6.111 Project Abstract: Projected Floor Piano
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Our digital system will interface a projector, a line array of distance sensors, and an FPGA to display the image of a 1.5 octave piano that can be played using one's feet. The FPGA will act as the main control system which integrates the three main modules of the device.

The first module will require the FPGA to interface with a projector via VGA. This module will be responsible for displaying the keyboard image. The module will also be responsible for responding to signals from the sensor module following various stimuli, like a key press. One way to reflect a key press is to make the pressed key of the projected image change color. Another option would be to use the lab monitor to display an image of a keyboard where the appropriate key is a different color.

The second module, the sensor module, will be responsible for interfacing with a line array of distance sensors in order to periodically update the other two modules with the current (x, y) coordinate location of a user's foot. Based on this coordinate location, it will determine which key has been pressed.

The third module, the music module, will take the key given to it by the sensor module. This module will then find a note sample stored in external memory and the FPGA will play it back. This in a nutshell represents the basic functionality of our project. Additional features that may be implemented are sample recording, the use of different instrument sounds, and the use of multiple sensor arrays for recognizing simultaneous key presses.