

JOHN B. LACSON
MOLO
LIBRARY
MAGAZINE
MAY 19 2019

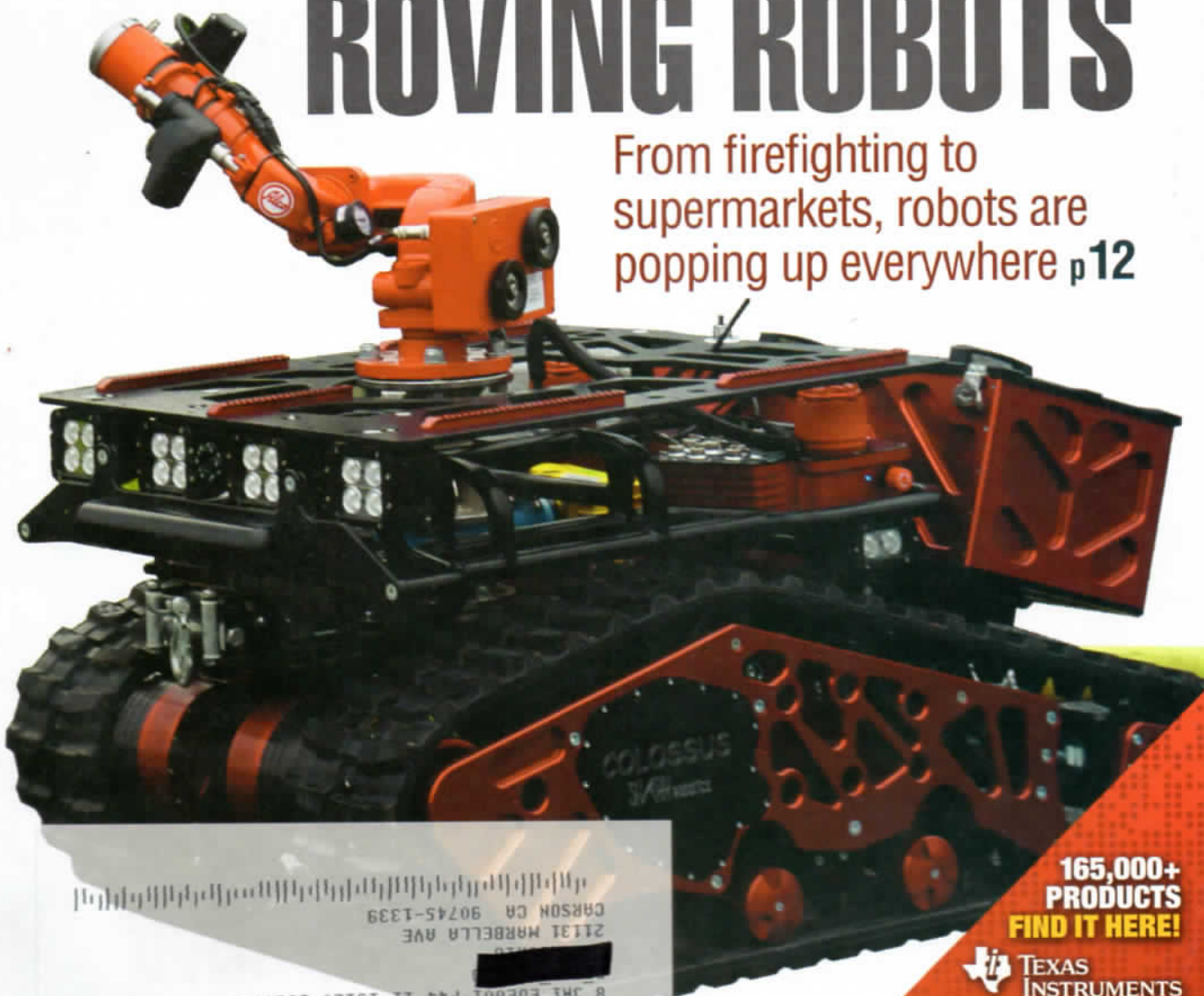
Electronic Design®

THE AUTHORITY ON
EMERGING TECHNOLOGIES
FOR DESIGN SOLUTIONS

MAY/JUNE 2019
electronicdesign.com


ROVING ROBOTS

From firefighting to
supermarkets, robots are
popping up everywhere p12



8 BXHPG2 FIRM*CAR-RT LOT*MC-031
#1003978801/O# EG SEG002
8 JMF E0E001 P44 11 15120 155379
2131 MARRBELLA AVE
CARSON CA 90745-1339

165,000+
PRODUCTS
FIND IT HERE!

 TEXAS
INSTRUMENTS

AUTHORIZED
DISTRIBUTOR



digikey.com/ti

IN THIS ISSUE

FEATURES

- 12 Robots: Coming to a Sidewalk Near You**
From sidewalks to firefighting and supermarkets to self-driving cars, robots are becoming an everyday sight.
- 18 Is Wireless Killing Our Wired Networks?**
While wireless grabs all of the headlines, wired networks continue to reliably do their jobs. But, despite their reliability and relative ubiquity, some foresee the demise of the wired side.
- 20 Virtual Reality Isn't Just for Games**
Virtual reality is finding its way into a range of applications, from controlling drones to training workers about safety zones.
- 22 Rightsizing Your Sensor Network Design for the IoT**
When developing your next wireless-sensor-network application, it pays to rightsize the network with the optimal number of sensors and consider variables such as the network medium, mains, or battery power sources, wireless protocol options, and network configuration.
- 30 Design Separately, Integrate Seamlessly with Dual-Core Controllers**
As the level of software integration becomes greater in embedded applications, designers are looking for ways to simplify the process. A dual-core digital signal controller offers one solution.
- 38 Virtual Emulation Knows No Bounds for Networking Design Verifications**
Virtual emulation is necessary to scale verification technologies with the growing speeds, capacities, and port counts of Ethernet designs, which is where the VirtualLAB Ethernet App steps in.
- 43 The Effect of Wire-Path Resistance on Battery Measurements**
Wire and contact resistance, which can lead to voltage drops, will wreak havoc when testing cells. Here are some tips that can help you alleviate those headaches.



COLUMNS & DEPARTMENTS

- | | | | |
|-----------|--------------------------------|-----------|--|
| 4 | ON ELECTRONICDESIGN.COM | 45 | IDEAS FOR DESIGN |
| 8 | EDITORIAL | 47 | AD INDEX |
| 10 | NEWS & ANALYSIS | 48 | LAB BENCH
The Ever-Improving Inference at the Edge |

EDITORIAL MISSION:

To provide the most current, accurate, and in-depth technical coverage of the key emerging technologies that engineers need to design tomorrow's products today.

ELECTRONIC DESIGN (ISSN 0013-4872) is published bi-monthly in Jan/Feb, Mar/Apr, May/June, July/Aug, Sept/Oct and Nov/Dec by Informa Media Inc., 9600 Metcalf Ave., Overland Park, KS 66212-2216. Paid rates for a one-year subscription are as follows: \$60 U.S., \$90 Canada, \$120 International. Periodicals postage paid at Kansas City, MO, and additional mailing offices. Editorial and advertising addresses: ELECTRONIC DESIGN, 605 Third Avenue, New York, NY 10158. Telephone (212) 204-4200. Printed in U.S.A. Title registered in U.S. Patent Office. Copyright © 2019 by Informa Media Inc. All rights reserved. The contents of this publication may not be reproduced in whole or in part without the consent of the copyright owner. For subscriber services or to order single copies, write to Electronic Design, PO Box 2100, Skokie, IL 60076. POSTMASTER: Send change of address to Electronic Design, PO Box 2100, Skokie, IL 60076. Canadian Post Publications Mail agreement No. 40612608. Canada return address: IMEX Global Solutions, P.O. Box 25542, London, ON N6C 6B2.

Permission is granted to users registered with the Copyright Clearance Center Inc. (CCC) to photocopy any article, with the exception of those for which separate copyright ownership is indicated on the first page of the article, provided that a base fee of \$2 per copy of the article plus \$1.00 per page is paid directly to the CCC, 222 Rosewood Drive, Danvers, MA 01923 (Code No. 0013-4872/94 \$2.00 + \$1.00). Copying done for other than personal or internal reference use without the express permission of Informa Media, Inc. is prohibited. Requests for special permission or bulk orders should be addressed to the editor. To purchase copies on microfilm, please contact National Archive Publishing Company (NAPC) at 732-302-6500 or 800-420-NAPC (6272) x6578 for further information.

Wired vs. Wireless

(Continued from page 18)

Clearly, we have taken our reliable wired networks for granted. They're considered old technology and get no recognition or appreciation. However, despite this inattention, even disrespect, wired networks continue to improve. The cable TV HFC systems keep gaining more speed thanks to the latest upgrade to the DOCSIS standard. It can easily handle 1-Gb/s data, and even faster in some instances.

DSL has also ramped up its speed over the years as companies invented technologies that let you put 1 Gb/s of data on a twisted pair. And, after all these years, the telecom companies discovered how to minimize 60-Hz induced voltage and current interference to the PSTN wiring and DSLAMs by using the mysterious Induction Neutralizing Transformer (INT). The INT has been around for a while, but its effectiveness hasn't been fully exploited. Fast data can be achieved over twisted pair by using the latest standards such as VDSL2, G.fast, and others thanks to the INT.

As for other examples of a healthy wired infrastructure, consider these. Many of the small cells needed for 5G will be fiber. IoT nodes are aggregated in gateways wired to some other wired LAN or internet connection. DSL and cable internet connections to homes and businesses aren't going away. New 5G broadband wireless may take some business, but not all.

If you want an in-depth look at this issue, get a copy of the new book, *Computer Networking Breakthroughs You've Always Wanted, Without Needing Fiber Optic Cable...Even in the Age of the Internet of Things*. It's written by an acquaintance of mine, Russ Gundrum, a veteran of the telecommunications and cable businesses. He's also the guy to thank for promoting and deploying the INT.

My conclusion is that wired networks still serve a real purpose. We actually can't get along without them. Yes, wireless is getting all of the attention right now, but we should pay some respect to the wired networks we use every day. ☐

Direct Connection

ElectronicDesign.

**JULY/AUGUST 2019
ISSUE PREVIEW**

**Ad Close: 7/5/19
Materials Due: 7/11/19**

TECHNOLOGY
Machine Learning Software

INDUSTRY TRENDS
Power Technology

PRODUCT TRENDS
FPGA

ENGINEERING ESSENTIALS
Memory

www.electronicdesign.com

Altech® DIN Enclosures

with Integral PC Board Guides

- 8 different series in many sizes
- DIN Rail and Panel Mount
- Fixed and Pluggable Terminals



**Largest selection
in the industry!**

altechcorp.com/dinenclosures

Altech® PCBs

with PUSH-IN TECHNOLOGY

TYPES:

- Fixed Push-In Terminal
- Power Terminals Push-In
- Tension Springs
- Pluggable Push-In



**Excellent Quality
at Competitive Prices**

www.altechcorp.com/PushPlug

INDEX

Advertiser	Page	Advertiser	Page
ABC Taiwan Electronics Corp.....	40	Ic-Haus GmbH.....	13
Absopulse Electronics.....	36	Ironwood Electronics Inc.....	36
Acces I/O Products.....	34	Keystone Electronics.....	5
Altech Corp.....	2	KOA Speer Electronics.....	9
Analog Devices.....	19	LPKF Laser & Electronics.....	41
Avtech Electrosystems Ltd.....	11	Memory Protection Devices.....	29
Burklin Elektronik.....	39	Mouser Electronics.....	32 a/b
Carlo Gavazzi Automation Components.....	24	Mouser Electronics.....	BC
Coil Craft.....	1	Pasternack Enterprises.....	14-17
Comsol Inc.....	37	Pickering Electronics.....	26
Dean Technology.....	23	Pico Electronics.....	21
Digi-Key.....	FC	Pico Technology.....	IBC
Digi-Key.....	IFC	Pololu Robotics and Electronics.....	27
ESB Source.....	33	Radicom Research.....	6
Hammond Mfg. Co. Inc.....	31	SNYN Electronics Co. LTD.....	39
Harwin.....	25	Stanford Research Systems.....	7
		TDK-Lambda Americas Inc.....	35

For more information on products or services visit our website www.electronicdesign.com. The advertisers index is prepared as an extra service. *Electronic Design* does not assume any liability for omissions or errors.