solar powered laptop

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LimboMan

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

Re: solar powered laptop

Sun Dec 13, 2020 4:28 pm

> *Rudolf (./memberlist.php?mode=viewprofile&u=353741&sid=633f2eaa5a26ba97b50978aa45151654) wrote: ↑ (./viewtopic.php?p=1778831&sid=633f2eaa5a26ba97b50978aa45151654#p1778831)*
> *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.

Thank you for the tip. I thought it might lose some efficiency with the plastic but I will definitely let you know how much when I try it!

LimboMan

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

Re: solar powered laptop

Sun Dec 20, 2020 12:36 am

> *Rudolf (./memberlist.php?mode=viewprofile&u=353741&sid=633f2eaa5a26ba97b50978aa45151654) wrote: ↑ (./viewtopic.php?p=1778831&sid=633f2eaa5a26ba97b50978aa45151654#p1778831)*
> *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.

I received my polypropylene case but the solar panel is larger than the case, so it's not possible to measure solar activity under it unless i leave the lid open and cover the sides of the panel sticking out. Seems imperfect but I should be able to blot out the parts.

In a few days I will get my hammer header from Adafruit:
https://www.adafruit.com/product/3662 (https://www.adafruit.com/product/3662)

I am going to try to hammer it on the Pi Zero, since I wanted to save $6.75 instead of buying Zero W with the GPIO header. I might use a wifi and/bluetooth via a usb adapter later, but I was mainly interested in the Zero to test the total system power use with the 3.5" TFT which should be less than 2 watts. On the 3B+ it was pulling b/t 2-5 watts.

I don't expect the Pi Zero to go over 2 watts with the TFT, but it would be nice to use an e-ink like the WaveShare e-ink 10.1 via HDMI:
https://www.waveshare.com/eink-disp-103.htm (https://www.waveshare.com/eink-disp-103.htm) I am not sure how much power it requires though.

I imagine the battery life on such a laptop would be great though.

~~LimboMan~~

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

Re: solar powered laptop

Wed Dec 23, 2020 12:31 am

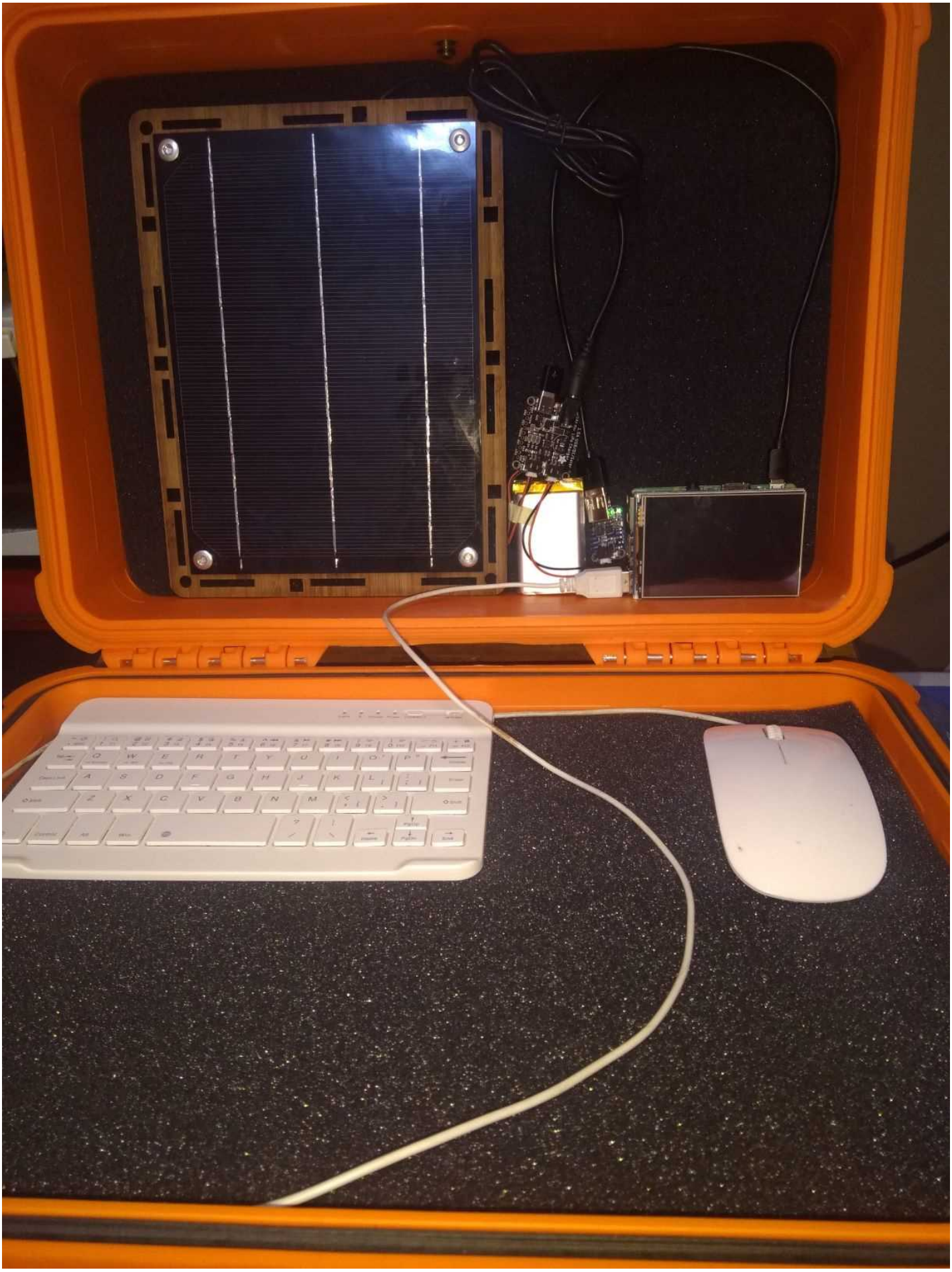
Update: I bought 30 new JST cables in the mail: https://www.amazon.com/gp/product/B07XNQBPY8/r
(https://www.amazon.com/gp/product/B07XNQBPY8/r)

I tested 3 cables yesterday, none of those worked. Today I tried a 4th one, and it lit up the Boost charger to power on the Pi!

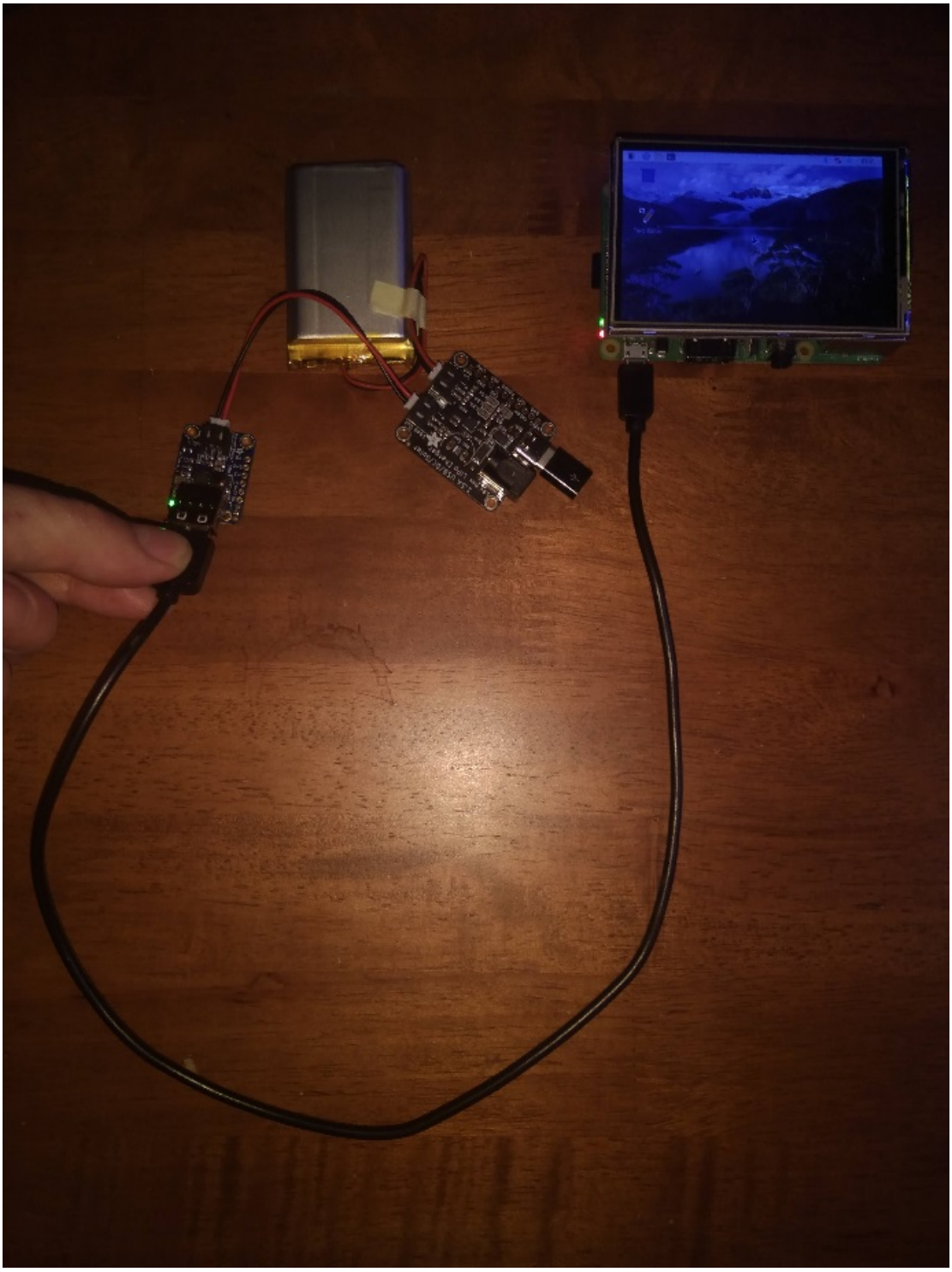
I've also confirmed the Lithium Battery can also power the Pi through the jumper cable from the Solar LiPoly charger to the Boost to the Raspberry Pi even when the USB/DC power source is unplugged.

Now I can start assembling the laptop case, so it actually looks like a laptop! No one will notice the difference, except the need for no plug 😉

Attachments



MVIMG_20201222_204952 (3)e.jpg (157.8 KiB) Viewed 1362 times



MVIMG_20201222_184546.jpg (146.72 KiB) Viewed 1373 times

~~LimboMan~~

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

Re: solar powered laptop

Thu Dec 24, 2020 11:51 pm

I will be moving this thread to the Other Projects board with a link to this thread. This will be my last post in this thread since I didn't start this one. Of course I could keep using it but I might as well start with some news: I was able to power the Pi Zero without a battery using no less than a 30watt solar panel by NusGear in midwestern winter weather with cloudy skies. In a way, it is positive result, because no panel before that I've tried has been able to do that without a battery- my 5W panel, and my 21W panel that also arrived from Amazon today.

Of course, the goal isn't to run it without a battery for future use, but to get an idea of the amount of current that it is able to do continuously- It powered right up with the 30W- the 21w didn't seem to blink the green activity LED in the first couple minutes of testing. It was 15 degrees out but I can test more tomorrow. So it appears the 30W was able to power continuously at least 50mA-150mA.

I'm aware .75watts needed for the Pi Zero is only 2.5% efficiency for 30W panels, but it was my first try.

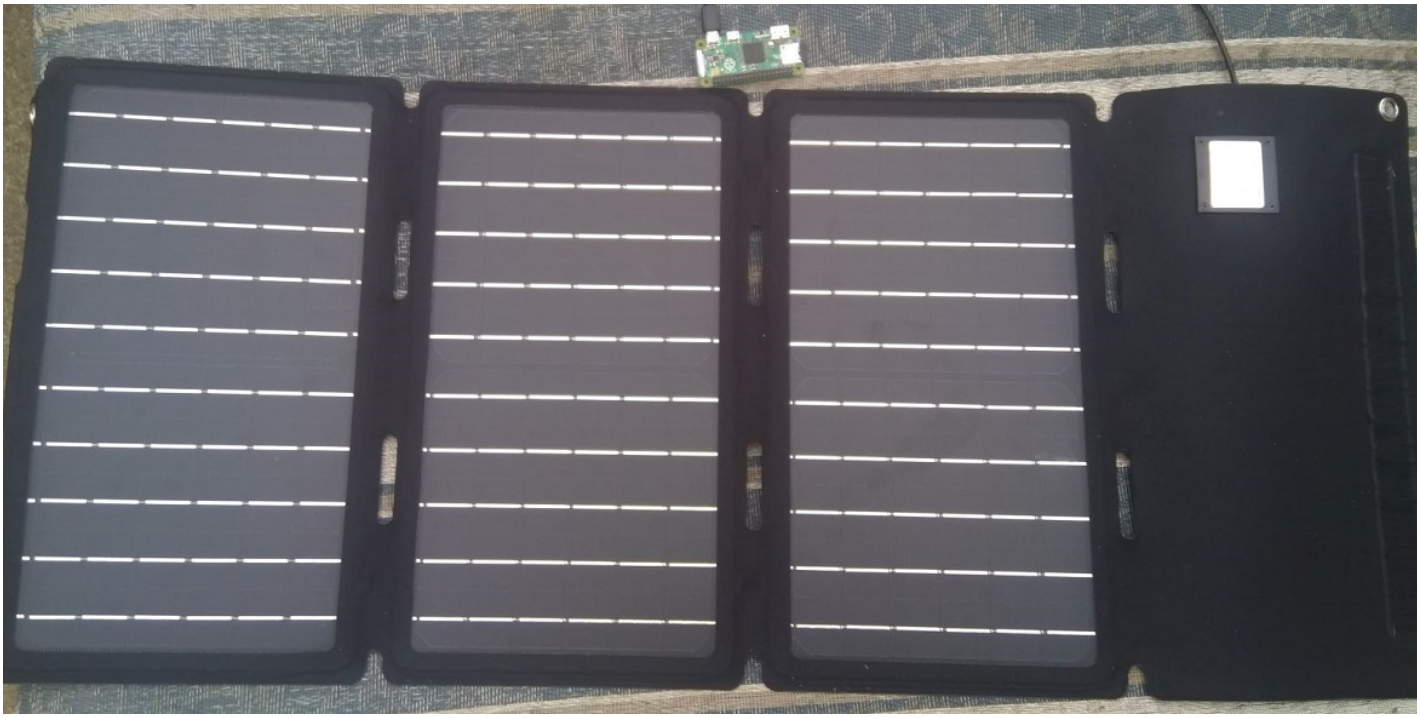
30W https://www.amazon.com/gp/product/B07ZV ... UTF8&psc=1 (https://www.amazon.com/gp/product/B07ZVDRQSR/ref=ppx_yo_dt_b_asin_title_001_s00?ie=UTF8&psc=1) (i got this one for $32 using a 50% off coupon!- I didn't initially see this one but i found it right after I bought the 21w and noticed it had more watts for less money).

21W https://www.amazon.com/gp/product/B07Y8 ... UTF8&psc=1 (https://www.amazon.com/gp/product/B07Y8CQWQD/ref=ppx_yo_dt_b_asin_title_002_s00?ie=UTF8&psc=1) (i got this one for $35- using an $8coupon)

The second one is able to power the Adafruit Universal Solar/Lipo Charger light (which my 5W was able to do), so I at least know it works. I imagine in sunny skies, even in winter, it might be able to power the Zero for a while, and maybe even a net replenishment on the battery while powering the Zero.

Attachments

MVIMG_20201224_135032charging.jpg (193.68 KiB) Viewed 1337 times



MVIMG_20201224_134742d.jpg (154.37 KiB) Viewed 1337 times

Last edited by LimboMan on Fri Dec 25, 2020 1:39 pm, edited 1 time in total.

Rudolf

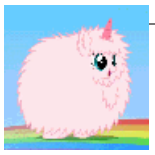
Posts: 169
Joined: Mon Nov 09, 2020 1:44 pm

Re: solar powered laptop

Fri Dec 25, 2020 11:10 am

Nice thing done!

For possible Futuregoogler I'd like to add one little remark, der 30W panel linked does work because it has a 5V solar regulator for USB built in. Do not try to hook up a Pi directly to a solar panel without proper regulator!



Gavinmc42

Posts: 7715
Joined: Wed Aug 28, 2013 3:31 am

Re: solar powered laptop

Sat Dec 26, 2020 1:44 am

Solar panel MPPT charges supercap, once charged the Zero power supply turns on.
https://www.instructables.com/Supercapacitor-Solar-Box/ (https://www.instructables.com/Supercapacitor-Solar-Box/)
https://electronics.stackexchange.com/q ... tor-buffer (https://electronics.stackexchange.com/questions/326271/solar-charging-with-a-super-capacitor-buffer)

There are some Lithium Titanate cells that look like super caps and some in 18650 size.
MPPT is what you will need to look at to get max output from the panels.

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

Sat Dec 26, 2020 2:12 am

> *Gavinmc42 (./memberlist.php?mode=viewprofile&u=81825&sid=633f2eaa5a26ba97b50978aa45151654) wrote: ↑ (./viewtopic.php?p=1785884&sid=633f2eaa5a26ba97b50978aa45151654#p1785884)*
> *Sat Dec 26, 2020 1:44 am*
>
> Solar panel MPPT charges supercap, once charged the Zero power supply turns on.
> https://www.instructables.com/Supercapacitor-Solar-Box/ (https://www.instructables.com/Supercapacitor-Solar-Box/)
> https://electronics.stackexchange.com/q ... tor-buffer (https://electronics.stackexchange.com/questions/326271/solar-charging-with-a-super-capacitor-buffer)
>
> There are some Lithium Titanate cells that look like super caps and some in 18650 size.
> MPPT is what you will need to look at to get max output from the panels.

Thanks, I had looked into capacitors before, but they are little over my head lol. For now.

As Rudolf has pointed out, I have a voltage controller on the panel which is why it was possible to charge at all without any additional MPPT or voltage regulator. The Adafruit Solar Lipo charger lets me charge a 3.7V battery and the Raspberry Pi at the same time: https://www.adafruit.com/product/4755 (https://www.adafruit.com/product/4755)

I tested the 21w panel today in the sun -in my parked car- was able to get a net charge on the kindle and battery & power the pi zero & 3B+ without a battery, suggesting 400-500mA in clear winter skies (approx 11:30AM).

The Adafruit solar lipo charger has an MPPT-like function:
" The charger chip is super smart, and will reduce the current draw if the input voltage starts to dip under 4.5V, making it a perfect near-MPPT solar charger that you can use with a wide range of panels."
"The bq24074 which powers this design is great for solar charging, and will automatically draw the most current possible from the panel in any light condition Even thought it isn't a 'true' MPPT (max power point tracker), it has near-identical performance without the additional cost of a buck-converter. Our detailed tutorial on this charger includes a design document explaining how it all works."
https://learn.adafruit.com/adafruit-bq2 ... sign-notes (https://learn.adafruit.com/adafruit-bq24074-universal-usb-dc-solar-charger-breakout/design-notes)

I find it very useful because I didn't have a multimeter, and it has two LEDS, a "good" green light to indicate there is voltage, and a 2nd red light to indicate it is charging or providing power to a load (whether battery or other device). When a 3.7v battery attached to it is full, the red charging light simply turns off. This turned out to be quite revealing, which I'll explain after I started charging the Kindle.

When I plugged in the Solar Panel to the The Kindle it went from 96-97% in the first few minutes. But then I put the panels on the dashboard, instead of by my side window. It still had the lightning icon indicating charging, but it went from 97 to 96, then 95. I couldn't figure out why (This was in airplane mode with no frontlight enabled), but I realized the panel wasn't getting enough sunlight because it was not perpendicular to the sun. I hadn't realized how important this was because all the Kindle showed was that there was a charge, without saying it was using more power to run it than it was being replenished. When I plugged the solar DC lipo charger back in, I could see exactly when the red (charging) light would turn on after a certain angle was tilted on the solar panel. With the kindle, it would only show a lightning bolt, and no indication of positive or negative net charge. It's nice to know the minute change with the lipo, but a third level of accuracy would be a solar tracker, which automatically rotate and tilt the panels to get the maximum solar energy. This is something that could be and has been made with an Arduino project. The PowerJive will allow me to manually adjust it periodically since I can observe the amps in realtime. https://www.amazon.com/SUNER-Adjustable ... 9LSMN?th=1 (https://www.amazon.com/SUNER-Adjustable-Solar-Panel-Mount/dp/B07RW85NL3/ref=psdc_13638744011_t2_B07Y49LSMN?th=1)

~~LimboMan~~

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

Re: solar powered laptop

Sat Jan 02, 2021 2:43 am

I've moved this thread to the Other Projects:

viewtopic.php?f=41&t=296208 (https://www.raspberrypi.org/forums/viewtopic.php?f=41&t=296208)

I've added some display & laptop research to this e-ink forum: https://forum.ei2030.org/t/e-ink-low-po ... ame-lid/82 (https://forum.ei2030.org/t/e-ink-low-power-cpu-solar-power-3-sides-of-the-same-lid/82) This project doesn't have a single "home" page/thread, but the above two links are current for now.

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