June 15, 2017

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Bill Sussman on Old Modem, New New Internet. Rudy vK on PC-XT Emulator On ESP8266

41 Comments

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Open Source Car Computer Dan on SpaceX Joins in the Long History of Catching Stuff from Space Bob on Order Drinks With Your Mind Dan on Quantifying Latency in Cheap RC **Transmitters** Jii on Crankshaft: Open Source Car

Cheap RC Transmitters

NOW ON

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+ CPLD = CPLD Fun Board!.

elmesito on Quantifying Latency in

Thinkerer on Old Modem, New Internet.

Just4Fun has updated details to Arduino

Droidbot 7 - Undefinable Whegged

fannylarradet wrote a comment on instructions for Live Biograph unity

Computer

to Hackaday World Create Day @ Made

shlonkin has added xxrealfuserxx as a contributor to A sci-fi adventure by

Arduino + CPLD = CPLD Fun Board!

deshipu wrote a reply on project log **LUFA Demos** Just4Fun has updated the log for Arduino + CPLD = CPLD Fun Board!. Jeroen liked Blackbox - Highend 3D FrancescoSaverioZuppichini liked Mike's **Robot Dog** 

**HACKADAY PRIZE ENTRY: OSCILLOSCOPE FOR THE MASSES** by: Bryan Cockfield f y 8\*

38 Comments 3.370m6 2.820ms6

If you head down to your local electronics supply shop (the Internet), you can pick up a quality true-RMS multimeter for about \$100 that will do almost everything you will ever need. It won't be able to view waveforms, though; this is the realm of the oscilloscope. Unlike the multimeter's realistic price point, however, a decent oscilloscope is easily many hundreds, and often thousands, of dollars. While this is prohibitively expensive for most, the next entry into the Hackaday Prize seeks to bring an inexpensive oscilloscope to

the masses. The multiScope is built by [Vítor] and is based on the STM32-O-Scope which is built around a STM32F103C8T6 microcontroller. This particular chip was chosen because of its high clock speed and impressive analog-to-digital resolution, which are two critical specifications for any oscilloscope. This particular scope has an inductance meter built-in as well, which is another

feature which your otherwise-capable multimeter probably doesn't have. New features continue to get added to this scope by [Vítor]. Most recently he's added features which support negative voltages and offsets. His particular scope is built inside of a model car, too, but we believe this to be an optional feature. The **Hackaday**Prize2017 is Sponsored by: supplyframe **MICROCHIP** Texas

Instruments Posted in The Hackaday Prize, Tool Hacks

Tagged 2017 Hackaday Prize, arduino, microcontroller, oscilloscope, scope, stm, stm32, STM32F103C8T6,

38 THOUGHTS ON "HACKADAY PRIZE ENTRY: OSCILLOSCOPE FOR THE MASSES"

← Imaginary AC Circuits Aren't Really Complex

**DoctorWizard** says:

Perry says:

**Thanks** 

Reply

of...

Reply

Ren says:

agjiigjaop says:

Reply

patrick says:

localhost says:

Ren says: June 15, 2017 at 2:38 pm

Reply

some guy says

>sampling rate of 1.7 MS/s

Reply

why don't you get a job?

What if you can't afford it even with a job?

this looks cool.

electrobob says: June 15, 2017 at 12:00 pm

i have all the parts I think I will put one together.

Ostracus says:

this to be an optional feature." Drive-by-scoping. Reply

"His particular scope is built inside of a model car, too, but we believe

philosiraptor117 says: June 15, 2017 at 11:50 am why not just buy a dso 138 15 bucks from your favorite chinesium provider, they are actually kinda good

Reply twodogs says: Strange all the reviews on the DSO 138 say it's too low bandwidth to

Reply electrobob says: It is, even for SMPS work is too slow as today's chips move faster. It is good to begin if that is all you can afford. It is good to have a portable one in your tool box if you don't mind spending the money. I got one out of curiosity. Never used it.

Same here. I am retired and my electronics budget is

limited. I can't afford a nice scope. But I have a cheap scope

and never use it. I can borrow a good scope if I need one, but have never needed to. Then again, everything I do is digital. I can see the value of a scope for doing analog audio work to view a complex waveform. If I was building synthesizers, I would want a good scope. I expect that part of the reason good scope prices are so high is that there just isn't a huge market for them. Reply Woyta says: DSO 138 is not only one you can buy in china. I got DSO 138 and it si working fine for my purposes. For its price i thing it is good tool. If i want something better DSO 203 seems to be interesting. Reply Steve Greenfield says: June 19, 2017 at 9:22 am The DSO203 is a marketing fraud. The actual analog bandwidth has been tested to be about 3 to 4MHz. As long as you know that, you can make an informed decision. Reply

That one is not in a model car.... Reply Jay Diggily says: +1 Reply ItsThatIdiotAgain savs:

There is no need to be disappointed, it is what it is. Most importantly it is a very cheap way to view sub 1MHz waveforms. You can spin one up from a couple of cheap ebay items and bits form the junk

analyser and built in FFT, its meant to allow you to probe low speed stuff and learn from the experience. I have a fluke, I have a bunch of

compartment of my car on a wet miserable day, I'll take out the elcheapo meter, in case I drop it in a puddle, or leave it lying about, or accidentally run it over. If I'm trying to fault find a mains powered

box, and if you blow it up, well what the heck, you learned something. Its not meant to replace a 1GHz scope with logic

cheap multimeters. If I'm prodding around in the engine

I feel very disappointed by this project, why try to make something that

Now, if he could properly design one around some STM32 that has 2 ADC at 5Msps which could bring the price point up to maybe 30, that would be much much more useful. But such chips have not been cloned I suppose so that is why they would be too expensive to make kits out

is already available and cheaper than building one from scratch? https://www.banggood.com/Orignal-JYE-Tech-DS0150-15001K-DSO-SHELL-DIY-Digital-Oscilloscope-Kit-With-Housing-p-1093865.html

amplifier or poking around in high voltage.. or looking at high frequency stuff... I'll use something more appropriate. Don't diss the thing out of hand. Besides.. it couldn't be more of a hack... hot glue, old toy car, bits of stripboard, batteries lashed together with sparky tape.. Its a hack.. this is hackaday, not review-a-high-endoscilloscope-a-day. Reply ne 15, 2017 at 8:13 pm Hear hear! Reply

With a Rigol 1052E you can focus on a problem you're trying to solve. Rigol scopes are dirt cheap for their value and if you can't afford one

So? Half the time people (or comment bots) make a comment about something that is available, a follow-up comment says "link please"... some guy says: link affiliate-link==SPAM some guy says:

Sorry, this is a (yet another) toy, not a scope. If you want a scope get a Rigol. Yes it's still a lot of money for some people (like students, i had this problem too like a lot of other people) but scopes are somewhat complex beasts so you have to invest some money to get something decent. And i think scopes are really cheap today, just look at the prices like 10 years ago. Also the sampling rate is one thing, but not the only important part: number of channels, voltage min/max, sample depth, USER INTERFACE with built-in functions (measurements,

cursors, ...), ... Even if the sample rate of a home-made scope is high enough there is still A LOT of work to really make a useful sope. If you want to make a scope and learn about the internals go ahead, if you want a working scope to work with just buy one. If you can't afford look for a used one or just wait, sorry...

You can't post a comment without posting Aliexpress links too...

Ups, this was supposed to go at the end as a new comment, sorry... Reply eccentricelectron says: Oh dear. I have to take issue with "about \$100 that will do almost everything you will ever need. It won't be able to view waveforms" The sub \$100 meter I've just built does just that. It's the usual Chinese stuff, and I wasn't expecting much, but it's actually pretty decent for run of the mill work. The high bandwidth DSO still has its place of course, but being able to view low frequency waveforms in situ is handy too. Reply eccentricelectron says: s/built/bought/ moo says: an oscilloscope is more than just an ADC and a display. (and there's nothing impressive about the resolution of an stm32's ADC. even if 12 bits were a lot, the bottom 3-4 are gibberish.) Reply electrobob says:

yeah, that chip is definitely cloned. Depending how they do it, things

Great idea, though plastic cars don't protect your device from RF

Now I'm looking around for interesting case ideas.

Piggy-bank. BNC snout, power entry under the tail.

like ADC resolution might suffer.

Model car case made me laugh.

Reply

notarealemail says

interference.

**Brian** says:

Reply

notarealemail says:

Reply

rasz\_pl says:

tuner chip

rasz\_pl says:

Reply

Reply

ItsThatIdiotAgain says: You mean something like this? https://camo.githubusercontent.com/c226a270be9399988b1f9 4179b50b9561d9b1ca5/68747470733a2f2f6c68362e676f6f676 c6575736572636f6e74656e742e636f6d2f2d42557a35724d33 42354a492f565650434c7072714e30492f414141414141414143515 92f7061545f4930614c4562592f773935312d683731332d6e6f2f 494d475f303335392e4a5047

Going to get a 4×4 Jeep one, so it can be used in the mud.

http://airspy.com/airspy-r2/ SDR is pretty much this chip + clock chip +

there is already open source software for it, and LPC LINK2 dev

https://www.eevblog.com/forum/projects/lpc4370-cheap-scope/

STM32F103C8T6 has impressive ADC?: o try ~\$6 LPC4370, it does 12bit 80Msps

board is only 20 Euro at mouser

"The selling point is the open source LabTool software that provides an 11-channel logic analyzer (up to 100 million samples per second), a 2-channel analog oscilloscope that can achieve up to 80 million samples per second, an 11-channel signal generator that can hit 80 million samples per second, and a 2-channel analog signal generate (up to 40 kHz)." echodelta says: But can you convert it to hard top protection when transporting it, or at least a rag-top. imqqmi says: I did something similar (but very basic) with a PIC32MX220. I planned to do a version for PIC32MZ1024EFG064 but I got a Rigol DS1054z in the mean time so my desire for a faster scope has been fulfilled. The

PIC32MZ EF has the capability to capture 3 channels at around 6MHz simultaneously by combining two ADC modules per channel. Running at

framework) so can send samples in real time to the PC. It also supports

One of the disadvantages of a MCU scope is that it can't do brightness simulation on the display without a massive performance hit. That would be only possible with a fast FPGA. Displaying 6M samples on a 800 pixel wide screen will allow you to see some detail, which helps

252MHz (I think 350DMIPS) can do some processing as well, and supports USB 2 hi-speed (I've tested it at 20MB/s using Harmony

triggers for ADC values, handy for triggering on level thresholds.

navigating in the waveform and spot features/anomalies.

I wonder how the update rate is. I managed about 15-20 fps depending how dense the waveform is on the PIC32MX220. More pixels means slower speed. I optimized the code for the display downloaded somewhere from Alieexpress seller webpage, went from 5 fps to about 15-20 by removing unnecessary delays and instructions. Reply One of my favourite things is a saleae logic analyzer that can capture at 24m/sec and buffer a billionaire n samples. I wonder if this could run at a useful speed if it had a digital only mode. There are continuing calls for

salsas to do a continuous display but they haven't pulled it off.

Max says:

much faster than it gets cheaper, and anything above it get expensive much faster than it gets better. For instruments like oscilloscopes, almost anything with a brand name bought new tends to be in the latter zone while anything cobbled up by hobbyists as the next "cheap scope for the masses" is, unfortunately, invariably way, way, waaaay down in the former region, labelled "toys lol". This one is no exception. Only of any use if you don't actually need a scope and you have never ever seen a waveform before. Reply e 16, 2017 at 9:45 am

For any product that has a spectrum of options there tends to be a "bend" in the price-performance curve somewhere – that's the most bang for your buck, if you can afford it. Anything below it gets shittier

I've played with the STM32F4 Discovery boards a good bit. They're cheap and very capable. Much better than the board used here. The STM32F479I is \$30. It has 256 KB RAM, 2 MB flash and a 64 Mb SRAM combined with a touch screen and three 12 bit 2.4 MS/s ADCs which can be interleaved for 7.2 MS/s. That puts Nyquist at 3.6 MHz and a usable BW of 2-3 MHz. A proper analog front end is essential to be useful as a

scope. Disclaimer: I started a hackaday.io project like this, but dropped it when I saw all the Chinese versions and wandered off into an odyssey in the mathematics of L1 approximations. A really interesting project would be to collect samples at random

intervals and then apply a compressive sensing program on a PC. That should provide 10-15 MHz bandwidth. The general rule of thumb is that