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10 Brilliant Redesigns for the Bicycle

The bicycle is the near-perfect vehicle, but that doesn't stop people from (brilliantly) messing with the design to increase speed, comfort or desirability to commuters. Here are 10 innovative variations on the bike.

BY JEREMY REPANICH



Varna Tempest

After moving to Toronto from Belgrade in the 1970s, sculptor [Georgi Georgiev](#) found inspiration in a [Popular Mechanics](#) article he read about the [Human-Powered Speed Championship](#), a competition that pitted the fastest pedal-powered vehicles against each other. Since then he's been trying to design his own version, taking cues from the world around him to shape the aerodynamic carbon fiber and Kevlar shell built around a low-profile recumbent bicycle. "I looked at nature and the shapes of

the things that moved efficiently through fluids, air or water, with a dolphin being a good example," he says.

Each year Georgiev takes the latest version of his Varna human-powered vehicle to Nevada, where Canadian cyclist Sam Whittingham squeezes himself into the shell to make an attempt on the speed record. In September, Whittingham broke his own mark, pedaling the Varna Tempest to a top speed of 82.819 mph. Underscoring the effectiveness of his aerodynamic bicycle design, Georgiev says, "we're using a half horsepower to move over 80 mph."



AutoVelo

An Excellence Award winner at 2010 International Bicycle Design Competition, the AutoVelo, created by [SpeedStudio Design's](#) founder, Erik Stoddard, is a hybrid electric recumbent bicycle that's more upright than traditional versions to mimic the seated position in a car. "Most recumbent bikes sit lower to the ground, but the

AutoVelo is actually modeled off the seating position of a small SUV so you're a little higher off the ground, so you can see in traffic and you can be seen," Stoddard says. "It's designed for people who like to drive but want the ease of use in a crowded urban environment."

In another tweak to the recumbent, Stoddard designed the pedals to power the front wheel instead of the rear; however, there is a motor that turns the back tire. He also shortened the traditional recumbent's wheel base to increase the bike's maneuverability, making it easier to direct through city traffic.



ElliptiGo

Most cyclists and gym-equipment enthusiasts would ask why anyone would ever want to combine a bicycle with an elliptical machine. Engineer and ultramarathoner Brent Teal's answer may not satisfy the diehards, but he can tell you just how to do it. After a year spent building five prototypes out of off-the-shelf steel tubing, abandoned bike parts and skateboard decks, and riding thousands of test miles on these DIY bike mashups, Teal built ElliptiGo, the first ever bike-cum-elliptical

machine.

One of the most difficult parts of building this bike, which was the brain child of injury-plagued Ironman athlete Bryan Pate, was getting the long stride length, Teal says. To extend the frame and create an adjustable platform, Teal designed a long span in the middle of the bike that was light and rigid. Crank arms attached to this platform are made from 7000-series aluminum, and to keep it light, the platforms that hold bikers are made of carbon fiber. The ElliptiGo stride length is adjustable from 18 to 25.5 inches so it can accommodate different rider sizes and preferences.

One thing can be said about the ride: The bike moves like nothing else on the road. It's surprisingly agile when taking turns, and smooth when accelerating. While standing and biking is at first awkward, it gives the rider better vision, although it's not made for mobile efficiency—a strenuous workout is a given. The ElliptiGo will be for sale in July 2010 for about \$2200. -*Tygha Trimble*



Lexus Hybrid Bicycle Concept

At the 2009 Tokyo Motor Show, Toyota's Lexus brand unveiled this Hybrid Bike prototype, complete with a 240-watt motor powered by a 25.9-volt lithium-ion battery. The bike has the ability to recapture kinetic energy to recharge its battery when the brakes are applied, a common feature in most hybrid

vehicles, but certainly rare in bicycles. But to Stoddard it's a bit of an oddity for an electric hybrid bicycle, which he says usually focus more on comfort. "It's a beautiful design, but it [has] a very aggressive riding position more typical to a racing bike," says Stoddard. "That's counterintuitive to what an electric bicycle is offering, which is an easier riding experience."



Mini-Penny

From the California-based tinkering collective Krank-Boom-Clank, the makers of the [Hennepin Crawler](#) who purport to create "kinetic conveyances of whimsy," comes the Mini-Penny, a small-scale version of the old-timey penny farthing bicycle. Invented in 1870, the original penny farthing came into vogue because in the days before chain-driven bicycles, its trademark large front wheel, which had pedals attached directly to the hub, multiplied the pedal power of cyclists more effectively than

previous bikes. However, the penny farthing's popularity lasted only about 20 years, until the advent of the safety bicycle. This new model featured a chain and sprockets that allowed for speed equal to the penny farthing, but with smaller wheels that made it safer to ride.

Krank-Boom-Clank has reimagined the 19th-century bicycle with their miniature version. Made from salvaged parts from conventional bicycles as well as a fixed-crank unicycle hub that comprises the front wheel, Mini Pennies "are designed for balance, and can be ridden well slower than a walking pace," says Cliff Hill, the bike's builder. Hill adds that the art collective plan to build more of the bikes to supply the public with a "gaggle of miniature Penny Farthings for leisurely mayhem."



Collapsible Bike Concept by Blair Hasty

A finalist in the 2004 International Bicycle Design Competition, Blair Hasty crafted his bike to take the pressure off of a rider's back by seating them in a prone position. "In traditional bike designs, the rider's feet are underneath them causing their torso to hunch forward in order to reach the handles; this results in unnecessary strain on the lower back, arms and buttocks, not to mention poor aerodynamics," he says.

To allow for this prone position, Hasty moved the pedals out from under the writer moving them to the back tire. Additionally, because he designed the entire bike folds down to make it easier to use

as a commuter bike.



protests from riders and manufacturers of conventional bikes against a recumbent holding cycling records, the sport's governing body, Union Cycliste Internationale, banned the design, forever ruling it out of events like the Tour de France. However, the recumbent bike remains popular with riders who want to trade the old-fashioned saddle for a seat that better supports their back, and among those chasing human-powered vehicle speed records.

Recumbent Bicycle

Invented in the late 1800s, the recumbent bicycle maintained a reputation as a bicycle built for comfort instead of speed until the 1930s, when French inventor Charles Mochet's version began to win races and claim speed records against traditional upright bicycles. Mochet's recumbent gave cyclists a more aerodynamic position, moving them closer to the ground, with the seat back allowing the riders to recline. However, amid



VW Electric Bicycle Concept

This all-electric bicycle from Volkswagen has about a 12-mile range on a single charge. The German automaker unveiled the bike at the 2010 Beijing Auto Show and showed that it could fold up small enough to fit into a car's spare tire well. "I thought it was really interesting that a car company thought of this idea to combine two modes of transportation," Stoddard says. "In many urban areas, driving is prohibitive when it comes to parking and

congestion fees, so this creates a scenario where you park your car outside of the city and have this electric bike take you the rest of the way."



HMK 561

Berlin-based designer Ralf Kittman's built his bike with carbon fiber, which does more than give it a strong lightweight frame. Carbon fiber's conductivity and

"special layer structure make it possible for the energy from driving to be stored directly in the frame," Kittman says. That energy powers motors in both the front and rear wheels, which are split so that they're bisected by swing arms that connect to the wheel hubs. Much like the Lexus Hybrid Bike Concept, the HMK 561 can regain energy when it brakes. Kittman began designing the bike in 2007 and has built a prototype, but has yet to finalize the design so it could go into production.



Strida Bicycle

Created by British designer Mark Sanders in the early 1980s, the Strida went into production in 1987, changing the classic bicycle shape to accommodate easy collapsibility. Stoddard, who uses a Strida to commute while he does design work in Korea, says that although the bike is slower compared to conventional models, the Strida "accelerates and gets to top speed quickly. It's also extremely maneuverable because of its short wheelbase and small wheels that turn on a dime." Stoddard

adds that the design causes riders to sit more upright, giving them better visibility in traffic.

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