-232, 2 x RS-232/422/485 w/ autoflow control	2 x RS-232, 1 x RS-232/422/485, (Optional 2 x RS-232 & 1 x RS-232/422/485 by cabling)	4 x RS-232/422/485
	Expansion	2 x PCI slot, 1 x Mini PCI	1 x PCI, 1 x PCIe, 2 x MiniPCIe	2 x PCI, 1 x Mini PCIe	2 x PCI/PCIe, 2 x MiniPCIe	2x PCI, 1 x PCIe
Storage	Wireless	-	-	-	-	-
	Solid State Disk	One Type I/II CompactFlash Card	One Type I/II CompactFlash Card	One Type I/II CompactFlash Card	One Type I/II CompactFlash Card	One Type I/II CompactFlash Card
	HDD	1 x 2.5" SATA HDD bay	2 x 2.5" SATA HDD Bay	2 x 2.5" SATA HDD bay	2 x 2.5" SATA HDD	2 x 2.5" SATA HDD Bay
Power Requirements	Input Voltage & Type	DC 14 V ~ 24 V, AT/ATX	DC 12V ~ 24V, ATX	DC 9 V ~ 34 V, ATX	DC 9V~34V, ATX	DC 12V ~ 24V, ATX
Certifications	EMC	CE, FCC, CCC, BSMI	CE, FCC, CCC, BSMI	CE, FCC, CCC, BSMI	CE, FCC, CCC, BSMI	CE, FCC, CCC, BSMI
	Safety	UL, CCC, BSMI	UL, CCC, BSMI	UL, CCC, BSMI	UL, CCC, BSMI	CCC, BSMI
Dimensions (W x H x D)		220 x 102.5 x 200 mm (8.66" x 4.04" x 7.87" )	220 x 102.5 x 200 mm (8.66" x 4.04" x 7.87" )	220 x 102.5 x 200 mm (8.66" x 4.04" x 7.87" )	220x102.5x200 mm (8.66"x4.04"x7.87")	137 x 189 x 221 mm(5.39"x7.4"x 8.7")
Operating Temperature		w/ Extended Temperature HDD: -20 ~ 45°C & CF: -20 ~ 55°C	w/ Extended Temperature HDD: -20~45 C & CF: -15~55 C	w/ Extended Temperature HDD: -20 ~ 45°C & CF: -20 ~ 55°C	w/ Extended Temperature HDD: 0~45 C & CF: 0 ~ 55 C	w/ Extended Temperature HDD: 0~45 C & CF: -20~60 C

\* CRT is extended from DVI-I port by Y-cable

# ARK-VH Series

## In-Vehicle Embedded IPCs



The ARK-VH Series embedded IPC is a brand new design for in-vehicle, fanless, embedded IPCs and offers industrial-grade, high computing power, multiple I/O and low-noise operation for a range of in-vehicle applications, including in-vehicle signage, in-vehicle surveillance, and in-vehicle communications. Advantech in-vehicle platforms feature a vehicle-friendly power design (compliant with ISO-7637-2), wireless communications, GPS receiver, in-vehicle certification (E-Mark, EN50155), anti-vibration and shock resistant design (MIL-810), and easy installation. They operate in an extended range of temperatures with industrial grade Compact Flash, from -20 up to 60° C; in addition, these rugged designs endure shock and vibration and fit a variety of vertical in-vehicle markets such as police cars, taxis, buses, emergency vehicles, trucks, and trains. They are ideal solutions to speed up system integrators' time-to-market and reduce cost for space-critical, in-vehicle applications.

### Ordering Information

ARK-1388V	
ARK-1388V-S0A1E	Intel® Celeron® M423 1.06 GHz, ultra-compact in-vehicle embedded IPC
ARK-1388V-S1A1E	Intel® Core™ 2 Duo U7500 1.06 GHz, ultra-compact in-vehicle embedded IPC
ARK-3202V	
ARK-3202V-S6A1E	Intel® Atom™ N270 1.6 GHz, in-vehicle fanless platform w/ 2 MiniPCIe, GPS, 5 x COM, 5 USB 2.0
ARK-VH200	
ARK-VH200A-D5A1E	Intel® Atom™ D510 1.66GHz, fanless mobile DVR platform w/ 4 ch H.264 video recording, GPS, and 2 x MiniPCIe
ARK-VH200B-D5A1E	Intel® Atom™ D510 1.66GHz, fanless mobile DVR platform w/ GPS, 1 x PoE, and 2 x MiniPCIe

### Product Selection Guide

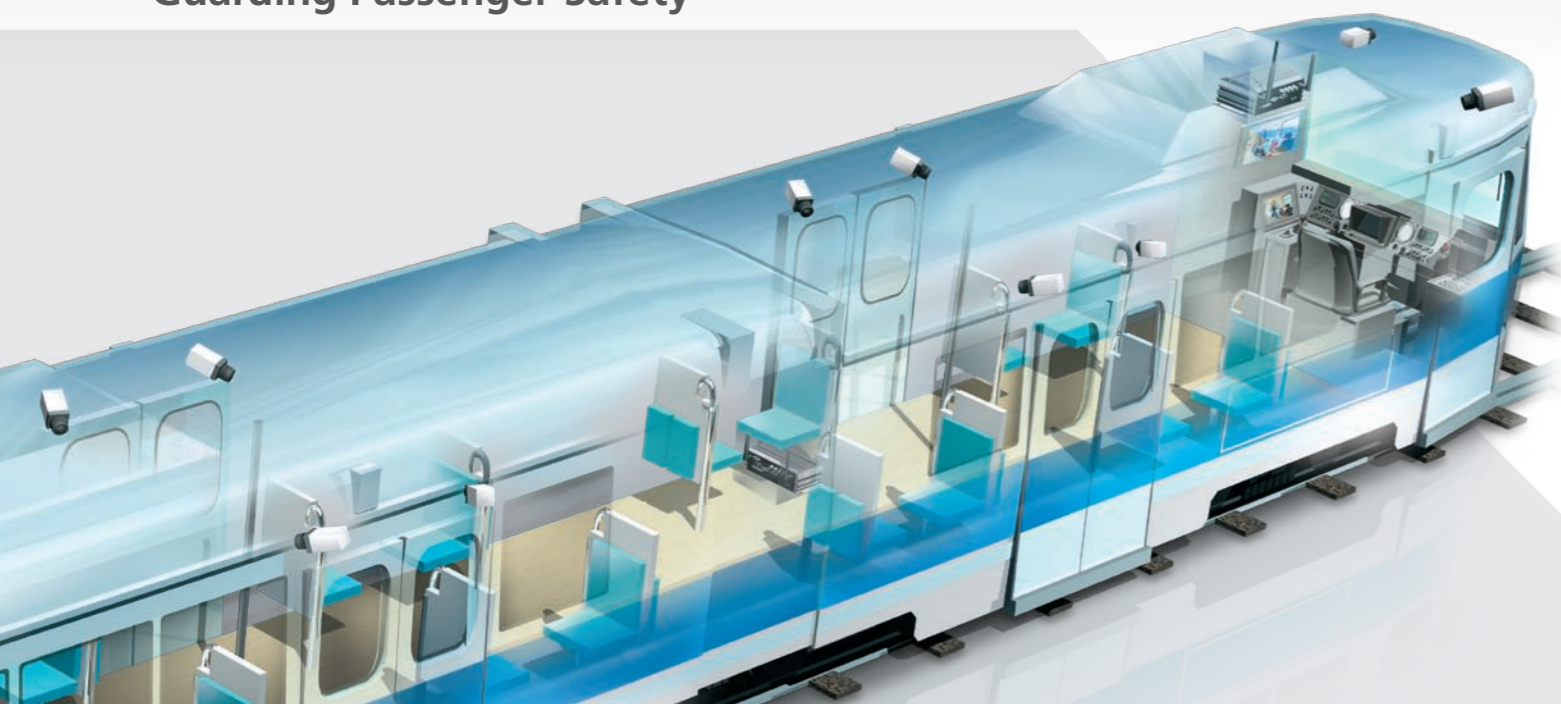


Model		ARK-1388V	ARK-3202V	ARK-VH200
Features		Ultra Compact in-vehicle high performance platform	Valuable Intel® Atom™ N270 in-vehicle platform	Fanless, Intel® Atom™ D510 mobile DVR platform
Processor System	Processor	Intel® Celeron 423 1.06GHz / Intel® Core™ 2 Duo U7500 1.06GHz	Intel® Atom™ N270 1.6 GHz	Intel® Atom™ D510 1.66 GHz
	System Memory	Up to 2GB SDRAM SODIMM	Up to 2 GB DDR2 SDRAM SODIMM	Up to 2 GB DDR2 SDRAM SODIMM
Graphics	CRT	Yes	Yes	Yes
	LVDS	36-bit LVDS	36-bit LVDS (Optional)	18-bit LVDS
	DVI	-	Yes (optional)	-
	TV Out	-	-	-
I/O Interface	Audio	Spkr-out (Left and Right), Mic-in	Spkr-out, Mic-in	Line-out, Mic-in
	Ethernet	2 x 10/100 Mbps	2 x 10/100/1000 Mbps	2 x 10/100/1000 Mbps, and 1 x 10/100/1000 Mbps support PoE
	Keyboard/Mouse	-	1 x PS/2	-
	USB	4 x USB 2.0	5 x USB 2.0	2 x USB 2.0, 2 x lockable USB2.0
	eSATA	-	-	1 x eSATA
	Serial Port / Parallel Port	1xRS-232, 3x RS-232/422/485	2 xRS-232, 3 x RS-232/422/485	3x RS-232
	Wireless	On-board GPS receiver, 1x 802.11 b/g WLAN (Optional), 1xGSM/GPRS/EDGE/UMTS/HSDPA (Optional)	On-board GPS Receiver	On-board GPS Receiver
Expansion	-	2 x MiniPCIe (with SIM card socket)	2 x MiniPCIe (with SIM card socket)	
Video/Audio Encoder	Video Input	-	-	4 CH video Inputs
	Resolution	-	-	CIF, 2CIF, D1
	Recording FPS	-	-	Up to D1 @ 120/100 FPS (NTSC/PAL)
	Video Compression	-	-	H/W Compression, H.264
	Audio Encoder	-	-	4 CH Audio Inputs
Storage	Solid State Disk	One Type I/II CompactFlash Card	One Type I/II CompactFlash Card	One Type I/II CompactFlash Card
	HDD	-	-	1 x 2.5" SATA HDD bay
Power Requirements	Input Voltage & Type	DC 9V~32V, AT/ATX, support PWR Ignition, Complaint with ISO 7637-2	DC 9V~32V, AT/ATX, support PWR Ignition, Complaint with ISO 7637-2	DC 9V~32V, AT/ATX, support PWR Ignition, Complaint with ISO 7637-2
Certifications	EMC	E-Mark E13, CE, FCC, CCC, BSMI	CE, FCC, CCC, BSMI	CE, FCC, CCC, BSMI
	Safety	E-Mark E13, UL, CCC, BSMI	UL, CCC, BSMI, E-Mark	CCC, BSMI, E-Mark, EN50155
Dimensions (W x H x D)		164 x 49.2 x 170 mm (6.46" x 1.94" x 6.69")	220 x 68 x 200 mm (8.66" x 2.67" x 7.87")	264.5 x 69.2 x 137.25 mm (10.41" x 2.72" x 5.4")
Operating Temperature		w/ Extended Temperature CF & RAM: -20~60° C (ARK-1388V-S0A1E); -20~55° C (ARK-1388V-S1A1E)	w/ Extended Temperature HDD: 0 ~ 45° C & CF: -20~ 60° C	w/ Extended Temperature HDD: 0~45° C & CF: -20~60° C

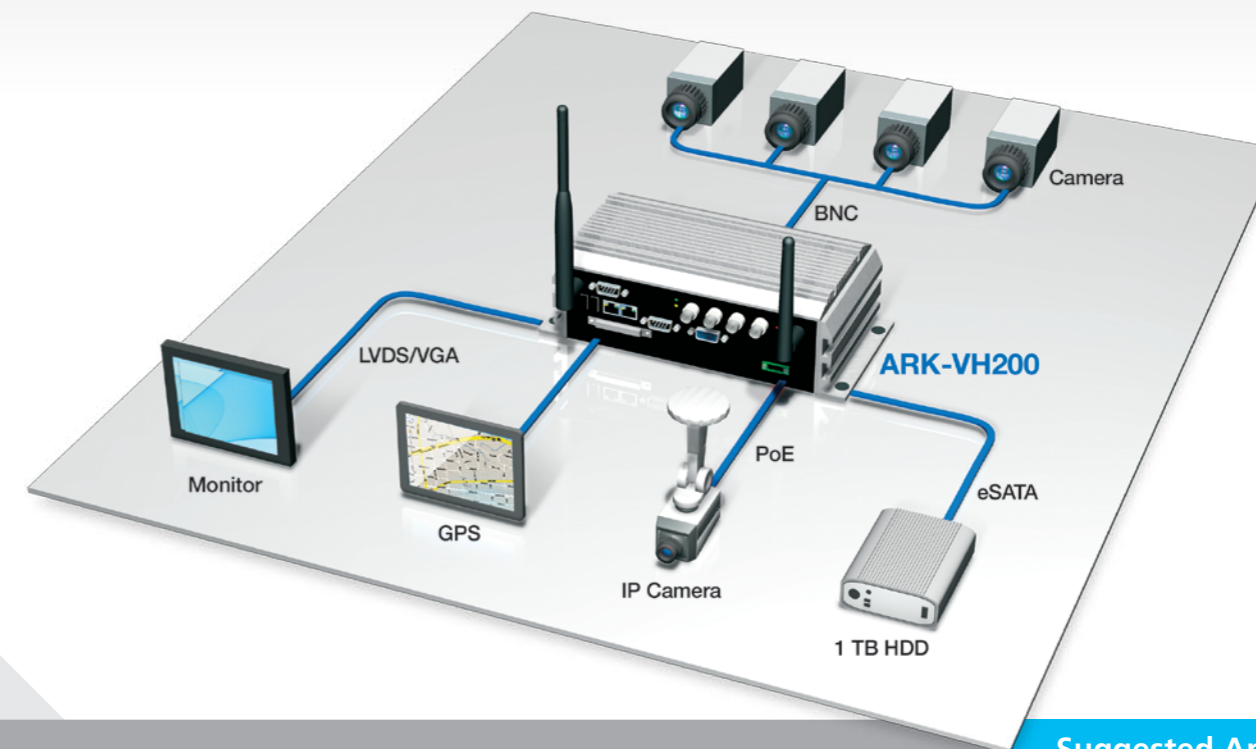
\* CRT is extended from DVI-I port by Y-cable

# MRT In-Car Video Surveillance System

## Guarding Passenger Safety



Asia



### Suggested Application Implementations



#### Project

In many cities, the Mass Rapid Transit (MRT) system carries over 1.4 million passengers every day. Mishaps can happen at any moment, involving casualties, crimes, or biohazards. A video surveillance system that monitors every corner throughout MRT stations and trains helps maintain minute to minute passenger safety.

One MRT authority is purchasing an in-vehicle video surveillance system for its newest MRT line. This time, Advantech, in cooperation with another partner, is providing a solution based on the ARK-VH200 fanless embedded IPC, which enables real time remote monitoring and simultaneous video recording of the in-car space.

The ARK-VH200 supports a state-of-the-art hardware H.264 video encoder, which is the most popular video compression technology; it provides high video quality with much smaller files, saving bandwidth and storage costs. The ARK-VH200 is provided with dual hard disks of up to 1TB storage capacity through internal HDD bay and eSATA. The solution also features the Power over Ethernet (PoE) function, so along with data transfer, power can also be fed to various devices, such as video cameras, all on Ethernet cabling.

#### Requirements

- Total of 1TB-Hard Drive Storage Capacity
- One PoE port compliant with IEEE 802.3 af
- Four channels of real time hardware H.264 digital video recording @ D1 resolution
- EN50155 certified
- Rugged and vibration-resistant

#### System

Each of the MRT cars is equipped with an ARK-VH200 connected to four video cameras that record in-car video from above. For the driver's cabinet, there is one video camera inside that monitors the driver, and another camera mounted outside on top of the lead car targeting the rails.

There is a 4-up, split-screen display in the driver's compartment that allows the driver to monitor live video from the passenger cars, with the screens shifting to display a different car every 5 seconds. All the video is recorded and saved in archives. The system supports high quality video; each video camera takes 30 frames per second at D1 resolution (704 x 480 pixels).

Last but not least, all devices used in this video surveillance solution are in accordance with EN50155, the most widely recognized international standard for electrical and electronic appliances used for rail vehicles, which means that this system has broad international applicability.

#### Conclusion

For a metropolitan mass transit system which sees huge human flows in and out each day, speed and comfort are among the main concerns for service quality, but security is most important of all.

A comprehensive video surveillance system can help prevent crimes and keep mishaps from becoming tragedies. The remote live-view function allows MRT staff to deliver help to passengers in need as soon as possible. Video archives come into play in resolving disputes or clarifying responsibilities, and also aid in preventative planning. Video archives can also, of course, offer important help in crime investigations.



#### ARK-VH200

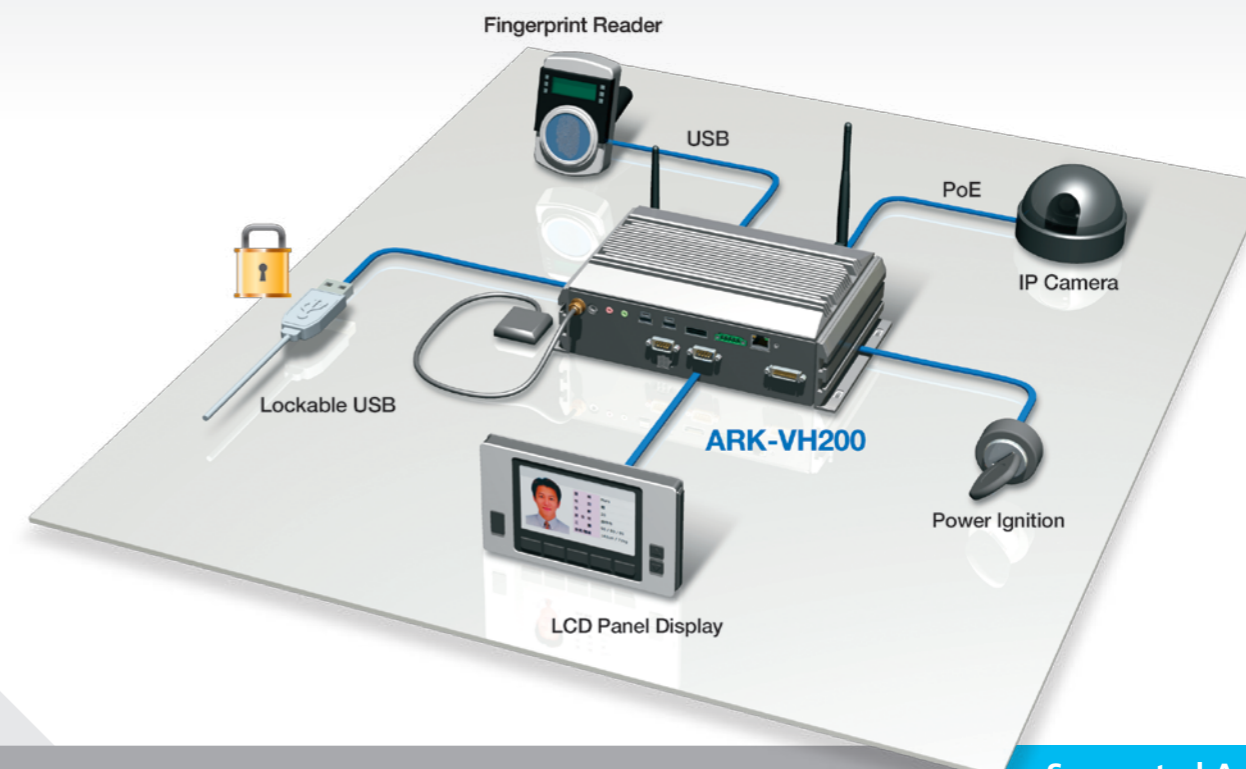
High Performance Mobile Intel® Atom™ D510 Fanless DVR Solution

# Computer-Assisted Oversight for Driving Tests

## In-vehicle Supervisory System



China



### Project

China's rising economy means that millions of new drivers take to the road there each year. A strict but fair driver's test system ensures that newly licensed drivers possess the solid driving skills important for the country's traffic safety. To achieve this, China has established a computer network-based supervisory control system for driving tests. In many cities, road test cars have been retrofitted with a surveillance system that verifies the examinee's identity via fingerprint reader, oversees and videotapes the whole process of examination, evaluates the examinee's performance, and uploads scores to the control center's database for a final determination.

The Chinese company in charge of this project designed and engineered a SCADA system to implement this computerized supervision, and they needed embedded IPCs serving as in-vehicle controllers that supported video capture and wireless communications. Advantech provided ARK-3420F-U0A1E embedded IPCs for driving test cars in large cities and ARK-VH200 embedded IPCs for those in medium-sized cities.

### Requirements

- Fanless, rugged, and reliable
- Expansion slots for WLAN communications and video capture
- Celeron® 550 2.0 GHz processor for ARK-3420F-U0A1E, and Atom™ Dual Core D510 1.6 GHz
- Up to 2GB RAM
- 2GB CF Card
- Anti-vibration
- Wide range temperature operation

### System

Based on customer inquiries, Advantech provided two different controller versions for this case. In large cities such as Beijing, Shanghai, Nanjing, and Hangzhou, test cars were equipped with the ARK-3420F-U0A1E; its more powerful CPU handles massive data loads with ease. In medium or smaller-sized cities such as Wuxi and Wenzhou, the more compact ARK-VH200 was utilized. Each driving test car has a controller unit installed in its trunk, with a connected video camera above the front passenger's seat, and a 7" LCD panel with fingerprint reader located on the dashboard.

The ARK-3420F-U0A1E has two PCI slots and the ARK-VH200 has two MiniPCIe slots for connecting to a WLAN card and a video capture card. With wireless communications, the whole system performs real-time surveillance and remote control functions.

When an examinee sits in the car to take a road test, he or she is first required to put a finger on the fingerprint reader to confirm that he or she is the same person who applied for the test. The fingerprint data is stored and sent to the test supervision center for verification. The driving test administrator, who sits in the front passenger's seat, sees the fingerprint result on the LCD panel.

A video camera above the front passenger's seat records the whole road test process to ensure that everything is conducted in accordance with rules and guidelines. If an irregularity occurs, the system issues a real-time warning or, if sufficiently severe, it can terminate the test immediately.

### Conclusion

This computerized automobile road-test system goes a long way in preventing cheating on driving tests. It also provides instant feedback information to the administrator, and records real-time data on the spot. In a populous country like China, where driver licensing is a mounting challenge, such a system helps increase efficiency significantly.

### Suggested Application Implementations



#### ARK-VH200

High Performance Mobile Intel® Atom™ D510 Fanless DVR Solution

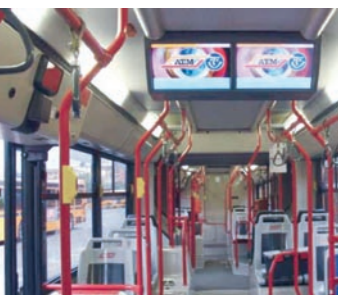
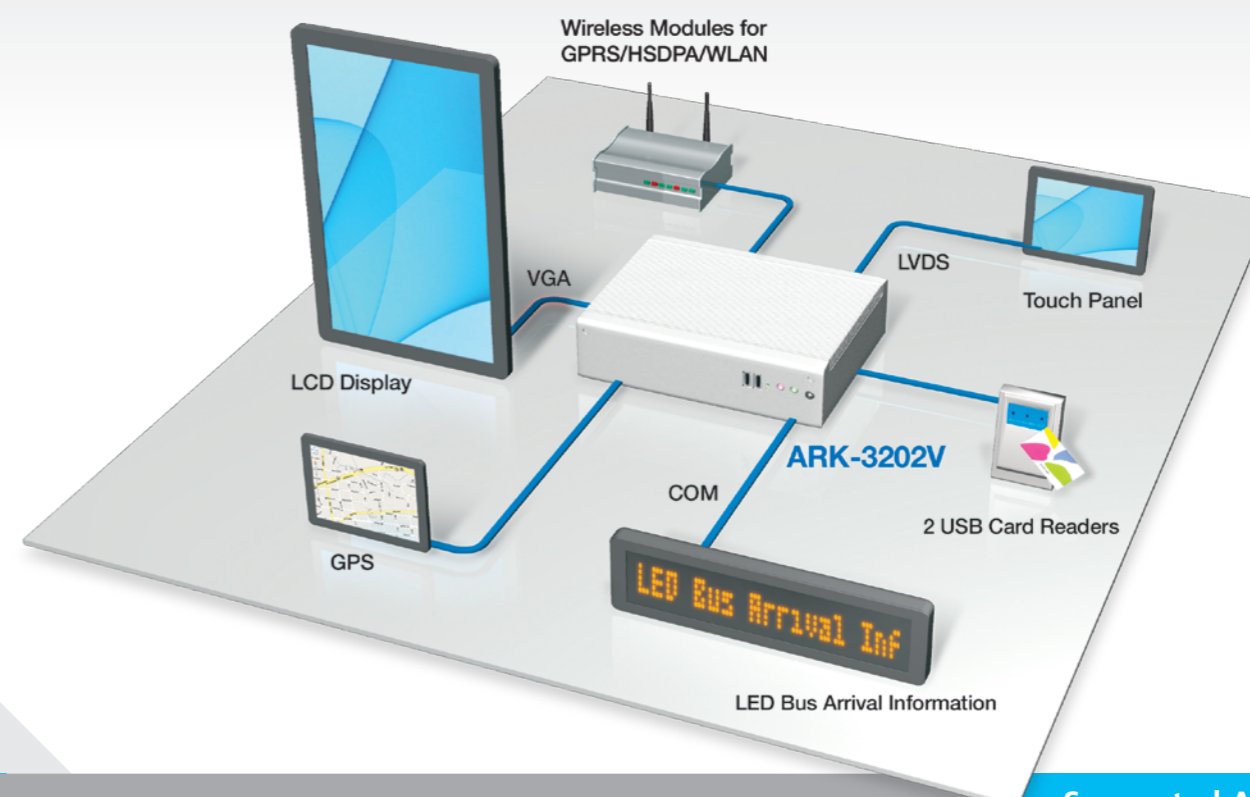


# Electronic Bus Fare Collection System

## All-in-one Onboard Solution



Southern Europe



### Project

A Mediterranean city in southern Europe is rolling out a new bus fare collection system to better serve its over one million residents and the seven to eight million tourists that visit annually. The system includes the use of proximity IC fare cards and magnetic-stripe fare cards instead of cash. An LCD display system is also set up on board each bus in order to air commercials touting the city's tourist attractions, hotels, and shopping malls.

Advantech assisted with the bus retrofits, providing fanless, embedded ARK-3202V industrial computers. Each bus got an ARK-3202V, which serves as an integrated, onboard platform controlling fare card readers, LCD displays and an LED display that shows next-stop information to passengers. The system downloads commercial contents from the control center server via a wireless HSDPA link. And GPS capability allows the control center to track each bus.

### Requirements

- An all-in-one solution that supports both electronic fare collection and information display
- USB ports for connecting fare card readers and an RS-232 COM port for LED indicator display
- Intel® Atom™ processor that consumes less power than ordinary CPUs
- In-vehicle power supply compatible with bus electrical system
- Mobile communications based on HSDPA (3.5G)
- On-board GPS for bus tracking
- Vibration and shock resistant
- Wide operating temperature range to cope with Mediterranean climate

### System

Two fare card readers are installed near the door of each bus. The IC fare cards are for local residents, while the magnetic-stripe fare cards are paper cards preloaded with a specific amount of money for the use of short-stay tourists. A small, 7-inch LCD panel near the driver's seat shows the validation of each pass and allows the driver to view each passenger's trip and associated charges. A large, 15-inch LCD screen is set up for all passengers' viewing; this currently airs commercials, but can be incorporated into a large touch panel in the future to allow passengers to look up tourist information with the touch of a finger.

All these applications are enabled, connected, and controlled by the single, onboard ARK-3202V embedded IPC, which is a great platform for in-vehicle applications as it supports GPS and wireless HSDPA communications. It also supports full HD performance with optional VGA and DVI displays—very well suited to an on-board display system. The in-vehicle computer power is directly linked to the bus power system with a protective circuit. Whenever the bus engine is started, the ARK-3202V and peripherals start up too.

### Conclusion

Traditionally on a bus, separate computer systems perform fare card reading and information display. However, the all-in-one solution provided by Advantech helps to save not only money but also space onboard. In this application story, the traditional cash box is completely discarded in order to help prevent embezzlement. Additionally, commercials aired in the buses are expected to bring in revenues. The transit authority of the city is exploring the possibility of combining the use of bank-issued credit and debit cards with that of the IC fare cards. Whatever they decide, the flexible ARK-3202V is ready to accommodate.

### Suggested Application Implementations



**ARK-3202V**  
Mobile Intel® Atom™ N270 Fanless Solution with Dual Display and Multiple I/Os



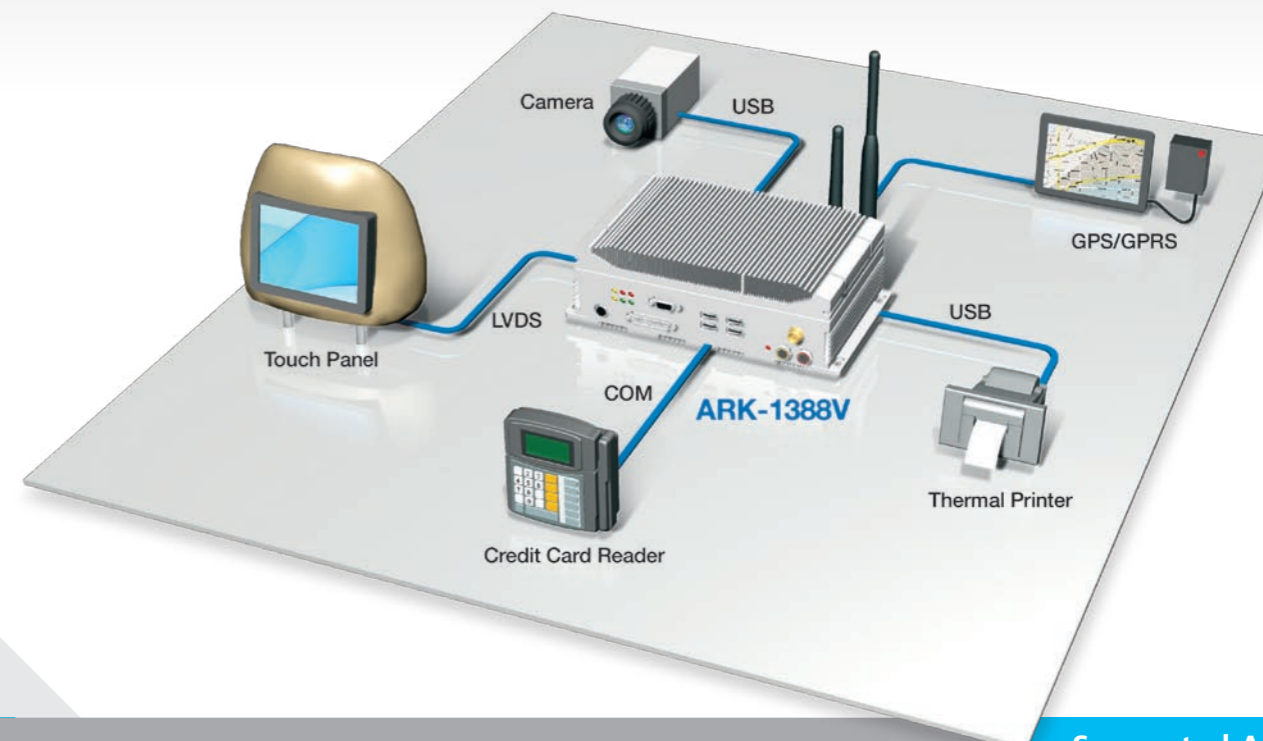
**ARK-1388V**  
Ultra Compact, In-Vehicle Solution with Safe Start/Shutdown and Wireless Functions

# Taxi Passenger Information Center

## The Peace of Mind Ride



Hong Kong



### Project

A taxi company was interested in providing real-time infotainment systems for its passengers. The systems were to be installed as flat panel displays in the backs of front seat headrests, allowing for convenient viewing by backseat passengers. Benefits to the passengers would include: GPS tracking, which should eliminate passenger concerns about routing, as well as advertisements and information of use to residents and travelers alike. Plans included display data covering hotels, restaurants, activities, local attractions, entertainment, and weather and safety bulletins. The taxi company anticipated recouping its investment, and more, through paid advertising.

### Requirements

- Durable
- Easily maintained
- Wireless communication
- Reasonably priced
- Able to tolerate automobile DC power

### System

Advantech's sealed, fanless ARK-1388V proved the ideal platform for this in-vehicle system. Its wide range of acceptable input power and built-in resilience more than fulfilled the specified requirements.

Outfitted with GPS and Wi-Fi communications, data updates are painless and automatic. A seven-inch LCD screen embedded in the back of the headrest provides crisp, lively displays designed to be of particular interest to commuters. The ARK-1388V provides great performance in infotainment applications.

### Conclusion

Passengers love the infotainment systems, especially the GPS readout, which lets them see just where they are, and where they are going. This gives peace of mind, especially for those unfamiliar with the city, quickly allaying any apprehensions about being "taken for a ride."

The taxi company is rolling out their paid advertising program, and is already considering their next generation of in-vehicle infotainment systems, which may include interactive touch screens. This upgrade will depend, of course, on the success of the original system. Stay tuned.

### Suggested Application Implementations



#### ARK-1388V

Ultra Compact, In-Vehicle Solution with Safe Start/Shutdown and Wireless Functions



#### ARK-3202V

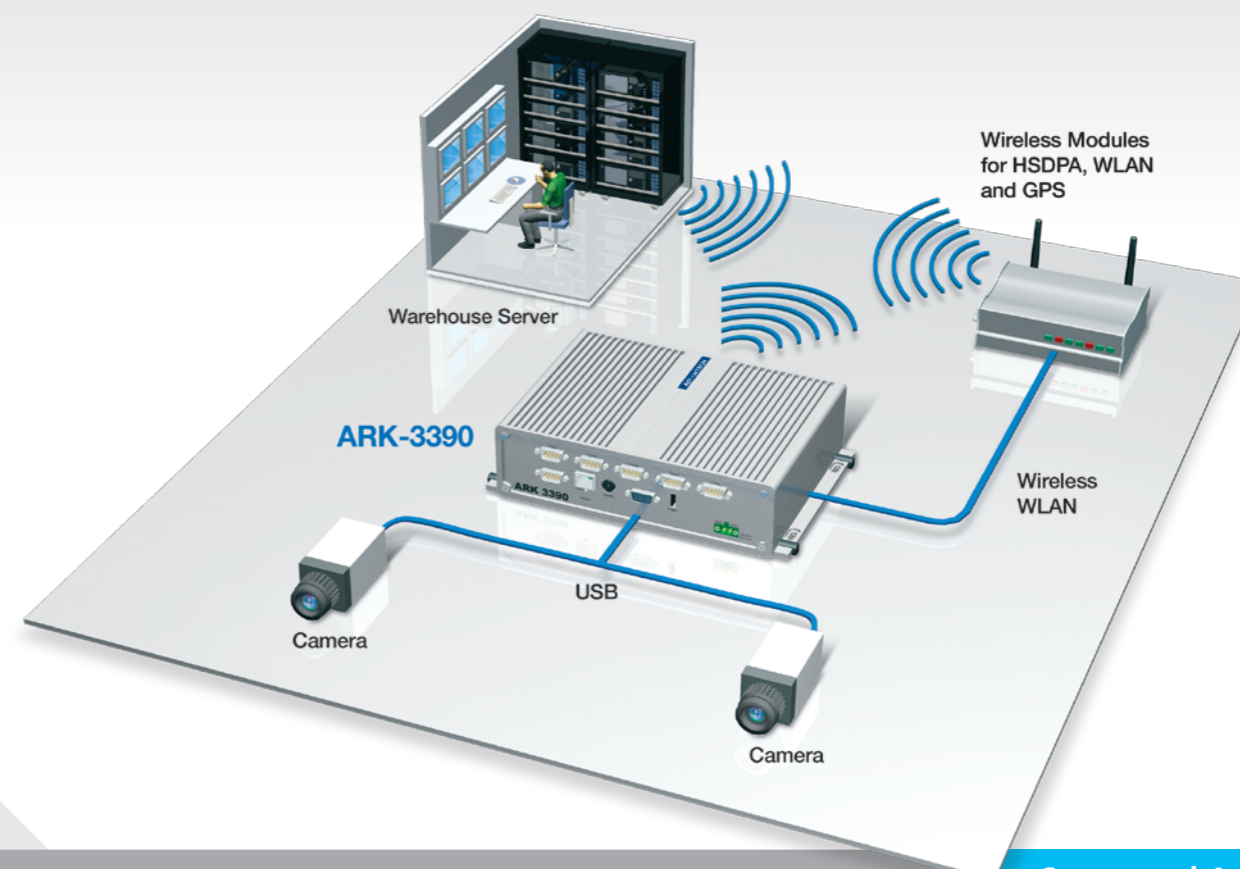
Mobile Intel® Atom™ N270 Fanless Solution with Dual Display and Multiple I/Os

# Super Efficient Forklift-mounted Scanner

## Instant Cargo Volumes



United States



### Project

Commercial freight charges are normally assessed by volume, or at least partly so, and thus it is important to quickly and accurately measure volumes of shipping lots. A customer that serves freight companies wanted to improve their volume-scanning offerings. Their previous-generation scanning solution was already automated to some degree, but required placing each cargo pallet in a designated space on the floor, then retiring for a few seconds while a ceiling-mounted scanner took measurements and calculated volume. The customer wanted to streamline the operation with forklift-mounted scanners that would require no special positioning, no extra placement and pick-up. Pallets could then be scanned directly and automatically, in the regular course of loading or unloading.

### Requirements

- Fast
- Accurate
- Forklift mounted
- Vibration resistant
- Stable and reliable
- No manual measurements
- No extra placement and pick-up
- Excellent wireless communications
- Voltage-tolerant to operate from forklift electrical supply

### System

Advantech worked together with the customer to assemble a system that could do the job. The electrical system in a forklift is variable, and at first the customer had specified a voltage range from 6 to 60 Vdc. This posed a problem when it turned out that accommodating such a wide range would require unexpected expense. When Advantech engineers inquired into the actual range of voltages encountered in daily forklift operations, they turned out to be considerably more stable than the customer had originally feared. As it turned out, the ARK-3390, with its ability to accept voltages from 9 to 34 Vdc, was more than adequate, and offered off-the-shelf savings without requiring expensive modifications.

Another question was the wireless communications system. Originally the customer was leaning toward the use of High Speed Downlink Packet Access (HSDPA), similar to that used in mobile telephone systems. While true that HSDPA can provide excellent coverage over long distances, again the relative high cost was a concern. Ultimately, wireless LAN (WLAN) was chosen as the communications engine, and a WLAN card inserted into the ARK-3390. One or more WLAN access points installed in the upper corners of warehouses allow huge interior spaces to be covered completely.

The rest was easy. A pair of USB cameras were linked to the ARK-3390, and also a handheld optical scanner. When the forklift operator picks up a pallet and scans in the waybill number, dual cameras mounted on the forklift run through a quick, accurate pallet scan. ARK-3390 takes care of control and calculations, and transmits the pallet data via Wi-Fi to the warehouse server.

### Conclusion

The sealed, fanless ARK-3390 again came through with flying colors, offering stable, reliable, vehicle-mounted control and communications, as well as helping to reduce costs on two important fronts. The new system cuts unnecessary motion from the cargo handling workflow, making it easier and more efficient. The customer is delighted to be able to offer this competitive new solution to its clients, and help speed the world's goods on their way.

### Suggested Application Implementations



#### ARK-3390

Intel® Core™ 2 Duo Automation Control System with Two Isolated COM Ports and GPIO



#### ARK-3360

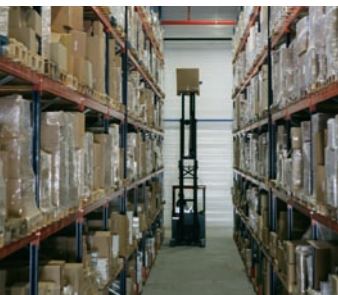
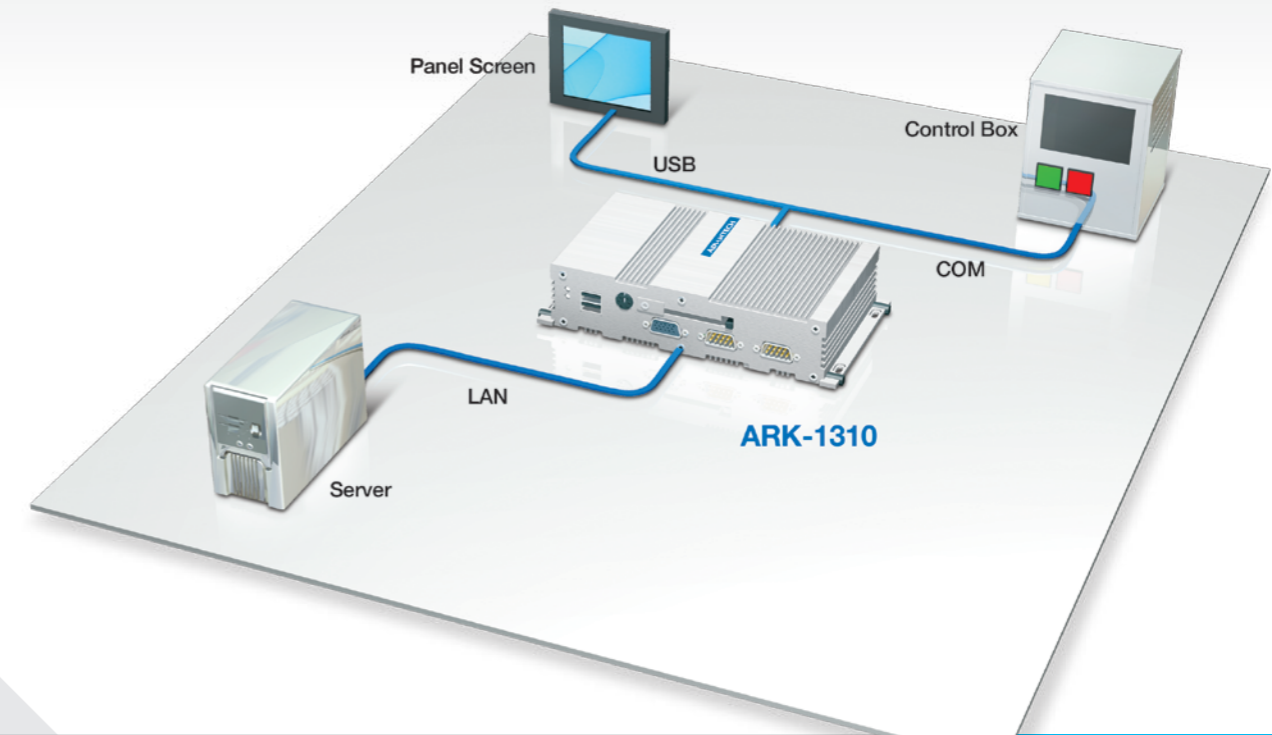
Highly Integrated Multiple I/O, New Generation Intel® Atom™ N450 CPU, Fanless Solution

# High-density Automated Warehousing

## Automatic Storage and Retrieval System



Taiwan



### Project

Taiwan is a small island with many areas of concentrated industrial output. In these areas, warehouse space optimization is naturally important. An automatic warehousing system connected, enabled, and managed by a computer network offers some attractive benefits.

A certain Taiwanese company in Taichung is engaged in designing and engineering automatic warehouse systems. Recently they approached Advantech seeking an industrial computer to include in their solutions. Advantech provided them with the ARK-1310 embedded IPC – an entry level system platform which met all their needs, at an effective price point.

They were working on a high-density, automatic warehouse system with very high storage racks. All storage and retrieval of goods was to be performed by an automatic apparatus so as to minimize human labor requirements. Advantech determined that the ARK-1310, with its rich I/O interfaces, would be a perfect fit, serving to connect to and communicate with all needed devices.

### Requirements

- Cost-effective
- Fanless, embedded IPC
- Compact and rugged
- Reduced power consumption
- 2 x USB 2.0 ports + 2 x LAN ports + 4 x COM ports
- All serial ports to support RS-232/422/485 with auto-flow control

### System

This automatic warehouse solution features high racks with very narrow aisles. A guide rail runs down the center of each aisle and a hoist apparatus glides along it. A carriage rides the hoist as it moves up and down vertically to any rack level to place or retrieve pallets or containers. There is no need for human workers to enter the rack area. Each of the rail units has a control box to command the movement of the hoist, and a touch panel screen which the warehouse workers can tap on to input orders. ARK-1310 stands side by side with the control box and the panel screen, and they are connected via COM ports. The ARK-1310 is also connected to a server computer via LAN. The ARK-1310, powered by an Advantech EVA-X4150 processor, is packed into a small, rugged unit of only 7.44" x 5.14" x 1.61". Reduced power consumption makes it a cool running IPC, suitable for the warehouse environment. When the warehouse workers want to store or retrieve goods, they simply browse through items listed on their screens, and tap on the touch screen or click with a mouse to make selections. All the actual work of moving goods is done by machines, and warehouse workers do not need to go into the rack area.

### Conclusion

The automatic system not only drastically changes the warehouse environment but also streamlines inventory management. It accelerates product flow and guarantees faster deliveries. The computerized data management also helps maintain accurate inventory records and helps reduce inactive inventory items.

Compared with old-style warehouses with drive-in aisles to accommodate manned forklifts, the rail-guided hoist system does not require human entry and reduces aisle space by half, making the warehouse more space-efficient, while at the same time reducing labor and management costs.

### Suggested Application Implementations



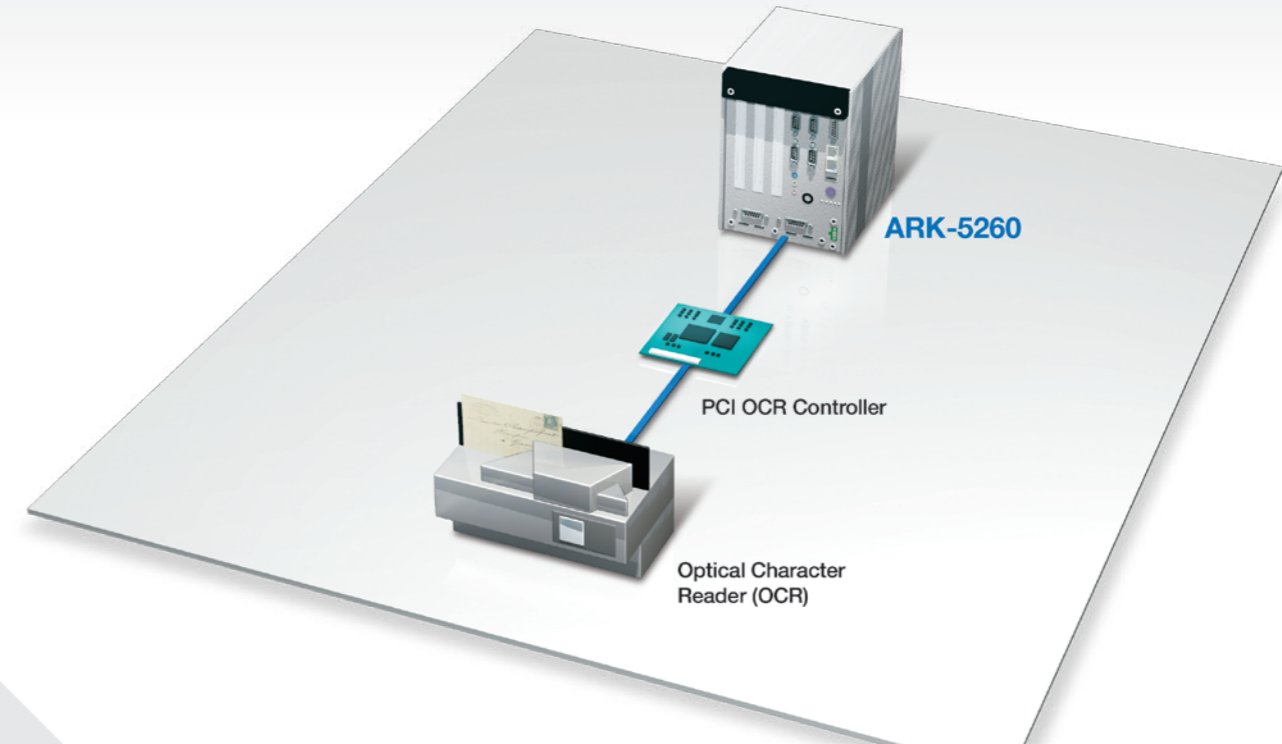
**ARK-1310**  
Cost-effective, Entry-level  
Automation System Solution

# Putting Hustle into a Modern Postal Service

## Automatic Mail Sorting Machine



North America



### Project

A certain North American country is carrying out renovation of its postal service by introducing an automatic mail sorting machine in its nationwide mail process workflow. Under this project, a high speed Optical Character Reader (OCR) will be used to replace human eyes for reading postal codes on letters, and the sorting machine will automatically transfer letters to containers according to predetermined categories. The international tech giant that won the contract to design and manufacture the system needed a powerful industrial PC that it could embed in the sorting machine. Advantech cooperated, offering its fanless, reliable, easy-to-maintain ARK-5260, which is powered by an Intel® Atom™ D510 Dual Core processor.

### Requirements

- An efficient CPU
- Watchdog timer mechanism to ensure stable and continuous operation
- Front-side I/O interfaces to facilitate easy replacement and maintenance
- Fanless, rugged, and reliable

### System

This automatic mail sorting system is composed of letter conveyors, a letter sorting machine, and many stackers and trays. At the core of the sorting machine is an Optical Character Reader (OCR) which is connected to Advantech's PC controller ARK-5260. Letters are fed in via the automatic, high-speed conveyor, scanned by the OCR, which can deal with either printed or hand-written postal code, and fed out to different containers according to destination area and district. Letters with postal codes too garbled for the OCR to decode are forwarded to a separate container, pending human judgment and disposition. The mail sorting machine is so efficient that tens of thousands of letters are processed every hour, with a very high accuracy rate. To achieve such efficiency, the PC-controller must be fast, stable, and reliable. But that is no problem for the ARK-5260, as it is powered by an Intel® Atom™ D510 Dual Core processor, which is twice as fast as a Pentium 1.4 processor. The ARK-5260 has a reset pin on the CPU board, and it is connected to the power switch of the OCR. If the OCR is inactive exceeding a pre-determined time span, the watchdog timer mechanism notifies the system and restarts the machine automatically. This ensures continual operation of the mail process system. The ARK-5260 is very easy to replace or maintain, as all the I/O ports and slots are located on the front panel. The service and maintenance engineers have only to lift a cover on the sorting machine's housing to reach the control PC and make changes or do maintenance.

### Conclusion

The automatic mail sorting system has drastically changed the postal work-floor as well as the entire modern post office. As mail volume multiplies, automatic mail processing gains importance. An efficient machine driven by a powerful IPC that can process huge mail volumes in a short period of time is an ideal combination for getting twice the result with half the effort.

### Suggested Application Implementations



#### ARK-5260

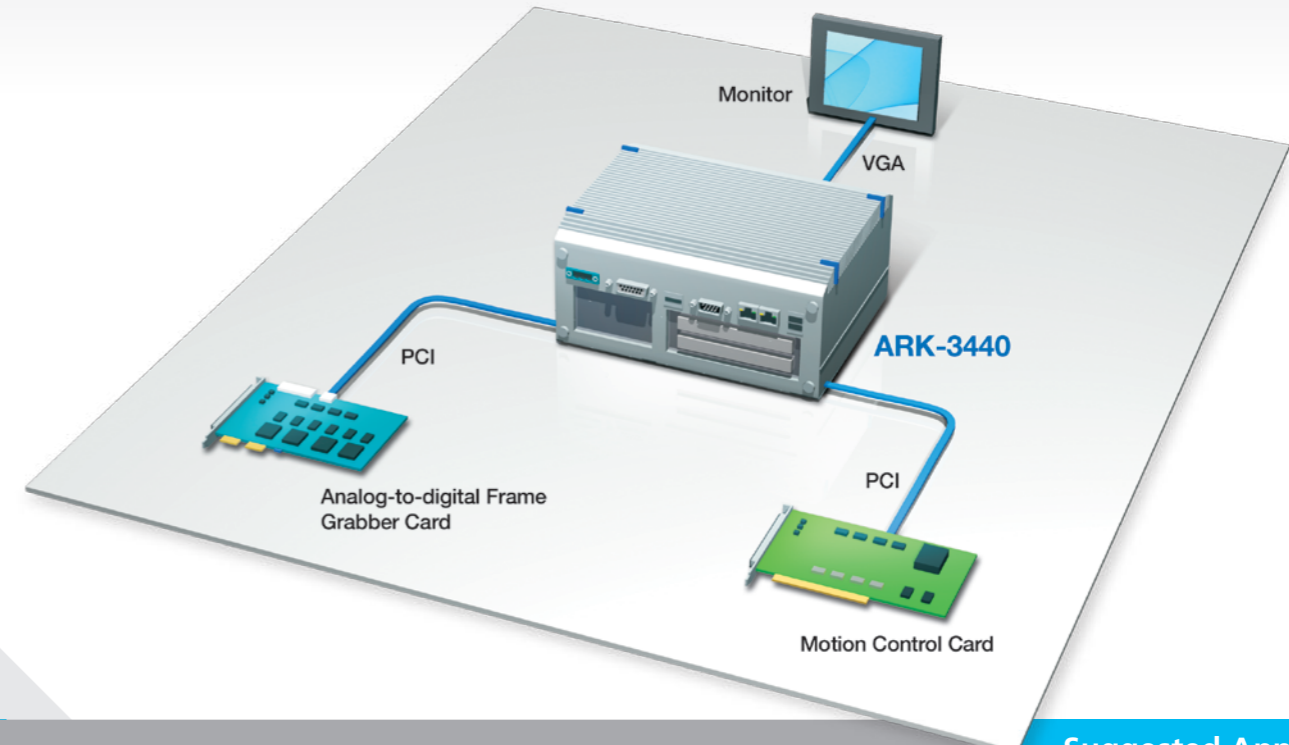
Fanless Embedded Box IPC with Intel® Atom™ D510 processor and PCIe/2 x PCI Expansion slots

# Pushing Semiconductor Machinery Up a Notch

## IPC with a Top Speed CPU



Israel



### Suggested Application Implementations



**ARK-3440**  
Intel® Core™ i7 Embedded IPC with PCIe Expansion and Dual SATA HDDs

### Project

A wafer foundry represents the epitome of modern microfabrication. Be it the process of etching or photolithography, precision and speed are keys for edging out competitors, especially when IC manufacturing is becoming ever finer, moving from 90nm to 45nm and 32nm nodes.

An Israeli semiconductor equipment manufacturer was seeking a fanless industrial computer of the highest computing power to incorporate in its semiconductor machinery. Advantech met their demands by providing ARK-3440, an embedded and fanless IPC driven by an Intel® Core™ i7 610E processor.

### Requirements

- Intel® Core™ i7 610E + QM57, with 2.53 GHz of computing speed
- 2 PCI/PCI Express versatile expansion slots for plug-in cards
- Fanless device to avoid contaminants in fabrication cleanroom environment
- 3 serial ports with support for RS-485 autoflow control
- Reliable, rugged, and enduring, for round-the-clock operation
- All-in-one solution ready for applications, without the need of compatibility testing

### System

This company had previously assembled computing systems for their machinery by themselves, using a server-class motherboard matched up with various components such as CPUs, chassis, and peripherals, purchased from different sources. This produced hassles as they had to go through a lengthy process of compatibility tests for all the components. Once any of the components was broken or out of product life cycle, they had to seek a replacement and the whole system had to be retrofitted, or worse, abandoned if the replacement didn't work. Advantech saved them from all these troubles by providing an all-in-one solution performed by the fanless and embedded box IPC, ARK-3440, which integrates all components as an application-ready product.

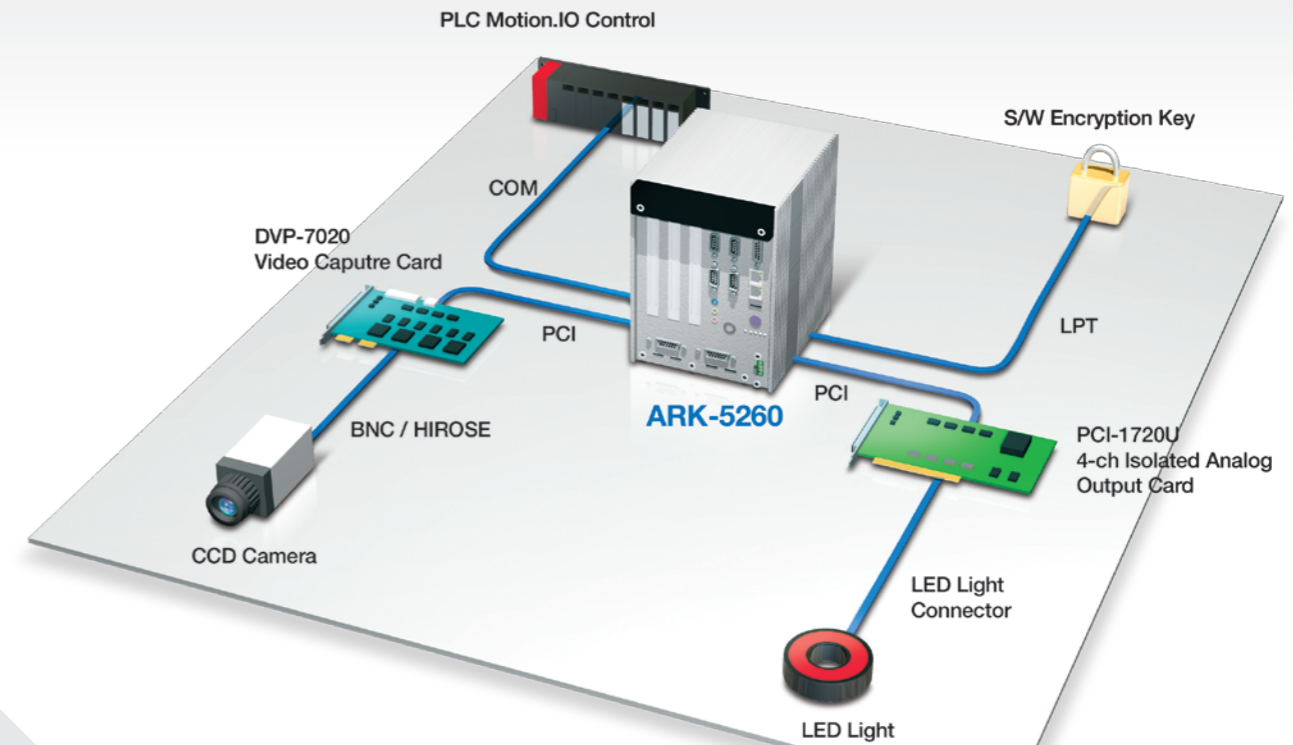
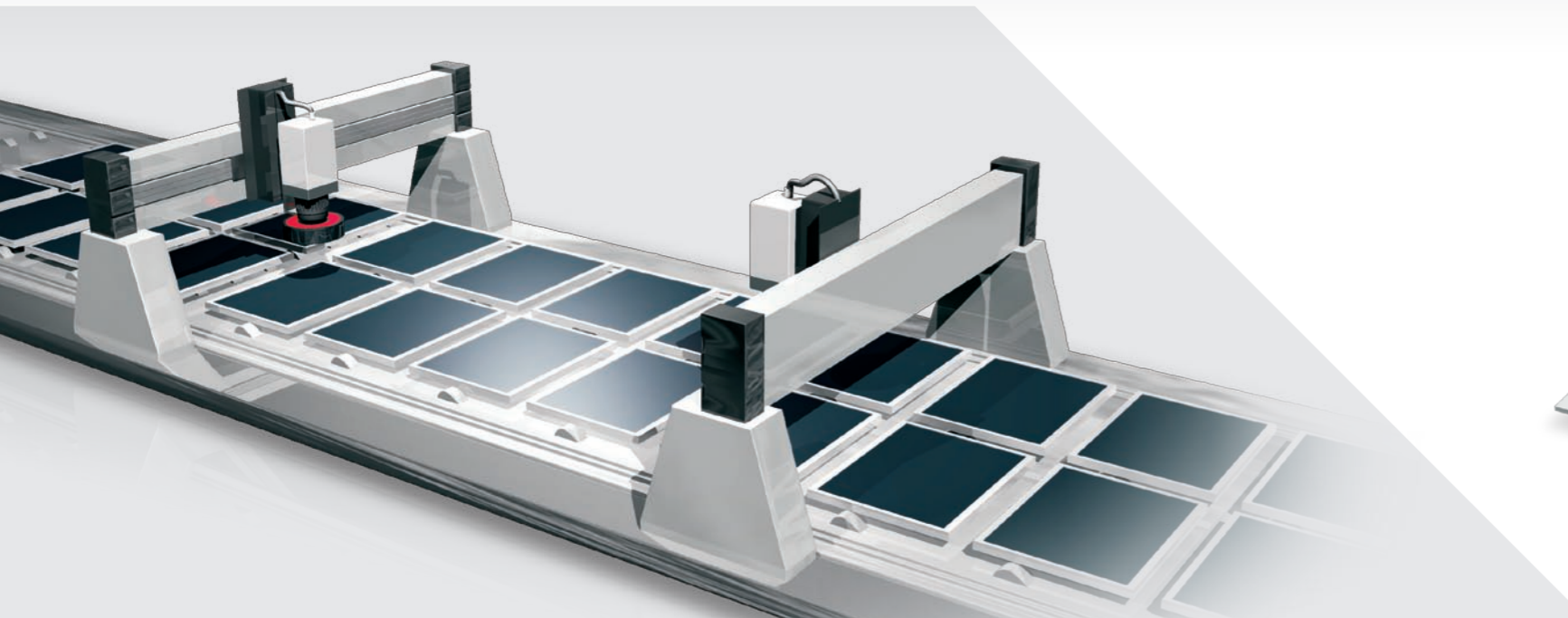
This ARK-3440 is currently in the front line as it is equipped with the fastest processor for embedded IPCs today; the Intel® Core™ i7 610E SV processor runs at 2.53 GHz. In this application one of the two PCI/PCI Express expansion slots is fitted with a motion control card, and the other with an analog-to-digital frame grabber card, providing the connected semiconductor machine with ultra-precision auto optical inspection capabilities.

### Conclusion

With ARK-3440 as its integrated and embedded computing platform, this Israeli company is exempt from troubles in remodeling and testing computers; they can now focus their attention on their core business. ARK-3440 guarantees 3 to 5 years of product life cycle, and during this period, Advantech's global logistic support and powerful RMA service eliminates any maintenance worries. ARK-3440's compact and fanless design is ideal for the cleanroom environment in wafer fabrications, where absolute freedom of contaminants is required. The ARK-3440's intrinsic ruggedness and durability make it a suitable workhorse for semiconductor manufacturing, where machines are typically required to work 24 hours a day, 7 days a week. More importantly, the ARK-3440's super fast CPU gives their machines a significant edge in high volume production, kicking IC manufacturing up another notch.

# LCD Production Quality Control

## AOI Alignment System



Taiwan

### Project

Due to the continuous development and popularity of consumer electronics, such as LCD TVs, LCD monitors and notebook PCs, global demand for TFT-LCD (thin film transistor liquid crystal display panels) keeps increasing. A major TFT-LCD manufacturer in Taiwan with 7.5-generation (1950 x 2250 mm) LCD production needed to have a full range of new inspection systems.

Automated defect inspection is absolutely necessary to ensure the quality of large, mass-produced LCD panels. The manufacturer's goal is to sell 100% "no failure" screens, therefore, a fast and highly accurate visual inspection of each finished assembly is essential. Before and after each step in the complete manufacturing process, an alignment is necessary to ensure the glass is positioned accurately. Advantech's ARK-5260 fanless embedded IPC, with two add-on PCI cards, was chosen as the key component for an Automated Optical Inspection (AOI) alignment system.

### Requirements

- Excellent computing power with Intel® Atom™ D510 1.66GHz CPU to handle image data
- All-in-one set with both image grabbing and LED lighting control capability
- Four independent image grab channels with BNC/HIROSE connectors
- Four independent channels for 5 - 50V LED light with software control
- Embedded software supports most of the popular image process libraries, such as Matrox Imaging Library (MIL), eVision, HALCON
- Windows XP Embedded ready with MUI and EWF functions
- Extremely compact, sealed construction with fanless operation

### System

The glass defect inspection equipment is for 7.5G glass substrates, capable of inspecting LCD glass plates up to 1950 x 2250 mm. The equipment performs a variety of critical tasks: image grabbing and processing, defect location, statistical computation, as well as data analysis and review. Before and after the defect inspection processing, the alignment procedure is conducted to ensure the TFT-LCD to be inspected is precisely positioned on the system. This procedure is fundamental and critical, as incorrect position of the glass on the system may lead to serious inspection errors. The AOI alignment systems are implemented at many stages throughout the manufacturing process.

Advantech's ARK-5260 operates with two added PCI cards. The first is a 4-channel PCI-bus Image Grabber Card with BNC or Hirose interface, which is connected to a CCD camera. The CCD camera captures the image of the cross mark on the glass, and calculates the variance from the absolute X and Y coordinates. According to the variance, it further moves the glass to an ideal position through PLC. The second PCI card is a 4-channel isolated analog output card. With this card, this system features 4-channel LED light software control. The system connects to an LED light through a standard LED connector interface. It could enable 5 - 50V wide-range LED light which illuminates the image to amplify features that need to be inspected. Also, the ARK-5260 connects to an encryption key via printer port. This ensures the security of the API. The printer port further provides easy access for a wide range of image process libraries, as most image process libraries in the world are available through printer port dongles.

### Conclusion

Advantech's ARK-5260 high performance rate was an exact match for the Taiwan LCD maker's requirements. Featuring two PCI slots for application expansion and system integration, the ARK-5260 also comes with five USB 2.0 and four standard serial port interfaces. It supports up to 2 GB of DDR SDRAM. Offering great flexibility in space critical environments, the ARK-5260 is ideal for embedded system applications required by machine automation, industrial plants, and cabinet integration. Its rubberized anti-vibration card-holder for system cards, combined with an anti-vibration HDD-bay, ensure maximum reliability; plus, the ARK's simple, modularized, user-friendly design is ready for quick installation, as well as easy expansion and maintenance.

### Suggested Application Implementations



#### ARK-5260

Fanless Embedded Box IPC with Intel® Atom™ D510 processor and PCIe/ 2 x PCI Expansion slots



#### ARK-3420

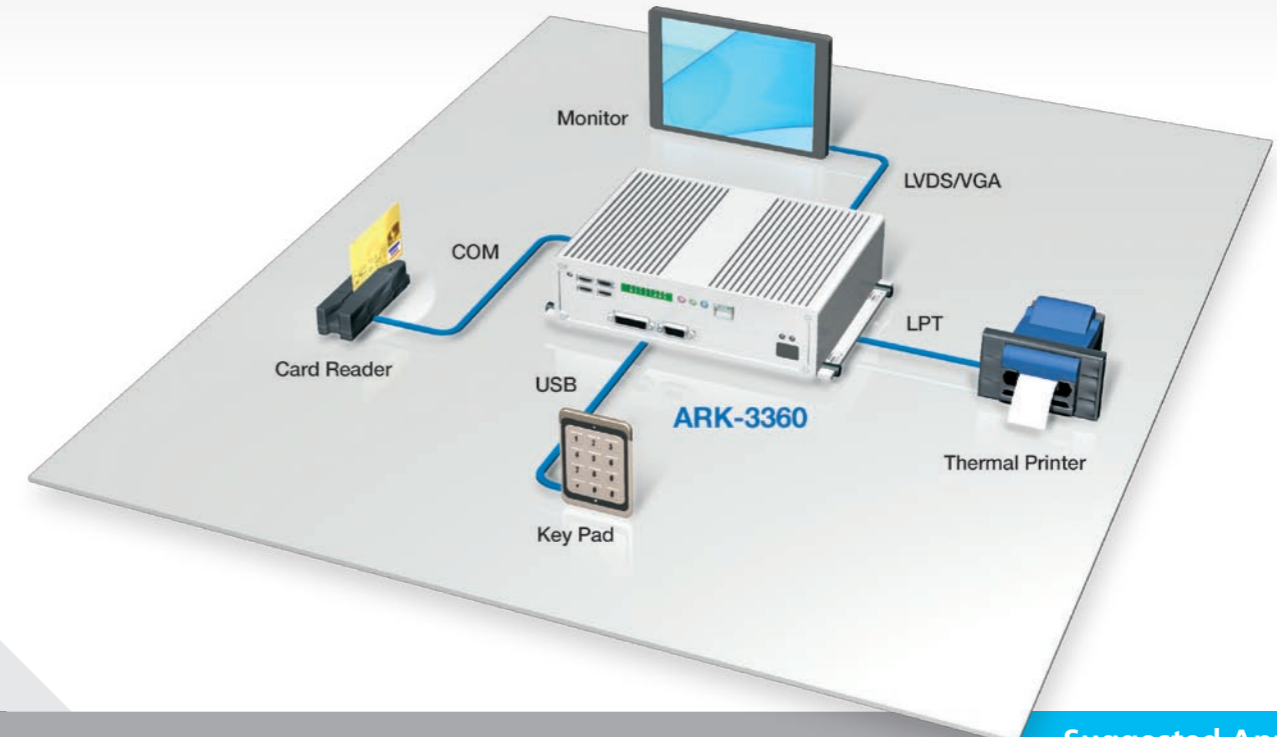
High Performance Solution with PCIe Expansion and Dual SATA HDDs for Image Processing and Surveillance Applications

# Saving Dollars with Self Service Gasoline

## Pay-at-the-Pump Facilities



Taiwan



### Project

Self service gasoline pumps are gaining popularity in certain countries where gasoline prices are on the rise. Many drivers opt to save money by refueling their cars themselves, since self-service pumps, void of attendants, offer discounted prices. Our customer is one of the biggest gas station chains in Taiwan. Some time ago, they purchased our IPCs for use in point of sale systems (POS). Later, they became interested in exploring the benefits of applying IPCs to self-service pumps.

The self-service pump is a machine that combines a fuel dispenser with a payment mechanism. At the core of this particular application is our fanless embedded IPC ARK-3360, which features low power consumption and rich I/O, all at an effective price. The fanless design of this IPC is especially suited for use in gas stations, as the IPC does not draw in oil vapor, which can result in deterioration of the PCB.

### Requirements

- Fanless and rugged
- Rich I/O with 3 parallel ports + 6 COM ports + 1 VGA port
- Wide Power DC input, 12V to 24V
- Wide temperature range of -20°C to 60°C
- 1.66 GHz Intel® Atom™ processor D510

### System

The self service pump is a “pay at the pump” machine that combines the functions of a gas dispenser and a kiosk. Like attendant-operated pumps, the self service pumps are usually placed on concrete plinths in the forecourt of a filling station. A driver pulls up to the self-service pump, swipes his or her credit card to initiate validation, picks up the nozzle for the octane rating wanted, and dispenses the gasoline. Once refueling is finished, they press the “ENTER” button on the machine panel and get a printed receipt and a completed credit card invoice—all from the same machine. (The machine is often equipped with several nozzles of different colors, each indicating a different octane rating.)

Controlling the kiosk in this case is the Advantech ARK-3360, which provides 3 LPT ports: one connects to a thermal printer for printing out credit card invoices, one to a machine that prints out receipts, and one to a hardware key. It also has 6 COM ports for connecting with other peripherals, such as the credit card reader and the user touch panel. A VGA port is also provided for displaying the details of dealings. Though the ARK-3360 provides comprehensive I/O which allows for further expansion of applications, its price is rather cost-effective. It is also power-efficient, with only 40% the power consumption of the previous generation product.

### Conclusion

Though many consumers prefer the “full service” provided by gas station attendants, there is a growing portion of consumers who opt for self-service gas at a discounted price. In Taiwan, many gas filling stations now offer consumers both service options. From the stance of the gas-station owners, self-service pumps help reduce labor costs. This is appealing to them, especially in countries where wage levels are higher, or when a night-time labor force is not so available.

### Suggested Application Implementations



#### ARK-3360

Fanless, Compact Embedded IPC with 1.66 GHz Intel® Atom™ Processor N450/D510

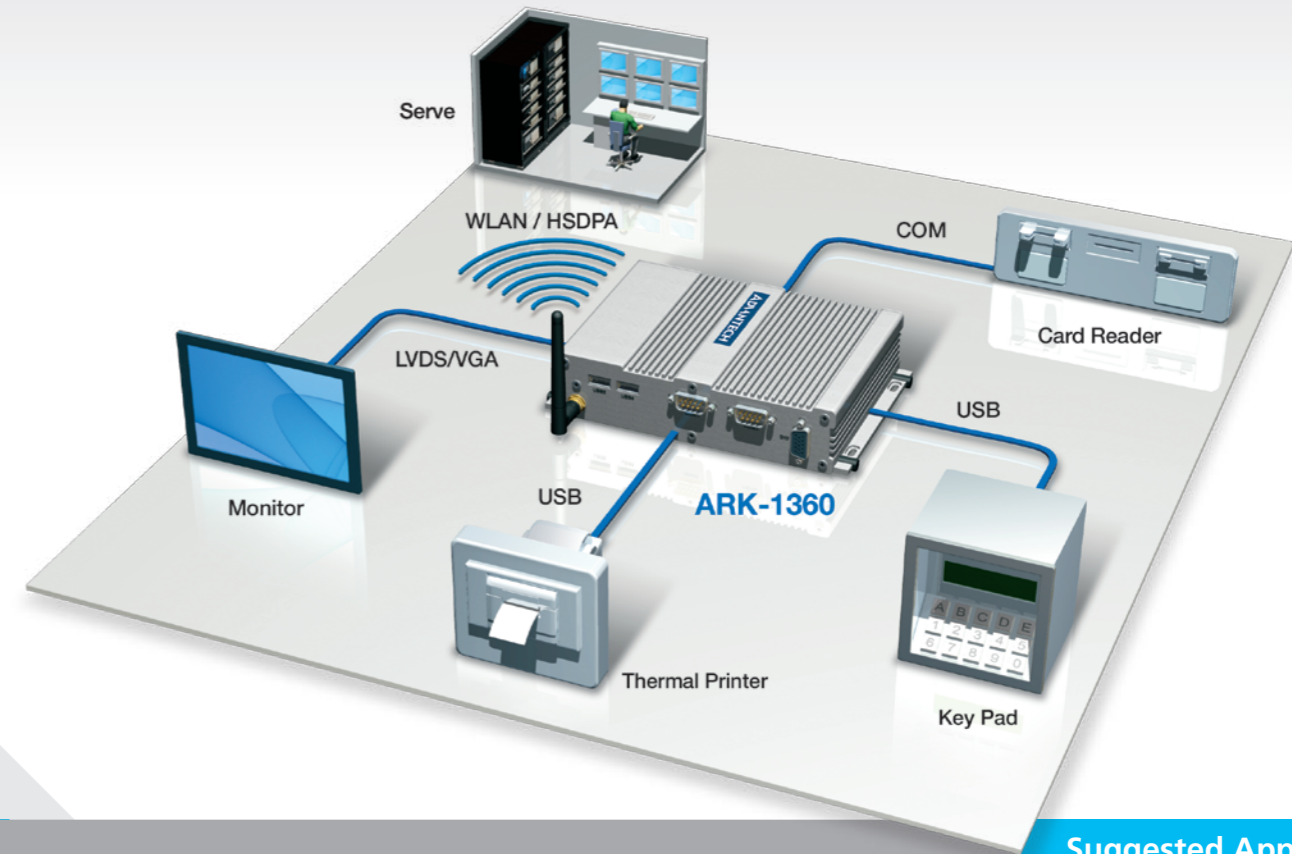


# Automatic Vending Machines

Have It Your Way; Any Time, Any Place



Japan



## Suggested Application Implementations



**ARK-1360**  
Cost Effective Intel® Atom™ Solution with miniPCIe Expansion Slot

### Project

In some big cities such as Tokyo, Japan, rental rates for any kind of commercial real estate are extremely high, and this has given a boost to automatic vending machines. These exquisite machines, performing like tiny retail shops but without a shop keeper or worker on site, sell a great variety of goods, from drinks to live lobsters, from tangible items to intangible, and probably with many future applications beyond our imagination.

A Japanese vending machine manufacturer came seeking a PC-based controller that would fit the ultra compact design of their machines yet still offer an open architecture and rich I/O interfaces for applications. Advantech met their needs by providing its fanless, embedded ARK-1360 IPC, which features ultra compact size, low power consumption, and comprehensive I/O functions at an effective price point. The ARK-1360 also supports graphic performance that allows the machine to display animated advertisements for the products inside. It also supports wireless communications that enable payments by credit card or e-cash card, or through a mobile phone.

### Requirements

- Ultra compact size
- Ultra power-efficient
- One mini-PCIe socket expansion for wireless applications
- I/O interfaces to include 1 x GbE + 2 x COM ports + 4 x USB
- Support for video display and audio speaker

### System

The ARK-1360 serving as an embedded controller for this automatic vending machine is driven by an Intel® Atom™ processor that features ultra lower power consumption. The ARK-1360 requires only 20-30% of the power consumed by controllers based on Celeron® level processors. The ARK-1360 connects to the machine's delivery system through COM ports, regulating the dispensing of goods or services, calculating and recording sales, and transmitting the data to a control server via wireless communications; this makes it easy for suppliers to manage accounting and arrange for restocking. The ARK-1360 comes with a mini-PCIe socket for wireless communications based on WLAN or HSDPA (optional), and USB ports for IC card readers, thus enabling payment by credit card, e-cash card, or via mobile phone account. Multi-media functions were also among the Japanese vendor's demands. The ARK-1360 supports graphic and audio performance to enable the display of advertisements via digital signage or a flat panel screen. It also supports a speech system that allows the machine to talk courteously to customers.

All these applications are made possible with ARK-1360, a thermally constrained and fanless embedded controller as small as a paperback book in length and width, and only 44 mm in height; this saves room in tight vending machine designs, allowing more space for product storage. It is space-efficient, power-efficient, and easy to maintain.

### Conclusion

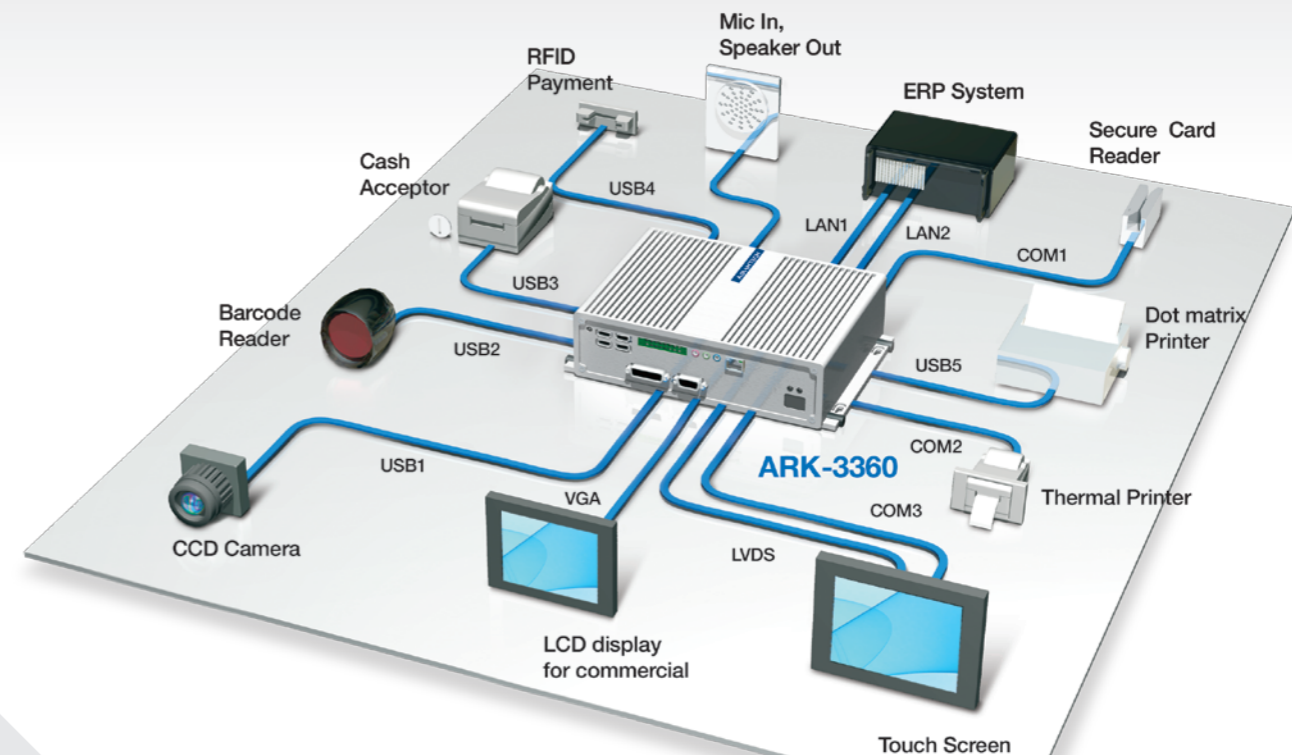
Vending machines are like widely distributed chain stores, offering consumers both convenience and fun. The ARK-1360 not only helps with the mechanics of delivery, but also promotes sales by enabling the display of advertisements on the front panel of the vending machines. It also provides wireless communication that allows vendors to track sales in real time and replenish goods just in time, optimizing their business opportunities.

# Self-Service Supermarket

## Retail Kiosk



France



## Suggested Application Implementations

### Project Description

Rising grocery prices mean large quantity wholesale purchasing becomes more appealing. As wholesale selections increase, so do the sizes and weights of individual items. Smart sellers know an older customer base will need more assistance with handling their purchases now and in the future.

Advantech's ARK-3360 fanless, embedded in outdoor kiosks are helping a major supermarket chain in France provide better services to its customers. Many kiosks are placed in the parking lot. When customers arrive, they can first use the kiosk to order large and heavy products, such as large bottles of water or multi-packs of dry goods. After they complete their other purchases inside the supermarket, the heavy items they ordered at the kiosk will be ready to be loaded by employees directly into the car.

### Requirements

- Indoor/outdoor usability with a wide temperature range of operation (-20~60°C)
- Excellent reliability and stability
- Sealed, fanless construction to protect from dust
- Extended operation with adequate processing power, low consumption, and efficient thermal cooling
- Sufficient USB and COM ports to connect to various devices
- A compact, fanless, temperature compliant system easily installed in small spaces
- Sufficient processing ability for the multiple purposes
- PC-based open architecture, easy to develop and maintain, and able to integrate many devices

### System

Advantech's ARK-3360 is the central controller for each kiosk. USB1 through USB5 connect to a cash validator, a barcode reader (for membership cards), an RFID reader (for digital purses/smart cards), a CCD camera, and a dot matrix printer (to print a shopping list for pick up). COM1 connects to a credit/debit card reader; COM2 to a thermal printer (to print credit card receipt); COM3 connects to a touch screen, with associated LVDS connection for display. VGA connects to the second display to broadcast commercials or product promotion information.

The kiosk is also equipped with a microphone and speaker in case a customer encounters a problem and needs to speak to customer services. Both microphone and speakers are connected to the ARK-3383 through AC97 Audio, mic-in, speaker-out, while the ARK-3383 itself connects to the superstore's inventory and management system through LAN.

### Conclusion

The ARK-3360 fanless compact embedded IPC combines five USB 2.0 ports, five serial ports, dual Ethernet, as well as other industrial features. It is housed in a rugged, compact, aluminum chassis ideal for intensive control and communication based applications -- precisely what the French supermarket chain requires. All electronics are conveniently protected in a compact housing with no vent holes, ideal for kiosks in which space and environmental demands are critical. The ARK-3360 features a choice of either a built-in Intel® low voltage Core Dual processor or Core 2 Duo processor and has independent dual display capability with both VGA and LVDS interfaces. Advantech's ARK-3360 also comes with Brightness Control API (part of Advantech's SUSI - Secure & Unified Smart Interface) that allows a developer to interface with Windows® XP and Windows® CE PCs to easily control brightness for good readability even in sunlight.



#### ARK-3360

Fanless, Compact Embedded IPC with 1.66 GHz Intel® Atom™ Processor N450/D510



#### ARK-3390

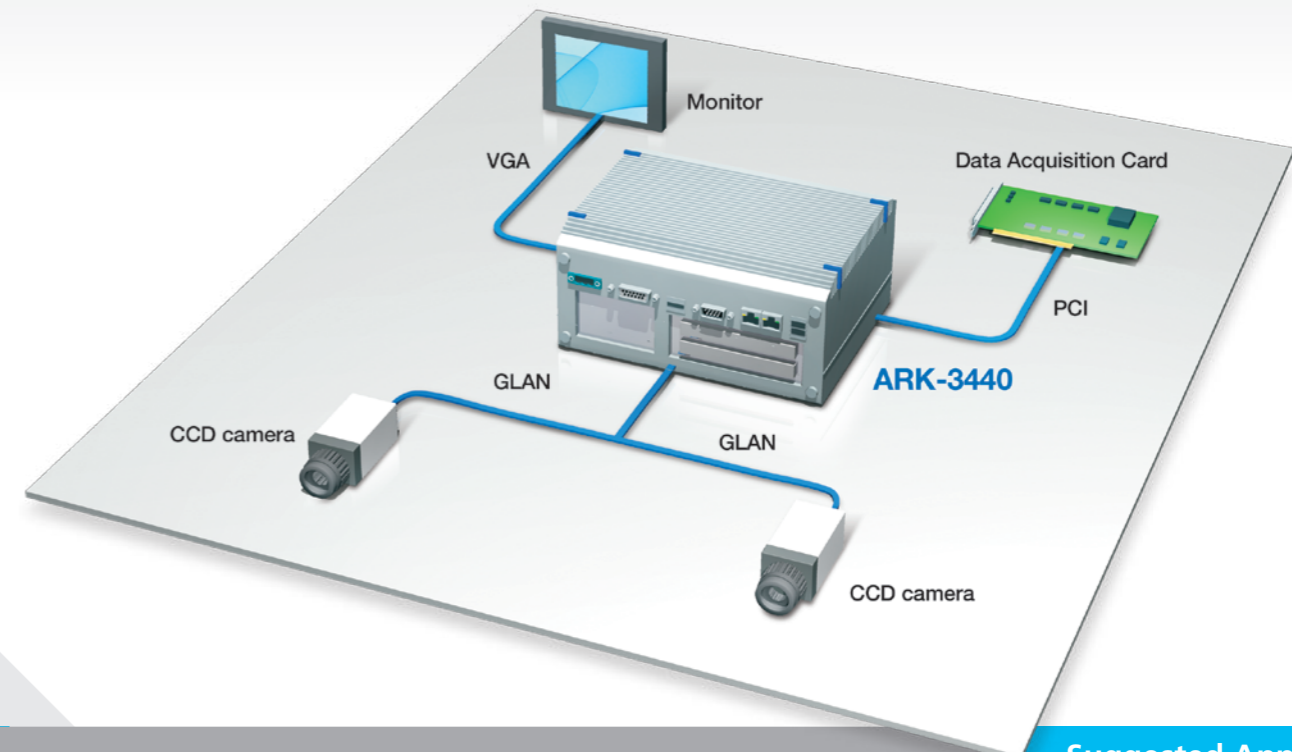
Intel® Core™ 2 Duo Automation Control System with Two Isolated COM Ports and GPIO

# New Efficiency for Excimer Laser Eye Surgery

## ARK-3440 in Refractive Surgery Machines



Taiwan / Korea



### Project

In recent years, excimer laser refractive surgery has grown to be recognized as one of the most reliable techniques for eye surgery in the treatment of near-sightedness, astigmatism, and far-sightedness. One of our customers is a Taiwanese developer of high-precision, refractive laser surgery systems, with their products sold mainly in Taiwan and Korea. Excimer laser surgery machines must deal with huge amounts of data very quickly. Often, a laser surgery machine requires two industrial computers, with each connected to a separate CCD camera that is trained on the eye as it is being treated. Once the power is turned on, CPU usage rates rally up to as high as 73 to 77 percent.

However, with Advantech's latest, fanless, embedded IPC ARK-3440, powered by an Intel® Core™ i7 processor—the world's fastest IPC processor—our customer has been able to develop an excimer laser surgery system that uses just one embedded IPC unit, saving space, cost, and allowing for a more compact form factor.

### Requirements

- Fanless and compact
- Intel® Core™ i7-610E at 2.53 GHz+ QM57
- Windows® XP Embedded
- 2 PCI expansion slots + 6 USB ports + 2 GbE ports
- GbE Ethernet cables carrying signals from two CCD cameras
- Supports VGA monitor

### System

ARK-3440 is powered by Intel® Core™ i7 processor, it operates at an impressive 2.53 GHz. At the heart of an excimer laser refractive surgery system, the single ARK-3440, though connected to two CCD cameras, still exhibits a CPU usage rate of only 23%; this gives the whole system great advantages in speed, precision, and margin of safety.

The system displays and records images of the eye under surgery at a blazing 543 frames per second. An Advantech PCI-1711 multi-function data acquisition card and an Advantech USB-4716 multi-function USB I/O module deal with the massive task of data acquisition and processing. GbE Ethernet cables connect to the CCD cameras, allowing for fast data transmission.

Although the ARK-3440 is much more powerful than its predecessor products, it comes in a rather compact form factor, occupying only 22cm x 20cm x 10.2 cm. This compares very favorably with traditional IPCs that are usually 19-inch rack mounted. The fanless and embedded design of the ARK-3440 also gives it an advantage over traditional fan-based IPCs, with its more stable and reliable performance. A fan-based computer is more likely to overheat and shut down.

### Conclusion

Though the price tag for a single ARK-3440 unit is significant, it is still lower than the combined price of the two traditional IPCs previously used by our customer. So with the ARK-3440, our customer is able to design surgery machines based on greater computing power at a reduced cost. This gives our customer an edge against market competition.

### Suggested Application Implementations

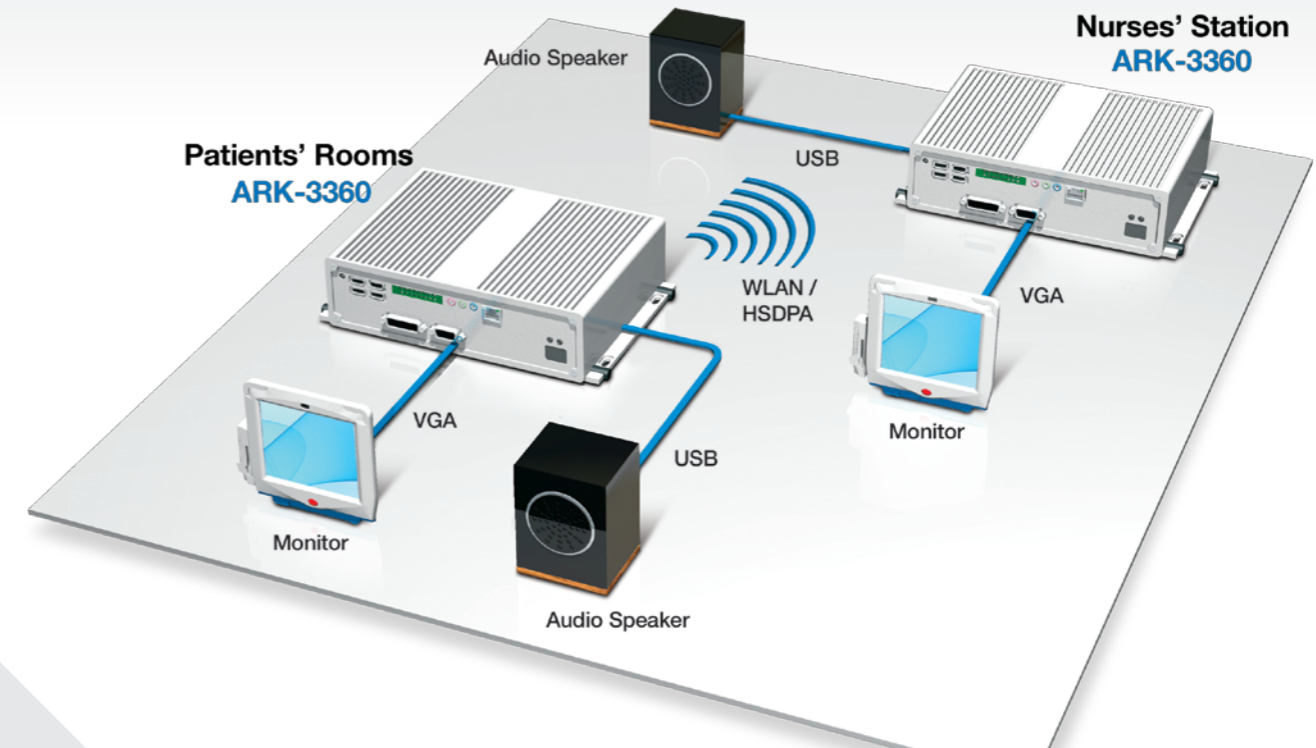


#### ARK-3440

Intel® Core™ i7 Embedded IPC with PCIe Expansion and Dual SATA HDDs

# Nurse Call Systems

## Serving Patients' Needs



USA



### Project

In hospitals and other healthcare facilities, life sometimes hangs by a hair, or by a second. A quick, effective communications system is of vital importance in serving patients' needs. Our customer is a provider of communications solutions for the healthcare industry, with a full line of products designed to improve the quality of patient care in medical facilities, including both long-term and acute-care facilities.

A fast, powerful industrial-grade PC that serves as a control platform is indispensable in developing such systems. Advantech has been providing the communications solutions company with its ARK-3360 fanless, embedded IPC for that purpose. The ARK-3360 is powered by a dual core Intel® Atom™ processor that runs at 1.66 GHz. Its fanless design is especially suitable for use in the hospital environment, as it doesn't disturb indoor air, and avoids stirring up dust, contaminants, or pathogens.

### Requirements

- Fanless and compact
- Low power consumption
- Windows® XP Embedded
- VGA display support
- Easy installation with optional wall mounting or DIN-rail mounting

### System

We provide the ARK-3360 to our customer with the Windows® XP Embedded operation system; they utilize it directly in developing software solutions. A typical application of our customer's hospital nurse call systems employs an IPC controller located near the nurses' station or duty counter; the controller is connected to a monitor screen at the nurses' rooms. When a patient presses a bedside or bathroom emergency button, the nurses' station not only hears the call, but also sees the room number and the bed that originated the call on the nurses' monitor screen. In some applications, the nurses' station or duty counter can even push an answer call button which automatically answers the highest priority call and assigns the patient's request to the correct staff member in one step. The ARK-3360 also provides an amplifier interface, so that mic and speaker devices can be set up in patient rooms and the nurses' station, allowing for two-way audio communications. And attention has been paid to the ARK-3360's external design as well. Its versatile mounting options provide hardware flexibility for our customer's system designs.

### Conclusion

The increasing average age in many countries means a surge in demand for long-term medical care, and for nursing facilities for seniors. Many of the elderly represent potential fall risks, or are patients with special needs. Addressing these needs is vital for medical care quality. These nurse call systems can be expanded by supporting advanced interfaces with radio paging, admissions computers, infrared staff tracking, wireless phones, telemetry, and more, so that they not only answer those in need, but also help locate caregivers and hospital staff members who can respond to their needs. Hospitals and clinics need these call systems, and so, too do many nursing homes that take care of the elderly. Instant access to the current well-being of the elderly or the sick is very important in providing top quality care for them. A powerful, rugged, compact embedded IPC with versatile applications makes generous contributions in these regards.

### Suggested Application Implementations



#### ARK-3360

Fanless, Compact Embedded IPC with 1.66 GHz Intel® Atom™ processor N450/D510



#### ARK-3202F

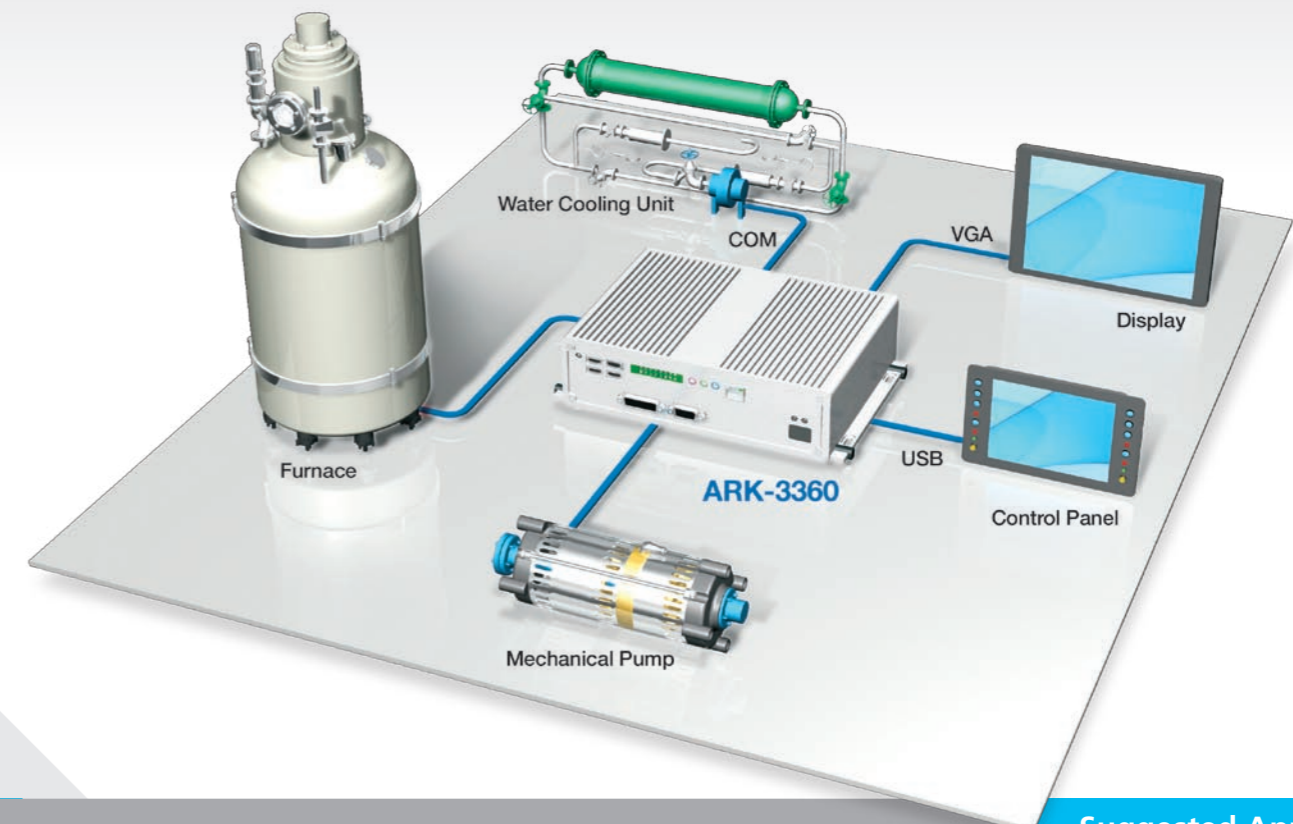
Mobile Intel® Atom™ N270 Fanless Solution with Dual Display and Multiple I/Os

# Solar Energy Equipment

## Making Silicon Ingots



China



### Suggested Application Implementations



### Project

Demand for alternative energy sources is growing amid concerns over global warming, especially in China, where the government has vowed to invest heavily in renewable energies, which has resulted in a surging demand for solar energy equipment. Our customer is one of the biggest suppliers of solar energy equipment in China, whose products include single crystal pullers, poly-crystal growers, cutting machines and solar cell makers.

Advantech has been cooperating with this company by providing rugged, compact, low-power, fanless, embedded ARK-3360 IPCs, which the customer mainly uses as control units in the single crystal growing apparatuses which compose a large portion of their product line. The monocrystalline silicon ingots these machines produce are ultimately sliced into wafers and made into high efficiency solar cells.

### Requirements

- Fanless
- Low power
- Rugged and reliable
- Rich RS-485/232 I/O interfaces with auto flow control
- Compact
- Cost-effective
- Support for VGA and LVDS dual display

### System

The single crystal growers manufactured by our customer use the Czochralski, or CZ, method of pulling single-crystal silicon cylinders. A load of 95kg, 120kg or 135 kg of granular silicon powder (the material loads vary with different machine types) is placed into a crucible and heated until molten. When the temperature is just right, a seed crystal is dipped into the molten mass and withdrawn slowly, spinning all the while. Lift rate is on the order 10 mm per hour; and spin, 15 rpm. The mass of silicon crystallizes around the seed and may be pulled into a large, single-crystal cylinder, a maximum of 200 cm in length and 6 or 8 inches in diameter. The operating temperature in the furnace can be as high as 1600 degrees Celsius. Temperature, spin, and pull rate are all precisely controlled (by complex, secret formulas) in order to produce a homogenous crystal of the desired diameter. Needless to say, this is a process where dependability and accuracy are crucial. Each single crystal growth apparatus has two ARK-3360 units inside, and they are connected to various components, including the furnace, the mechanical pump, the water cooling unit, the control panel, and the display.

### Conclusion

The development of clean and renewable energy sources helps protect our planet and preserve it for coming generations. The practical application of green energies depends not only on the availability of the technology, but also on whether the price of that technology is affordable. While the solar industry shares similar wafer production processes with those of the semiconductor industry, the latter often has more stringent requirements for cleanliness and quality control. But for the solar industry, the goal is to generate maximum quantities in the shortest amount of time to realize cost-effective mass production. The ARK-3360 is able to edge out its competitors in this field with its compact size, reliable operation, power efficiency, and attractive price.



#### ARK-3360

Fanless, Compact Embedded IPC with 1.66 GHz Intel® Atom™ processor N450/D510



#### ARK-3202

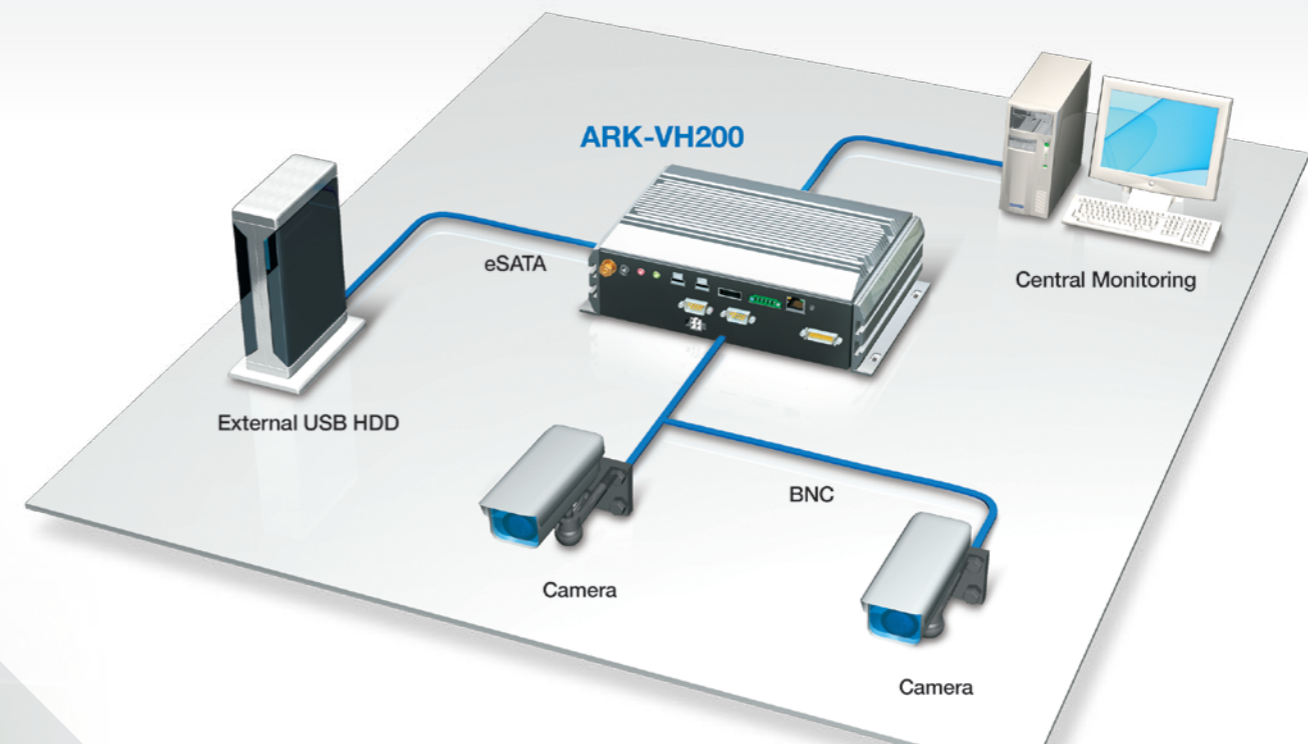
Mobile Intel® Atom™ N270 Fanless Solution with Dual Display and Multiple I/Os

# City Security and Traffic Management

## Road/Traffic Surveillance System



Africa



### Project

A capital city in Africa is experiencing growth and with it, increasing vehicle traffic. To help manage the burgeoning flow of vehicles, a network of local video surveillance systems covers more than 350 intersections. This network, in conjunction with Advantech's ARK-VH200 embedded IPC computer, simultaneously manages over 1,000 high quality real-time video streams, which will be viewed by authorities monitoring the key intersections of the city. Recording and video management are fully supported, as well as an effective data traffic management system that prioritizes data flow and prevents network overbooking. In addition to the traffic control system, urban surveillance, and the all-important public safety, the system can also provide video streaming to the Internet. Ultimately, the transportation authority of the capital city plans to build a nationwide, H.264 real time video network infrastructure.

### Requirements

- H.264 hardware compression and decompression
- Simultaneous 4 channel preview, encoding
- Anti-vibration to ensure maximum reliability
- Fanless and fully sealed mechanical design
- Cooled by thermal fins, heat pipes, and a heat diffuser
- Easy integration, easy maintenance, and few parts
- Rugged and easily mounted

### System

Integrating an H.264 encoder, the ARK-VH200 captures image data from the camera, compresses the image, and sends the data to the server. The capital city's transportation authority's networked video and distributed recording system provides: encoding (H.264) and digital recording for video streaming; management and control of video streams and serial data across the network (30fps NTSC and 25fps PAL on each channel); integration with the Ethernet backbone for multicasting and quality of service; decoding of video streams and still pictures for viewing via the internet gateway; and system control via remote real-time monitoring for diagnostics and maintenance. Cameras are connected by BNC cables, the eSATA port connects to the HDD for plentiful image data storage space, and the LAN connects to the server -- all work together to make travel in the capital city safe and efficient, no matter what your means of transportation.

### Conclusion

ARK-VH200 features an embedded H.264 H/W compression video encoder, which provides the best video frames and supports dual streaming. The lockable USB connector ensures that USB devices are well secured, even in harsh, high-vibration environments. The four BNC ports are easily connected and integrated by operators. An additional port offers PoE (Power over Ethernet), and supports an IP camera for real time IP surveillance. With SDK service that supports Windows® XP and Linux with VB, VC++, and .NET, the ARK-VH200 more than satisfies the needs of this capital city's transportation authority.

### Suggested Application Implementations



**ARK-VH200**  
High Performance Mobile Intel® Atom™ D510 Fanless DVR Solution



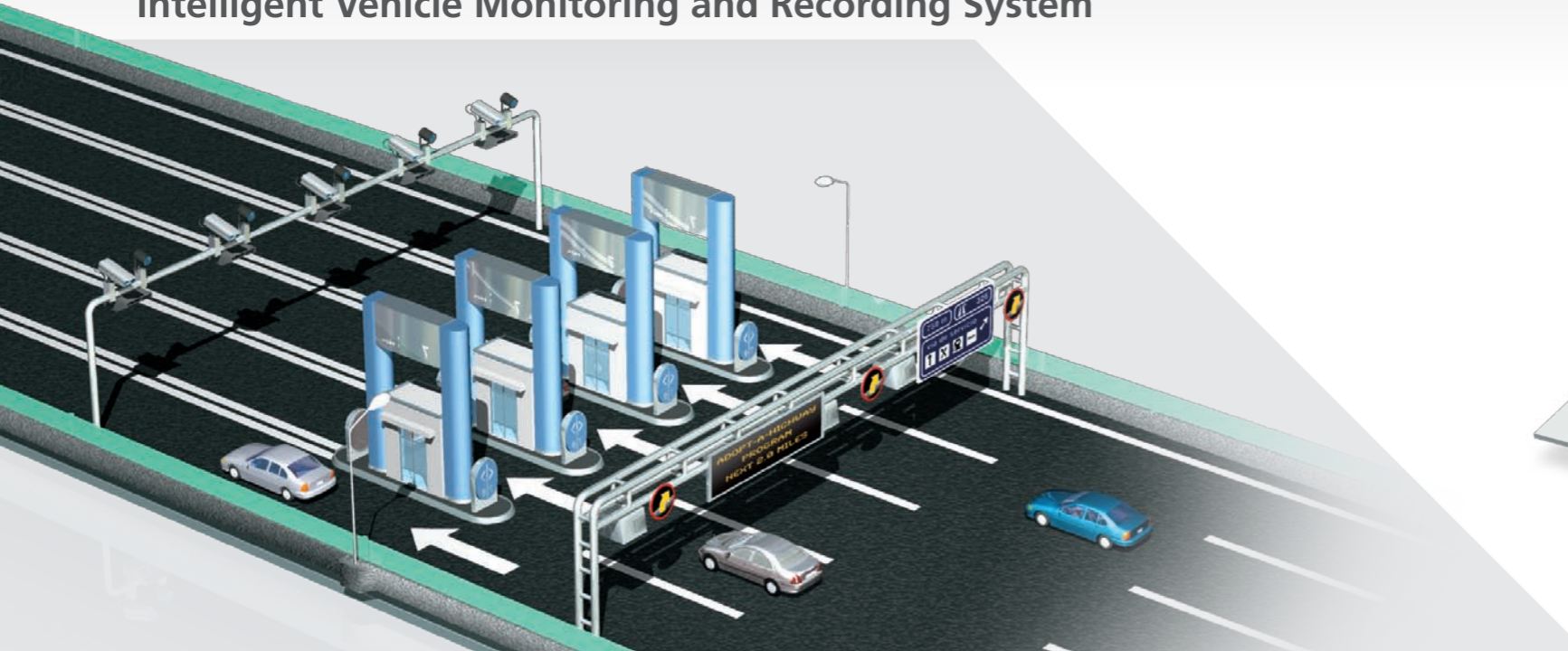
**ARK-3420**  
High Performance Solution with PCIe Expansion and Dual SATA HDDs for Image Processing and Surveillance Applications



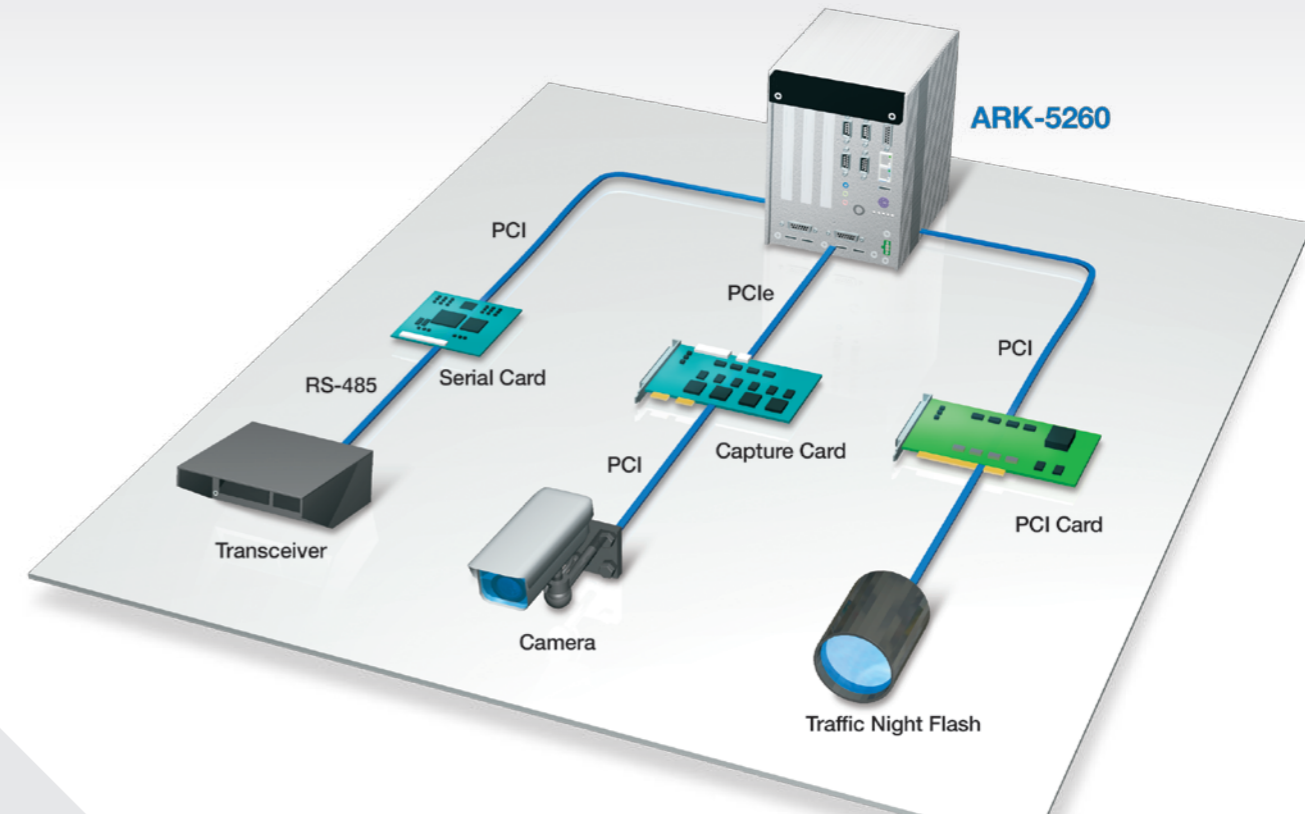
**ARK-3403**  
Cost Effective Intel® Celeron® M Solution with 2 PCI Expansion Slots and Multiple I/Os

# Highway Surveillance and ETC Service

## Intelligent Vehicle Monitoring and Recording System



China



### Project

China's booming economy has led to a significant increase in automobile ownership, and hence a growing need for more roads. China started developing its modern highway system in 1984, and as of 2006 it encompassed over 45,000 km of highway. And the Chinese highway system is currently growing by an average of 3,000 km per year. This ever-increasing labyrinth of highways has served upwards of 50 million vehicles (June 2007) and, perhaps not surprisingly, traffic violations have risen correspondingly. To address this problem, an effective monitoring system was required to insure public security against traffic violations and more serious crimes. This innovative monitoring system utilizes real-time CCD image processing while successfully eradicating common difficulties affecting the rates of video capture, image definition, and recognition. Three major outputs register panoramic views of traffic, recording elements crucial to identification and culpability, including license plate pictures, speed, and aggravating circumstances. Advantech's ARK-5260 fanless, embedded computer was chosen as part of the solution.

### Requirements

- Built to withstand fluctuating weather conditions, wide temperature range (-20 ~ 60° C), shock, and vibration
- Fully sealed to protect against dust and water
- Easy to maintain and install with the utmost reliability
- Compact design, fanless, low power consumption
- Offering 2 PCI and 1 PCIe x1 expansion slots for further vertical applications
- Accepts a wide range of DC power sources

### System

The China highway system requires a high quality, fanless IPC with PCI/PCIe expansion, and ARK-5260 with two PCIs and one PCIe x1 is more than adequate. Each surveillance camera is connected by a 4-port PCI video capture card. The camera is already integrated with a graphic card that makes the AD (analog-to-digital) conversion. Throughout the entire system, all of the ARK-5260s are connected to the server via Ethernet via LAN. Whenever a vehicle enters the electronic toll lane, a PCI-1761 is triggered, and it captures a license plate snapshot. The add-on PCIe Serial card connects with electronic toll sensors for toll collection via RS-485 interface. This partnership has made it possible for China to implement effective, fast, and reliable monitoring of their burgeoning highways.

### Conclusion

The ARK-5260 fanless embedded IPC is perfectly suited for electronic toll applications because it offers three PCI/PCIe expansion slots, LPT, and dual movable HDD trays. All electronics are conveniently protected in a sealed housing, and are equipped with thermal fins for easy cooling – ideal when space and environmental demands are crucial, as in the case of China's outdoor traffic systems. Not only did the ARK-5260 provide vivid communication and connectivity for China's highway system, Advantech's software customization services helped fine tune the Linux-based OS according to the needs of the China highway development department.

### Suggested Application Implementations



#### ARK-5260

Fanless Embedded Box IPC with Intel® Atom™ D510 processor and PCIe/2 x PCI Expansion slots



#### ARK-3403

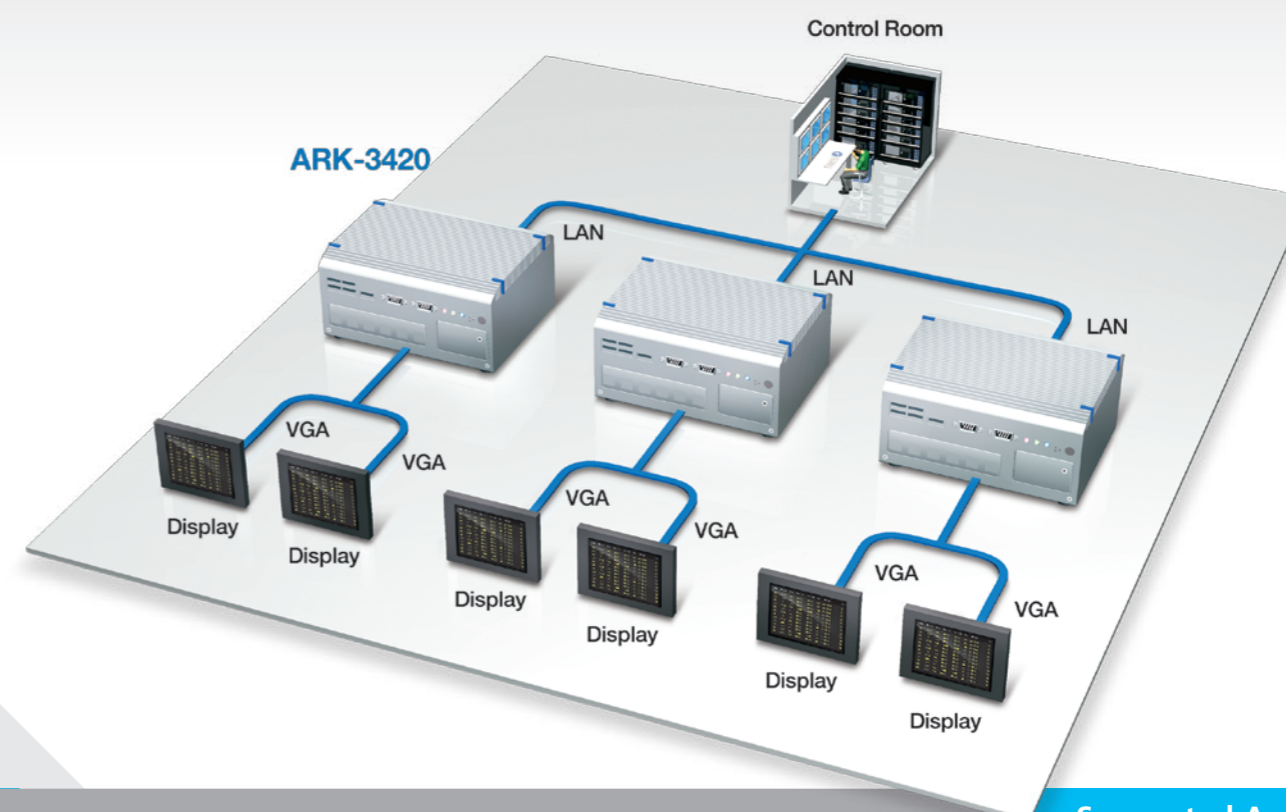
Cost Effective Intel® Celeron® M Solution with 2 PCI Expansion Slots and Multiple I/Os

# Instant Broadcasts at International Airports

## Flight Information Display System (FIDS)



China / Korea



### Project

As growing Asian airports of increasing importance, both Shanghai's Pudong Airport in China and Seoul's Incheon Airport in Korea recently required reliable, low-maintenance FIDSs. To manage heavy and ever-increasing passenger traffic, the two airports each needed a comprehensive system to assist its passengers by broadcasting information from a constantly updated database to multiple LCDs placed strategically throughout passenger facilities. These systems supply timely information regarding flight arrivals/departures, gate assignments, waiting halls, baggage area assignments, and even destination weather forecasts. Considering Pudong averages almost 29 million passengers per year, and Incheon 31 million, top-notch solutions were deemed mission-critical. Any potential onsite technical problems could cause a series of consequences that might influence the operation of many other airports. Advantech's ARK-3400/ARK-3420 were selected to meet the challenges in the two airports, respectively.

### Requirements

- Powerful processing ability for displaying, and controlling digital multimedia in various formats
- An excellent TCP/IP LAN solution through which the FIDS database, input terminals, and display monitors all connect for real time display
- Extended operation with adequate processing power, low consumption, and efficient thermal cooling
- Electromagnetic compliance
- Simple maintenance and increased dependability via an embedded operating system
- A compact, fanless, temperature compliant system to fit into small control cabinets
- Great reliability, stability, and connectivity
- Future proof

### System

To provide passengers and visitors with instant information, the ARK-3400 & ARK-3420 receive data from the airport's central FIDS server regarding flight schedules, luggage claim locations, weather reports, and other public-related information. Depending upon location, embedded computers display information on 16:9 or 4:3 LCDs placed in vertical or horizontal orientations. Because of their compact and integrated designs, both the ARK-3400/3420 are easily installed behind each LCD display, thereby concealing and protecting cables and wires. In the Pudong Airport application, the ARK-3400 was selectively expanded with a PCI graphic card to support up to 1920 x 1080, high definition resolution -- for larger displays, such as in the airport lobby. For smaller displays, such as at the boarding gates, the ARK-3400 built-in VGA interface was more than adequate. Each Compact Embedded IPC supports simultaneous dual displays, which helps to reduce total system cost. Featuring real time display, the FIDS database, input terminals, and display monitors are all connected via a TCP/IP compliant LAN. The ARK-3400/3420 fanless and energy efficient designs ensure utmost reliability, keeping passengers constantly updated with flight information and announcements at a glance.

### Conclusion

High performance, fanless, compact embedded IPC, the ARK-3400/3420 proved to be ideal solutions for the FIDS at the airports. The dual independent VGA/SVGA/DVI displays and anti-vibration features (cushioned HDD bay, rubber expansion card holder), plus a rich selection of I/Os, and support for up to 1 or 2 GB RAM, all made these models the answers to the airports' current and future requirements. The ARK-3400 demonstrated its flexibility with the addition of the PCI expansion board. Capable of operating over a wide power range, and equipped with mounting brackets to complement their compact designs, the ARK-3400/3420 adapted well to the two airport environments.

### Suggested Application Implementations



#### ARK-3420

High Performance Solution with PCIe Expansion and Dual SATA HDDs for Image Processing and Surveillance Applications



#### ARK-3440

Intel® Core™ i7 Embedded IPC with PCIe Expansion and Dual SATA HDDs



#### ARK-3403

Cost Effective Intel® Celeron® M Solution with 2 PCI Expansion Slots and Multiple I/Os