HOME AUTOMATION

Project by

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Under the guidance of

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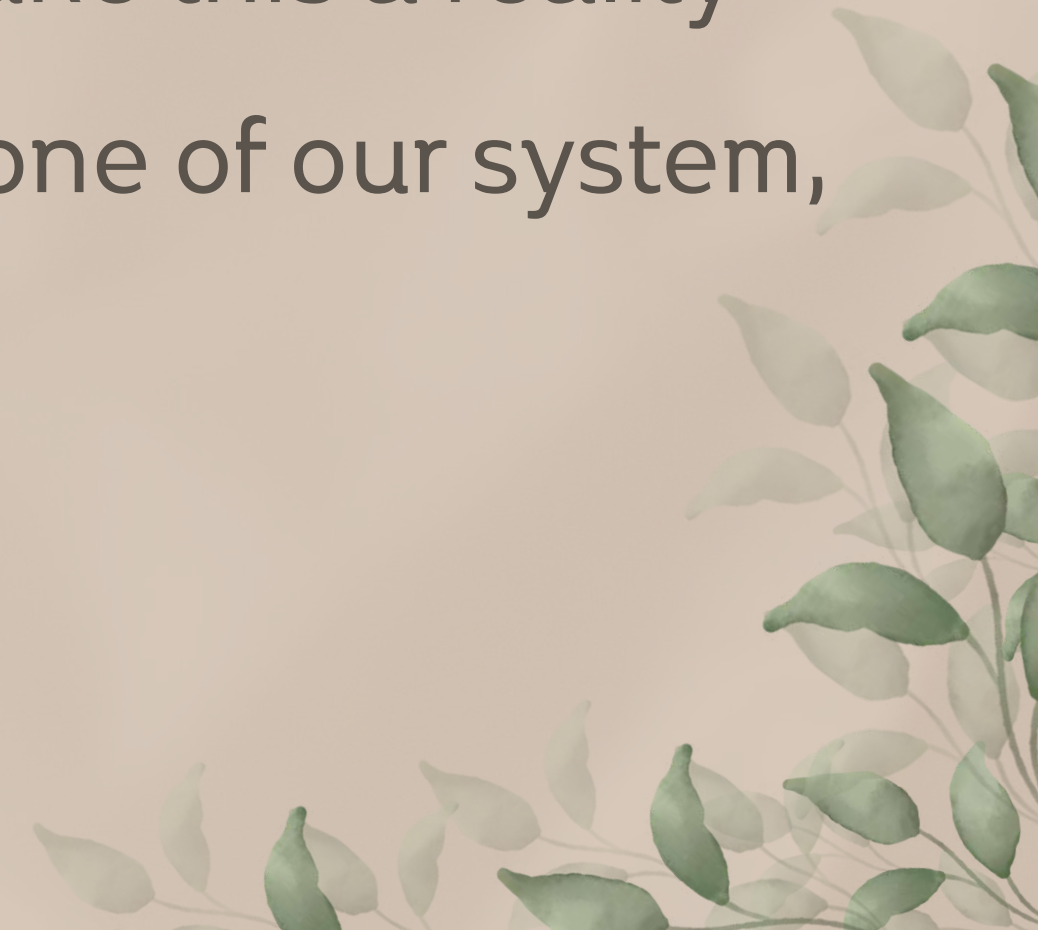
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INTRODUCTION

- Imagine a home that seamlessly adapts to your preferences, optimizes energy consumption, and ensures security.

- Our project, the 'Home Automation System Using FPGA', helps to make this a reality

- . FPGAs, form the backbone of our system,

1. Designing a system that scales to accommodate a variety of home sizes and configurations, while remaining adaptable to evolving user preferences and technological advancements is a challenge.

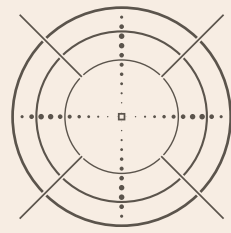**2.** An intuitive and user-friendly interface for controlling and monitoring the home automation system

3. Balancing the implementation of advanced technologies, such as FPGA, with the need for an affordable and accessible home automation solution

PROBLEM STATEMENT

OBJECTIVES

Objective 1

To incorporate features such as:

1. **Smart Lighting Control:** To implement controlling lighting system such as dimming of lights .

2. **Temperature and Climate Control:** Integrating temperature sensors and smart thermostats for climate control, allowing users to set and monitor the temperature remotely

3. **Door Lock Automation:** Integrate smart door locks for locking/unlocking.

Objective 2

Writing FPGA program and optimizing it to efficiently manage resources

Objective 3

Conduct thorough testing and validation processes to ensure the functionality, security, and performance of the home automation system under various scenarios.

LITERATURE REVIEW

Home automation is the integration of technology and automation within a residential setting , which involves the management and control of various electronic devices and systems in a home to enhance convenience, comfort, energy efficiency, and security

The key aspects which are generally focused in the home automation are security features, lighting and temperature control, management of household appliances. These features are implemented such that they can communicate with each other and can trigger actions without the human interference.

Our project is based on the paper titled 'Home Automation System Design Using Verilog Hardware Descriptive Language.' The paper focuses on security and comfort features, including fire security, anti-burglary measures, and adjustable light and temperature control. These features are simulated using Verilog.

Our project uses Verilog HDL to implement secure door locks, light control, and temperature management–key components of home automation. This is further implemented on FPGA Nexys 4 DD Artix-7.

We have written a Verilog code for our home automation system which does the following:

1. Rings an alarm when the wrong input is entered to open the door.
2. Adjusts the lighting of the room based on the light intensity outside.
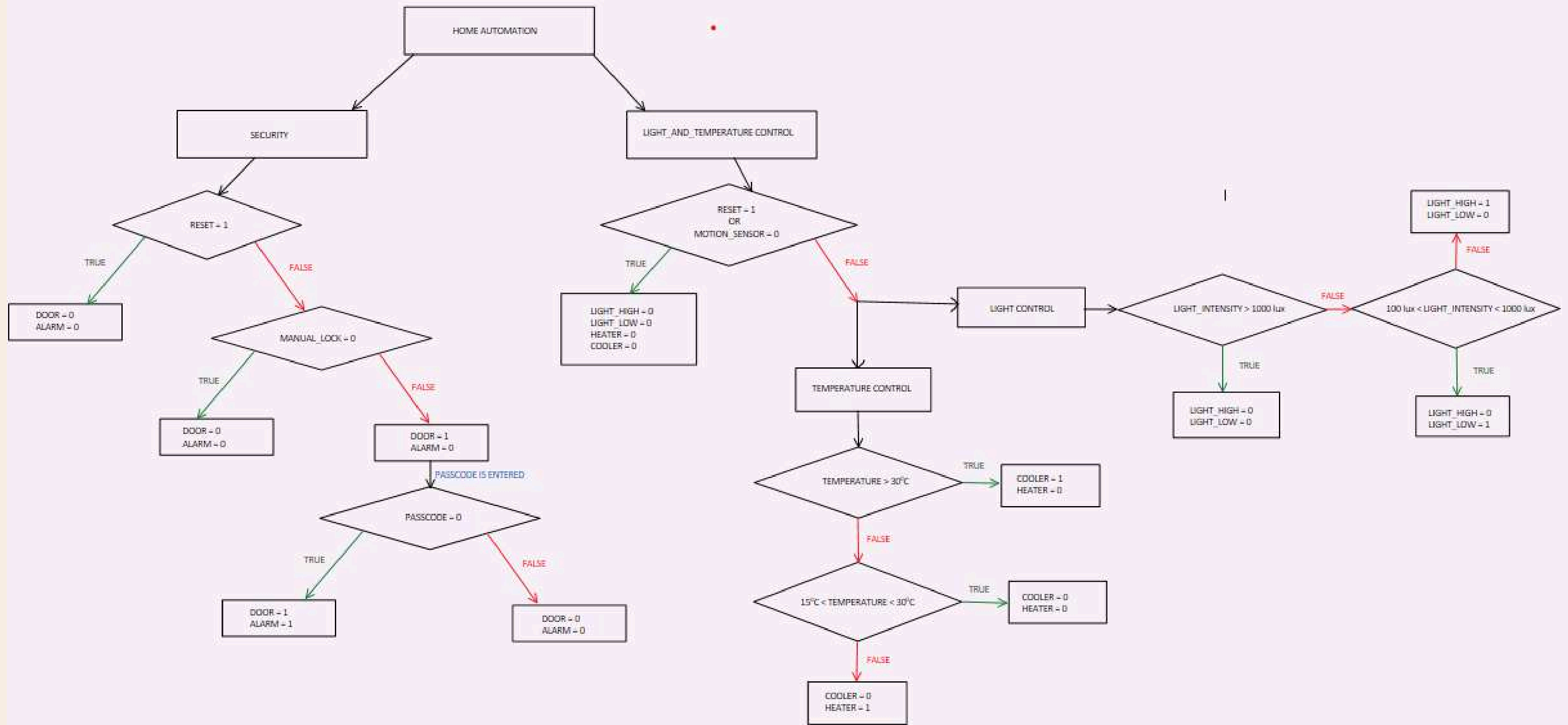3. Adjusts the temperature of the room by controlling the cooler and heater.
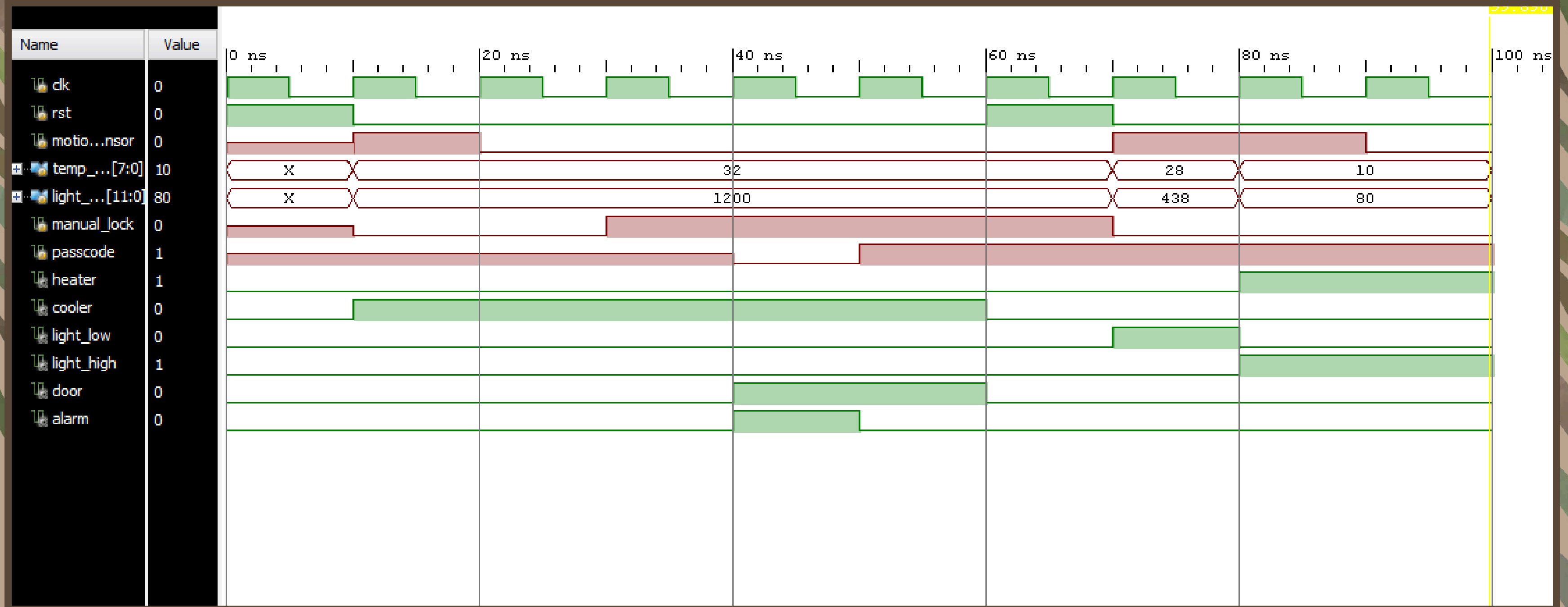
WORK DONE

- We implemented code on the Nexys 4 DDR Artix-7 FPGA.

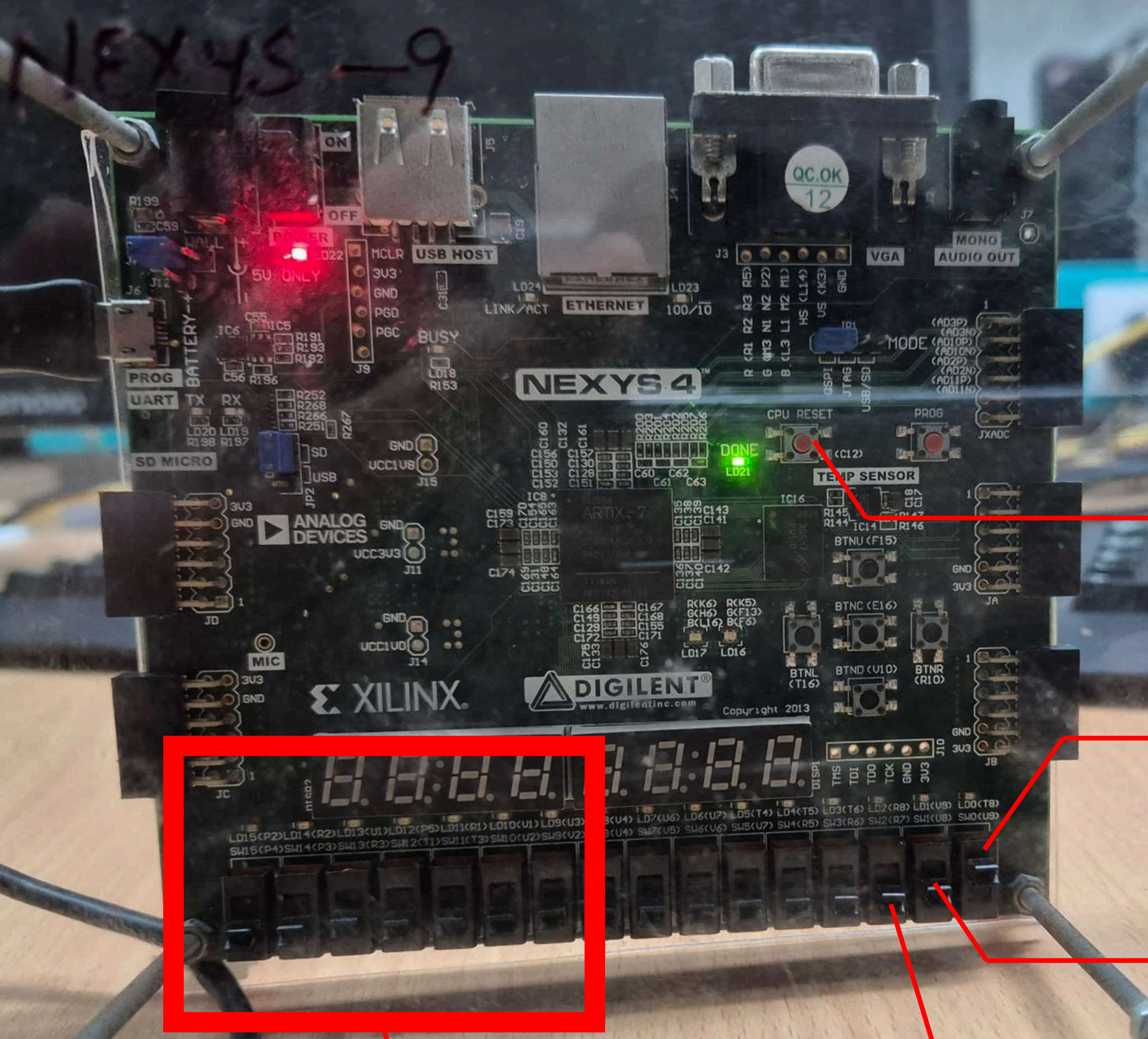- User inputs are provided via switches, and the output is observed using LEDs.

FLOW CHART

OUTPUT WAVEFORM

Name	Value					
clk	0					
rst	0					
motio...nsor	0					
temp_...[7:0]	10	X	32	28	10	
light_...[11:0]	80	X	1200	438	80	
manual_lock	0					
passcode	1					
heater	1					
cooler	0					
light_low	0					
light_high	1					
door	0					
alarm	0					

NEXYS -9

LED CONFIGURATION
1. T8 - ALARM
2. R8 - COOLER
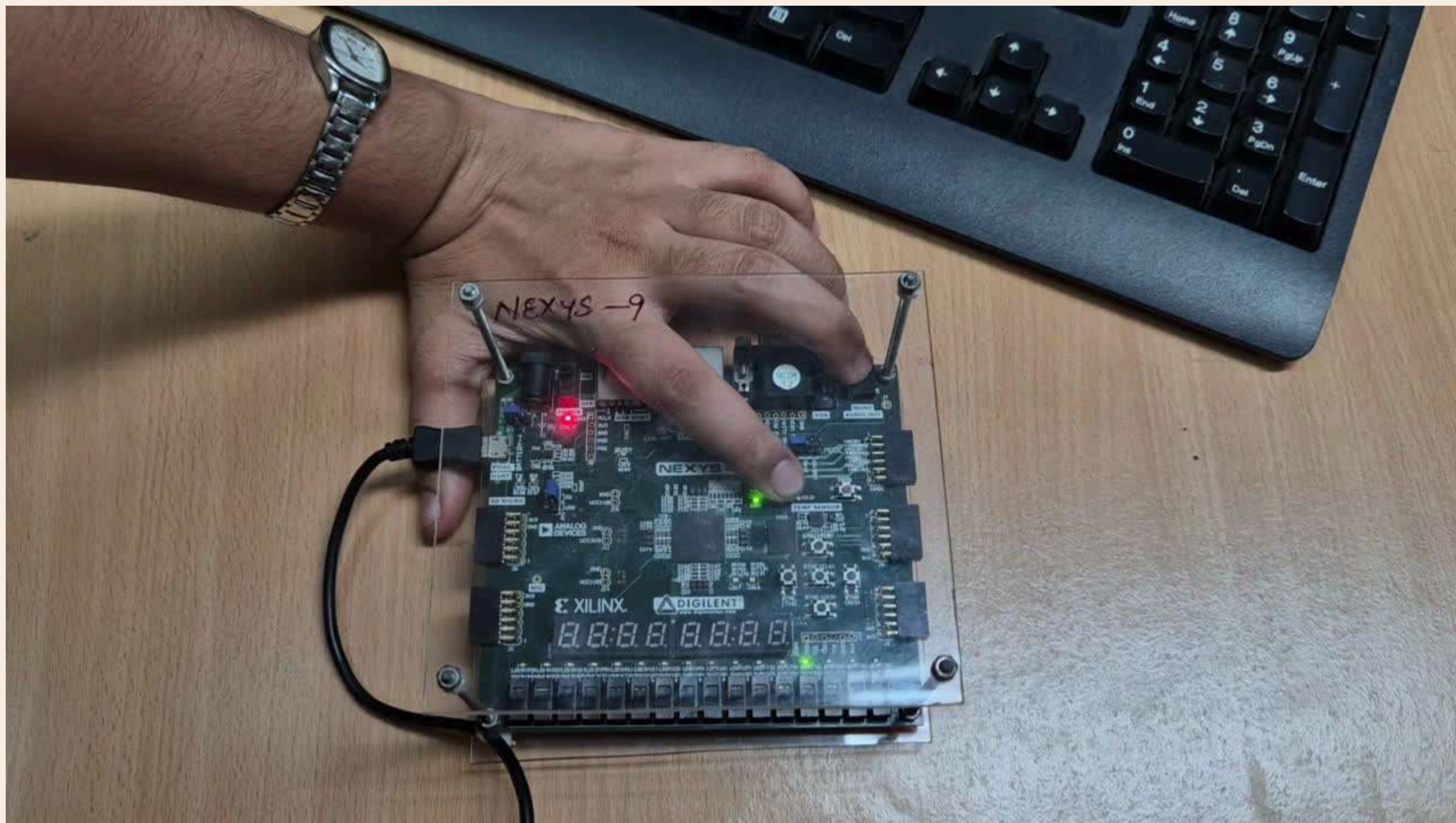3. V9 - DOOR
4. T6 - HEATER

RESET

MOTION SENSOR

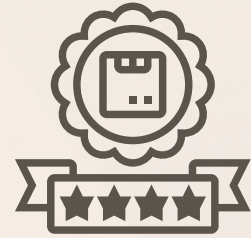MANUAL LOCK

PASSCODE

TEMPERATURE INPUTS

- Code can be written which helps in taking input from the temperature sensor on the FPGA.

- Interfacing the light and motion sensor to the FPGA.

- Making provisions so that the user can connect to the home automation system through their mobile phones.

FUTURE WORK

REFERENCES

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[2] Chee-Pun. Ooi, Wooi-Haw. Tan, Soon-Nyean. Cheong, Yee-Lien. Lee, V. M. Baskaran, Yeong-Liang. Low, "FPGA-based embedded architecture for IoT home automation application", Indonesian Journal of Electrical Engineering and Computer Science, Vol.14, No.2, May 2019, pp. 646~652

[3] Santosh Wagaj, Pooja More, "IOT based home automation system using FPGA", International Journal of Advances in Engineering and Management (IJAEM) Volume 3, Issue 7 July 2021, pp: 2180-2182

[4] Tanvi Gurav, Ibrahim Gaonkhadkar, Soham Deolekar, Yash Dhanawade, Rashmi Kulkarni, "IOT BASED HOME AUTOMATION USING FPGA", 2022 IJCRT, Volume 10, Issue 4 April 2022

THANK YOU