XO Game

XO Game Project Report

Abstract

This report details the development of a simple XO game (also known as Tic-Tac-Toe) using the Texas Instruments Launchpad development board (Tiva C Series TM4C123G). The project incorporates additional components such as a Nokia 5110 LCD for display, push buttons for player input, LEDs with resistors for status indication, a potentiometer for contrast adjustment, and a buzzer for sound effects. The project aims to create an engaging and interactive gaming experience using embedded systems.

Introduction

The XO game is a classic two-player game where players take turns marking spaces in a 3x3 grid. The first player to align three of their marks in a horizontal, vertical, or diagonal row wins the game. This project implements the XO game using the Texas Instruments Launchpad development board, demonstrating the capabilities of embedded systems in creating interactive applications.

Objectives

- Implement a two-player XO game using the Texas Instruments Launchpad.
- Display the game state on a Nokia 5110 LCD.
- Provide sound effects using a buzzer.
- Indicate game status using LEDs.
- Allow contrast adjustment of the LCD using a potentiometer.

Components

- Texas Instruments Launchpad development board (Tiva C Series TM4C123G)
- Nokia 5110 LCD
- Push buttons (at least 2 for player input)
- LEDs with resistors
- Potentiometer for ADC
- Buzzer for sound effects

System Design

Hardware Design

The hardware design involves connecting the various components to the Launchpad. The Nokia 5110 LCD is used to display the game board and current game state. Push buttons are used for player inputs, allowing players to select their moves. LEDs are used to indicate game status, such as player turns and win conditions. A potentiometer is included to adjust the contrast of the LCD for better visibility, and a buzzer is used to provide sound effects for user interactions.

Software Design

The software for the XO game is developed using the Code Composer Studio IDE. The code is structured to handle the following functionalities:

- Initialization of the LCD, push buttons, LEDs, potentiometer, and buzzer.
- Displaying the game board and updating the game state on the LCD.
- Handling player inputs and updating the game board accordingly.

- Checking for win conditions and indicating the game status using LEDs.
- Generating sound effects using the buzzer for user interactions.

Game Logic

The game logic follows the standard rules of Tic-Tac-Toe:

1. The game starts with an empty 3x3 grid.
2. Players take turns selecting their moves using the push buttons.
3. The current state of the game board is displayed on the LCD.
4. The game checks for win conditions after each move.
5. If a player wins, the game indicates the winner using LEDs and sound effects.
6. If the grid is filled without a winner, the game declares a draw.
7. In case the game is ended (a player wins or none) the screen shows you choices to play again or end the game

Implementation

Step-by-Step Instructions

1. **Clone the Repository:**

   git clone https://github.com/your-username/xo-game-launchpad.git

2. **Connect the Components:** Connect the Launchpad and other components as per the provided circuit diagram.
3. **Open the Project:** Open the project in Code Texas Studio.
4. **Build and Flash:** Build the project and flash the code to your Launchpad.
5. **Power Up:** Power up the Launchpad and begin the game.
6. **YouTube video:** https://www.youtube.com/watch?v=9SS2o7W5R3Y

Results

The project successfully implements a functional XO game using the Texas Instruments Launchpad. The game board is displayed on the Nokia 5110 LCD, and players can interact with the game using push buttons. The LEDs indicate the game status, and the buzzer provides sound effects for user interactions. The potentiometer allows for contrast adjustment of the LCD.

Conclusion

The XO Game project demonstrates the potential of embedded systems in creating interactive applications. By integrating various hardware components with the Texas Instruments Launchpad, we successfully implemented a classic game with engaging features. This project serves as a valuable learning experience in embedded systems design and development.

References

- Texas Instruments. (n.d.). Tiva C Series LaunchPad. Retrieved from TI Tiva C Series LaunchPad
- Nokia 5110 LCD Datasheet. Retrieved from Nokia 5110 LCD