



Dice Poker Game – Project Documentation

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1. Project objective

The project is a dice game inspired by the rules of poker. The application allows the user to roll five dice up to three times. After each roll, the player can choose to keep specific dice or re-roll the rest. The results and game status are displayed on an LCD 1602 screen.

This type of game mechanics mimics aspects of probability theory and decision-making under uncertainty, offering a simplified simulation of strategic choices found in classic poker.

2. Functional Description

2.1 Random Dice Roll Generation (1–6)

The randomness of dice rolls is achieved using an Analog-to-Digital Converter (ADC), which leverages analog voltage fluctuations to generate pseudo-random values.

Hardware random number generation is crucial in embedded systems where standard software-based RNG (Random Number Generators) may not be reliable due to deterministic nature. Using ADC noise introduces entropy, allowing for better emulation of true randomness.

2.2 Game Control:

The game is controlled via a 4x4 matrix keypad. The keys perform the following actions:

- Start the game
- Select dice to keep (Keys 1–5 correspond to individual dice)
- Advance through the game stages:
 - 7: Confirm dice selection
 - 8: Execute a roll
 - 9: Proceed to the next turn
- End the game: Key 0

2.3 Display of Results:

The dice roll outcomes and game information are shown on the LCD 1602 display via I2C communication.

3. Code Structure

- Main file – main.c
- Handles game logic, user interaction, dice roll flow, and display updates.
- Keypad handling – klaw2.c
- Manages scanning and reading the matrix keypad input.
- Random number generation – ADC.c
- Configures and uses the ADC for random value generation essential to simulate dice throws.
- Display handling – i2c.c and lcd1602.c
- Implement I2C communication and LCD control functions for presenting game state and results.

4. Key Functions

make_a_dice_roll(int amount_of_dice) - generates values for non-kept dice using ADC-derived randomness.

show_dice_lcd(int amount_of_dice) - displays the current dice values on the LCD. Marked dice (kept by the user) are indicated with a caret (^).

update_kept_lcd(int amount_of_dice) - allows the player to select which dice to keep between rolls.

k_read() - reads the currently pressed key from the matrix keypad.

ADC_Init() - sets up the ADC to enable analog value acquisition used in dice generation.

5. Hardware Overview

- **Microcontroller: MKL05Z4**
- **Keypad: 4x4 matrix type**
- **Display: LCD 1602 (via I2C)**
- **ADC Channel: Channel 8 (PTB11)**

6. Final Remarks

The project is fully functional and has undergone testing. The game logic and user interaction are carefully adapted to the hardware capabilities of the microcontroller and connected peripherals. The code is modularly structured for clarity and future scalability.

The implementation of embedded games like this one is a practical example of integrating digital system design, human-machine interaction, and random event simulation in real-time systems. It also demonstrates effective event-driven programming and peripheral control in embedded C environments.