solar powered laptop

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- 1
- 2

nduka002

Posts: 30
Joined: Mon Aug 10, 2020 8:38 am

solar powered laptop

Wed Oct 28, 2020 10:57 pm

I'm trying to make a laptop that is solar powered purely from scratch could someone help me plan it out
ill be editing this list as I go but right now I'm working on:
motherboard
solar panels
finding a good online PCB designer that I can use to design a motherboard
The time limit is till January 1st but I have to make 3 ideas but since this is the 1 I'm most enthusiastic about ill spend a month on this idea and 2 weeks on the other ideas
my questions are {what other parts would I have to create to make this a fully working laptop that can type up on a word editor and send emails it's supposed to be a baseboard working computer }
if you have any contributions or anything that you would like to add thanks also this is my last post of the day but ill try to edit this response to reply to u guys good suggestions would be :
[things I need to add to this list because it is all from scratch and the deadlines January 1st only things allowed are PCB printers and other tools and services like 3d printing services used for printing out the cooling fan]
[coding the os I don't mean coding an OS with every dingle dangle in their just a word editor and connecting all the peripherals, managing files, and this is

huge if I have time somehow adding an internet browser cause]
[a nice lithium-ion battery.size to be determined but it will be custom made so if you have any suggestions for how places to order one it would be nice how much mAh it should be depending on how much it cost to run since its gonna be low power]
[If you could give me some more suggestions on coding languages and where to start if there are any good teaching platforms like code gym for java or if there are any good books like black hat python]
this is for an engineering project I thought it would be better to address it head-on with 1 large post instead of those 2 posts from earlier today but for all those who answer your responses won't be in vain right now I'm waiting for more notebooks to come in because my other engineering/coding notebooks are filled up with doodles

well I think I put everything in here later ill edit the other requirements in if you got any advice it would be helpful

topguy

Posts: 7313
Joined: Tue Oct 09, 2012 11:46 am
Location: Trondheim, Norway

Re: solar powered laptop

Fri Oct 30, 2020 11:14 am

Where is the Pi in this project ?

~~LTolledo~~

Posts: 6657
Joined: Sat Mar 17, 2018 7:29 am
Location: Anime Heartland

Re: solar powered laptop

Fri Oct 30, 2020 1:37 pm

> *topguy (./memberlist.php?mode=viewprofile&u=37966) wrote: ↑ (./viewtopic.php?p=1751167#p1751167)*
> *Fri Oct 30, 2020 11:14 am*
>
> Where is the Pi in this project ?

probably roasted already under the sun?

@OP,
the Pi topguy mentioned means Raspberry Pi board....
dont mistake it with other boards with the "pi" suffix
otherwise its not supported here....

"Don't come to me with 'issues' for I don't know how to deal with those
Come to me with 'problems' and I'll help you find solutions"
Some people be like:
"*Help me! Am drowning! But dont you dare touch me nor come near me!*"

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Tue Nov 03, 2020 9:43 pm

I'm doing the same project as you,

Though I have had similar ideas many years ago. Ultimately the idea is to build a solar powered Pi Zero laptop much like a TI-30Xa Solar can be fully powered by light: https://upload.wikimedia.org/wikipedia/ ... _Solar.jpg (https://upload.wikimedia.org/wikipedia/commons/thumb/4/48/TI-30Xa_Solar.jpg/332px-TI-30Xa_Solar.jpg)
Though I do not anticipate it charging completely just by tilting the lid, I anticipate a 5W panel in the sun for 4-5 hrs might be enough to charge it for at least a couple hours of use every day. According to user W.H. Heydt, a Pi Zero can run for 12hrs with a 3.5" TFT with a 4000Mah battery: viewtopic.php?p=1721023#p1721023 (https://www.raspberrypi.org/forums/viewtopic.php?p=1721023#p1721023)

My battery is 2000Mah so my goal is it for to last ~6hrs on a single charge. With a single 5W panel, the idea is to charge it in the morning from 7AM-5PM, and then to be able to use it from 3PM to 9PM. The concept of being able to fully recharge for the next day is the goal so the exact hours are arbitrary, except that it would charge during the daylight hours, practically. Thus if the panel can charge 2x the battery capacity, then it can pass-through and run during the day with the excess charge while still fully replenishing the battery. If a PC is only used 3 times a week, then it is easier to charge a larger battery, but that might not be as common.

For this I am using the most basic and affordable components, with the aim to make it as minimalistic as possible. In other words, the goal of making a cheaper typewriter like the https://getfreewrite.com/ (https://getfreewrite.com/) but solar powered, or a light office machine for productivity. Using a Pi Zero WH board is optional and also uses low power, but I went with a Pi Zero simply to prototype.

I have ordered a 3.5 TFT" screen, but it is more for proof of concept and would not suit virtually any office productivity or e-readers. Fitting a HAT onto it may be tricky, since I would like to position the Pi Zero under the screen but near the edge so that the SD card and HDMI is accessible from the side of the laptop.

I used particle board for the chassis because it is easy to cut with a jig saw, but do not plan on using it beyond prototype.

https://ibb.co/QjkcYBP (https://ibb.co/QjkcYBP) (back lid + keyboard) This wouldn't normally be what the laptop would look like, unless the lid was a 180 degree swivel (could be useful if tilting/rotating the lid to allow photovoltaic charging to follow the sun angle)
https://ibb.co/zQJYHtH (https://ibb.co/zQJYHtH) The twisty tie is just a schematic for the double-ended 2-pin JST connector that I am awaiting in the mail.
https://ibb.co/5FPVknV (https://ibb.co/5FPVknV)
https://ibb.co/ofsrfdX (https://ibb.co/ofsrfdX)

I still need to solder the GPIO header and the USB A Jack. I am awaiting a double ended 2-pin JST cable to connect the solar charger to the 5V USB Boost. As some users have reported, a 4Ah battery can last 12hrs on a Pi Zero with a 3.5" screen. I am using an Adafruit 2Ah 3.7V battery.

These are all the parts I am using/plan to use:

Pi Zero: $5

5W Solar Panel (purchased from a project no longer active: https://www.instructables.com/Assemblin ... -Battery-/ (https://www.instructables.com/Assembling-a-BootstrapSolar-Chi-qoo-Solar-Battery-/)) I am attempting to use the same concept as that assembly: https://www.instructables.com/Assemblin ... -Battery-/ (https://www.instructables.com/Assembling-a-BootstrapSolar-Chi-qoo-Solar-Battery-/) approx $30 (likely more now)

https://www.microcenter.com/product/503 ... 7v-2000mah (https://www.microcenter.com/product/503621/adafruit-industries-lithium-ion-battery---37v-2000mah) - Adafruit Industries Lithium Ion Battery - 3.7v 2000mAh $12.50

https://www.adafruit.com/product/4755 (https://www.adafruit.com/product/4755) Adafruit Universal USB / DC / Solar Lithium Ion/Polymer charger - bq24074 (pictured) $10

https://www.adafruit.com/product/1903 (https://www.adafruit.com/product/1903) PowerBoost 500 Basic - 5V USB Boost @ 500mA from 1.8V+ (pictured, but USB A Jack not yet soldered) $10

https://www.adafruit.com/product/3662 (https://www.adafruit.com/product/3662) Hammer Header Male - Solderless Raspberry Pi Connector $2.25

Double-ended JST cables: https://www.amazon.com/gp/product/B07XNQBPY8/r (https://www.amazon.com/gp/product/B07XNQBPY8/r)
Use the JST cables to connect the Load connector on the DC Solar Lithium Charger to the 500 Basic 5V USB Boost will work!
(This will also work): https://www.adafruit.com/product/4714 (https://www.adafruit.com/product/4714)

https://www.amazon.com/gp/product/B005G ... UTF8&psc=1 (https://www.amazon.com/gp/product/B005GI2VMG/ref=ppx_od_dt_b_asin_title_s00?ie=UTF8&psc=1) Sanoxy Micro USB Right Angle OTG (On-The-Go) to USB 2.0 Adapter (i ordered this one, but mine is not a right-angle one) $1.25

https://www.amazon.com/dp/B00L2442H0/re ... 00_TE_item (https://www.amazon.com/dp/B00L2442H0/ref=pe_385040_30332200_TE_item) Sabrent 4 Port Portable USB 2.0 Hub (9.5" Cable) for Ultra Book, MacBook Air, Windows 8 Tablet PC (HB-MCRM) $6

https://www.newegg.com/x-gene-01021-usb ... 6823157025 (https://www.newegg.com/x-gene-01021-usb-wired/p/N82E16823157025) X-Gene 01021 Black 88 Normal Keys USB Wired Mini Keyboard Approx $25 paid (The Raspberry Pi Keyboard would make an interesting and less expensive replacement if considered: https://vilros.com/products/raspberry-p ... rd-and-hub (https://vilros.com/products/raspberry-pi-keyboard-and-hub))

https://www.aliexpress.com/item/3258799 ... 4c4dL4X7Fl (https://www.aliexpress.com/item/32587995145.html?spm=a2g0s.9042311.0.0.69da4c4dL4X7Fl) 3.5 Inch TFT LCD Display Touch Screen Monitor for Raspberry Pi 3 2 Model B Raspberry Pi 1 model B 480x320 RGB Pixels - I plan to file the sides of the GPIO connector since it is 26 pins and might not fit in the 40 pin HAT without some thinning the short sides. $10.49 w/shipping

G-Skill 32GB microSD card: Approx $10-12

Total: $120.41 Close to the $100 OLPC: https://www.theverge.com/2018/4/16/1723 ... -is-it-now (https://www.theverge.com/2018/4/16/17233946/olpcs-100-laptop-education-where-is-it-now)
Microcenter sells 16GB micro SD cards for $3 and keyboards can be had for $10, which would make this total $107 if one can find a $30 solar panel (I paid $5 for an Inland one a few years ago), so making a $100 solar powered laptop doesn't seem too far off...

Did not purchase, but considered: https://www.amazon.com/Voltaic-Systems- ... B07ZS3WYZY (https://www.amazon.com/Voltaic-Systems-Formerly-Battery-Samsung/dp/B07ZS3WYZY) I know that Voltaic Systems has a V25 6000Mah battery with pass through charger- that is, the ability to charge the battery while simultaneously discharging from it to power a Pi or other device, I am opting to use slightly cheaper materials to test out first, so I bought an open box 2000Mah Adafruit battery from Microcenter for $9: Shipping Lithium batteries can cost more from Adafruit because it requires UPS Ground, so I went with a local pickup. A DC 5.5x2.1mm Female to Micro USB Male Plug Charge Cable Plug would be needed though to pair it with a solar panel, from what I've read.

Many of the peripherals were purchased a long time ago and may not be available anymore. Of course, some were purchased because they were a deal at the time and are only being used here for illustrative/demonstrative purposes.

Eventually I would like to add some more sophisticated battery management devices like the Witty Pi: http://www.uugear.com/tag/witty-pi/ (http://www.uugear.com/tag/witty-pi/) along with a switch for the power plug and charge plug.

I plan to use a 7"-10" e-ink screen in the future, but there aren't any that are plug and play and low cost..

This article seems to have calculated enough power to charge the Pi Zero https://www.activecountermeasures.com/m ... pberry-pi/ (https://www.activecountermeasures.com/making-a-solar-powered-raspberry-pi/) if one is willing to spend more- 4x7w panels won't fit on a laptop lid, even a 17" screen. But I think a 10watt panel, or 2 5W panels is feasible.
https://www.switchdoc.com/2019/06/solar ... pberry-pi/ (https://www.switchdoc.com/2019/06/solar-power-sizing-solar-panels-for-raspberry-pi/)
This is also a great resource: https://blog.voltaicsystems.com/powerin ... lar-power/ (https://blog.voltaicsystems.com/powering-a-raspberry-pi-from-solar-power/)

Any comments or suggestions are welcome. Thanks!

Last edited by LimboMan on Wed Jan 13, 2021 5:31 am, edited 4 times in total.

AlCap3003

Posts: 8
Joined: Sat Nov 07, 2020 12:59 pm

Re: solar powered laptop

Thu Nov 19, 2020 3:47 pm

Thats crazy stuff. I runned my pi with solar energy too. But not this way, this is genius.
I have a little solar panel from wich i feed my powerbank and from this powerbank my pi runs the whole day.
The Powerbank i´ve ordered is in this article: https://www.kaufberater.io/powerbank-test/ (https://www.kaufberater.io/powerbank-test/) it is a german article but your browser can translate it or you use a other translation tool.

Best regards and have fun

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Thu Nov 19, 2020 6:49 pm

@ AlCap3003 Thanks and I translated the article!

~~Rudolf~~

Posts: 169
Joined: Mon Nov 09, 2020 1:44 pm

Re: solar powered laptop

Sat Nov 21, 2020 6:26 pm

I am running a Pi from solar panel for a long time on board of a fully electrically self-sustaining sail boat. Solar power is vastly overestimated in efficiency and the physics you have to master is quite simple in math.

A Pi4B running reliable on solar power in mid geo locations as Europe - from experience - requires a 45WP solar panel (approx. 30 inch x 18 inch in size on a swivel mount to follow the sun) and a 74Wh power bank. After a lot of experiments I ended with a Solara SM160SRM solar panel buffering onto a 20.000mAh Intenso powerbank. This setup is barely able to sustain on demand usage of a 10" LCD display and the Pi - in summer. The solar panel delivers about 90Wh/d on sunny summer days, which gives about 6 hours of operations a day for the Pi and the monitor - that's it.

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Sat Nov 21, 2020 6:38 pm

> *Rudolf (./memberlist.php?mode=viewprofile&u=353741) wrote: ↑ (./viewtopic.php?p=1765161#p1765161)*
> *Sat Nov 21, 2020 6:26 pm*
>
> I am running a Pi from solar panel for a long time on board of a fully electrically self-sustaining sail boat. Solar power is vastly overestimated in efficiency and the physics you have to master is quite simple in math.
>
> A Pi4B running reliable on solar power in mid geo locations as Europe - from experience - requires a 45WP solar panel (approx. 30 inch x 18 inch in size on a swivel mount to follow the sun) and a 74Wh power bank. After a lot of experiments I ended with a Solara SM160SRM solar panel buffering onto a 20.000mAh Intenso powerbank. This setup is barely able to sustain on demand usage of a 10" LCD display and the Pi - in summer. The solar panel delivers about 90Wh/d on sunny summer days, which gives about 6 hours of operations a day for the Pi and the monitor - that's it.

Rudolf, thank you for posting this. I am well aware that even a Raspberry Pi 3B+ uses more power than I want a solar panel to support, which is why I went with the Pi Zero. Using the hungriest Raspberry Pi, the Pi4B is going to be difficult for a solar panel without lots of space, especially on a boat, let alone a portable laptop lid. Therefore to deliver a longer battery life, the Pi Zero would not use as much as the Pis 2 and above. See this chart:
https://www.pidramble.com/wiki/benchmar ... onsumption (https://www.pidramble.com/wiki/benchmarks/power-consumption)

Also, this blog writer has reached the same conclusion:
from https://www.activecountermeasures.com/m ... pberry-pi/ (https://www.activecountermeasures.com/making-a-solar-powered-raspberry-pi/) :
"Which Raspberry Pi?
For anyone that dreamed of running a Pi 4B with Gigabit Ethernet, multiple external hard drives, and an HDMI display streaming video from Youtube, you can enjoy the system for about 2 minutes before you drain the battery.

The power load on the newer boards is substantial; by contrast, the Pi Zero line just sips electricity. I hooked up the Pi Zero with a PiOled display on a moderately beefy battery pack and 24 hours later we hadn't dropped a single led out of the 4 on the battery charge meter. At the end of this article, I'll give the math on why this battery pack should be able to run the Pi Zero for almost 10 days by itself.

It's true that you only get a 1GHz single-core processor and 512MB of ram, but the point of a project like this is running lean – doing the minimum needed to capture information remotely, and doing any beefier processing when the data comes back."

Of course if you're on a boat, you may need a more powerful Pi for certain satellite or radio navigation communications software, but other than that I don't see why a Pi Zero is not the best choice for solar until more efficient panels are developed. While there are more efficient panels available today, they are not worth the cost for a $5 Pi Zero.

Also, a 10" e-ink screen is something I would like to use with a Pi Zero. They are costly, especially color eink, but Waveshare makes a beautiful e-ink with an easy plug and play HDMI monitor for around $540: https://www.waveshare.com/product/displ ... sp-103.htm
(https://www.waveshare.com/product/displays/e-paper/epaper-1/eink-disp-103.htm)

If money is no object then that is one way to get both a Pi and a monitor (LCDs use much more power than the e-ink and the Pi board) to use as little power as possible - less than 2 watts.

Last edited by LimboMan on Sat Nov 21, 2020 7:02 pm, edited 1 time in total.

~~Rudolf~~

Posts: 169
Joined: Mon Nov 09, 2020 1:44 pm

Re: solar powered laptop

Sat Nov 21, 2020 7:01 pm

The difference in real life between Zero and Pi4 was much smaller than anticipated at first glance - reason is, the CPU is not the major power hungry part. Simple math confirmed by real life: a Zero uses about 0.8W, while the full blown Pi4B draws 4W. Math: going from Pi4 to Zero saves 3.2W of power in my setup, or reducing power consumption from 12.3W to about 9W -> or as a result going from 6 hours Pi4B to 8 hours Pi Zero. I decided to take the much higher power of the Pi4 over the two more hours of little power.

Last edited by Rudolf on Sat Nov 21, 2020 7:04 pm, edited 1 time in total.

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Sat Nov 21, 2020 7:03 pm

> *Rudolf (./memberlist.php?mode=viewprofile&u=353741) wrote: ↑ (./viewtopic.php?p=1765182#p1765182)*
> *Sat Nov 21, 2020 7:01 pm*
>
> The difference in real life between Zero and Pi4 was much smaller than anticipated at first glance. Simple math confirmed by real life: a Zero uses about 0.8W, while the full blown Pi4B draws 4W. Going from Pi4 to Zero saves 3.2W of power in my setup, or reducing power consumption from 12.3W to about 9W -> or as a result going from 6 hours Pi4B to 8 hours Pi Zero. I decided to take the much higher power of the Pi4.

I added this part to my previous comment.

"Also, a 10" e-ink screen is something I would like to use with a Pi Zero. They are costly, especially color eink, but Waveshare makes a beautiful e-ink with an easy plug and play HDMI monitor for around $540: https://www.waveshare.com/product/displ ... sp-103.htm

(https://www.waveshare.com/product/displays/e-paper/epaper-1/eink-disp-103.htm)

If money is no object then that is one way to get both a Pi and a monitor (LCDs use much more power than the e-ink and the Pi board) to use as little power as possible - less than 2 watts."

Is the real life usage of 9 watts due mainly to the monitor, or the Pi Zero?

~~Rudolf~~

Posts: 169
Joined: Mon Nov 09, 2020 1:44 pm

Re: solar powered laptop

Sat Nov 21, 2020 7:06 pm

Major power goes to the display, which is in part due to the sailing environment.
The e-Ink technology has shown to not be bright enough for such daylight use.
(And the very s.....l.....oooooo.....ooo... w response time of e-Ink is annoying.)

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Sat Nov 21, 2020 7:17 pm

> *Rudolf (./memberlist.php?mode=viewprofile&u=353741) wrote: ↑ (./viewtopic.php?p=1765187#p1765187)*
> *Sat Nov 21, 2020 7:06 pm*
>
> Major power goes to the display, which is in part due to the sailing environment.
> The e-Ink technology has shown to not be bright enough for such daylight use.
> (And the very s.....l.....oooooo.....ooo... w response time of e-Ink is annoying.)

Thank you. There is a solution to that too.

https://www.adafruit.com/product/4694 (https://www.adafruit.com/product/4694) "The Adafruit 2.7" 400x240 SHARP Memory Display Breakout is a chonky cross between an eInk (e-paper) display and an LCD. It has the ultra-low power usage of eInk and the fast-refresh rates of an LCD. This model has a gray background, and the pixels show up as black-on-gray for a nice e-reader type display. It does not have a backlight, but it is daylight readable. For dark/nighttime reading you may need to illuminate the LCD area with external LEDs."

The thing is, these boards are not ready-made like an HDMI monitor. Ideally this technology makes its way into a more general-purpose monitor, or at least a niche one designed for marine daylight (and nighttime) use. Having a backlight can be handy at night. And I know this is only a 2.7" screen with 400x240-, but it delivers fast refresh rate and low power. So maybe a larger monitor and higher res might be released with an HDMI cable one day. Which E-ink screen have you tried? I am still researching them for my own project.

Also that e-ink i mentioned earlier supports up to 15hz, which is much better than my 1st generation Nook e-reader.

"The EINK-DISP-103 is updated for a faster refresh rate. It supports up to 15Hz refresh rate in A2 mode." In action: https://www.youtube.com/watch?v=A7Se2vsOC48 (https://www.youtube.com/watch?v=A7Se2vsOC48)

~~Lbox1~~

Posts: 96
Joined: Wed Oct 21, 2020 1:03 am

Re: solar powered laptop

Sat Nov 21, 2020 9:16 pm

If looking at eink displays, have you considered the kindle hack? https://www.meccanismocomplesso.org/en/ ... berry-pi/ (https://www.meccanismocomplesso.org/en/kindleberry-the-economic-ultraportable-laptop-with-kindle-and-raspberry-pi/)

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

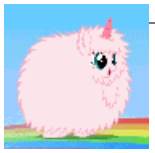
Re: solar powered laptop

Sat Nov 21, 2020 11:54 pm

> *Lbox1 (./memberlist.php?mode=viewprofile&u=351551) wrote: ↑ (./viewtopic.php?p=1765262#p1765262)*
> *Sat Nov 21, 2020 9:16 pm*
>
> If looking at eink displays, have you considered the kindle hack? https://www.meccanismocomplesso.org/en/ ... berry-pi/ (https://www.meccanismocomplesso.org/en/kindleberry-the-economic-ultraportable-laptop-with-kindle-and-raspberry-pi/)

I have. It seems like a lot of work, and I am not adept at rooting many devices. It is cheaper to re-use a kindle if one knows how to re-program the display, but even then it may not be that customizable. The idea of using a router and SSH to run the display seems overly complicated, but I appreciate the effort.

Manufacturers typically develop only in bulk or for a very high customized price, so I think it is more practical to sell the idea via something like CrowdSupply and then have a larger pilot so that it can be further mass-produced. There may only be a niche use for going fully-solar, but the concept doesn't preclude having a dual power source (not removing a conventional micro USB charging ability). It's kind of like a hybrid PHEV, it can run purely on electric for a short, local town trip, but it still has the option of gasoline (outlet charger) for those with range anxiety.



Gavinmc42

Posts: 7713
Joined: Wed Aug 28, 2013 3:31 am

Re: solar powered laptop

Sun Nov 22, 2020 6:07 am

Wish these guys would hurry up.
https://clearinkdisplays.com/ (https://clearinkdisplays.com/)

I'm dancing on Rainbows.
Raspberries are not Apples or Oranges

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Sun Nov 22, 2020 1:46 pm

> *Gavinmc42 (./memberlist.php?mode=viewprofile&u=81825) wrote: ↑ (./viewtopic.php?p=1765387#p1765387)*
> *Sun Nov 22, 2020 6:07 am*

> Wish these guys would hurry up.
> https://clearinkdisplays.com/ (https://clearinkdisplays.com/)

Yeah, fortunately there some options in 2020, mainly on the tablet/e-reader side for color e-ink and greyscale e-ink.

The Poke2 Color looks amazing: https://onyxboox.com/boox_poke2color (https://onyxboox.com/boox_poke2color) $300

https://onyxboox.com/boox_poke3 (https://onyxboox.com/boox_poke3) The Onyx Poke 3 (new, not to be confused with the Onyx Note 3 or Nova 3) also looks amazing.
https://www.youtube.com/watch?v=sX31cffogIQ (https://www.youtube.com/watch?v=sX31cffogIQ)
It is a grey e-book reader with much more functionality than an older gen-e-reader. It has bluetooth, which allows connecting an external keyboard along with web-browsing. It costs $189 and there are few sellers in the U.S:
https://goodereader.com/blog/product/onyx-boox-poke-3 (https://goodereader.com/blog/product/onyx-boox-poke-3)
https://www.ectaco.com (https://www.ectaco.com)
although the Onyx website ships direct DHL worldwide. https://onyxboox.com/checkout/pricelist (https://onyxboox.com/checkout/pricelist)

Update: it does support a micro USB OTG cable, which I would use to connect to a keyboard and mouse, however I do not know if it supports the power consumption of those devices, nor know where I can find an extremely low profile (as in ultra low power consumption) mouse and keyboard that are powered entirely by the OTG cable's connection to the E-reader/tablet.

The PocketBook Color https://www.theverge.com/21507390/pocke ... o-e-reader (https://www.theverge.com/21507390/pocketbook-color-review-e-ink-kaleido-e-reader)

https://remarkable.com/ (https://remarkable.com/) A tablet with a pen and high resolution.

More for desktop but large screen by DASUNG: https://www.amazon.com/2200x1650-Monito ... 07P2VLSWW/ (https://www.amazon.com/2200x1650-Monitor-Electronic-Paperlike-Technology/dp/B07P2VLSWW/)

The Poke3 for example, perform 80-90% of the needs of a laptop, and unlike the Kindle, requires very little jailbreaking because it allows easily sideloading the Google Play Store, which means you can install Open Office (https://www.collaboraoffice.com/collabo ... ase-notes/ (https://www.collaboraoffice.com/collabora-office-android-ios-release-notes/)).

https://techcrunch.com/2020/11/10/the-b ... -e-reader/ (https://techcrunch.com/2020/11/10/the-boox-poke-3-is-my-new-favorite-e-reader/)
"It’s not as simple as it would be on an ordinary Android device, though. Because the Poke 3 comes from China, it doesn’t have access to Google services right off the bat. You can add it through settings, which isn’t hard, but there’s also a sideloading store built in with recent (if not quite brand new) install packages of popular, vetted apps for the device."

The power consumption of the CPU and monitor are both optimized for weeks of use without recharging, but it still may be practical to set it up with a solar panel because even heavy video use on an e-ink is going to drain the battery in less than a week or even a day. Though if I went with one of these, I wouldn't need to use a Pi since it would have a processor built in, but I don't know how much power the 8 core processor uses compared to a Pi4 or Pi Zero.

Imperf3kt

Posts: 4675
Joined: Tue Jun 20, 2017 12:16 am
Location: Australia

Re: solar powered laptop

Sun Nov 22, 2020 8:47 pm

> *Rudolf (./memberlist.php?mode=viewprofile&u=353741) wrote: ↑ (./viewtopic.php?p=1765182#p1765182)*
> *Sat Nov 21, 2020 7:01 pm*
>
> The difference in real life between Zero and Pi4 was much smaller than anticipated at first glance - reason is, the CPU is not the major power hungry part. Simple math confirmed by real life: a Zero uses about 0.8W, while the full blown Pi4B draws 4W. Math: going from Pi4 to Zero saves 3.2W of

> power in my setup, or reducing power consumption from 12.3W to about 9W -> or as a result going from 6 hours Pi4B to 8 hours Pi Zero. I decided to take the much higher power of the Pi4 over the two more hours of little power.

Something here doesn't add up.
The Pi zero uses less than a quarter of the energy the Pi4 uses, so you should be getting over four times as much run time yet you claim to only get an additional 2 hours?

55:55:44:44:4C
52:4C:52:42:41

Rose tinted glasses are difficult to see through.

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Sun Nov 22, 2020 9:01 pm

> *Imperf3kt (./memberlist.php?mode=viewprofile&u=236640) wrote: ↑ (./viewtopic.php?p=1765724#p1765724)*
> *Sun Nov 22, 2020 8:47 pm*
>
> > *Rudolf (./memberlist.php?mode=viewprofile&u=353741) wrote: ↑ (./viewtopic.php?p=1765182#p1765182)*
> > *Sat Nov 21, 2020 7:01 pm*
> >
> > The difference in real life between Zero and Pi4 was much smaller than anticipated at first glance - reason is, the CPU is not the major power hungry part. Simple math confirmed by real life: a Zero uses about 0.8W, while the full blown Pi4B draws 4W. Math: going from Pi4 to Zero saves 3.2W of power in my setup, or reducing power consumption from 12.3W to about 9W -> or as a result going from 6 hours Pi4B to 8 hours Pi Zero. I decided to take the much higher power of the Pi4 over the two more hours of little power.
>
> Something here doesn't add up.
> The Pi zero uses less than a quarter of the energy the Pi4 uses, so you should be getting over four times as much run time yet you claim to only get an additional 2 hours?

He later acknowledged the display is the major power draw:

"Major power goes to the display, which is in part due to the sailing environment.
The e-Ink technology has shown to not be bright enough for such daylight use.
(And the very s.....l.....oooooo.....ooo... w response time of e-Ink is annoying.)"

And e-ink is not too dim in daylight: some myths debunked:
https://www.electronicdesign.com/techno ... r-displays (https://www.electronicdesign.com/technologies/embedded-revolution/article/21805149/11-myths-about-epaper-displays)

"5. E-paper isn’t readable in sunlight.

LCDs become virtually unreadable in bright sunlight, because the backlight, designed to make the image in the liquid crystal visible, can’t compete with the brightness of the sun.

Conversely, e-paper displays remain perfectly usable in the sun because they’re reflective. The image on the display remains visible in sunlight exactly like printed ink on paper: The dark areas absorb the sunlight and the light areas reflect it, thereby creating a visible image.

This is one of the reasons why e-readers are so popular among sun-seeking holidaymakers."

The e-inks out today are available in color with better refresh rates, so I do not know which e-ink display he was using. Transflective is another type of display that could work in the sun. https://www.quora.com/How-does-transfle ... from-E-Ink (https://www.quora.com/How-does-transflective-display-technology-

differ-from-E-Ink) They both use less power than transmissive displays. I also read about Rdot https://rdotdisplays.com/displays (https://rdotdisplays.com/displays) This is new to me so I don't know what interfaces they support.

Imperf3kt

Posts: 4675
Joined: Tue Jun 20, 2017 12:16 am
Location: Australia

Re: solar powered laptop

Sun Nov 22, 2020 10:37 pm

If I add a screen that draws (imaginary) 5W to a Pi4b, then it will be the same for the pi0. The pi0 still uses a quarter of the energy the Pi4b does, so the difference in energy use is still the same..

55:55:44:44:4C
52:4C:52:42:41

Rose tinted glasses are difficult to see through.

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Sun Nov 22, 2020 10:44 pm

> *Imperf3kt (./memberlist.php?mode=viewprofile&u=236640) wrote: ↑ (./viewtopic.php?p=1765779#p1765779)*
> *Sun Nov 22, 2020 10:37 pm*
>
> If I add a screen that draws (imaginary) 5W to a Pi4b, then it will be the same for the pi0. The pi0 still uses a quarter of the energy the Pi4b does, so the difference in energy use is still the same..

Right, I think it's important to keep in mind that a lot of this is relative. If one has the time and space to build a 30"x18" 45 watt solar panel, one can power a 12watt system (Pi4+10" 7W LCD), and a 3W difference isn't going to seem like much. If we're comparing apples to oranges, like a solar laptop with a 17" bezel and a 5-10watt solar panel that fits in a backpack and not just on a boat deck, then choosing a low watt CPU and LCD screen is a lot more sensible. My goal is 1.2W total consumption (an e-ink might use as little as 200mW I believe, and 1Watt for the Pi Zero).

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

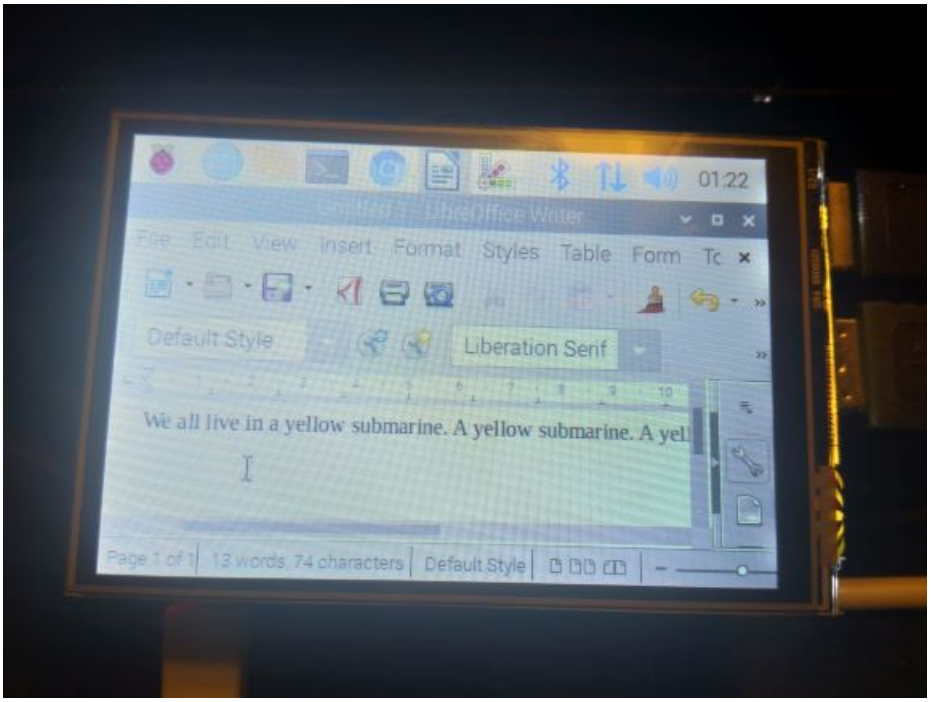
Re: solar powered laptop

Thu Dec 03, 2020 3:53 am

Just a quick update. My 3.5 TFT arrived from AliExpress:
https://www.aliexpress.com/item/3258799 ... 4c4dnQvXJc (https://www.aliexpress.com/item/32587995145.html?spm=a2g0s.9042311.0.0.45374c4dnQvXJc)

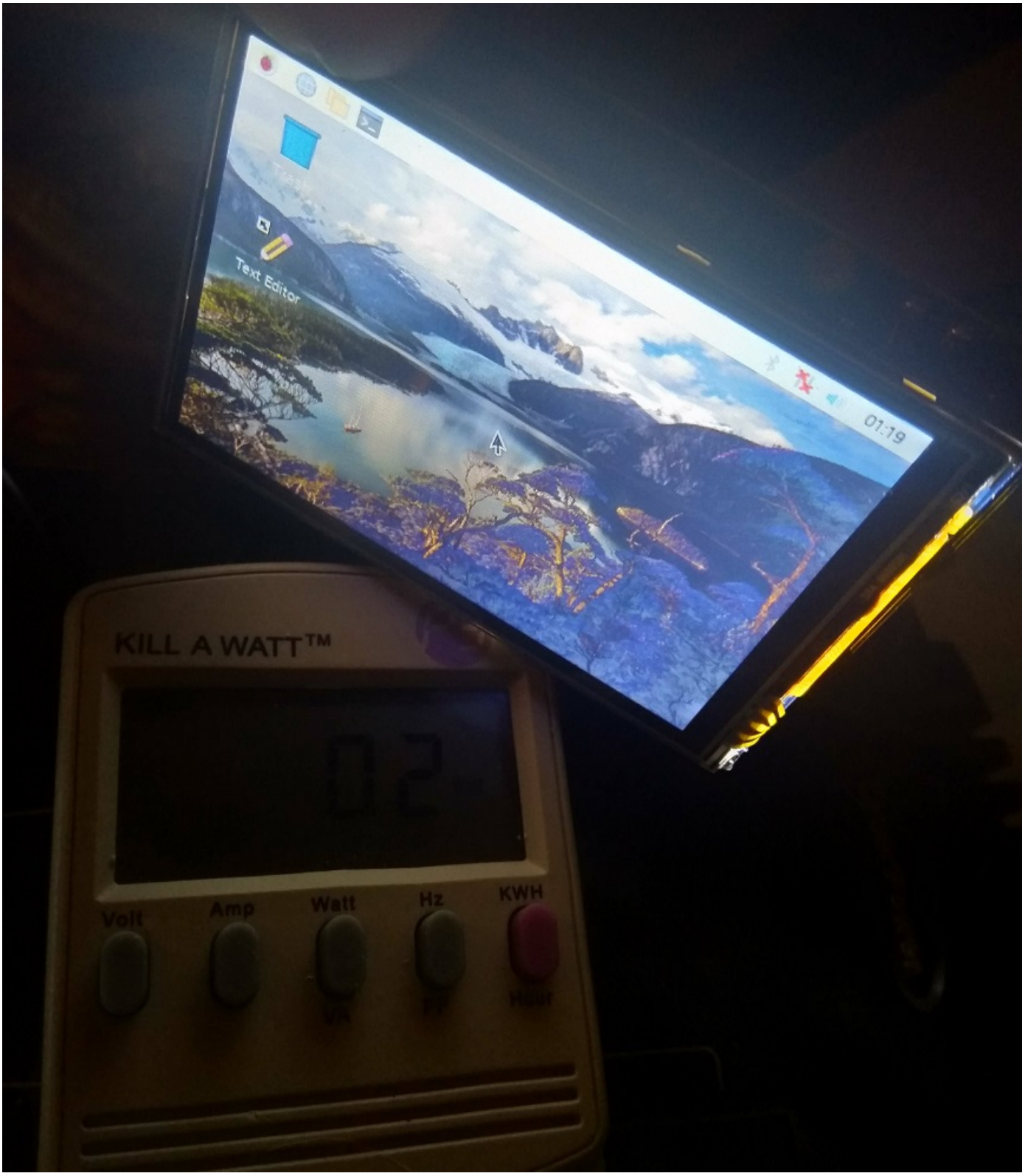
My Raspberry Pi 3B+ uses around 2 watts on idle and peaks around 5 watts with the 3.5" TFT screen. Though according to this:
https://www.pidramble.com/wiki/benchmar ... onsumption (https://www.pidramble.com/wiki/benchmarks/power-consumption)
At 100% cpu usage, the Pi 3B+ should use around 5w alone, leaving the screen to use around 1-2 watts by my estimate for a total of 7W, for example, with video playback or anything requiring constant refresh rates. Fewer square inches for the screen translates into fewer watts of course but still looking into e-ink. I also got it to run on the 3.7V 2000Mah battery.

Also, I recently got a new Kindle with a front-light- 9th generation on Black Friday week for less than $59 used-(like new) and I am pretty impressed. It has decent battery life although I would like to see it underclocked a bit.
https://www.amazon.com/Kindle-Now-with- ... 07978J597/ (https://www.amazon.com/Kindle-Now-with-Built-in-Front-Light/dp/B07978J597/)
It's a fine PDF reader on its own so there are times where I would like to use it as an e-reader over a rasp pi but it would be nice to see a laptop using a screen like the e-reader. The Nook lasts a little longer- it got around a month of charge with little use.



IMG_20201128_192154t.jpg (30.35 KiB) Viewed 3703 times

Attachments



IMG_20201202_211736.jpg (174.7 KiB) Viewed 3703 times

~~Stephaned22~~

Posts: 1
Joined: Tue Dec 08, 2020 3:29 am

Re: solar powered laptop

Tue Dec 08, 2020 4:36 pm

> *AlCap3003 (./memberlist.php?mode=viewprofile&u=353522) wrote: ↑ (./viewtopic.php?p=1763823#p1763823)*
> *Thu Nov 19, 2020 3:47 pm*
>
> Thats crazy stuff. I runned my pi with solar energy too. But not this way, this is genius.
> I have a little solar panel from wich sticker personnalisé Cagnes sur mer (https://www.numericard.fr/cagnes-sur-mer/) i feed my powerbank and from this powerbank my pi runs the whole day.
> The Powerbank i´ve ordered is in this article: https://www.kaufberater.io/powerbank-test/ (https://www.kaufberater.io/powerbank-test/) it is a german article but your browser can translate it or you use a other translation tool.
>
> Best regards and have fun

I also think it's a good idea. Anyway, thanks for sharing.

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Wed Dec 09, 2020 3:54 am

I recall back in 2012 Intel had a story about Near Threshold Voltage. It generated a lot of buzz but I forgot about it and never followed up on it. It was basically an x86 PC that was designed to run at the minimum voltage possible that could still function, and was considered a solar compatible PC due to how little power it used. I do not know what happened to it- The Claremont CPU, but there are some articles shortly after that:
https://semiaccurate.com/2012/12/20/int ... r-pentium/ (https://semiaccurate.com/2012/12/20/intel-explains-claremont-the-near-threshold-solar-pentium/)

Update: I found that there is still some research in the field- scholarly articles for Near-Threshold Computing, and this:
https://fuse.wikichip.org/news/1119/iss ... edge-mote/ (https://fuse.wikichip.org/news/1119/isscc-2018-intels-self-powered-intelligent-iot-edge-mote/)

~~LimboMan~~

Posts: 74
Joined: Sat Oct 31, 2020 7:12 pm

Re: solar powered laptop

Sun Dec 13, 2020 4:02 pm

I may have found the final piece of the puzzle- an appropriately low-cost laptop chassis:
https://www.harborfreight.com/550-weath ... 56378.html (https://www.harborfreight.com/550-weatherproof-clear-case-56378.html)

The clear polypropylene should make it possible to charge the solar panel inside the case while protecting it from the elements.

56378_W3.jpg (148.58 KiB) Viewed 3173 times

The adjacent side should also make it possible to mount the display.
EDIT 3: this thread has a good discussion on reasons not to use plastic because of its insulative properties compared to glass's conductive properties: https://www.solarpaneltalk.com/forum/di ... #post64453 (https://www.solarpaneltalk.com/forum/diy-solar-panels/diy-solar-panels-aa/4683-acrylic-perspex-v-glass?p=64453#post64453)

https://hackaday.com/2020/09/14/this-ru ... be-copied/ (https://hackaday.com/2020/09/14/this-ruggedized-raspberry-pi-was-built-to-be-copied/) I also like the Apache 1800, since it is $13 from Harbor Freight in the U.S. and probably a lot cheaper than the cost it would be for 3D printing time and materials. https://www.harborfreight.com/1800-weat ... 64550.html (https://www.harborfreight.com/1800-weatherproof-protective-case-small-64550.html) While a little small for a full size keyboard, there is enough space for a fold out one, if there is one that suits you.

As far as ports for power and charging the solar, the Apache 1800 or similar Pelican case wouldn't be ideal for a solar panel, but it would still be a very practical portable Pi carrying case, whether mounted in a fixed/removable position or for just storing loosely for assembly.

(EDIT 4: some of these links may be tagged as "survival kits," but the reasoning behind my interest in this project is actually just out of the convenience of having a self-charging laptop, and determining if it could be built with around $100-$150 of materials, sourced from either off-the-shelf materials and/or parts readily assembled (like a 3d printed keyboard tray or monitor bezel).)

I also found a chassis for a larger laptop display:
https://www.homedepot.com/p/Plano-Large ... /308744513 (https://www.homedepot.com/p/Plano-Large-ABS-Case-with-Handle-in-Orange-PLA1460HD/308744513)? Less ruggedized than the Apache 3800 but still practical for indoor/light handling.
This is looks a little too barebone https://www.homedepot.com/p/4-5-in-x-13 ... /203002008 (https://www.homedepot.com/p/4-5-in-x-13-in-Large-FlipTop-Box-in-Clear-18058606/203002008) but it might do, lol.

EDIT: This has a solar panel on(outside) a Pelican case: https://www.hackersforcharity.org/pelicanpi-ruggedpi/ (https://www.hackersforcharity.org/pelicanpi-ruggedpi/) Nice design! EDIT 2: just noticed it is from 2014, but still good concepts. It uses Adafruit's older solar LiPoly charger- i recommend their newer one that I use in my post above.

Last edited by LimboMan on Sun Dec 13, 2020 7:48 pm, edited 5 times in total.

~~Rudolf~~

Posts: 169
Joined: Mon Nov 09, 2020 1:44 pm

Re: solar powered laptop

Sun Dec 13, 2020 4:23 pm

Transparent polypropylene may look for the human eye as translucent, but the wavelengths for solar panel harvesting are not identical to visual wavelength. Try and let us know how much efficiency you are loosing by the lid.

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