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Development of Motion Analysis Device for Rider and Motorcycle

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In this study, we have developed a device that simultaneously measures the vehicle situation and the rider's operation while riding a motorcycle. The following 13 were measured.

(1) Vehicle bank angle (2) Steering angle (3) throttle operation (4) Brake oil pressure (5) Clutch oil pressure (6) suspensions contraction (7) riding speed (8) Vehicle position on the course (9) Operating force on Steering (10) Operation force for step (11) Operating force on the seat (12) Rider's gaze direction (13) riding posture

In recent years, the increase of accidents of “return riders” becomes a serious problem. “Return riders” are the elderly riders who rode the motorcycle at a young age. In order to decrease the accidents of the amateur riders including “return riders”, some rider’s training courses are running. In these rider’s training courses, the rider exercises some riding events, such as crossing a balance beam, sudden braking, cornering. While riding a motorcycle, the rider’s body exerts forces on several points of the motorcycle. The forces exerted by the professional riders are quite different than by the beginners or the “return riders”. On the other hand, as the exerted forces on the motorcycle are not visible, it is sometimes really difficult for the instructors to teach the most effective way of riding to beginners.

This device improves the efficiency of the training courses. In the system, various sensors are installed on the different parts of the motorcycle, such as sheet, steps, handles. The visualization of forces sensed by the sensors give a clear images of what kind of operations the rider are performing. Figure 1 shows the experimental motorcycle. The sensor does not hinder the rider's operation. Figure 2 shows the strain gauge installed on the Steering. On the l Steering, 2 strain gauges are installed. The strain gauges measure the rider's operating force. Other strain gauges are installed in a similar way. These sensors are installed without replacing parts, so riders can experience the same operation as the original vehicle. The output signals from the sensors are processed by the developed Communication Control Module, and the processed signals are then sent to a PC. PC and wireless communication modules are mounted at the rear of the vehicle. The wireless communication module executes the A/D conversion of the signal. The converted signals are sent to a mobile PC. Finally, our developed application software plots and shows each exerted force as a bar chart in real-time. Figure 3 shows the snapshot image of an interface of the developed application software on the PC screen.

Fig. 1 Experimental Motorcycle

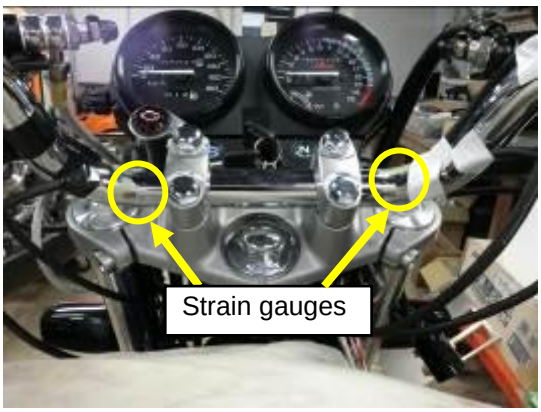

Fig.2 Strain gauges attached on the handle

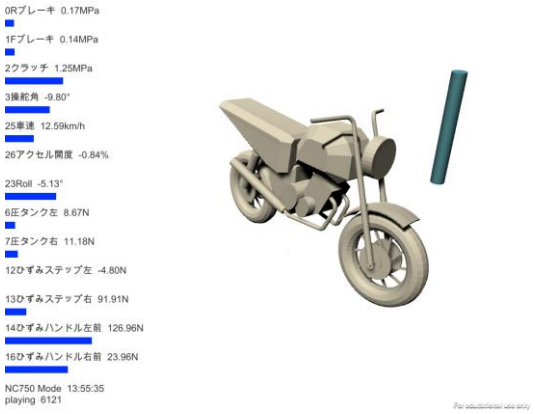

Fig. 3 Snapshot image of bar charts of exerted forces on PC