EE 214 Project

Analog Clock on VGA

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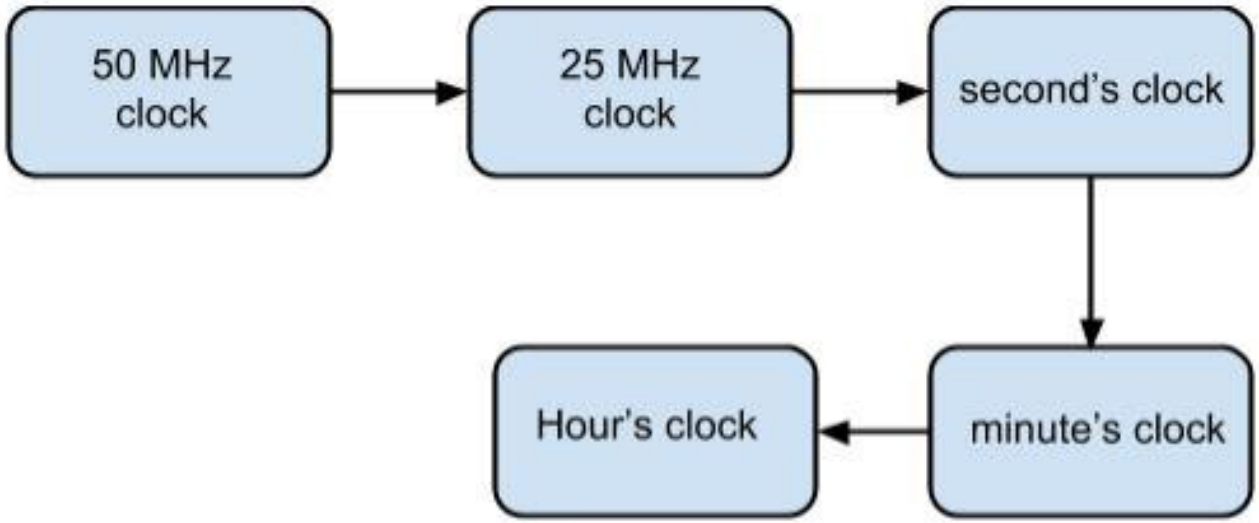
Abstract

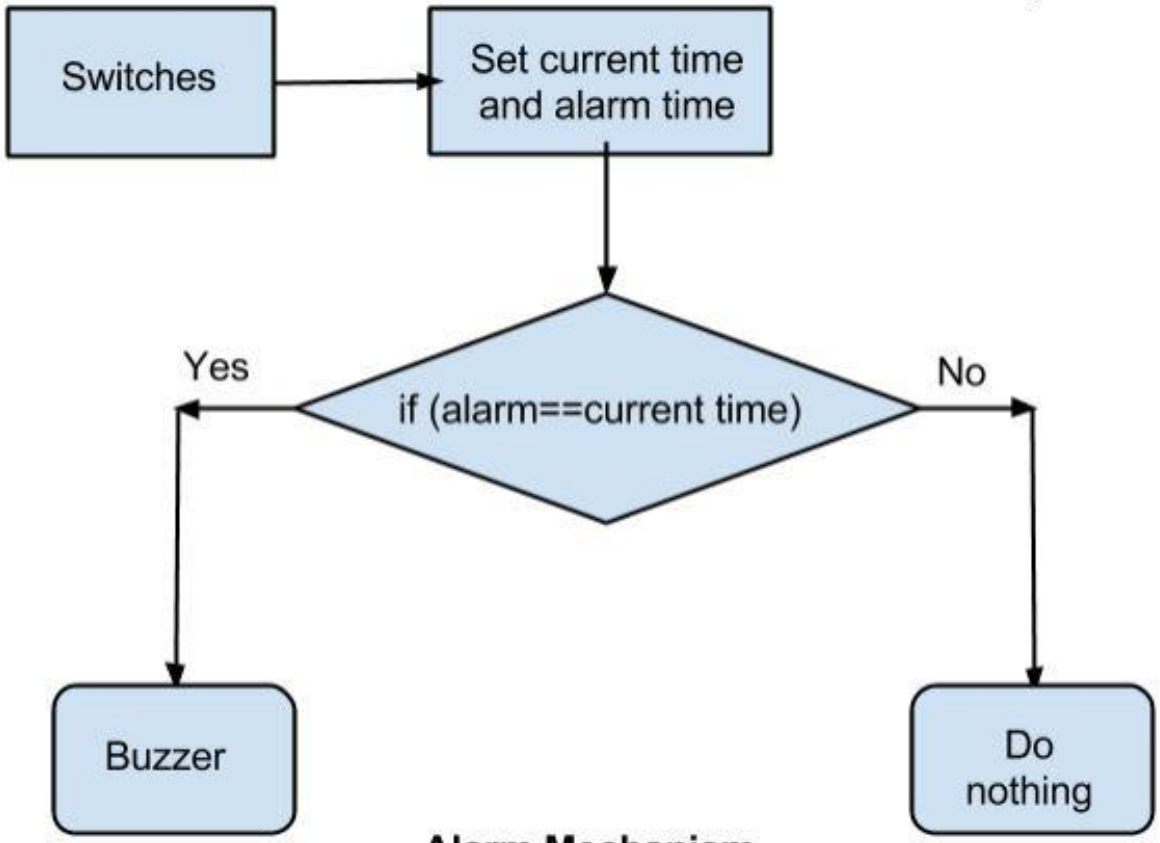
- An analog alarm clock with four hands (hour, minute, second and alarm).
- Clock is displayed on a VGA monitor.
- Functioning is controlled using a DE0 Nano board (FPGA).
- Current time and alarm time can be set using the provided switches.
- When clock reaches alarm time buzzer would start ringing.
- A bunch of themes are added to make the project a little attractive.

Block Diagrams



Time keeping mechanism of the clock

Block Diagrams



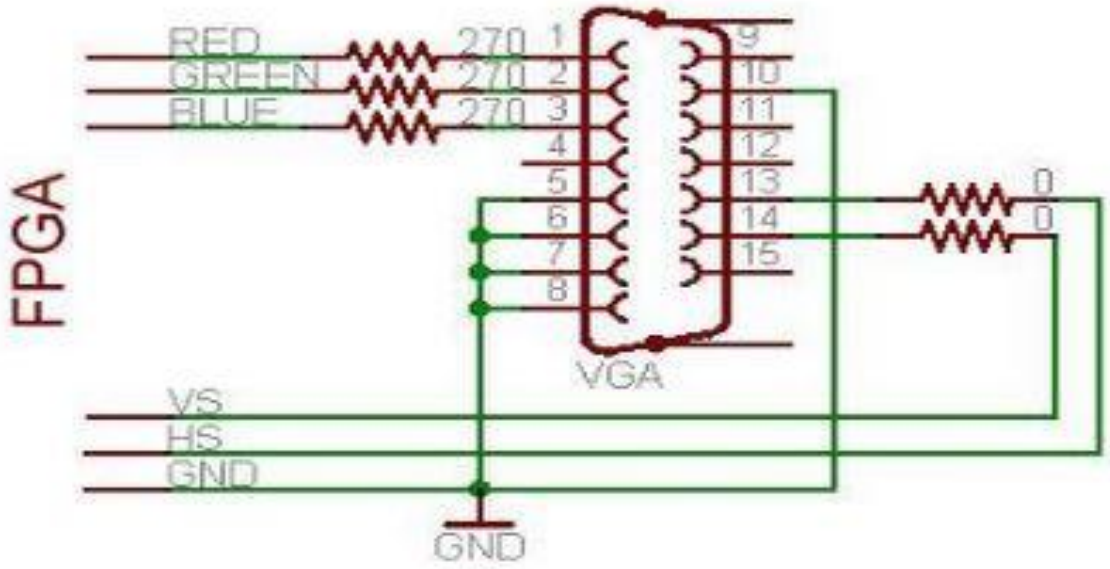
Alarm Mechanism

Software Architecture

- Generating the vertical and horizontal sync signals for VGA interfacing (640x480 screen resolution).
- Printing a circle on the VGA screen for the body of the clock.
- Displaying the four hands of the clock.
- Mechanism for controlling the time and alarm.
- Giving user the control of setting the time and alarm.

Hardware Architecture

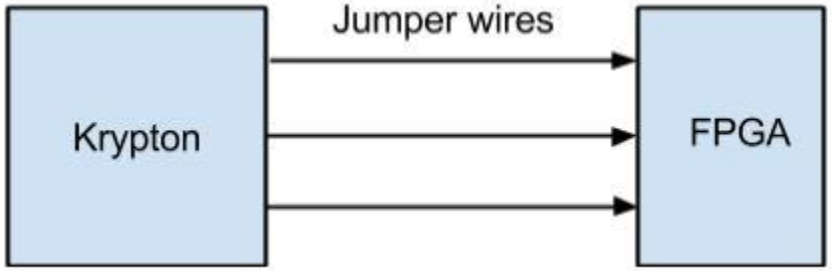
- VGA monitor's port connections



Connections of the female-female D15 connector

Hardware Architecture(Contd.)

- Switches for time setting: The switches of the Krypton board were used for this.
- The outputs from the Krypton board were sent to the input pins of the FPGA via jumper wires.



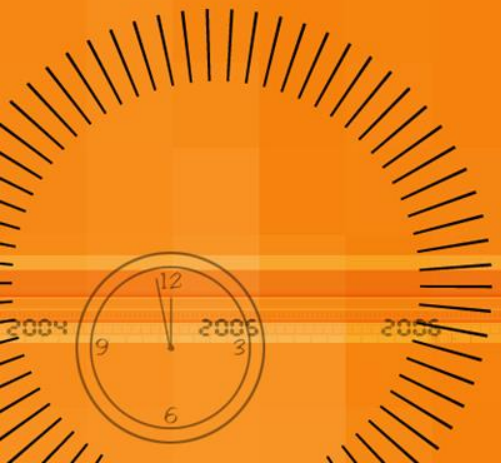
Project Implementation:

Work	Timeline
1. Study on VGA interfacing	5th March to 11th March
2. Devise the algorithm to print the clock on VGA	12th March to 18th March
3. Implementation of the devised algorithm	19th March to 25th March
4. Control of time and alarm through external switches	26th March to 1st April
5. Debugging and Finishing	2nd April to 7th April
6. Final demonstration	8th April

Difficulties Faced

- No output on the VGA even with a very simple code.
- Algorithm to print the circle.
- Displaying all the hands together in synchronization.
- Interfacing the hex keypad. Failed at the end.

Results:

- Successfully designed an analog clock using FPGA board which could display real time on VGA monitor.
- Made a separate hand for alarm and once the alarm-hand coincides with the hour hand alarm would start ringing
- Separate switches to set the current time and alarm time
- Various themes (background) for the analog clock which could be changed by pressing a push button

THANK YOU