Project Proposal: Alarm System with Password Entry

Project Overview:

The Alarm System with Password Entry is a security system designed to provide protection against unauthorized access. The system requires users to enter a password using a 4x4 matrix keypad connected to an Artix A7 FPGA. If the entered password matches the predefined password, the system remains disarmed. However, an incorrect password triggers an alarm and activates a buzzer to indicate a security breach.

Components:

- Artix A7 FPGA board
- 4x4 matrix keypad
- 3.Comparator
- SRLATCH
- Display (optional) for feedback messages
- Buzzer or alarm sound output
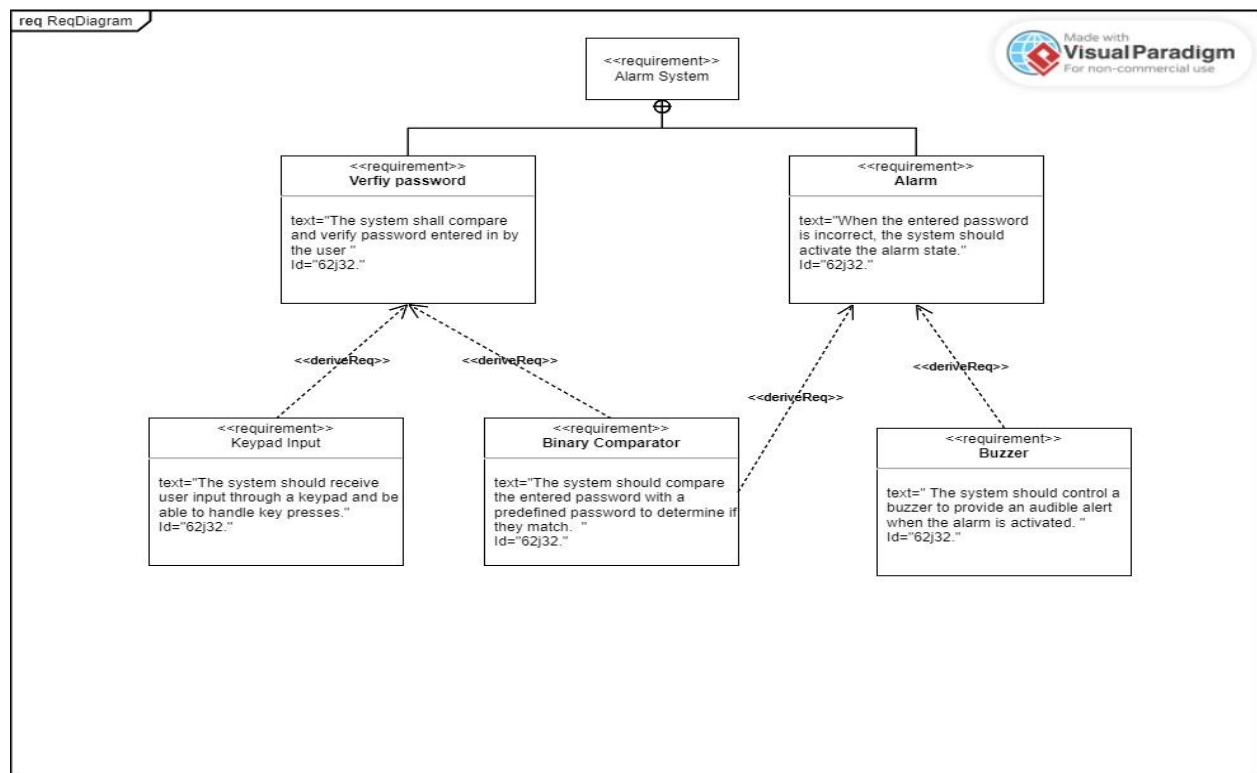
REQUIREMENT FOR OUR SYSTEM

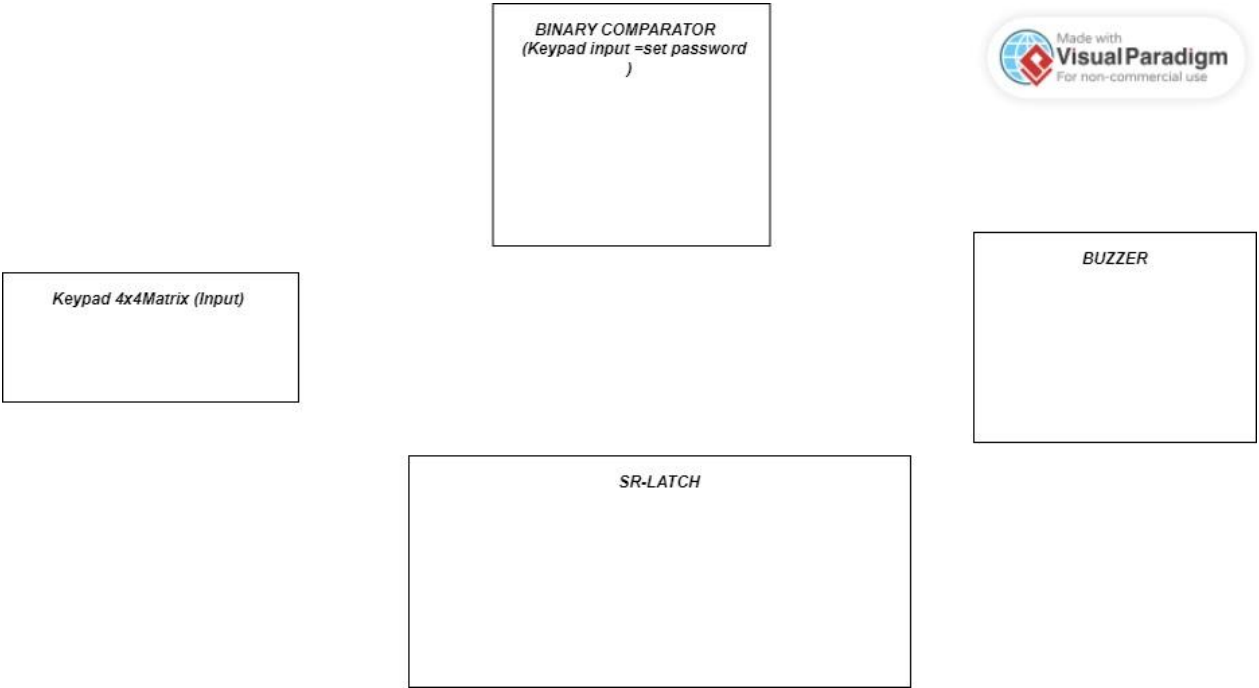

Figure 1 Requirement alarm system

BLOCK DIAGRAM

BINARY COMPARATOR
(Keypad input =set password
)

BUZZER

Keypad 4x4Matrix (Input)

SR-LATCH

Figure 2 Block Diagram

Functionalities

- ➢ User Interface:
  - o The 4x4 matrix keypad allows users to enter the password.
  - o Optional display provides feedback messages, such as "Enter Password" or "Incorrect Password."

- ➢ Password Entry:
  - o The FPGA scans the keypad to detect keypresses and converts them into corresponding binary values.
  - o The entered password is compared with a predefined password stored in the FPGA.

- ➢ Password Comparison:
  - o Combinatorial logic in the FPGA compares the entered password with the predefined password.
  - o If the entered password matches the predefined password, the system sets a latch signal to indicate a correct password.

- ➢ Alarm Activation:
  - o The latch signal controls the activation of the alarm and buzzer.
  - o If the latch signal is set (indicating an incorrect password), the alarm and buzzer are activated to signal a security breach.
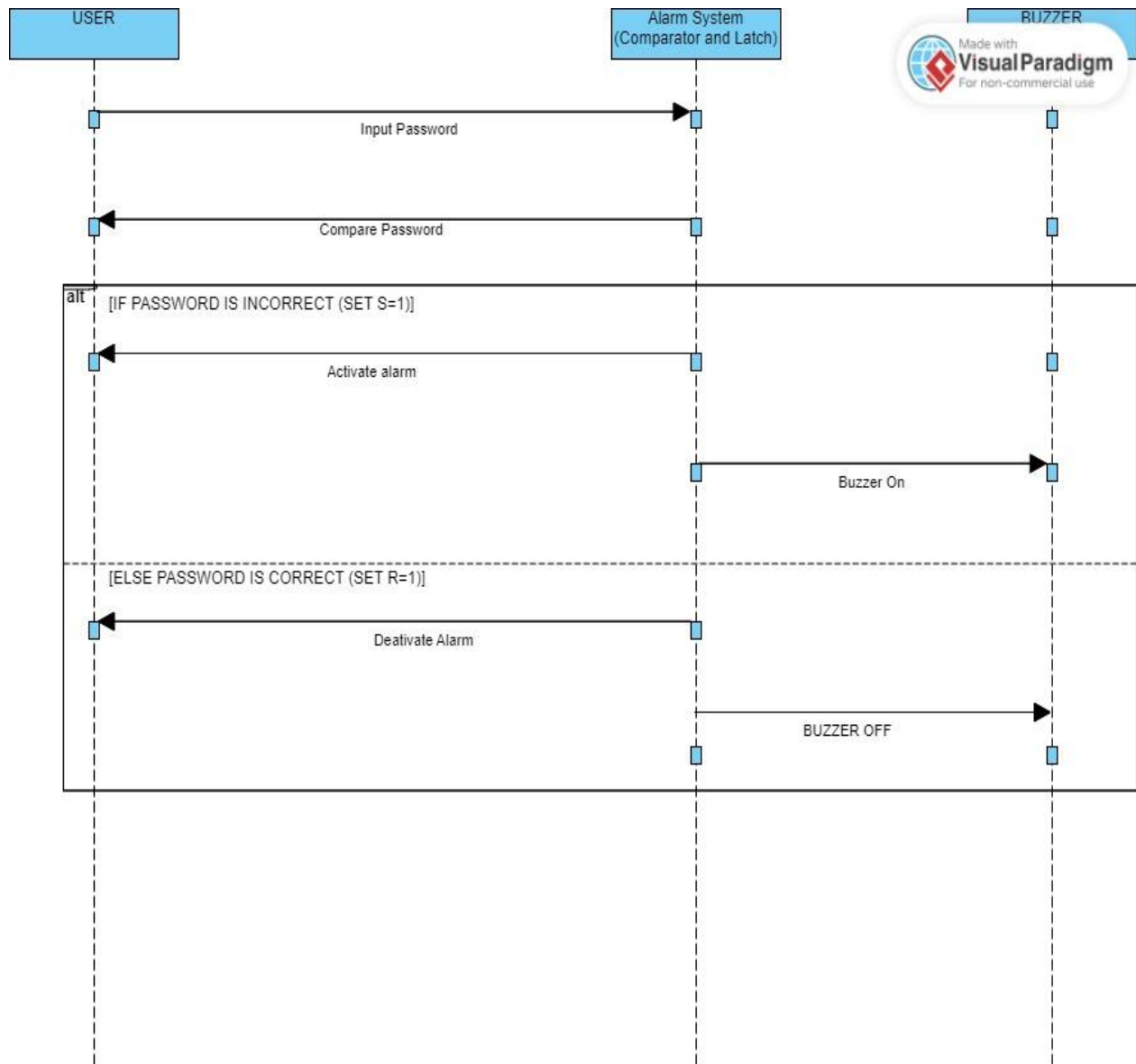
Figure 3 Artix A7 FPGA

Figure 4 Sequence of system

Depiction of how our system is intended to function the states and transitions are made clear in the above sequence diagram.

Considerations:

➤ Hardware Design:
   - Design the circuitry to interface the 4x4 matrix keypad with the Artix A7 FPGA.
   - Connect the alarm and buzzer output to appropriate pins on the FPGA board.
   - Ensure proper power supply requirements for the system.

➤ FPGA Programming:
   - Write VHDL code to implement the keypad scanning algorithm, password comparison logic, and latch control.
   - Simulate and verify the functionality of the code using FPGA simulation tools.

➤ PCB Design:
   - Design a PCB layout that incorporates the FPGA board, keypad, display (if used), and other required components.
   - Ensure proper signal routing and component placement for efficient and reliable operation.

➤ Testing and Integration:
   - Thoroughly test the complete system to verify its functionality and performance using test benches
   - Debug any issues and make necessary adjustments to ensure proper operation.

Conclusion:

The Alarm System with Password Entry provides a reliable security solution by leveraging an Artix A7 FPGA and a 4x4 matrix keypad. The system offers password-based access control and triggers an alarm in case of unauthorized attempts. By implementing the proposed design, we can ensure robust security and peace of mind.

Note: This concept proposal provides an outline for the project and can be further developed to include additional details and specifications based on project requirements.