# **Pocket Tanks Game Project Report**

## **About the Game**

Introduction:

Pocket Tanks is a classic 2D artillery game where two tanks take turns firing projectiles at each other, trying to reduce the opponent's health to zero. The player can choose the power of their shot as well as adjust the horizontal position of their tank to aim. The game also includes a projectile that can bounce off walls and the ground, making it challenging to hit the opponent.

Game Mechanics:

Tank is based on physics and projectile motion mechanics. The projectile is fired at an initial velocity from the tank, and then moves in a parabolic path under the influence of gravity. The power of the shot determines the initial velocity of the projectile. The projectile also bounces off walls and the ground using the coefficient of restitution. The goal is to hit the opponent's tank with the projectile, and reduce their health points to zero.

Conclusion:

Tank wars is a fun and challenging game that combines physics mechanics and strategic gameplay. The ability to adjust the power and horizontal position of the tanks make the game more interesting. The addition of the projectile that can bounce off walls and terrain adds another layer of challenge to the gameplay. Overall, Tank Wars is an engaging game that is easy to learn but difficult to master.

# **Working**

We have used seven segment display to display the power of the tanks :

void display\_num(int x)

{

    volatile int \*hex3\_hex0\_ptr = (int \*)HEX3\_HEX0\_BASE; // Pointer to HEX3\_HEX0

    int digit\_values[] = { 0x3F, 0x06, 0x5B, 0x4F, 0x66, 0x6D, 0x7D, 0x07, 0x7F, 0x6F };

    int ones = x % 10; // Extract the ones digit

    int tens = (x / 10) % 10; // Extract the tens digit

    // Set the values of the individual digits on the 7-segment displays

    \*hex3\_hex0\_ptr = (digit\_values[tens] << 8) | digit\_values[ones];

}

For displaying the health of both of the players simultaneously in the LEDR section we have used Bitwise-XOR operation:

void updateHealthToLEDR(int health1,int health2)

{

    volatile int \*LEDR = (int \*)LEDR\_BASE;

    \*LEDR = ((((int)(1<<health2)) - 1) + ((((int)(1<<10) - 1))^(((int)(1<<(10-health1)) - 1))))& 0b1111111111;

}

For using the push buttons on the FPGA board we have used while loop for shoot ,moving position of the tanks , adjusting power :

 for (int i = 0; i < 2000000; i++);

            PBval = \*PUSHBUTTONS;

            display\_num(pwr);

            if (PBval & 0x01) // Check if button KEY0 is pressed

            {

                if(turn){

                    erase\_power\_bar(player\_A.posx,player\_A.posy-40);

                    player\_A.posx++;

                    draw\_power\_bar(player\_A.posx,player\_A.posy-40,pwr);

                }

                else{

                    erase\_power\_bar(player\_B.posx,player\_B.posy-40);

                    player\_B.posx++;

                    draw\_power\_bar(player\_B.posx,player\_B.posy-40,pwr);

                }

                prnt\_rect(player\_A.posx-1, player\_A.posx-1 + 20, 240 - 20, 240, 0);      //tank 1

                prnt\_rect(player\_B.posx-1, player\_B.posx-1 + 20, 240 - 20, 240, 0);

            }

            else if (PBval & 0x02) // Check if button KEY1 is pressed

            {

                 if(turn){

                    erase\_power\_bar(player\_A.posx,player\_A.posy-40);

                    player\_A.posx--;

                    draw\_power\_bar(player\_A.posx,player\_A.posy-40,pwr);

                }

                else{

                    erase\_power\_bar(player\_B.posx,player\_B.posy-40);

                    player\_B.posx--;  
}

For displaying the various backgrounds in the game we have used write pixel function and drawn various shapes as needed :

void write\_pixel(int x, int y, int colour)

{

    volatile short \*vga\_addr = (volatile short \*)(0x08000000 + (y << 10) + (x << 1));

    \*vga\_addr = colour;

}

# **Individual contributions**

Padmaksh Mishra 2101CS56

* Power changing push buttons
* Moons and stars
* VGA connection
* Led for health

Ayush Sharma 2101CS15

* Projectile of bomb
* Push buttons to move
* Seven segment display for power
* Color changing after hitting

LINK for demo

<https://drive.google.com/file/d/10c5Didsxm3NE1jKzAqiHtW8Jeuzde3O-/view?usp=drivesdk>

**CS 210**

**Mini Project Phase 2**

**Under the guidance of : Prof. Jimson Mathew**

**IIT Patna**