Bicycle race

20 August 2010 | By Siobhan Wagner

With the rise in popularity of urban cycling, engineers in the UK and US are promoting new bike concepts they say are better equipped for navigating city streets.

The teams from the UK and US are competing in the international James Dyson Award for engineering design, according to the short listed projects announced earlier this month.

It remains to be seen whether either will make the final list, which will be released in mid-September. The international winner will be announced here on 5th October.

While the UK’s concept aims to increase bike stability and maneuverability with different sized wheels, the US cycle is built with a regenerative technology that stores energy every time the rider puts on the brakes.

The UK bike, called the Lunartic, is designed with a large back wheel which provides a gyroscopic effect, helping cyclists travel faster and keeping more contact with the road. This, its designer says, ensures a more stable and comfortable ride. The smaller front wheel gives the bike more maneuverability.

An interesting touch is the wheel at the back is hubless and it’s driven by a toothed track inside the wheel. According to the designer, ‘Moving the working parts back, inside the rear wheel shortens the wheel base but maintains large wheel performance and there is no sacrifice to conventional geometry.’

It also creates a new space, the designer adds, and an intriguing aesthetic.

Across the pond in the US, a small team of students at the SENSEable City Lab at MIT are presenting the ‘Copenhagen Wheel’ as a new way to transform existing bicycles into hybrid electric-bikes with regeneration and real-time sensing capabilities.

The rear wheel contains a sleek red hub that contains a motor, batteries and an internal gear system. This system stores energy every time the rider puts on the brakes, and then gives that power back to provide a boost when going uphill or to add a burst of speed in traffic. The boost power essentially makes it easier for riders to pedal.

As reported in The Engineer in December last year: ‘There are also a variety of extra functions hidden within the hub of the new wheel,'
which is designed to be easily interchangeable with any standard bicycle’s rear wheel.

‘By using a series of sensors and a Bluetooth connection to the user’s iPhone, which can be mounted on the handlebars, the wheel can monitor the bicycle’s speed, direction and distance.’

The MIT students plan on spinning the technology out of a university environment so that it is ready for market in approximately 12 months time with an estimated cost of $600 per wheel.

Readers' comments (24)

- hivealka | 20 Aug 2010 1:47 pm
  What if I don't have or want an i-phone? And what will be the increased weight of the Copenhagen Wheel?

- AT | 20 Aug 2010 2:11 pm
  Well Hivealka, if you don't have an iphone, then you can't get the readings - but it doesn't look as if not having an iphone would mean it not working. If you are not that into technology, then you are unlikely to be interested in this innovation anyway are you?

- Paul Hitchen | 20 Aug 2010 2:13 pm
  Looking at the Lunartic bike, I'm intrigued to understand how one might change the tyre or fix a puncture on the back wheel?

  One assumes also that the bearing surface is also way out at the edge of the wheel as well. This would make sealing it harder as the velocity will be higher and the seal more prone to coming into contact with water and dirt/grit.

  Copenhagen wheel - only connects to an i-phone, and costs $600. That seems to be limiting it's appeal somewhat. You can buy a very nice light set of wheels for $600

- John | 20 Aug 2010 2:24 pm
  Re - Lunartic

  Did we learn nothing from the cautionary example of the Raleigh Chopper, grossly unstable.

  Sadly for concept bicycle designers, the original victorian design was pretty near the mark and has been incrementally improved to near optimal ever since.

  Why do these designs always reject wheel hubs too? The problems of rim supporting a wheel are huge.
william towner | 20 Aug 2010 2:31 pm

I don’t know about the Lunartic wheel. It certainly looks interesting and would make heads turn. on the minus side though the gearing looks low. How would gears be implemented? The bottom bracket and hence the feet look low for urban cycling over bumps. The small front wheel increases maneuverability but also increases the impact of hitting kerbs and bumps. What can you do with the space in the wheel? About half of it is taken up by the foot sweep clearance. The rear wheel must be more expensive than a standard rear wheel due to the extra material, machining and forming requirements. What happens if you cycle into a kerb at 15mph does the frame buckle and you have to buy a new frame rather than just a need new wheel?

Stuart Nathan | 20 Aug 2010 2:38 pm

The Copenhagen Wheel does seem to be a lot of extra weight for not much benefit. Most bikes already have a built-in power boost system for going uphill. It's called 'the gears'.

John | 20 Aug 2010 2:46 pm

I think I’ve figured out the lack of hubs:

Spokes are difficult to draw properly.

(Sadly they also work rather well too)

matthew | 20 Aug 2010 2:59 pm

The prospect of trying to hit 40mph downhill on the lunartic is positively scary, the front wheel looks tiny! As for the Copenhagen wheel, I could see that catching on, much more appealing than the rather large and ugly electric bikes that you see dotted around, although if I were to spend $600 on a rear wheel it wouldn't look anything like that..

Hamish Mead | 20 Aug 2010 3:24 pm

Great engineering projects in their own right, but both are complete designPorn. I hate to be a killjoy, but if ever there were a time design schools need to revisit (the economics of) simplicity, now is it. I urge these young designers to get a job (OK, easier said than done) - any job in any industry except 'design', find out the real needs of real people, then go design some useful stuff that doesn't need to molest an iPhone via Bluetooth.

S. Martin | 20 Aug 2010 4:03 pm

There seem to be a number of positives with this concept, but also a number of other non highlighted negatives. What happens if the rider applies a burst of power at the wrong time, surely this will lead to it confusing motorists and causing accidents.
The bike also looks more unstable with its large rear wheel and smaller front wheel, the Raleigh Chopper has already been cited as an example. What about the brakes? are they to be up to the task, and will the tyres have sufficient traction to grip under hard braking.