

SOLAR BIKE

Field Report



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When I was working as a researcher for the Institute for Future Research in Gelsenkirchen, Germany, some years ago, I had the idea of a solar bicycle based on the concept of a tricycle with a box for transportation between two wheels in the front and one wheel in the back. The idea was basically: "A car up front and a bicycle in the back".

As soon as I had enough money I bought an old Christiania bike, batteries, an electric motor and a pedelec-controller (Pedelec means, that the motor is controlled by pedeling and not by a throttle: pedal-electric). Later I added solar panels to the electric bike. I tested this construction more more than two years and was utterly surprised by the convenience of the bike - not only in the summer but also, to my own surprise, especially in the winter.



Pic. 1: Noah with a friend enjoying the blue leather armchair on the SoFa, while it is charging in the sun.

First of all, it is a joyful feeling to chauffeur somebody else around on your bike and still be faster than most other bikes with a minimum of effort. The motor accelerates the bike to about 25 km/h (about 16 miles/h).

It's also convenient to not only be able to have an extra passenger but also a lot of stuff under the seat in the wooden box up front, such as a blanket, a little picnic bag, some toys for the children or the shopping.

I called the solar bike SoFa, because Solar Bicycle is “**Solar Fahrrad**” in German and I had this wonderful blue artificial leather armchair installed in the front, which is “Sofa” in German.

The SoFa is especially practical for transporting children, because you always have them in your eye sight and you can fit at least two children on the big seat. Sometimes I had as many as four or five children in the seat. The children always loved to be trundled around on the SoFa, which also was fun for me thanks to the extra power boost from the electric motor.

During the winter, driving the SoFa was especially positive, because of the stability and security provided by the three wheels. Even when there was ice on the streets in Berlin or even worse weather such as rain and sleet, when nobody could even walk on the streets, the SoFa took me safely home.

Because of the weight of the batteries, the SoFa would go through the ugliest snow easily. The box up front protects the rider from wind and rain. Shoes do not get as wet as they usually do on a bike when you come into a sudden downpour. With a rain cape, the rider is totally protected from the elements. And the solar cells work on sunny winter days as well, even though the SoFa had to be charged in winter more often than in the summer. There aren't many sunny days during a Berlin winter. But, in sunny parts of the world, keeping the SoFa charged should not be a problem at all.

All in all, the SoFa based on a Christiania Bike is the best everyday solution I have come across during all my years as a biker. It gives you a lot of advantages compared to a car when traveling in and around your neighborhood, especially in crowded cities like Berlin. You don't have to worry about finding a parking place, getting a parking ticket, or getting stuck in traffic jams. Which vehicle allows you to drive right up in front of the supermarket and lets you drive away with the whole weekend shopping for the whole family?

It is especially useful that the SoFa is still considered a bicycle by law, so you can use the sidewalks or can go through road closures which are often prohibited for cars in the city. This is especially useful if you are traveling short distances in narrow urban streets or making several stops within short distances, like dropping off the kids for kindergarten, doing the shopping and loading it off at home, then grabbing a quick coffee in your favorite café....

The SoFa is the ideal vehicle for the inner city. The metal construction around you and the big box up front makes you feel much safer than on a normal bike. Because of the pedelec-controller you do not need much power for pedaling. Rather the pedaling is like a switch for the motor: Once you start pedaling the motor will help you go forward. So driving is as effortless as you want it to be, you yourself decide how much energy is used by the batteries and how much you want to pedal.



The only issue I found with the SoFa was the batteries, which would give me trouble after some time. This was due to the fact that I used the cheapest car batteries around (14 Euro a piece), which are not built for this kind of use. I strongly recommend getting high-quality batteries, if you can afford it. Longer battery life and more capacity would certainly help increase the maximum distance the SoFa could go. With cheap car batteries the maximum range was about 35 km (22 miles) on a cloudy day and about 50 km (31 miles) on a sunny day (in the mostly flat Berlin city streets and with my help from pedaling). One full charge of the batteries at the power plug costs about 10 cents for about

700 Wh. Because we have solar power on the roof at our house of Luisenstadt in Berlin Kreuzberg, I always used the power plug with a good conscience.

Because of my positive experience with the SoFa in my everyday life, my colleague Herbert Riemann has designed a upgraded version of the SoFa which also integrates more solar panels.



Pic. 2, 3 & 4: Design for a new SoFa (Source: Herbert Riemann, www.mobikon.de)

From an ecological perspective the SoFa is by far better than any automobile. The SoFa has an electric motor of approx. 250 W. A motor vehicle today has easily a installed motor power of 250 kW or more: a factor 1000!

And the only energy it needs comes directly from the sun!