March 2018

22 Build an Analog-Style LED Clock
— Part 1
Driving LEDs using the lowest possible pin count is a common challenge for folks creating projects with microcontrollers. Complementary LED drive — also known as “Charleplexing” — allows a large number of LEDs to be controlled with a relatively small number of I/O pins. This fun digital LED clock project is a hands-on example of how Charleplexing can be used to stretch your “pin budget.”

By Robert Gill

32 Enhance Your Debugging Tool Suite with Embedded Manchester Serial Output
Debugging microcontroller designs can be difficult due to resource limitations that block or curtail access to real-time information internally and externally. In this article, I’ll demonstrate both a multiplexed bus protocol analyzer and the 1-Wire Manchester decoder. Combining these logic analyzer decoders with an embedded software Manchester encoder forms a great tool to enhance your debugging and diagnostic skills.

By Kevin J. O’Connor

06 TechKnowledgey 2017
Events, Advances, and News
Read about these cool topics:
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• Think Big about eVOTLs
• Abuse of PDA is A-OK
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• Enhancing 4K
• Cheers!
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Topics discussed this month:
• Targeted Dunking
• Sensor Inversion
• Training a Train

14 The Ham’s Wireless Workbench
Practical Technology from the Ham World
High Voltage
There are lots of circuits for generating high voltages out there, but what about the “gotchas?” Learn how to be safe and smart when working with these potentially dangerous types of projects.

40 REVIEW: Zeppelin Design Labs
Altura MIDI Theremin
A theremin is a musical instrument that is played by waving one’s hands in midair over the instrument itself. There is no physical contact between the player and the instrument. Of course, this makes playing a theremin very difficult. However, help is on the way! Enter the Altura theremin MIDI controller kit!

By Craig A. Lindley

46 The Arduino Graphics Interface
— Part 2
In Part 1, we described the background and hardware build of the Arduino Graphics Interface (AGI). With this platform, you can turn an analog oscilloscope into a very high-resolution graphics display device. This time, we’ll complete the project by describing the details of the XYscope: the software libraries and sample code that make the AGI hardware easy to use and integrate into any graphics display application.

By Ed Andrews WASLON

54 The Design Cycle
Advanced Techniques for Design Engineers
ARMing a Postage Stamp-Sized LCD
If you follow this column, you know that we’ve been ARMing lots of stuff lately. This month, we’ll continue to build on our IoT arsenal by ARMing a postage stamp-sized LCD. We’ll utilize the free Keil MDK for the STM32F0 compiler and the free Segger J-Link OB upgrade, along with an $11 Nucleo-F030R8 to ARM a Crystalfontz CFAL96648B-F1.

39 The Big Crossword Challenge
Here’s a fun puzzle to stimulate your neurons. Most entries are related to electronics, but other STEM fields are also included.

By David Goodell

Departments

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