Integrating CAN Bus Communication Interfaces in Various Industries

By Johney Hu

The CAN bus itself has a host of special features, and its open architecture allows for great flexibility across a wide range of uses. The CAN Bus is both high-performance and high-security, common requirements for application in aviation, vehicular use, medicine, railways, robotics, and critical control systems. Not only was ICP DAS a frontrunner on the CAN Bus scene (making its first advance more than a decade ago), but it is also one among a few truly global R&D CAN Bus manufacturers. From its many years of experience, ICP DAS has produced hundreds of high-quality products related to the CAN Bus.

The CAN Bus is a serial communication system that can maintain high fidelity communication in harsh environments that have extensive electrical noise interference. CAN Bus also provides generous fault tolerance capabilities and ensures easy debugging. The bus itself includes a host of special features, and its open architecture allows for great flexibility across a wide range of uses.

The CAN Bus provides both high-performance and high-security, common requirements for applications in the aviation industry, for vehicular use, and for use in medicine, railways, robotics, and critical control systems.

To keep pace with the ever-increasing sophistication of industrial technology and industrial automation, major equipment manufacturers and system integrators alike have adopted the CAN Bus Communication System as their core technology. In the industrial sector, CAN Bus is generally regarded as a component that is integral to the stability and security of any system.

In real industrial settings, a wide range of communications interfaces, including RS-232, RS-485, Ethernet, and CAN Bus, to name a few, are used by the majority of automation applications. In order to create a heterogeneous system, it is necessary to take the various interfaces, together with their distances and speeds into consideration, meaning that the combined communication performance and cost is difficult to estimate.

To complicate matters further, integration issues and stability concerns are both very real and common. To resolve these difficulties, numerous types of converter and gateway devices are available on the

market - including those made by ICP DAS.

Not only was ICP DAS a frontrunner on the CAN Bus scene, making its first advance more than a decade ago, it is also one of only a few truly global R & D CAN Bus manufacturers. From its many years of experience, ICP DAS has produced hundreds of high-quality CAN Bus products.

The CAN Bus converter developed by ICP DAS manages a wide range of transmission interfaces, meaning that more complex network structures are within easy reach with the aid of the ICP DAS CAN Bus converter. The CAN Bus converter serves as a solid foundation upon which many basic components can be built, including COM, USB, and Ethernet communications. The I-7530 series signal converter supports the RS-232, RS-485, RS-422 interfaces. The I-7540 series converter supports both Ethernet and Wi-Fi interfaces, while the I-7565 series manages USB interfaces. By choosing – or possibly combining - the appropriate CAN Bus signal converters, users can easily manage and integrate multiple interfaces, bridging the exchange and transfer of information.

CAN bus vs. RS-485

Fieldbus / Feathures	CAN bus	RS-485
Interference Immunity	Best	Poor
Baud Rate	10K ~ 1M bps	9.6K ~ 115.2K bps
Distance	40m ~ 5Km	40m ~ 1.2Km
Error Detection	Yes, Provided by hardware	No
Arbitration	Yes	No
Multiple Masters	Supported	No
Data Exchange	Polling or replied by slave	Polling
Stability	Best	Poor

CAN Converter Comparison Sheet

CAN to COM Converter series products:

Module Name	I-7530-FT	I-7530	I-7530A	I-7530A-MR
Pictures				
COM 1	RS-232		RS-232/RS-422/RS-485	
Modbus RTU Slave	-			Yes
CAN Baud Rate (bps)	10 k ~ 125 k	10 k ~ 1 M		
CAN Specification	ISO 11898-3 (Low-Speed/Fault-Tolerance)	ISO 11898-2		
CAN Single-line Communication	Yes	-		
CAN Terminal Resistance	1 kΩ terminator resistor for CAN_H and CAN_L	Selectable 120Ω terminator resistor		

CAN to Ethernet Converter series products:

Module Name	I-7540D	I-7540-MTCP	I-7540D-WF
Pictures			
COM 1	RS-232		-
COM 2	RS-485		-
Virtual COM	Yes		-
Modbus RTU Slave	-	Yes	-
Ethernet Port	10/100 M		802.11 b/g, Infrastructure & Ad-hoc
Modbus TCP Serve	-	Yes	-
CAN Baud Rate (bps)	10 k ~ 1 M		5 k ~ 1 M
CAN Specification	ISO 11898-2		
CAN Terminal Resistance	Selectable 120Ω terminator resistor		

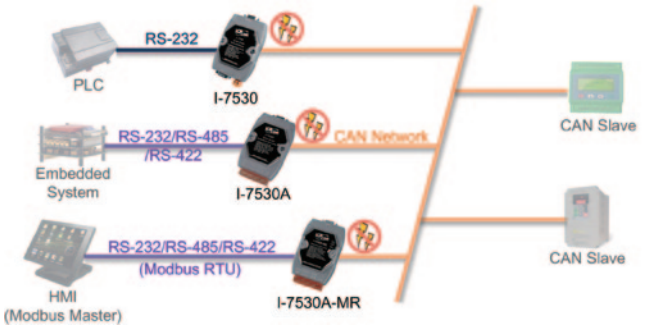
USB to CAN Converter series products

Module Name	I-7565	I-7565-H1	I-7565-H2
Pictures			
CAN Channel	1		2
CAN Baud Rate (bps)	10 k ~ 1 M	5 k ~ 1 M	
Real-time Cyclic Transmission	-	Yes	
Time Stamp	-	Yes	
FPS	250	3000 (Total CAN ports)	
PC Driver	Windows 98/Me/2000/ XP/XP-64bit/ Vista/Vista-64bit/7/7-64bit Linux	Windows XP/XP-64bit/7/7-64bit Linux	

Typical Applications of the CAN Converter Architecture

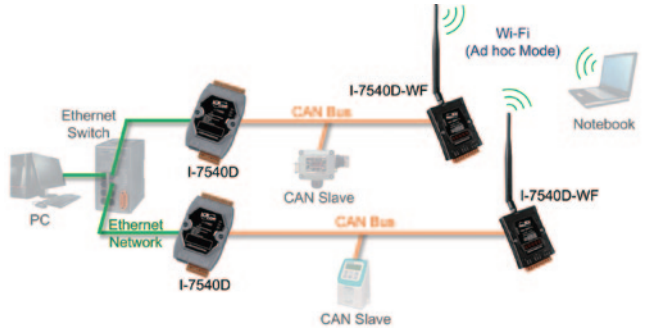
The CAN Bus sees a wide range of use in aviation, electric vehicles, solar energy, wind power, elevator systems, building fire protection systems, environmental monitoring, warehouse automation, and redundant control systems, etc.

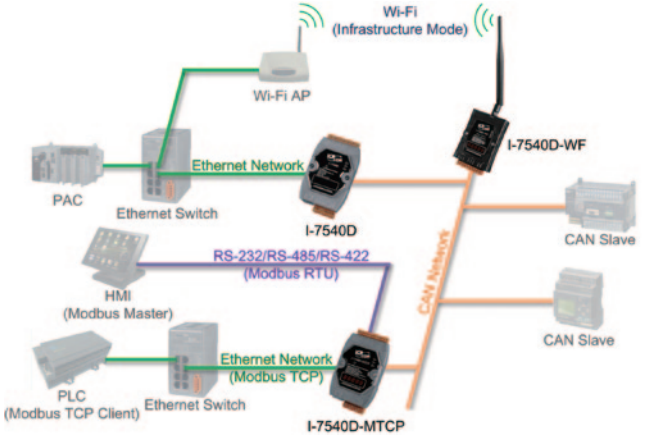
Communication between RS232/ RS485 and CAN bus



Pair connection application 2

Communication between CAN bus and Ethernet

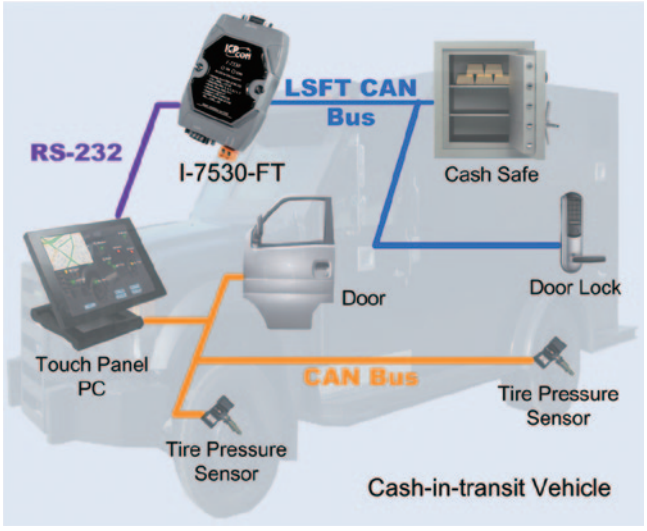




CAN Bus Applications

Usage in Armored Cars

This example is based on the monitoring systems used by a Chinese security company in their armored cars. When it comes to monitoring the current status and the state of the security door, stability and reliability is absolutely critical. To this end, a well-integrated data exchange interface is needed. LSFT (low speed fault-tolerant) systems are often used in automotive electronic systems: the I-7530-FT is designed to convert between LSFT CAN and RS-232. Consequently, the company can effectively control the security doors, which can also be monitored remotely.



Gyroscopic Vehicle Monitoring System

Real-time data is sent to the vehicle's CAN Bus devices via the J-1939-71 protocol. The gyroscope's real-time data is sent via RS-232. The I-7540 will receive the data and will then forward it to the Host PC. The speed of the vehicle, the engine speed, fuel consumption, air inlet pressure, and device manifold pressure is sampled and resolved by the Host PC and then stored into a database to be accessed in the future as the need arises.

ABS/ESP and Train-aided Radar System

The I-7540D-WF can be used in conjunction with ABS/ESP system data and assisted driving radar functions. iOS, Android, or other mobile devices can be used to connect to the system via Wi-Fi, and the I-7540D-WF will transform the information provided to CAN Bus signals and forward the data tp an ABS/ESP system or assisted driving radar system.

CAN Signal Converter Series

Product	Interface	Description
I-7530	CAN <--> RS-232	CAN to RS-232 converter
I-7530-FT		Low-Speed/Fault-Tolerance CAN to RS-232 converter
I-7530A-MR	CAN <--> RS-232/ RS-422/RS-485	CAN to Modbus RTU slave converter
I-7530A		CAN to RS-232/RS-422/RS-485 converter
I-7540D	CAN <--> Ethernet	CAN to Ethernet converter
I-7540D-MTCP		CAN to Modbus TCP server converter
I-7540D-WF	CAN <--> Wi-Fi	CAN to Wi-Fi converter
I-7565	CAN * 1 <--> USB	USB to CAN converter
I-7565-H1		High performance 1-port USB to CAN converter
I-7565-H2	CAN * 2 <--> USB	High performance 2-port USB to CAN converter

ICP DAS provides a thorough description of all its CAN-related products on the web. Full details, including product specifications and operating manuals, can be found at

http://www.icpdas.com/products/Remote_IO/can_bus/can_series.htm

Summary

With the introduction of more sophisticated industrial technology, automation and increasingly automated production equipment, customers are more focused on that elastic strain and the turnaround time to big changes in the market. For many years, ICP DAS has cultivated the automation market, actively working to meet market demand through its sizable R & D team, especially in the CAN Bus technology field, where the R & D department spares no effort. Although ICP DAS has attained full mastery of CAN Bus technology, the R & D team continues in its pursuit of innovation for its products in order to develop better and more diverse CAN devices. The ICP DAS R & D department continually strives to provide a wealth of bus and integration solutions to better meet the many needs of the market.