

## Digital Dice

The project is an interactive electronic system built around the Arduino Uno development board, designed to replace traditional dice with a sound-activated digital version. The central component of the system is the Arduino board, which acts as a microcontroller, managing the data flow between sensors and the display elements. For user interaction, the project utilizes a sound sensor module equipped with a microphone that monitors the surrounding environment to detect claps or loud noises. Once such a sound is detected, the system initiates a random number generation algorithm to simulate the rolling of dice.

The results are shown on a 4-digit, 7-segment LED display, although only two digits are used for this specific game. Because all digits on this type of display share the same pins for individual segments, the Arduino uses a technique called multiplexing. This involves switching the two digits on and off alternately at an extremely high frequency, tricking the human eye into perceiving both numbers as being lit simultaneously. A decimal point is activated between the two values to serve as a visual separator, making it easy to read the result for each die.

Auditory feedback is provided by a buzzer, which plays an essential role in the user experience. During the "rolling" process, as the numbers change rapidly on the screen in an animation, the buzzer emits short, ticking sounds to suggest the movement of the dice. At the end of the animation, when the randomly generated numbers stabilize on the screen, the device emits a long, clear beep to confirm the final result. This combination of visual and auditory elements transforms a simple electronic circuit into an engaging gaming tool.

From a construction standpoint, the circuit is assembled on a breadboard, using jumper wires to connect the Arduino's digital pins to the display segments, digit selectors, and audio peripherals. The entire system is powered directly through the USB cable connected to the Arduino, and the stability of the display is maintained by using resistors that protect the LEDs against excessive current. The project demonstrates fundamental concepts of electronics and programming, such as digital signal processing, control of optoelectronic components, and real-time timing management.

This electrical circuit demonstrates the use of seven-segment displays with an external multiplexing controller. Multi-digit seven-segment displays are frequently used on vending machines to display the amount of money entered.

