**BLINK LED PROJECT ON FPGA BOARD**

1. **OBJECTIVE:**

The objective of this project is to blink an RGB LED using Verilog HDL on the VSDSquadron FPGA Mini (FM) board. The blinking is driven by an internal oscillator and counter logic.

1. **HARDWARE USED:**

* VSDSquadron mini FPGA Board
* USB-C cable for programming

1. **Verilog code:**

module top (

output wire led\_red ,

output wire led\_blue ,

output wire led\_green ,

input wire hw\_clk,

output wire testwire);

**// it defines the top module**

**// 3 Leds(red,green and blue)**

**// testwire is for extra debug input**

wire int\_osc ;

reg [27:0] frequency\_counter\_i;

**// int\_osc: A wire that will carry the internal oscillator clock signal**

**frequency\_counter\_i: A 28-bit register that will count up every clock cycle.**

assign testwire = frequency\_counter\_i[5];

always @(posedge int\_osc) begin

frequency\_counter\_i <= frequency\_counter\_i + 1'b1;

end

**// always box triggers on the rising edge of the clock**

//----------------------------------------------------------------------------

// --

// Counter --

// --

//----------------------------------------------------------------------------

//----------------------------------------------------------------------------

// --

// Internal Oscillator --

// --

//----------------------------------------------------------------------------

SB\_HFOSC #(.CLKHF\_DIV ("0b10")) u\_SB\_HFOSC ( .CLKHFPU(1'b1), .CLKHFEN(1'b1), .CLKHF(int\_osc));

**// this line powers up and enables the internal oscillator of FPGA board and sets it to 12MHz**

//----------------------------------------------------------------------------

// --

// Instantiate RGB primitive --

// --

//----------------------------------------------------------------------------

SB\_RGBA\_DRV RGB\_DRIVER (

.RGBLEDEN(1'b1 ),

.RGB0PWM (1'b0), // red

.RGB1PWM (1'b0), // green

.RGB2PWM (1'b1), // blue

.CURREN (1'b1 ),

.RGB0 (led\_red ), //Actual Hardware connection

.RGB1 (led\_green ),

.RGB2 (led\_blue )

);

defparam RGB\_DRIVER.RGB0\_CURRENT = "0b000001";

defparam RGB\_DRIVER.RGB1\_CURRENT = "0b000001";

defparam RGB\_DRIVER.RGB2\_CURRENT = "0b000001";

endmodule

// **The SB\_RGBA\_DRV block is used to connect the internal FPGA signals to the onboard RGB LED. It enables the driver, sets the output logic levels for each color (ON or OFF), and defines how much current each color channel uses.**