Pong

User manual

Petr Chalupa, Ján Jakub Tomášik, 2025

Main menu

Application launches into the main menu

Controls:

- Use the middle knob's rotation to switch between selected buttons.
- Press the middle knob to confirm button selection

Buttons:

- Start Game → takes the user into game mode select menu to start the game
- High Scores → takes the user to high scores
- Exit → exits the application

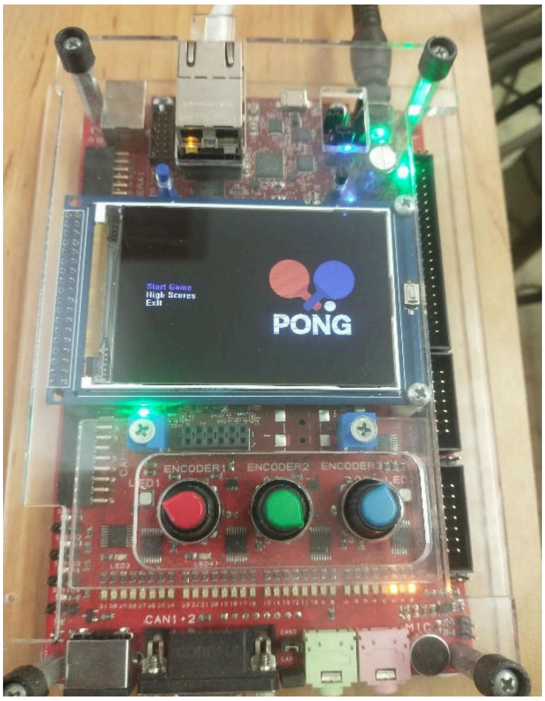


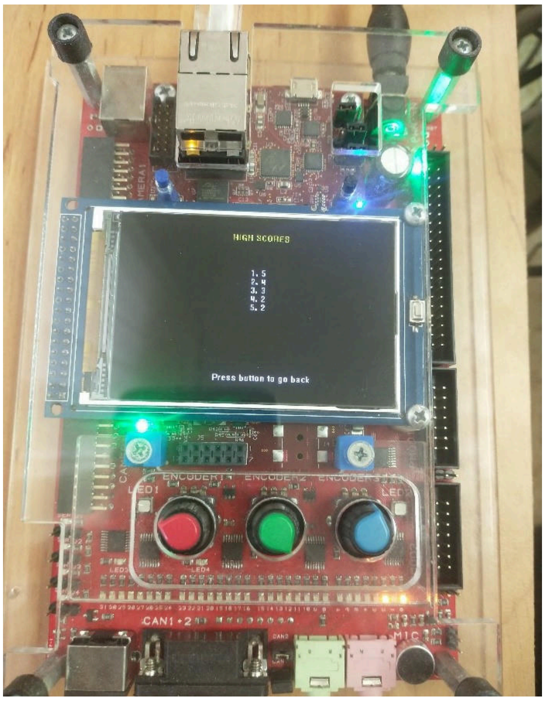
Figure 1: Main menu

High scores

Shows the high scores from the top in descending order.

Controls:

- Press the middle knob to return to the main menu



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HIGH SCORES

1. 5
2. 4
3. 3
4. 2
5. 2

Press button to go back
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Figure 2: High scores

Game mode select

Controls:

- Use the middle knob's rotation to switch between selected buttons
- Click the middle knob to confirm button selection

Buttons:

- PVP → starts player vs player game
- PVC → starts player vs computer game
- DEMO → starts computer vs computer game that goes indefinitely

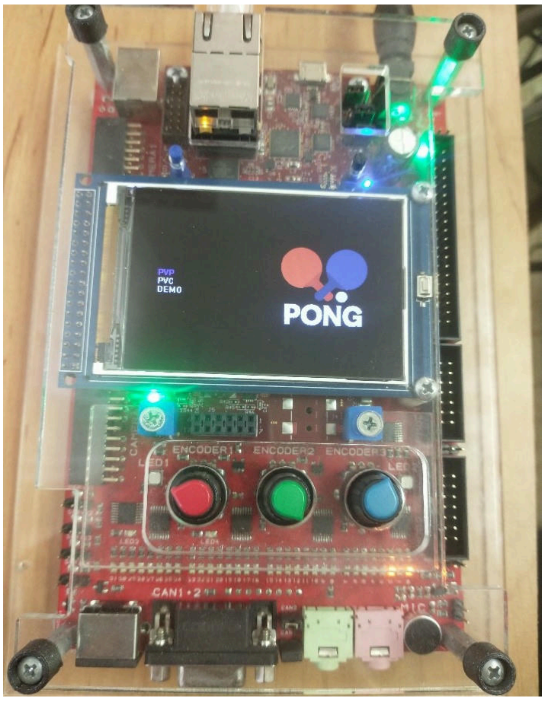


Figure 3: Game mode select

Running game

Controls:

Controllable knobs are indicated by LEDs next to the knobs. If a knob is controllable, the LED is turned on. The LED line displays the combined score of both players and resets after reaching 32.

- Users can control the rackets using the rotating knobs on the left and on the right to control the left and right racket respectively
- For PVP – the left knob controls the red racket, and the right knob controls the blue racket
- For PVC – the user controls the red racket only
- For DEMO – user does not control any racket
- User can pause the game by pressing the middle knob

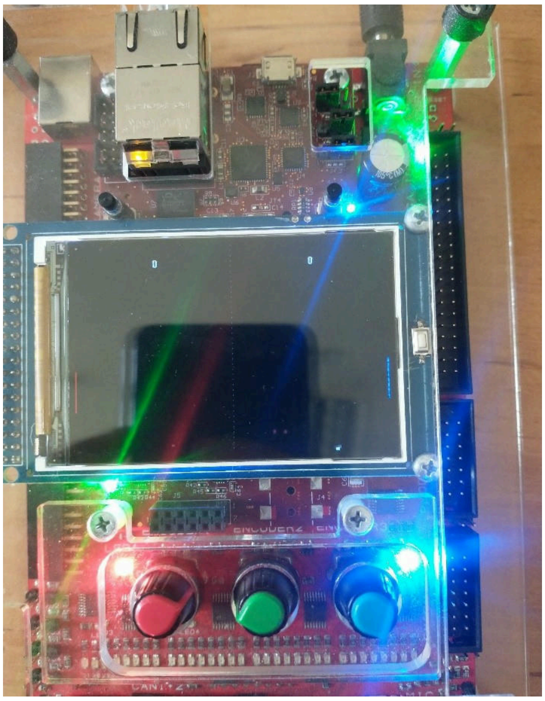


Figure 4: Running game

Pause menu

Controls:

- User can either return back to main menu or get back into the game

Buttons:

- Main menu → returns to main menu
- Resume → resumes to the game

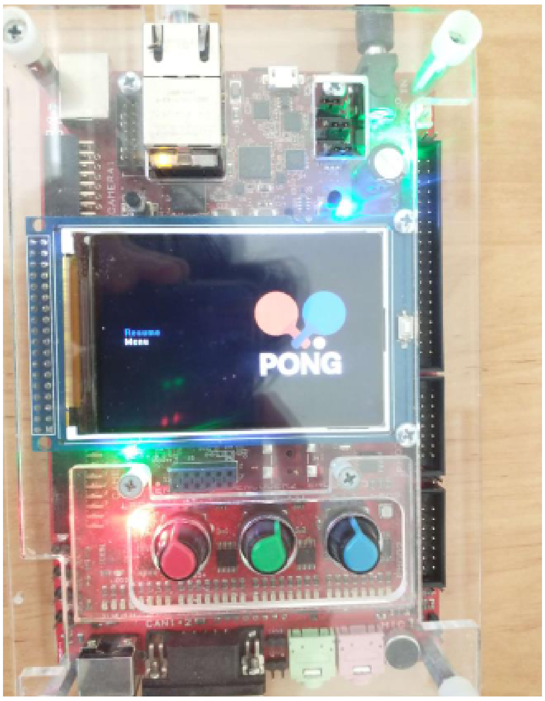


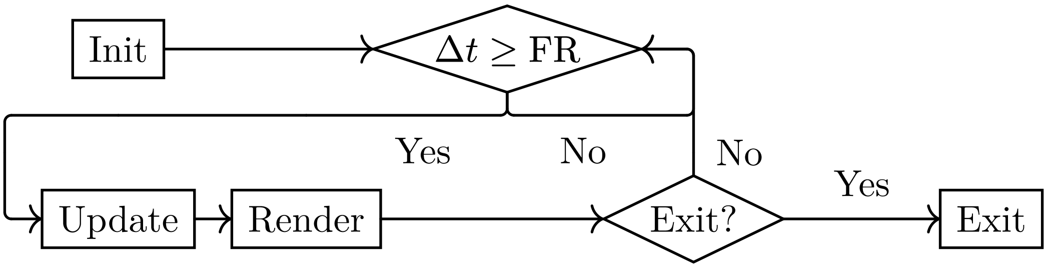
Figure 5: Pause menu

Project architecture

The project is divided into two folders – *src* containing .c files and *include* containing .h files. Application entry point is *pong.c*, which handles the main game loop and utilizes utility functions from general *utils.h* and specific *IO_utils.h*. For game state and game mode an enum is used. Menu items and ball have their respective structures which encapsulate their properties for improved organization and modularity.

Game loop

The game operates inside a typical game loop with time step limited by frame rate. The loop first calls the *update* function consuming user input and updating the game state and then the *render* function reflecting the state onto the LCD screen and other visual peripheries. The loop is executed until an exit condition is met. The diagram below illustrates the loop:



- Δt is time elapsed in the last cycle
- FR is Frame Rate