Antilock Braking System (ABS) for bicycles

Reference No: B77080

CHALLENGE
Cycling is with no doubt an inexpensive, environmentally friendly and healthy way of transportation. However, it also involves the risk of a fall, especially for the inexperienced rider. One of the most dangerous situations are the front wheel lock up and the resulting loss of control or a rollover as a result of an over-braked front wheel. These two riding situations can be avoided with an actively engaging safety system (ABS). An ABS in general requires a constant power supply which is usually not guaranteed in conventional bicycles. Hence its current use is limited to motor vehicles and e-bikes.

INNOVATION
The innovative solution to this challenge is a bicycle ABS in which all necessary components, including an electrical generator, a rechargeable backup battery, a clutch, actuators and control electronics are integrated in the front wheel hub. This makes the system completely self-contained so that both e-bikes and bicycles can be equipped or upgraded with it. In addition, all components of the original brake system can still be used.

COMMERCIAL OPPORTUNITIES
✓ Not limited to e-bikes and/or proprietary e-bike drive-systems.
✓ ABS as an upgrade option and/or after-sales solution.
✓ System expansion for e-drive manufacturers who do not offer ABS yet.

DEVELOPMENT STATUS
✓ System-specific control logic successfully simulated in Matlab® with the help of a multi-body simulation of a bicycle.
✓ Clutch test bench available (Fig. 1).
  • Test benches available for all machine elements by the end of 2020.
  • Prototype for test rides expected to be available by the end of 2021.

Fig. 1: The clutch test bench for gaining initial experience with the relaxation stroke and the friction force.