

Design team has revealed new self-charging electric bike

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Professor YeonWoo Jung's 'Hybrid Module Mobility' design concept. Credit: UNIST

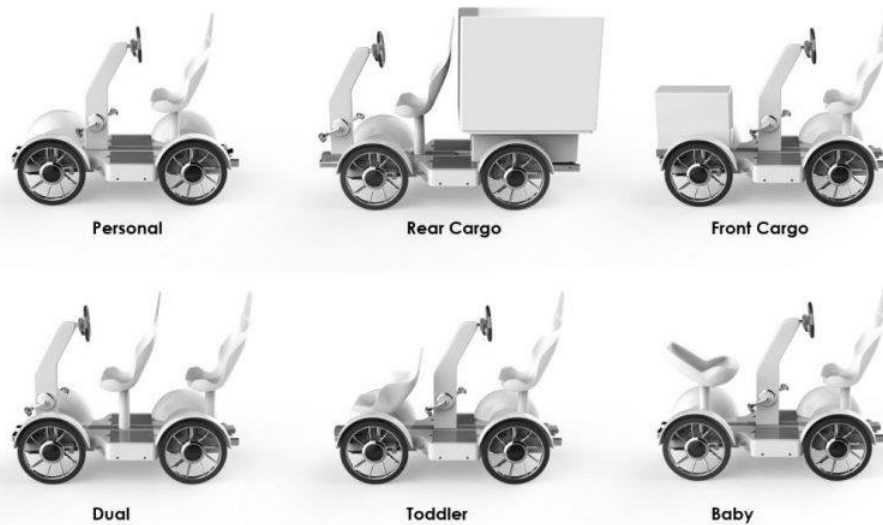
A UNIST design team has revealed its new self-charging electric bike design concept, "Hybrid Module Mobility" at the 67th IAA Frankfurt Motor Show, the world's largest fair for mobility. Depending upon users' requirements, this design concept is capable of converting its forms into six different purposes, including cargo-carrying, child-carrying, driving.

This breakthrough comes from a recent design project, led by Professor Yunwoo Jeong in the Graduate School of Creative Design Engineering at UNIST in collaboration with Mando Corporation, the leading automotive parts manufacturer in South Korea.

Hybrid Module Mobility is a new form of transport, aimed at European market. This four-wheeled electric bike includes regenerative technology which allows users to recharge their batteries while riding or by simply pedaling. However, because these vehicles transfer power from the pedals to the drive-wheel of a bicycle, there has been a limitation that it can be made up of two wheels only.

The newly-released hybrid system by Mando Corporation, entitled "Mando Footloose Urban Modular E-bike" is not only capable of generating electricity through human pedaling, but also capable of storing that energy for later use. This system is characterized by requiring no such complex bicycle chain structure and being applicable to four-wheeled vehicles.

"This new hybrid system eliminates the need for having complex bicycle chains or mechanical driving mechanism, making it suitable for being applied to various platforms, including four-wheeled vehicles," says Professor Jeong.



The transformative Hybrid Module Mobility design concept that can change its forms into six different modules, according to users' needs. Credit: UNIST

Hybrid Module Mobility generates electricity, using a pedal-powered alternator. The energy, generated by the alternator is, then, stored in eight large-capacity, multiple-connected, battery systems. Each of the vehicle's four in-wheel electric motors will, then, generate power by using the stored electricity.

This mobility can be transformed into different forms to suit people's needs. For instance, it can serve the purpose for the front-and-rear-loading electric-powered cargo bikes. Such purpose is aimed specifically at cargo bike delivery firms in Europe, such as DHL or FedEx.

In addition, passengers may also select different driving modes, such as regular driving mode and family mode. For regular driving mode, there are two types: 'Personal' for driving alone and 'Dual' for two people. When it comes to family mode, there is a 'Toddler' mode for carrying 1

to 2 year olds and 'Baby' mode for carrying 3 years or older.

"Hybrid Module Mobility adopts a Flex Overhang structure to give the vehicle the extended space beyond the wheelbase at the front and rear, if needed," says Professor Jeong. "[In addition], Cargo modules will be highly successful in the Europe, which has a reasonably well-developed bike courier market."

At the exhibition, Professor Jung's team also released their "Aero-vent Brake Caliper" design [concept](#). With its eye-catching innovative design, the proposed concept has brought Mando's existing high-performance caliper to life. Significantly enhanced cooling capability, as well as the trendy style have been attained in the newly-introduced design concept.

In addition, Professor Jeong has recently proposed a new brake design concept, called 'Modular Brake Caliper' that no world-class brake companies have ever tried. Currently, this new [design](#) concept is patent pending.

Provided by Ulsan National Institute of Science and Technology

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