

## Biomechanical Engineering: Bike Simulator

The simulation of real environmental conditions and human-machine interfaces of various mechanical applications in the lab is an important issue in the field of mechanical engineering. It is shown by the means of a bicycle simulator.



The development of applications in which the interface between human and machine has a major relevance a direct investigation on the body and at the application site is often limited by environmental circumstances. By the use of simulators realistic and reproducible conditions can be achieved in labs and research questions can be addressed.

### **Simulating real conditions in the lab**

For this purpose a bicycle simulator has been developed, which can simulate floor unevennesses using actuators that transduce the corresponding signals to the bicycle. Simultaneously the signals are being transduced to a subject riding the bicycle during a tests. On one hand important informations regarding the stability of bikes and its components can be attained. On the other hand a strong tool to use measuring systems in order to attain body-related data is provided by this system.

### **Muscle activity and cinematics of the body**

In addition various sensing systems like e.g. an EMG (Electrocardiogram) or an angle measuring system can be included to the simulator in order to acquire e.g. muscular activity of extremities like limbs or arms as well as acceleration- or suspension behaviour data of the entire body during a testing session. These data can be used to evaluate the attenuation and suspension behaviour of the body while riding a bike in order to drive performance diagnostics or to optimise riding comfort.

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