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4aMUa7. FireFader: A single degree-of-freedom force-feedback device for multimodal interaction with physical models. Edgar J. Berdahl (Audiokommunikation, Tech. Univ. of Berlin, Sekr. EN-8, Einsteinufer 17c, 10587 Berlin, Germany, eberdahl@mail.tu-berlin.de)

The design of a relatively inexpensive force-feedback device known as the FireFader is presented. It is controlled using physical models to provide multimodal force, auditory, and visual feedback in real time, and it is based upon a linear potentiometer fader coupled to a DC motor, also known as a “motorized fader”. Lamps are connected electrically in parallel with the motor in order to visually communicate the strength of the force. The device is linked by a serial USB interface to a general-purpose computer, which employs a physical model to calculate the motor force as a function of the fader position. The USB interface causes delay of the control signal, but it facilitates easier programming and less expensive control. Furthermore, additional sensed parameters can help provide the illusion of more than a single degree-of-freedom (DOF) feedback, via modulation of the physical model parameters. For estimation of the downward force applied by the performer on the fader, a pair of force sensors can be sandwiched in between the motorized fader and the housing. In conclusion, we hypothesize that by providing multimodal feedback in real time, the FireFader may help promote the expressivity of new media interactions.