Bicycle iPod Charger

a sidewall dynamo powers both lights and tuneage

by Mark Hoekstra

After buying an iPod mini a couple years ago, I started experimenting with ways of extending its battery life...

First I tried the perfectmate hand-cranked flashlight/charger, only to find that it takes up to 20 minutes of cranking to generate just enough power to boot the device. As well as making me appreciate how much power today's lithium-ion batteries can hold, this got me thinking about other ways to human-power my iPod.

I live in Holland, where bicycles are one of the most popular means of transport. A typical Dutch bike has the old lighting system, which consists of front and rear light bulbs powered by a 6V dynamo that runs off a friction wheel on the front tire. So I got the idea to open up the flashlight charger, find out where the dynamo connects to the PCB, and connect my bike dynamo there.

The iPod mini takes a USB-standard 5V and can handle up to 6V. The hand crank charger nominally supplies 6V or a little more. Its battery pack stabilizes the current it produces, but there's no regulator to limit its output voltage. So I needed to add something to prevent the charger from possibly damaging my iPod with excess power. I first thought of a voltage regulator IC like an LM7805, but these are designed to step power back from much higher levels. Instead, I simply used a Zener diode, which cuts off everything above 5.1V. I wired the output to a female USB connector to let me connect the iPod with its included USB charging cable.

For a detachable enclosure—so I could remove the system from my bike while it was parked—I considered an Altoids tin. Those are hard to find here, but i did have a couple of old Apple mice, so I decided to use the a mouse case. I found that an S-video female connector fits perfectly onto an ADB (Apple Desktop Bus) connector, so I left the mouses's cable intact. Inside the case, I wired up the hand-crank charger's PCB and battery along with my voltage regulator and the USB port for the iPod. The charger also had a neat little charging light, which found its way onto the back end of the mouse.

On my bike, I connected the dynamo to an S-video plug that hangs from my handlebars. That's where I connect my mouse unit, and then I plug the iPod into the other end of the mouse. Both iPod and mouse charger are kept protected by iPod socks, one of which I embroidered with a skull design.

Then I started thinking it would be silly to have a working dynamo on my bike and no lights, and even sillier to run LED lights with batteries while riding with the dynamo on. I did some voltage probe experimenting with an identical hand-crank flashlight, and found that when you switch the light on while cranking, it stops supplying voltage to the charging jack, and when you switch the light back off, charging resumes. This meant that my charger could easily work the same way.

I opened the charger moouse back up and connected two more wires from the ADB cable to the contacts for the flashlights charger's light. On the other side, I split these contacts into two pairs that supplied front and rear LEDs for the bike, which fit where the original bulbs had been.

Finally, I wired the mouse button to the contacts for the flashlight charger's light switch. So the mouse button has one function: switch between turning on the bike light and charging the iPod. In theory, you could run into trouble at night, with no more music and a long way from home. But during the one and a half years I've been using my charger, this has never happened.

Mark Hoekstra has a passion for technology and the urge to control and combine whatever he lays his hands on. This results in some original projects you can see at geektechnique.org.