Snake Game - Embedded Multi-Controller System

Project Overview and Technical Documentation

System Components

- AT89C52 microcontroller (Clock: 1.3824MHz)
- LM041L LCD display
- L293D motor driver
- 2x 7-segment displays
- Matrix keyboard

1. System Architecture

Four interconnected microcontrollers managing:

- Snake game logic
- Score display
- Motor control
- High score system

2. Controller Specifications

2.1 Input Controller (K1)

Functions:

- Keyboard control
- Serial command transmission

Key Mapping:

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Movement:       Game Control:
2: Up           *: Start
4: Left         0: Pause
6: Right        #: End
8: Down         5: Snake skin change

Special:
1,3: Segment display animations
1,3,7,9: LED blink sequence
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2.2 Display Controller (K2)

- IT0 interrupt handling (score increment)
- High score management
- Current score display
- Animation control

2.3 Motor Controller (K3)

- PWM motor control (speed/direction)
- INT0 interrupt for rotation counting
- Automatic direction change on score increment
- LED status indication

2.4 LCD Controller (K4)

- Snake game engine
- Display management:
    - Start screen
    - Game screen
    - End screen with scores
- Inter-controller communication

3. Communication Protocol

Serial communication for:

- Control commands (K1)
- Score data (K2 ↔ K4)
- High score updates
- Score increment signals (K4 → K3)
- Animation commands (K1 → K2)
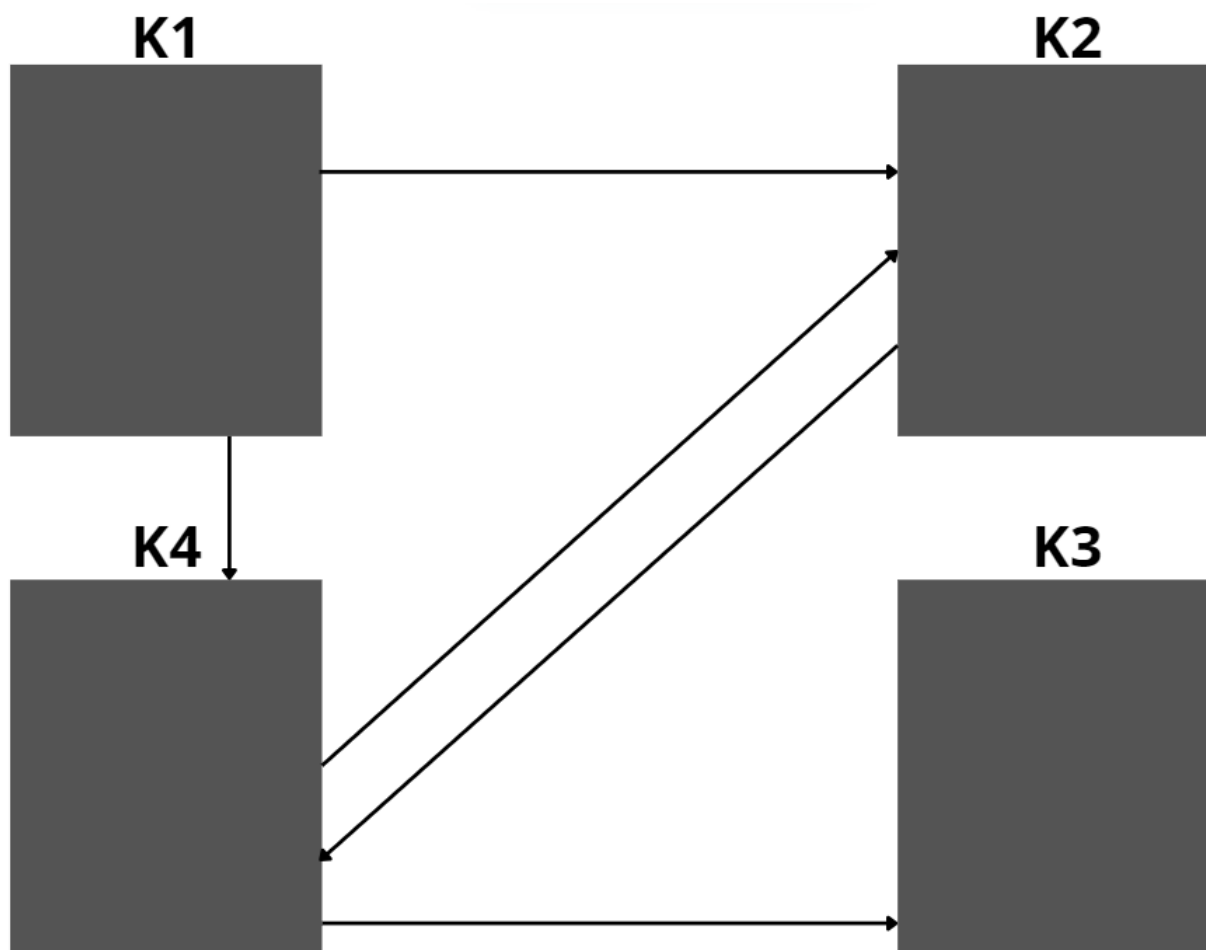
Img. Communication Protocol

1. Initial State

- LCD displays start screen
- System waits for '*' key input
- 7-segment displays show "00"
- Motor in idle state

2. Active Game State

- Snake movement control via keypad
- Score tracking and display updates
- Collision detection:
    - Wall boundaries
    - Snake body
    - Food items
- Pause functionality (key '0')
- Motor speed/direction adjusts with score

3. Game Over State

- Final score display on LCD
- High score comparison
- LED sequence activation
- Reset preparation
- Awaits new game start command