DIGITAL DICE USING 8051

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BONAFIDE CERTIFICATE

Certified that this project report entitled "**DIGITAL DICE USING 8051"** is a bonafide work of **LAKSHITA K J - 22BEC1001, RADHIKA P - 22BEC1051, SWAPNA S - 22BEC1232 and S LAKSHITHA - 22BEC1302** who carried out the Project work under my supervision and guidance for BECE**204L Microprocessors and Microcontrollers**

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ABSTRACT

This project presents the design and implementation of a digital dice made using 8051 microcontroller kit. The digital dice is a popular electronic gadget used in various games and simulations, offering a random number generation mechanism like traditional dice. The project aims to create a compact, efficient, and user-friendly digital dice system with the flexibility to customize the number of sides on the dice. The hardware architecture comprises an 8051 microcontroller, an LCD display unit, push-button switches for user input, and supporting components. The microcontroller is programmed to generate random numbers within the desired range corresponding to the sides of the dice. The user interface allows players to roll the digital dice by pressing a button, and the generated number is displayed on the seven-segment display.

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INTRODUCTION

The digital dice project involves the use of 8051 microcontroller kit and the algorithm of random number generation. The digital dice uses the generation of random number, equivalent to that of rolling of a dice. The regular dice used in several popular board games like ludo, snakes and ladder, etc. have proven to be biased during the manufacture of the dice or during the course of their usage. Since the centre of gravity of a regular dice affects its rolling and thus has a very high possibility of being biased or becoming biased with regular usage, a digital dice would ensure fairness and an unbiased game. In contrast, the fairness of a digital dice is independent of its mass and centre of gravity, making it more reliable.

OBJECTIVES AND GOALS

The objectives and goals of a project like "Digital Dice using 8051" typically revolve around creating a functional digital dice simulation using the 8051 microcontroller. The project simulates the rolling of a dice by generating a random number between 1 to 6 when the push button is pressed. The LEDs glow according to the random number generated. This dice can be used to play board games in a fair manner as it is unbiased.

APPLICATIONS

- The audio amplifier system finds application across multiple domains:
- Home Entertainment Systems: This involves enriching audio quality in setups like televisions, DVD players, and gaming consoles, elevating the immersive experience.

- Portable Speakers: The project facilitates the creation of compact, powerful speakers, ideal for outdoor events, casual gatherings, or mobile music playback.
- Audio Interfaces: Incorporating the circuit into audio interfaces for musicians ensures pristine recording and playback, crucial for studio work or live performances.
- Public Address Systems: The project's application extends to amplifying speech or music in venues ranging from small conference rooms to medium-sized event spaces.
- Automotive Audio Systems: Enhancing sound output in vehicles, including car stereos and aftermarket speaker installations, is another practical application.
- Personal Audio Devices: Improving the audio quality of headphones, earphones, and personal music players enhances the overall listening experience for users.
- These varied applications underscore the project's versatility and utility across entertainment, communication, education, and personal enjoyment realms.

FEATURES

This project uses an IC LM386 for audio power amplification purposes. Due to its low voltage operation, simple operation, and single supply operation, LM386 serves as an ideal IC for audio amplification. The LM386 can provide a gain of up to 200

times (typically set by an external resistor) to the input audio signal. This makes it suitable for amplifying weak audio signals from microphones or line-level sources. Some versions of the LM386 come with an internal gain control pin, allowing for easy adjustment of the amplification level without changing external components. It includes thermal shutdown and current limiting features to protect itself from overheating and damage under adverse conditions. The circuit also uses a capacitor to denoise the input signal given. This capacitor, often referred to as a bypass or decoupling capacitor, acts as a reservoir of charge, supplying instantaneous current to the chip during transient loads and filtering out high-frequency noise on the power supply lines.

DESIGN AND IMPLEMENTATION

LM386:

This is the heart of the amplifier. It takes the weak audio signal from a mobile phone and amplifies it to a level that can drive the speaker.

Capacitors:

2 x 1 µF Capacitors: These capacitors provide high-frequency filtering at pins 4 and 7. They help remove unwanted high-frequency noise from the audio signal entering and leaving the IC.

1 x 100 nF Capacitor: This small capacitor in parallel with the 100 µF capacitor connected to the speaker. It could act as a bypass capacitor for high frequencies, improving the sound quality slightly.

1 x 100 µF Capacitor (Electrolytic): This capacitor acts as a decoupling capacitor at the output (pin 5). It blocks any DC voltage from reaching the speaker and allows only the AC audio signal to pass through.

Resistors:

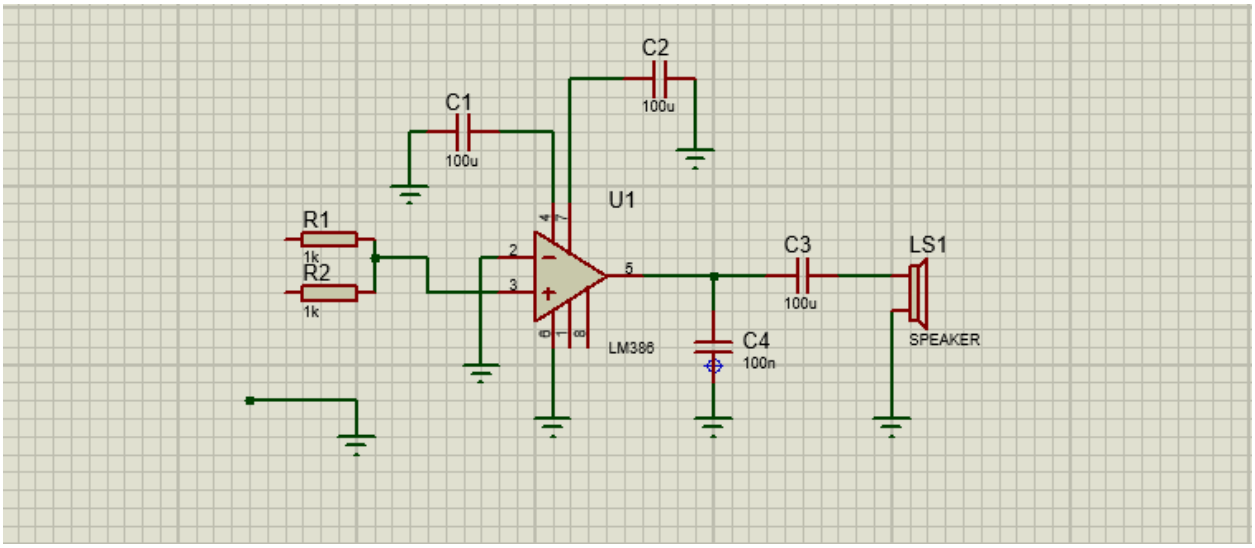
2 x 1 kΩ Resistors: These resistors form a voltage divider circuit at the input (pin 3) By dividing the voltage from the phone, they control the overall volume level entering the amplifier.

Other Components:

Speaker: This is where the amplified audio signal is converted back into audible sound waves.

Mobile Phone (Audio Source): This provides the weak audio signal that the LM386 amplifies.

BLOCK DIAGRAM



HARDWARE ANALYSIS

Terminals 1 and 8 of the LM386 IC are left open. Terminals 2 and 6 are grounded. To terminals 4 and 7, one microfarads' capacitor is attached to each, with the other terminal being grounded.

One end of both the 1k ohm resistors is connected to the third terminal of the IC, with each resistor connected to one particular wire from the cable connected to a mobile phone.

To the 5th terminal, one end each has a 100 microfarads capacitor, and the 100 nano-fared capacitors are connected. The other end of nano nano-fared capacitor is grounded, and the other end of the 100-microfarad capacitor is connected to one terminal of the speaker. the other terminal of the speaker is grounded.

CONCLUSION AND FUTURE WORK

In conclusion, audio amplifiers like the LM386 are essential components in various electronic projects, offering simplicity, versatility, and reliable performance. By using capacitors strategically for power supply decoupling, input coupling, feedback, and output coupling, noise can be effectively reduced, ensuring clean and amplified audio output. Future work in audio amplifier projects could focus on optimizing component selection for specific performance goals, exploring advanced amplifiers for higher power output or improved audio fidelity, and integrating additional features such as tone controls or signal processing capabilities to enhance the overall audio experience. Future work could involve finding innovative methods to increase the compactness of the device.

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