Brainstorm - Communication Buses

As electronic networks become more data-intensive and intelligent subsystems increase in number and complexity, bandwidth limits, signal interference, and device compatibility issues become important concerns. What are some ways that an electronic circuit designer can address these challenges?

Simon Prutton, [1] **Akros Silicon** [2]

Ethernet offers the highest degree of robustness and interoperability for data-intensive networking. However, Ethernet's inability to deliver both power and data over the same CAT-5 cable becomes a bigger issue as processing and intelligence moves closer to the edge of the network.

As a solution, the IEEE 802.3af Power over Ethernet (PoE) standard introduced a means for delivering up to 13W to a "powered device," such as a VOIP phone, from a PoE-enabled Ethernet switch or other "power sourcing equipment." The upcoming 802.3at standard more than doubles that power level to 30W.

As a result, PoE is seeing rapid adoption in a wide range of markets seeking to add "plug-and-play" power capability to the system. PoE increases system flexibility to significantly reduce support and deployment costs, while eliminating the overhead associated with a separate power infrastructure. Because of IEEE's standards-driven approach, 802.3 effectively allows engineers to realize these benefits in a way that ensures their systems will continue to work with the infrastructure...in today's applications and in the networked world of the future.

Chris Ferland, [3] **Fairchild Semiconc**
[4]

High resolution displays are becoming a
have for many consumer electronics.
bandwidth required to support these dis
requires...tradeoffs based on data rate, si
method, acceptable levels of EMI, numb
wires, mechanical considerations, pov
consumption, and on and on. Existing sig
technologies may work up to the data
necessary for these applications; howev
EMI associated with these signals when
very high speeds is often impractical. Ar
option is to use parallel signals. In disp
applications, 24 or more wires are often
transmit a single image. This will reduce t
rate of any individual wire but may intro
new issues with signal routing or mecha
limitations.

Serializers and deserializers, or SerDes,
used to solve these issues in high band
applications. In displays, for example, S
may be used to serialize the parallel d
transmit the data across a medium using

Click here for complete comment [1]

speed differential technology, and th
deserialize the data back to its original p
form for the display to use.
Click here for complete comment [3

Mark Leinonen, [5] **ROHM Electronics USA, LLC** [6]

Today's high-end automotive electronic systems typically utilize multiple networks, includir
LIN, FlexRay, MOST, Bluetooth and others — all operating in the same vehicle at different
rates. The near future will see cars using LAN interfaces to communicate with the infrastru
and with each other, underscoring the need for circuits designed to prevent interference a
automotive frequency bands. Because of their greater efficiency, switching power supplie
seeing rapid growth in automotive applications. However, SMPS operate at frequencies th
couple into adjacent circuitry and thus interfere with other systems. This key design challe
answered with switch-mode power supply ICs that are user-selectable for operation at diff
frequencies depending on the application. In this way, interference with other systems
completely eliminated. Another solution, LVDS ICs for video transmission, uses spread spe
technology to reduce interference with other systems. These ICs also reduce emissions by a
users to adjust signal swing to lower signal levels. USB interfaces are being introduced for p
device connection in automotive applications owing to the development of single- and d
channel USB power management ICs that protect against inrush currents or excessive cu
draw from connected devices.
Click here for complete comment [5]

Jay Tyzzer, [7] **Nordic Semiconductor** [8]

A Body Area Network (BAN) is a group of wireless sensors carried by a human, such as the Nike + iPod Sport Kit that uses a sneaker-based sensor and iPod Nano to enhance training.
BAN sensors must be light, compact and…inconspicuous. That means coin cells, and that means sensors that boast ultra low power consumption if those tiny batteries are to last nearer a year than a day.
For a one-size-fits all global wireless solution, the 2.4 GHz ISM band means interference. Employ a robust co-existence strategy within the BAN sensors. This isn't aided by the human body's 60% water content – a great electromagnetic radiation absorber.
BANs…must "plug and play"…out of the box. A 2.4 GHz RF transceiver for BAN applications

Kurt Radtke, [9] **ZMD** [10]

In automotive electronics, sensor and ac
and ECU applications do not demand exp
solutions…The data exchange…is implen
as analog signals, typically in a linear vo
range of 0.5V to 4.5V…due to the MCU o
ECU, which provides several analog inpu
required integrated ADCs. A resolution of
is almost always sufficient for this situa
When SSC-suppliers require a digital sig
adjust sensors, extra steps are taken to m
conversion, resulting in an increased accu
16 bits.

should handle around 12 mA peak transmit/receive currents with average operating currents of 2 µA. When combined with an optimized protocol stack, a one-year battery life on a CR2032 coin cell is often achievable.
Click here for complete comment [7]

There is PWM-signal processing (which) c
be defined as a purely digital communic
signal since the pulse modulation is sti
analog component.
Rather than unnecessarily expensiv
systems...use digital signal processing for
stand-alone sensors. When transmitting
signals, implementation works well when
on communication standards like LIN or
Click here for complete comment [9

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