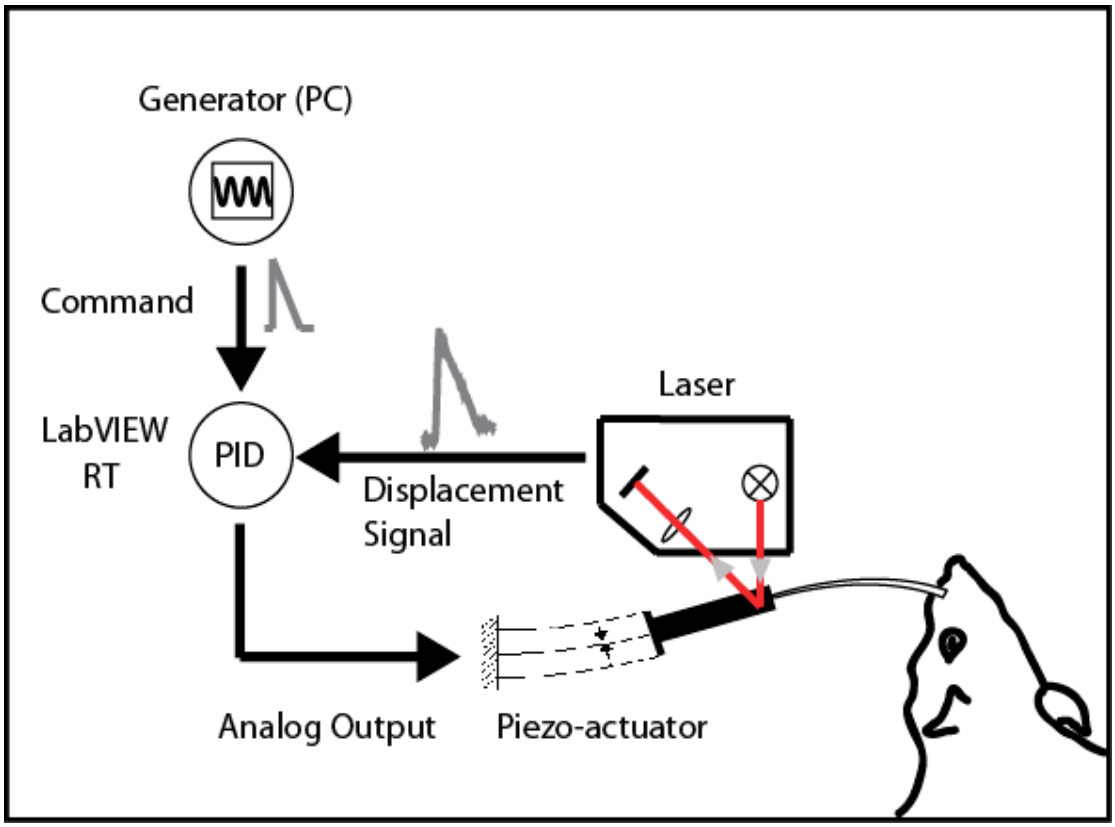

Figure S1. Schematic illustration of the close-loop control system. The system is based on real time measurement of the error between the desired displacement and the actual displacement. The proportional integral derivative (PID) algorithm was used to process the actual command to the amplifier of the piezo actuator. The position of the stimulator, at the contact point with the whisker, was measured using a non-contact optical displacement measuring device (optoNCDT 1605; Micro-Epsilon, Ortenburg, Germany). The analog output of this device and the desired analog command were processed by a real-time computer system (LabVIEW RT 7.0 and NI PCI-7041/6040E, National Instruments, Austin, TX). After proper scaling of the command, the sum of the three following terms was used as input to the amplifier of the piezo actuator: 1) the error between the displacement and the scaled command (*e*).2) the time derivative of *e*. 3) the continuous integral of *e*. The iteration rate was set to 40 kHz. When the command from the generator bypassed the PID circuit the mode is defined as open-loop and when it is engaged it is defined as close-loop.

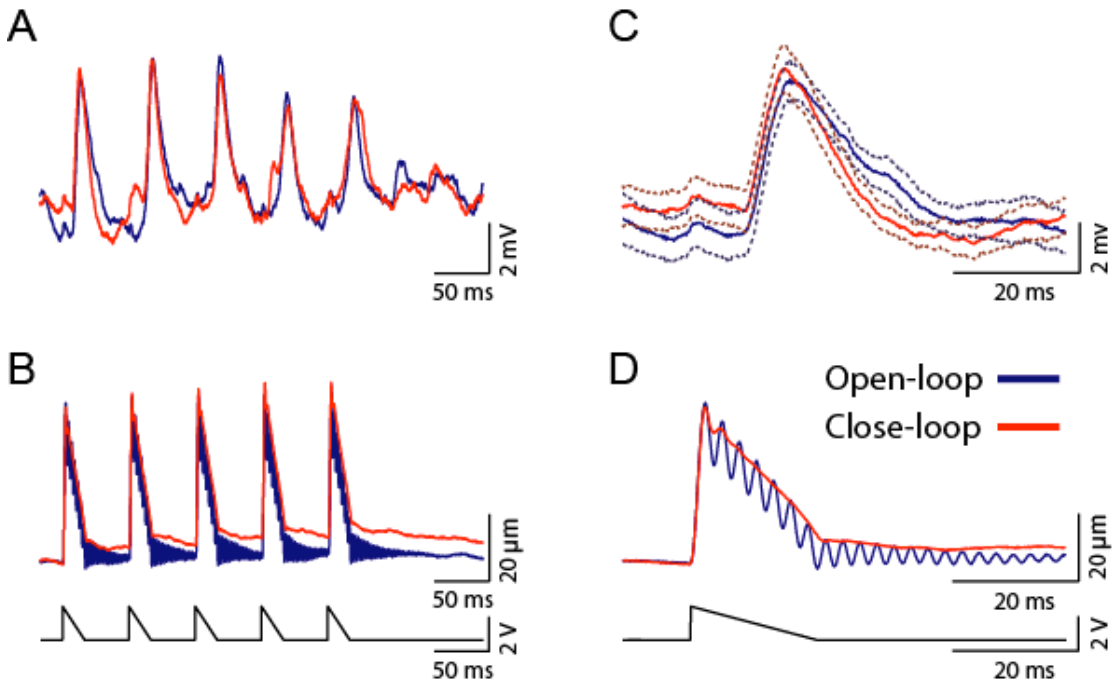

Figure S2. The average response of a barrel neuron to whisker deflection was almost unaffected by eliminating mechanical vibrations of the stimulator using the close-loop control system. Trials of close loop and open-loop modes were interleaved (25 trials at each condition). **A,B,** The average response (**A**) of the cell to a train of 5 stimuli delivered with 60 ms interstimulus interval and the displacement of the stimulator (**B**) indicate that vibrations (367 Hz) have no clear effect on the response of the cell. **C,D**, Expansion of the first response in this train together with the s.e.m. measured at each condition. The shape of the displacement at early time was barely affected by the close-loop system although vibrations were practically eliminated. Note that the amplitude and the width of the response were similar at these two conditions. The same experiment performed in two additional neurons showed similar results.