

Development Concept e-Bike Balance for the e-bike.

Studies conducted by research foundations, among other things, SWOV (road safety) and TNO (applied scientific research), show that the use of e-bikes by elderly, in addition to the many advantages, also give problems with the control over the e-bike in traffic situations. Not only is the drive speed with an e-bike higher, but the accident rate from (nearly) standstill is also larger. Many of these accidents usually happen at nearly standstill and stopping conditions of the e-bike followed by step-on/off actions. Many elderly experience these actions as tricky and stressful which often cause (one-sided) accidents with lots of injuries and material damage. These accidents will rise further because the share of e-bikes on the total cycling file increases substantially year by year.

To limit the accidents to a minimum at nearly standstill/halt conditions, Innovation Support (www.Innovatie-Support.com) has developed a patented idea, named e-Bike Balance.

The application of the e-Bike Balance is suitable for e-bikes with front wheel-, rear wheel - or central/pedal shaft electrical motor drive. The mechanical/electrical systems for these applications will as a future product be integrated into the e-bike systems.

The e-Bike Balance consists of two balance arms with wheels which are placed between pedal/shaft and the front wheel. At slow/walking speeds to a halt condition of the e-bike, a speed/rotation sensor signal moves the balance beam wheels automatically to the ground. As a result, this system helps the cyclist to maintain cycling balance and gives the option to remain seated on the e-bike during a stop. At driving away, after the signal from the torque/rotation sensor, the balance wheels moves automatically from the ground up,.

A project team, consisting of four 4th year mechatronic students of the Summa College-Engineering in Eindhoven - The Netherlands, have developed for their graduation project the "Concept of e-Bike Balance" system. This system, working with existing and new mechanical and electric components, was designed, manufactured, assembled and tested by the team on an e-bike. The function programming could not be integrated into the e-management /software of the e-bike because the e-bike manufacturer made this information not available.

Reasons why the concept was manually activated and were control functions restricted or not feasible. The primary objective of the graduation project, "*after activation of the e-Bike Balance, the e-biker can remain seated on the e-bike without falling*", was realized.

With the application of the e-Bike Balance system and when stopping the e-bike, it will be not necessary to step-off and step-on each time. Reducing these physical actions contribute to extra bike safety and bike comfort because the e-biker, young or old, can remain seated on the e-bike and can devote more attention to their individual traffic situations.

The developed Concept e-Bike Balance system by the Summa College-Engineering team shows that a fully functional e-Bike Balance system can be further developed to a new integrated product for an e-bike by a producer of e-bikes and/or e-drive system supplier.