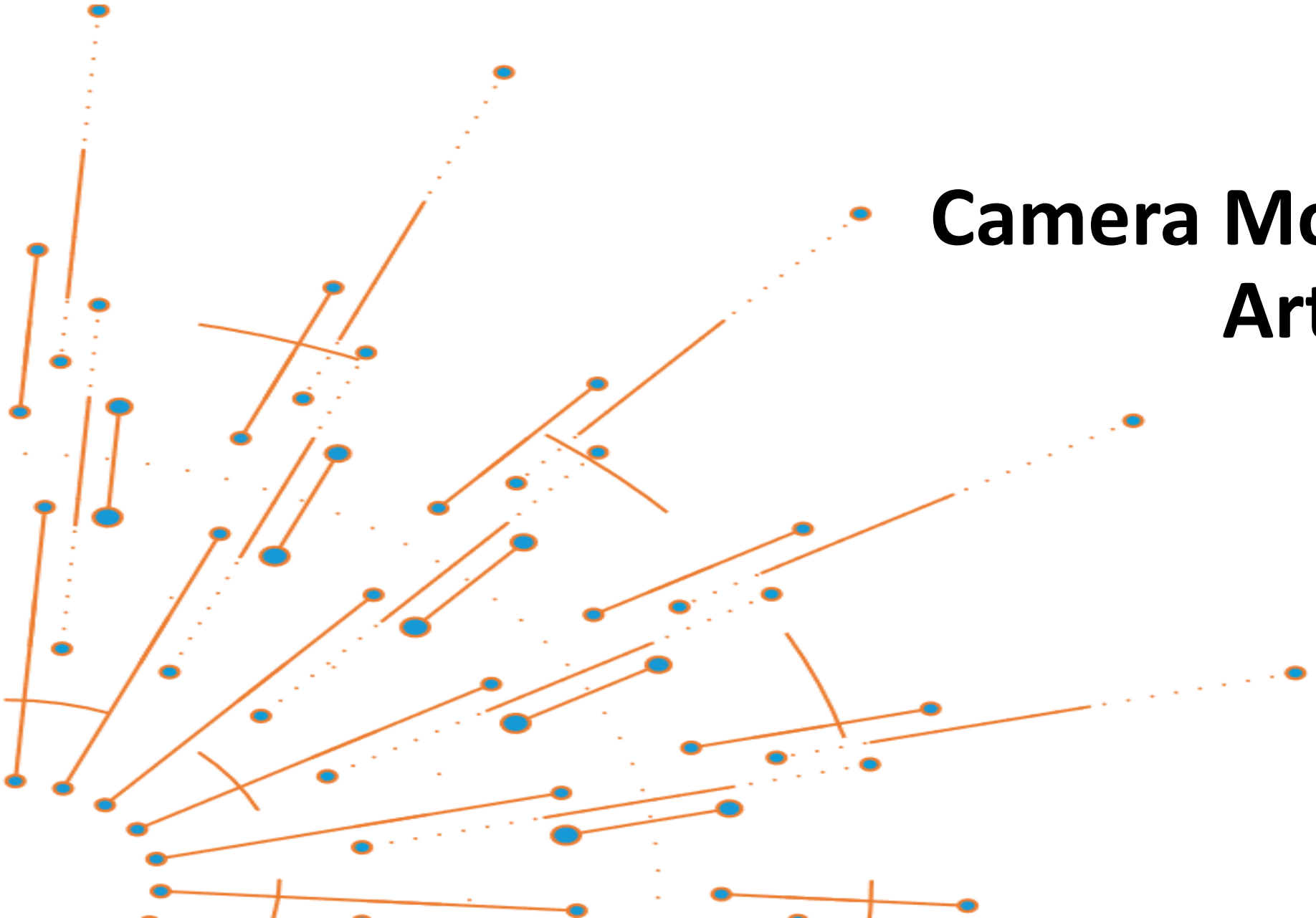


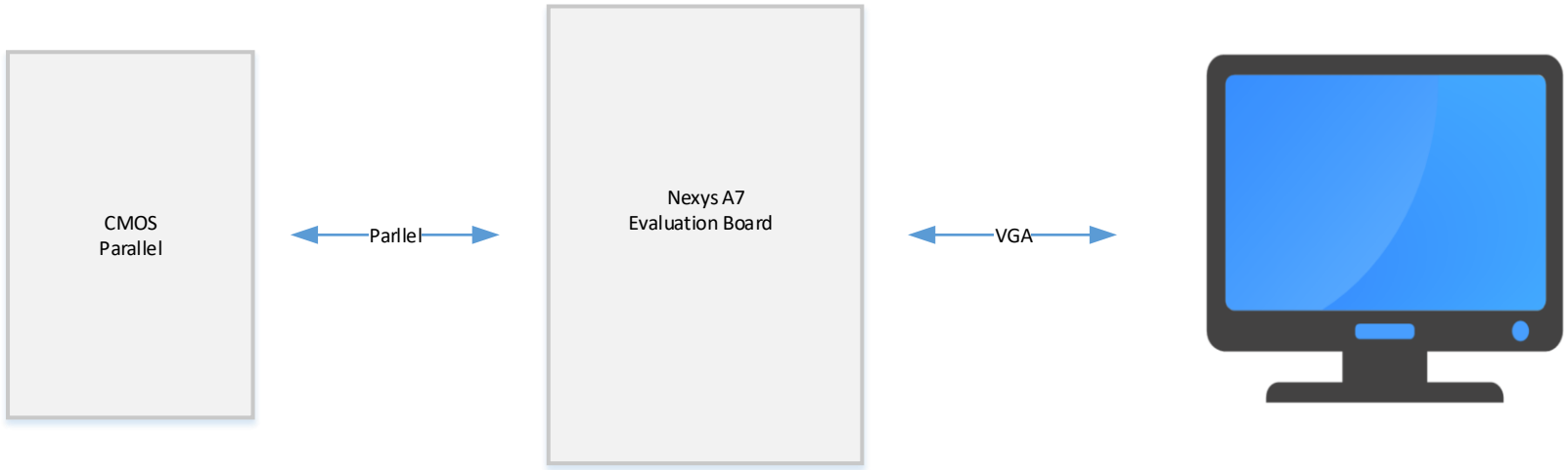
Camera Module FPGA Artix7

Agenda

- Camera Module major requirements
- Design Flow
  - Main Block Diagram
  - Major components
  - Design flow

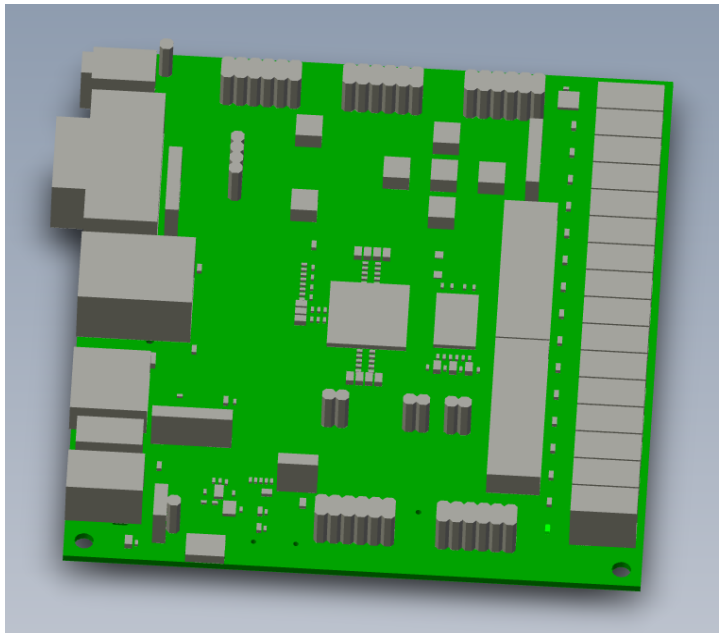
Camera Module major requirements

- Project main purpose :
  - Live stream video display using FPGA Artix 7

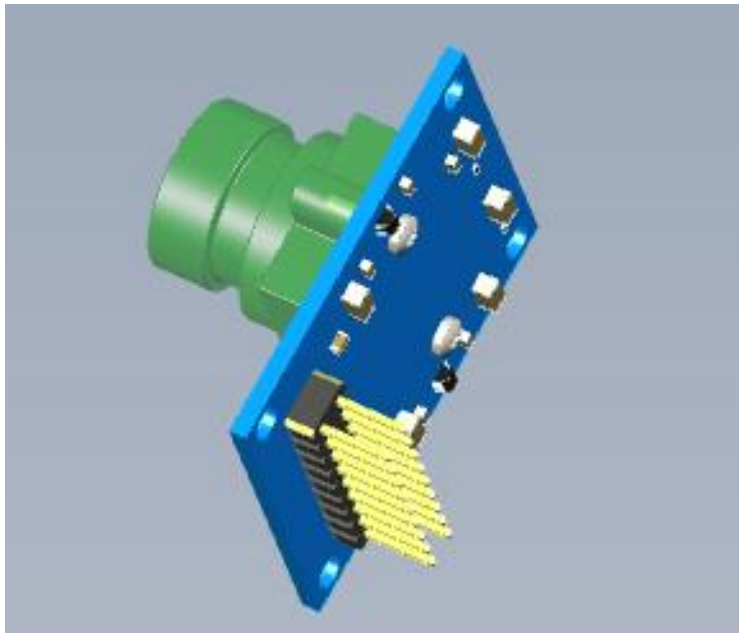


- Project Major components :
  - Nexys A7 FPGA Evaluation Board - Digilent
  - CMOS camera Interface ov7670 - Ominivision

Design Flow : Major Components

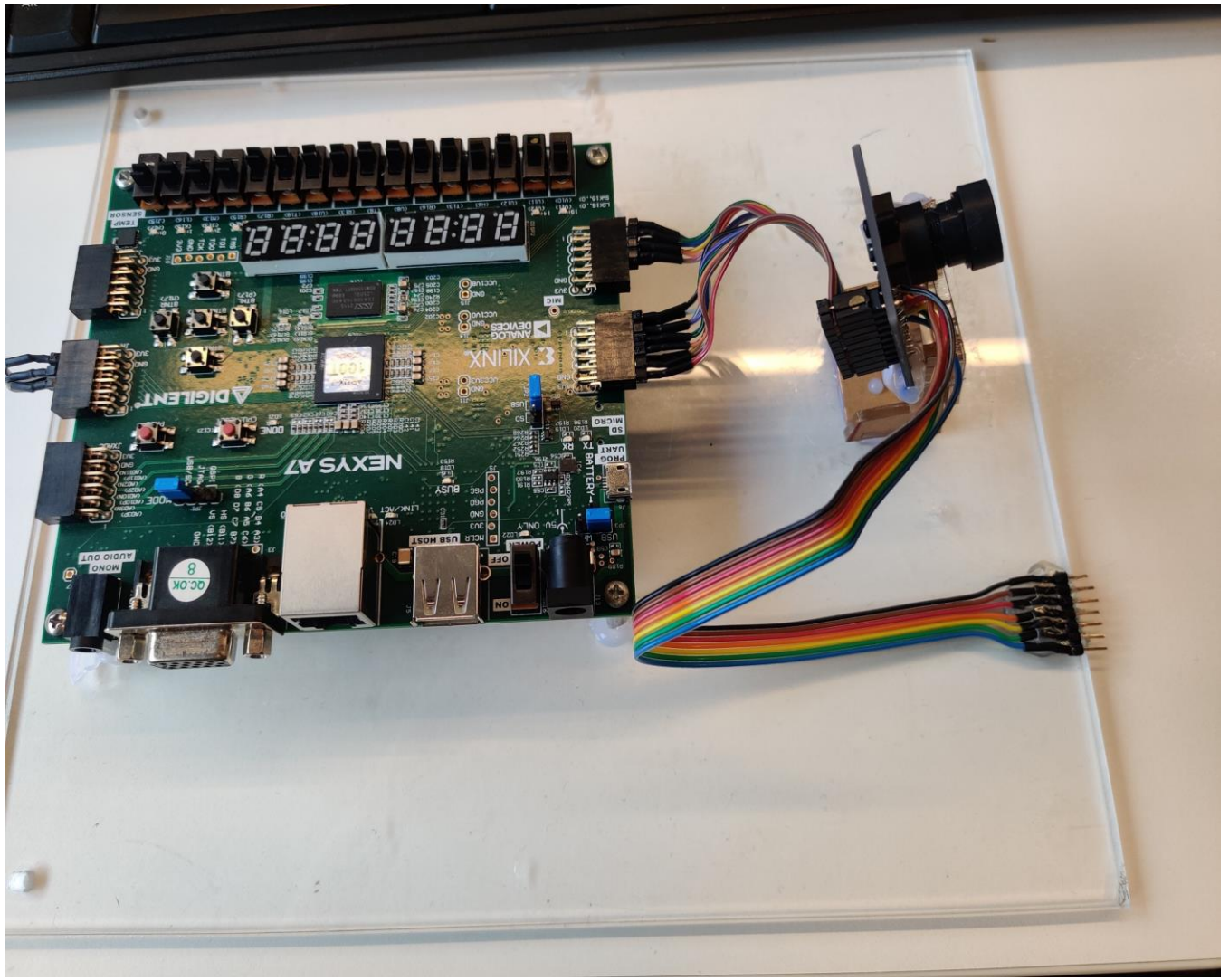


Nexys A7 FPGA Evaluation Board
Xillinx Artix 7 FPGA-
“XC7A100T-1CSG324C “



OV7670 Ominivison VGA sensor
Output format :RGB565
Operation Voltage :3.3V
Communication : I2C

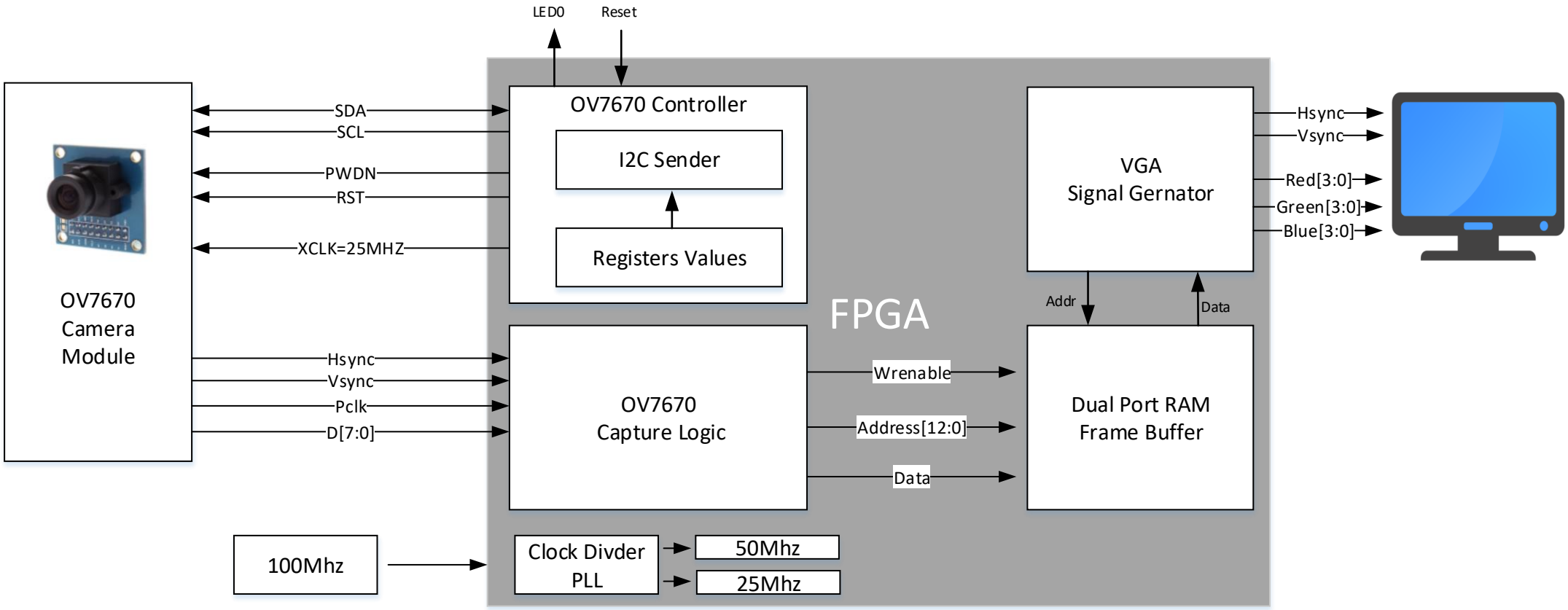
Design Flow : Major Components



Nexys A7 with Ominivisoin OV7670

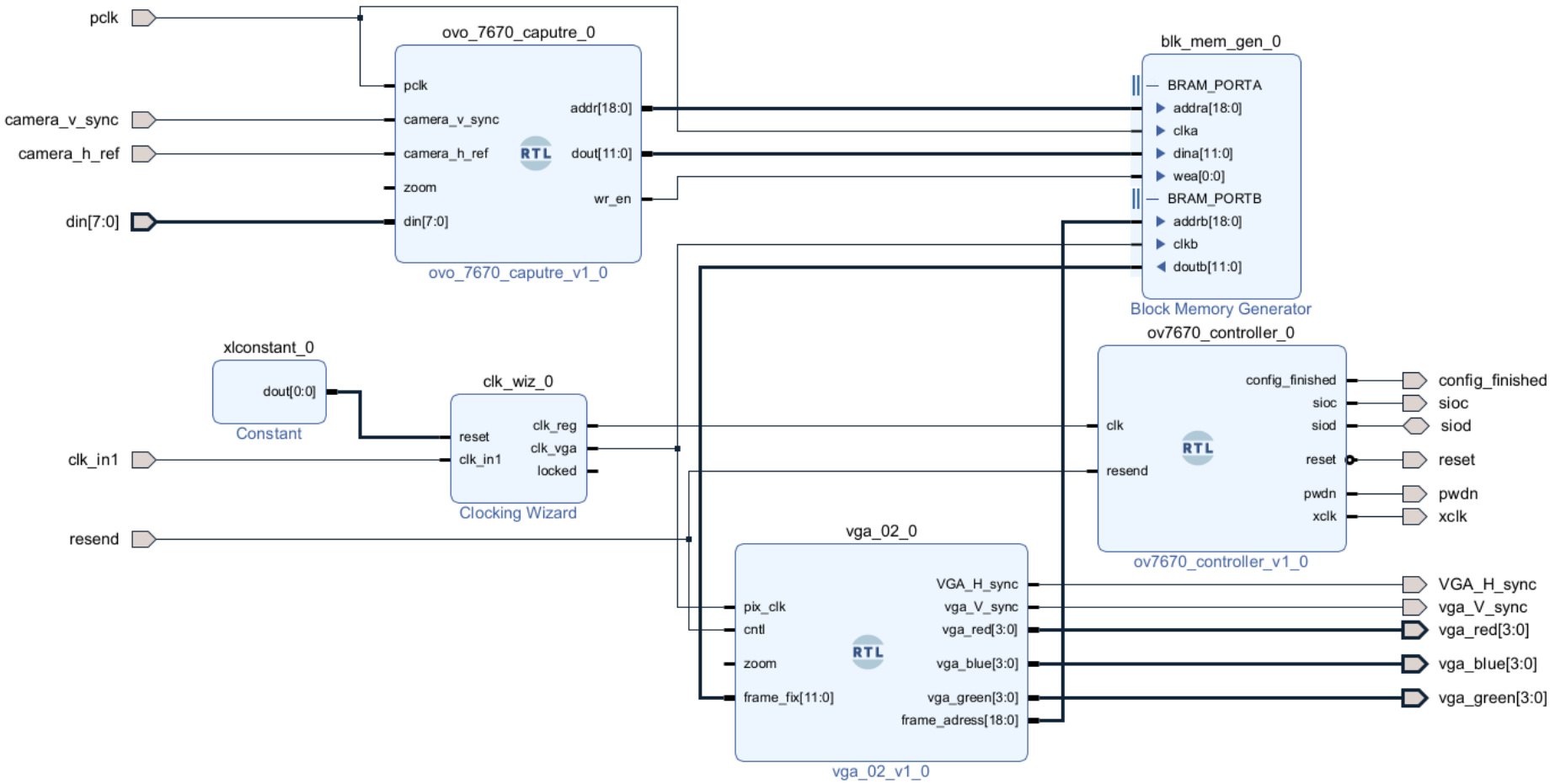
FPGA Blocks

Design Flow : Main Block Diagram



Block Diagram concept

Vivado Block Diagram



Clock Domains

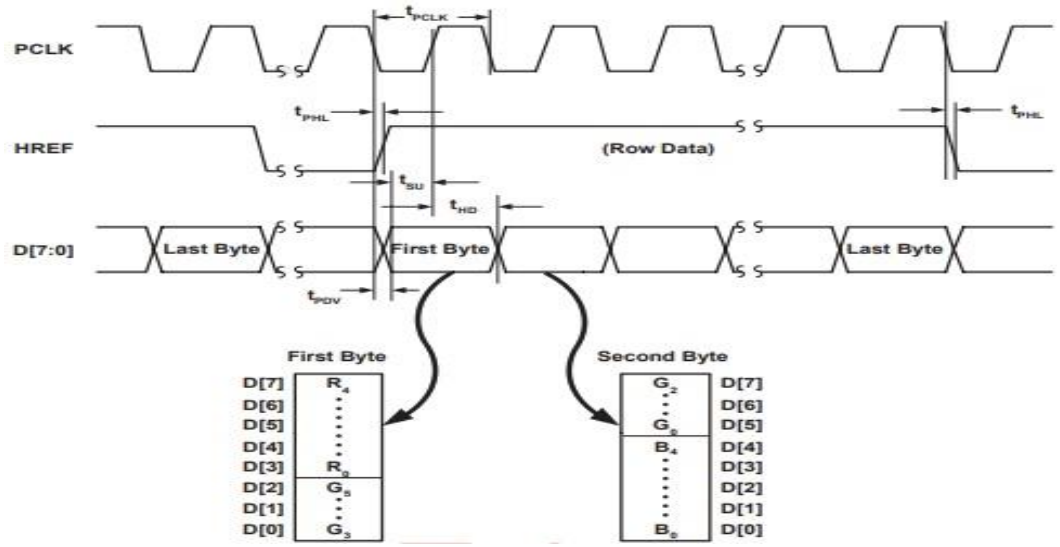
- Input CLK- 100Mhz from Oscillator of the Nexues 7
- Xclk – 25Mhz
- Pxclk – 25Mhz
- clk_wiz
  - Vga - 50Mhz
  - Reg - 25Mhz

OV7670 Camera Controller

- To configure the OV7670 camera ,it is required to configure the camera register list via I2c communication protocol
- Camera register list controls all sensor configuration such as output format and timing of output signals etc...
- Camera Controller Block also control :
    - Reset signal for the sensor - active low
    - Power down signal of the sensor - active high
    - Xclk System clock signal

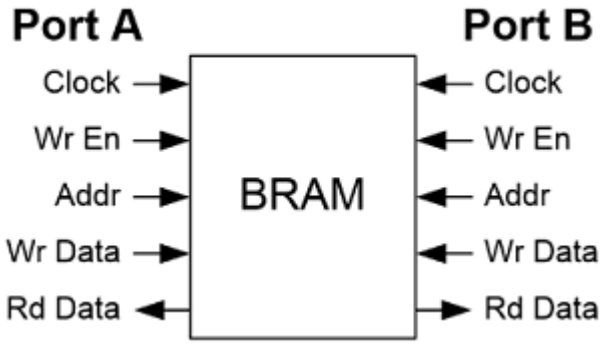
OV7670 Capture Logic

- Input Data 8 bits
- RGB565 format is 16 bits (Red – 5 bits ,Green- 6 bits ,Blue -5 bits).
- 2 Clock for each pixel.



Dual Port Ram Frame Buffer

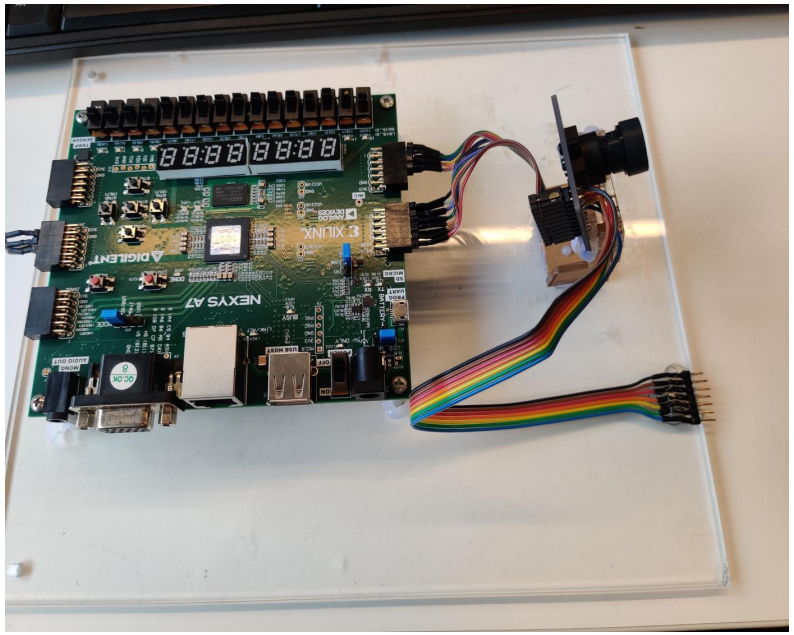
- Allows multiple reads or writes to occur at the same time format and timing of output signals etc...



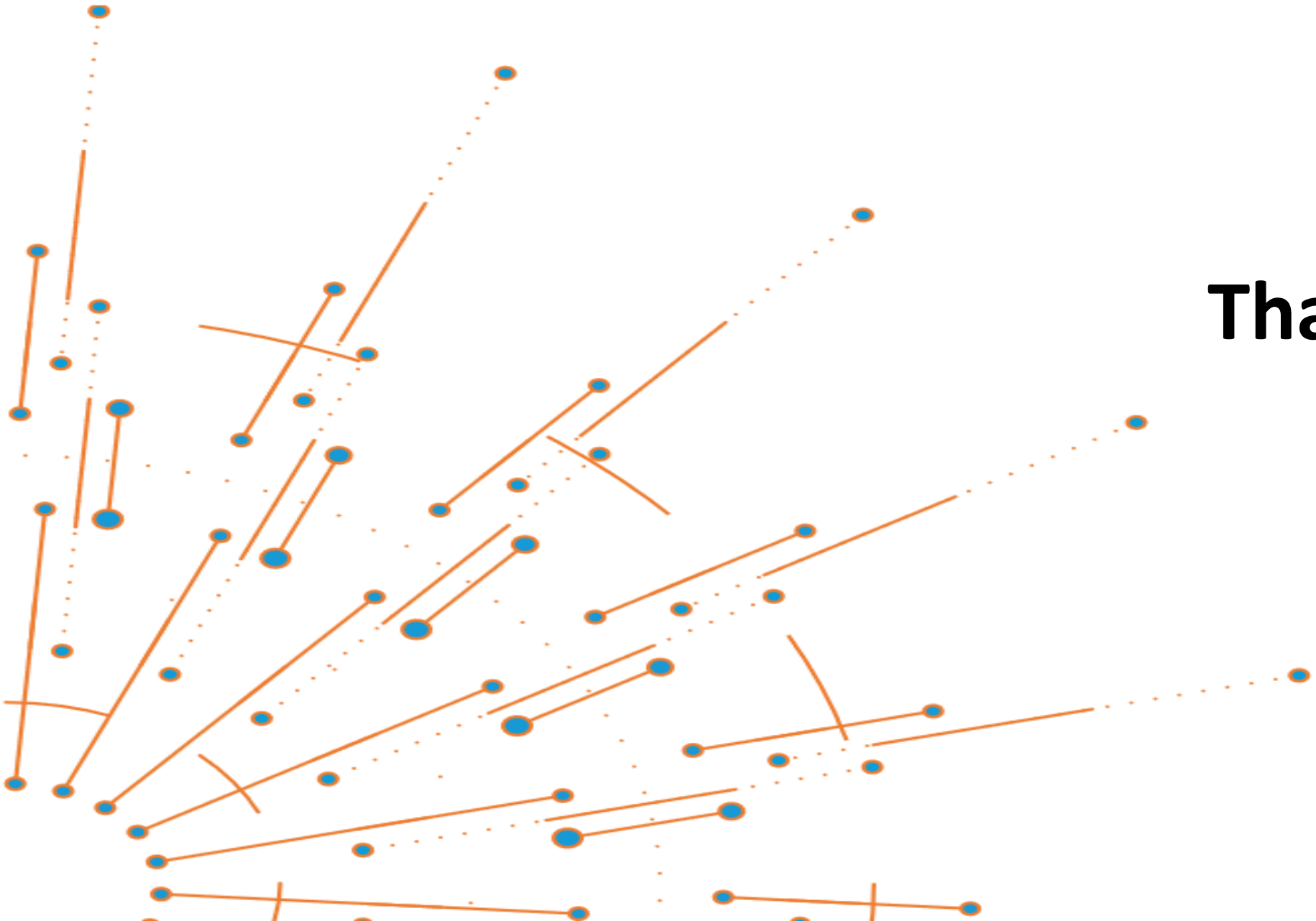
VGA Signal Gubernator

- A VGA signal contains 5 active signals
  - Two TTL compatible signals for synchronization.
    - HSYNC – horizontal synchronization
    - VSYNC – vertical synchronization
- Three analog for color control
  - Red
  - Green
  - Blue
- All other color combinations are generated by changing the analog levels of the three RGB signals
- In standard VGA format, the screen contains 640x480 pixels
- The standard refresh rate for a screen is 60 Hz

Short Video performances



Link



Thanks