

Homemade solar harvester to power your outdoor projects.

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<html> This will be a post containing detailed instructions on building a solar harvester. <div class=„separator c2“></div>
 Solar harvester is a device that takes in solar power - in most cases it utilizes solar panels, but there exist thermal non-electric variations too - and stores it for future use - again, usually in a battery. Solar panels can only source minuscule amounts of current, that's why some preliminary conversions have to take place in-between solar panel and battery. Feeding the panel's output directly to battery terminals would just collapse solar panel voltage, and no charging would ensue. <p> The resulting gizmo can be put to use to supply juice to your low-power devices otherwise barred from other power sources such as mains - be it deep in the woods or even your balcony/terrace.</p> <p>Here are the main requirements I had in mind while designing this thing:
</p> Parts are easy to source locally or order online (e.g. ebay, aliexpress). Low-cost bill of materials. Can be mounted anywhere. Both the angle of inclination and orientation can be tweaked effortlessly. This requirement arose from the fact that the optimal tilt angle depends not only on your location, but also on the season (and even month or day, if you want to fine-grain it). Here's a handy link to determine yours: <a href=„<http://www.solarelectricityhandbook.com/solar-angle-calculator.html>“ target=„_blank“>Optimal angle calculator Water- and dust-proof (IP56 or better). Suitable for outdoors, that is.
<table align=„center“ cellpadding=„0“ cellspacing=„0“ class=„tr-caption-container c5“><tbody><tr><td class=„c4“></td> <td class=„tr-caption c4“>My early dabbling in solar power gathering, something that later crystallized into the device you're reading about. </td> </tr></tbody></table>
 To satisfy the first two of them, I'd rummaged in my parts drawer, found a LiPo battery in a holder and ordered everything else from China. Why couldn't just I fish more from the parts bin? Well, this can probably be explained by the two remaining requirements. Also, the parts we'll be needing are quite specific to our application (it's not like we're going make the harvester out of a handful of transistors). That being said, here goes the ... <h4>Bill Of Materials</h4> <div class=„separator c2“><br class=„Apple-interchange-newline“/></div>
1) CN3065 solar charger board. [<a

href=„<https://www.aliexpress.com/item/32905496351.html>“ target=„_blank“>link]
<div class=„separator c2“></div>
 Heads-up for those who don't have heaps of JST connectors hoarded at home: note how much connector cables comes with the package. For instance, <a href=„<https://www.aliexpress.com/item/32905496351.html>“ target=„_blank“>this lot has three, but <a href=„<https://www.aliexpress.com/item/32884724839.html>“ target=„_blank“>those <a href=„<https://www.aliexpress.com/item/32961469377.html>“ target=„_blank“>two have only one - this may come as a nasty surprise if you don't usually read detailed descriptions to Aliexpress items, and you'll have to waste more time to find <a href=„<https://www.aliexpress.com/item/32885830887.html>“ target=„_blank“>those extra cables. <p> We're picking this one first as the choice of a chip capable of handling a certain wattage is going to cap the current output of our solar panel. CN3065 can safely handle 4.4 to 6 Volts at 500mA, so naturally, you'd want to source a ...</p> <p>2) 6V 500mA solar panel. [<a href=„<https://www.aliexpress.com/item/32881064543.html>“ target=„_blank“>link]</p> <div class=„separator c2“></div>
 Find the one with dimensions exactly 145x145mm. - that way you can reuse my 3d-printed enclosure for it. <p>3) Lithium battery - 18650 is the most commonly encountered type of detachable battery. You might find one inside an old power bank you're not using anymore. [<a href=„<https://www.aliexpress.com/item/32807032859.html>“ target=„_blank“>link]</p> <div class=„separator c2“></div>
 Make sure to grab a holder for it as well [<a href=„<https://www.aliexpress.com/item/32847696147.html>“ target=„_blank“>link] <div class=„separator c2“></div>
 Again, if you find a holder looking exactly like mine (with hole for mounting in dead center), you won't need to modify any 3D models to make it work. <p>4) Waterproof connector. SP16, 2 pin variety. [<a href=„<https://www.aliexpress.com/item/32915527313.html>“ target=„_blank“>here or <a href=„<https://www.aliexpress.com/item/32884651751.html>“ target=„_blank“>here or <a href=„<https://www.aliexpress.com/item/32915527313.html>“ target=„_blank“>maybe here]</p>

<div class=„separator c2“></div> <p>5) Three 3D printed parts: solar panel holder, back lid (with electronics mounted on it) and a tiny bar to fix the solar charger board to the enclosure.
</p> <div class=„separator c2“><br class=„Apple-interchange-newline“/></div>
 Now, 3D printed parts are not necessarily watertight, although they can just happen to turn out this way - due to the nature of additive manufacturing process underlying 3D printing. We don't want to rely on finicky chance, and achieving 100% watertightness in 3D-printed parts usually involves advanced trickery. <p> To sum up, you can do either of those to waterproof your 3D print:</p> Slightly overextrude while printing. Try <a href=„<https://www.fabbaloo.com/blog/2017/10/19/waterproofing-your-3d-prints>“ target=„_blank“>these <a href=„<https://www.instructables.com/id/3D-Printing-Make-Water-Tight-and-Air-Tight-Contain/>“ target=„_blank“>links to read up on it. Printing in ABS and <a href=„<https://hackaday.com/2017/03/23/the-latest-in-3d-printed-part-smoothing-use-a-brush/>“ target=„_blank“>smoothing the part with acetone. <a href=„<https://en.wikipedia.org/wiki/Epoxy>“ target=„_blank“>Epoxy coating (actually, I suspect that a wider variety of coating materials can be used successfully, such as <a href=„<https://en.wikipedia.org/wiki/Cyanoacrylate>“ target=„_blank“>cyanoacrylate glue, varnish or spray paint).
 I'm a lazy person, so I didn't want to waste time learning and perfecting the first method. Versatility is also something I value in my builds - if you can't quickly find a certain tool or part, just replace it with a similar one and it will work as well - that's why I passed over acetone smoothing. Most people print in PLA now, anyway. <p> So we'll just coat every part in epoxy and plaster the seams with silicone. Therefore it does not matter which material to print out of: any plastic will do. Slicer settings (infill percentage etc.) are also irrelevant. 3D print not falling apart when you grab it? Consider it a passing mark 😊.</p> <p> Alternatively, try either overextrusion or acetone smoothing, and coat the parts with epoxy on top of it. I believe it will be a nice and almost effortless additional measure against moisture, guarding you from any mess-ups in more involved methods.</p> <p>6) Small screws, two-component epoxy, any silicone sealant (sanitary, food-grade, automotive gasket maker - whichever you manage lay your hands on).
</p> <div class=„separator c2“><br class=„Apple-interchange-newline“/></div>
 Quite confusingly, the picture above also includes a silicone baking form. What on Earth do we use it for? Well, this one can be explained by of my quirks that you may or may not want to adopt after an explanation. <p> Over the years of tinkering, I occasionally found myself in the need of inconventionally-shaped washers or gaskets. Sometimes the

href=„<https://github.com/panovvv/solar-harvester-145x145>“ target=„_blank“>link to the Git repo with all source files. Modifications, pull requests and replications are more than welcome! 😉 <p> There's something else I added to this build as an experiment:</p> <div class=„separator c2“></div>
 Know those silica gel bags they put in shoeboxes all the time (not a toy, don't swallow etc.)? They're supposed to absorb water from surrounding air. Since I'd assembled the device in an open atmosphere with certain humidity levels present in air, I thought I'd give one of those bags a try to let them suck up any condensing moisture when outdoor conditions change. Does it work? Time will tell. <p> A couple of pictures of finished product:
</p> <table align=„center“ cellpadding=„0“ cellspacing=„0“ class=„tr-caption-container c7“><tbody><tr><td class=„c4“></td> <td class=„c4“></td> </tr><tr><td colspan=„2“ class=„c4“></td> </tr></tbody></table> <h4>Railing mount</h4> <div> Each and every source file for <a href=„<https://github.com/panovvv/balcony-railing-clamp>“ target=„_blank“>my railing mount is located on Git too..</div> <div>
</div> <div class=„separator c2“></div>
 Footnote: I'd like to express my gratitude to <a href=„<https://hackerspace-krk.pl/>“ target=„_blank“>Hackerspace Krakow for letting me use their 3D printer and all kinds of other tools, and also for the great company. </html>

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