

MIT'S BIG WHEEL IN COPENHAGEN

New bicycle wheel not only boosts power using Formula One inspired technology, but also can keep track of fitness, friends, smog and traffic - helping Copenhagen become the first carbon neutral capital by 2025

It looks like an ordinary bicycle wheel with an oversized center. But packed inside the sleek, bright red hub is a veritable Swiss army knife's worth of electronic gadgets and novel functions.

The Copenhagen Wheel, designed by researchers at MIT's Senseable City Lab, will be presented at the Copenhagen Conference on Climate Change on December 15, 2009 before heads of state and mayors from all over the world. It can store energy every time the rider brakes and then give that power back to provide a boost when going uphill or to add a burst of speed in traffic. "The wheel uses a technology similar to the KERS (Kinetic Energy Recovery System), which has radically changed Formula One racing over the past couple of years. When you brake, your kinetic energy is recuperated by an electric motor and then stored by batteries within the wheel, so that you can have it back to you when you need it." - explains professor Carlo Ratti, Director of the MIT Senseable City Lab.

"The bike wheel contains all you need so that no sensors or additional electronics need to be added to the frame and an existing bike can be retrofitted with the blink of an eye. In a sense, you drive by foot: when you pedal forward the motor supplements your torque; when you pedal backwards to brake, the motor starts regenerating electric energy while reducing your speed."

The first goal of the Copenhagen Wheel is to promote cycling by extending the range of distance people can cover and by making the whole riding experience smoother so that even steep up-hills are not longer a barrier to comfortable cycling. According to Ritt Bjerregaard, Lord Mayor of Copenhagen, "our city's ambition is that 50% of the citizens will take their bike to work or school every day. So for us, this project is part of the answer to how can we make using a bike even more attractive."

But there are also a variety of extra functions hidden within the hub of the Copenhagen 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 traveled, as well as collect data on air pollution and even the proximity of the rider's friends. "One of the applications that we have discussed with the City of Copenhagen is that of an incentive scheme whereby citizens collect Green Miles - something similar to frequent flyer miles, but good for the environment," comments Christine Outram, who led the team of researchers at MIT.

The project aims to create a platform for individual behavioral change. "The Copenhagen Wheel is part of a more general trend: that of inserting intelligence in our everyday objects and of creating a smart support infrastructure around ourselves for everyday life," comments Assaf Biderman, Associate Director of the Senseable City Lab. "The Wheel also has a smart lock: if somebody tries to steal it, it goes into a mode where the brake regenerates the maximum amount of power, and sends you a text message. So in the worst case scenario the thief will have charged your batteries before you get back your bike."

The initial prototypes of the Copenhagen Wheel were developed along with company Ducati Energia and the Italian Ministry of the Environment. It is expected that the wheel will go into production next year, with a tag price competitive with that of a standard electric bike. According to Claus Juhl, CEO of Copenhagen, the city might place the first order and use bicycles retrofitted with the Copenhagen Wheel as a substitution for city employee cars as part of the city's goal to become the world's first carbon-neutral capital by 2025.

The Copenhagen Wheel team at MIT is composed of Christine Outram, Project Leader, Rex Britter, Andrea Cassi, Xiaoji Chen, Jennifer Dunnam, Paula Echeverri, Myshkin Ingawale, Ari Kardasis, E Roon Kang, Sey Min, Assaf Biderman and Carlo Ratti. The project was developed for the City of Copenhagen in cooperation with Ducati Energia and with the support of the Italian Ministry for the Environment.

Patti Richards
Director, Media Relations
MIT News Office
Massachusetts Institute of Technology
77 Massachusetts Ave., Room 11-400
Cambridge, MA 02139

tel: 617.253.8923
main:617.253.2700
prichards@mit.edu