

Project Year

2001

Project Team

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Project Title

Haptic Display of Dynamic Systems

Audience

30 to 40 students per year, enrolled in the *Mechanical Vibrations* course, will benefit from these materials.

Pedagogical Issue

Understanding how certain variables affect dynamic systems is difficult for students to comprehend in mathematical terms.

Solution

Student learning is enhanced by simulations in which they can see how changing variables affect systems. This project team proposes to develop a sample simulation for this purpose, involving the design and development of haptic (touch-based) human-computer interface hardware and software. A simple, single-axis haptic interface, called the haptic paddle, will enable students to assemble, model, connect to a computer, and use an interface for interactively experiencing computer simulations of dynamic systems. Our design goals for this project include low cost (less than \$30 per paddle) and robustness. The project team also seeks to address the force levels and bandwidth required to simulate concepts accurately. Software will be developed for the paddles to create an unlimited number of virtual systems. For example, by adjusting the magnitude of a virtual spring or damping constant, students will be able to immediately feel the effects of stiffness and damping and their effect on system performance and stability. The paddles will allow students to interact with ideal, changeable physical systems that exist only in the virtual world.

Technologies Used

Microsoft Visual C++, Machining of Mechanical Parts, Device-Computer Interface Board