# Hero Maze Game with ESP32

## 📍 Objective:

To develop a real-time interactive game where the player (hero) must navigate across an 8x8 LED matrix while avoiding dynamic walls and a moving tank using a joystick. The game includes proximity-triggered wall generation, a moving tank, collision detection, and victory conditions.

## 🧱 Components Used:

- ESP32 Devkit V1
- 8x8 LED Matrix (MAX7219-based)
- Joystick Module
- Ultrasonic Sensor (HC-SR04)
- Buzzer
- Jumper wires + Breadboard
- Simulated on Wokwi: 🔗 Project Link

## ⚙️ Working Principle and Features:

**1. Player Movement:**

- Player is represented by a single lit LED.
- Joystick movement mapped to change X, Y coordinates.
- Movement restricted to 8x8 boundary.
- Deadzone logic avoids jitter or accidental movement.

**2. Tank Movement:**

- Tank is shown as a 2x2 LED block.
- Moves up and down continuously on the same X position.
- Bounces off the top and bottom edges.
- If the hero touches the tank → buzzer beeps and game resets.

**3. Wall Generation:**

- Ultrasonic sensor checks if hero is within 30 cm.
- Based on last move direction:
    - If UP/DOWN → horizontal wall.

    - If LEFT/RIGHT → vertical wall.
- Wall = 3 LEDs wide in line, blocks further movement.
- Hero cannot cross active wall tiles.

**4. Collision Detection:**

- Collision with tank or wall → triggers buzzer + resets game.

**5. Victory Condition:**

- If the hero reaches (7, 7) corner → buzzer beeps, game restarts

## 🧠 Gameplay Twist – Mismatched Controls:

To increase difficulty, joystick controls are intentionally reversed:

- **Left movement sends the player right**, and vice versa.
- Vertical controls (up/down) are unchanged. This twist disorients the player and makes maneuvering toward the goal more challenging and engaging.

## ⚙️ Key Features:

- **Hero movement** via joystick (with reversed left/right logic)
- **Tank** moves up and down continuously; colliding with it resets the game
- **Wall generation** is triggered by proximity using an ultrasonic sensor
- **Walls block player movement** and are placed based on last direction of travel
- **Buzzer** provides feedback on collisions and victory
- **Goal** is to reach coordinate (7, 7) without crashing
- **Game display** runs on a MAX7219-based 8x8 LED matrix

## 🧪 Simulation & Testing (Wokwi):

- Simulated successfully on Wokwi Project.
- Used virtual joystick and ultrasonic approximations.
- Simulation video Game_Simulation