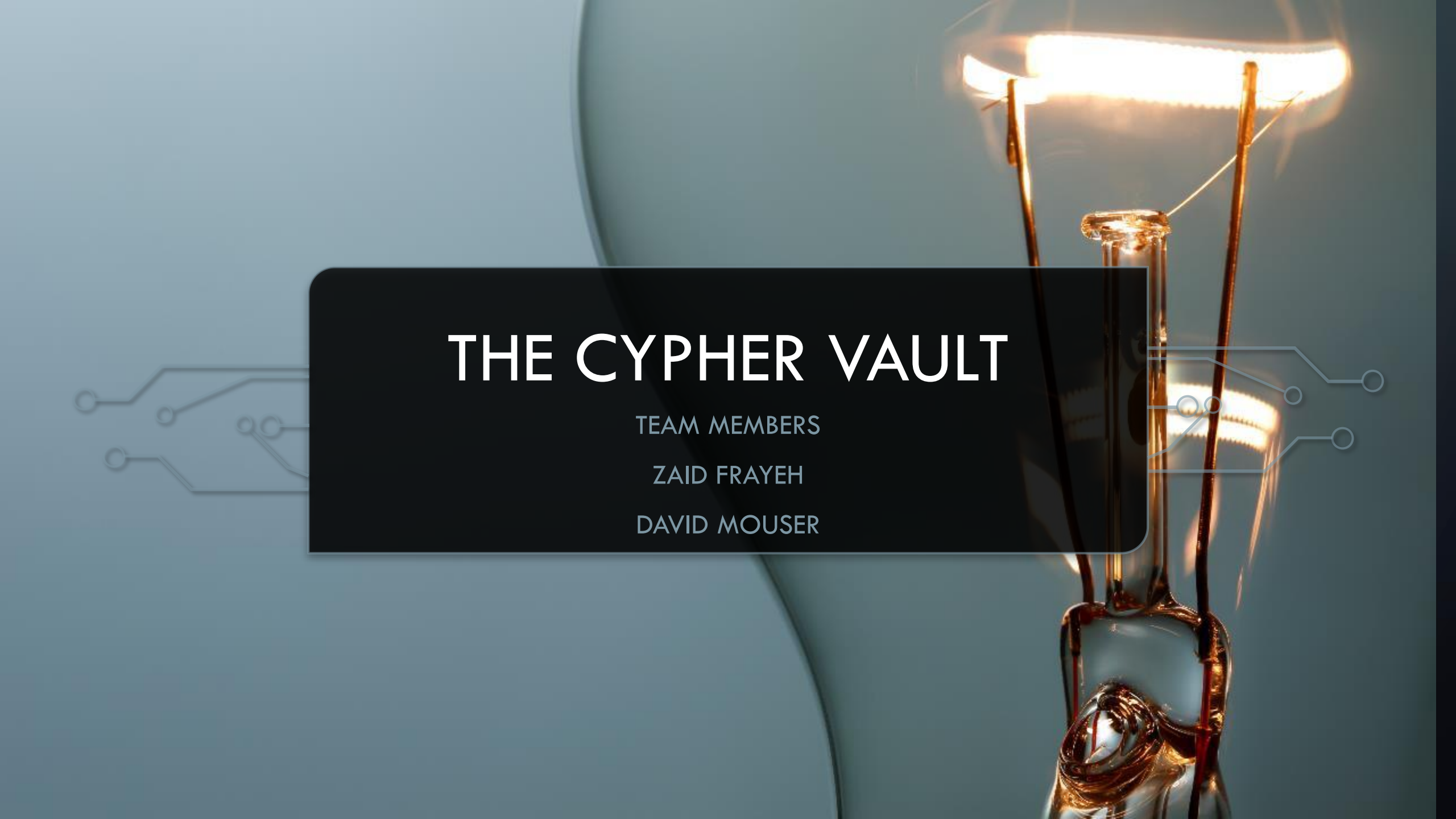
THE CYPHER VAULT

TEAM MEMBERS

ZAID FRAYEH

DAVID MOUSER



MOTIVATION

Designing a digital safe is an exciting and rewarding challenge that offers the opportunity to create a product that can protect people's most valuable possessions and keep them secure.

But what really brought us to design a digital safe is the challenges that we wanted to go through we have combined many topics that were learned during the semester like Finite State Machines, 7 segment display, Decoders and many more.

DESCRIPTION

- Our code consists of:
- Mealy finite state machine
- Clock Divider
- seven segment display Decoder
- Top Module

DESCRIPTION

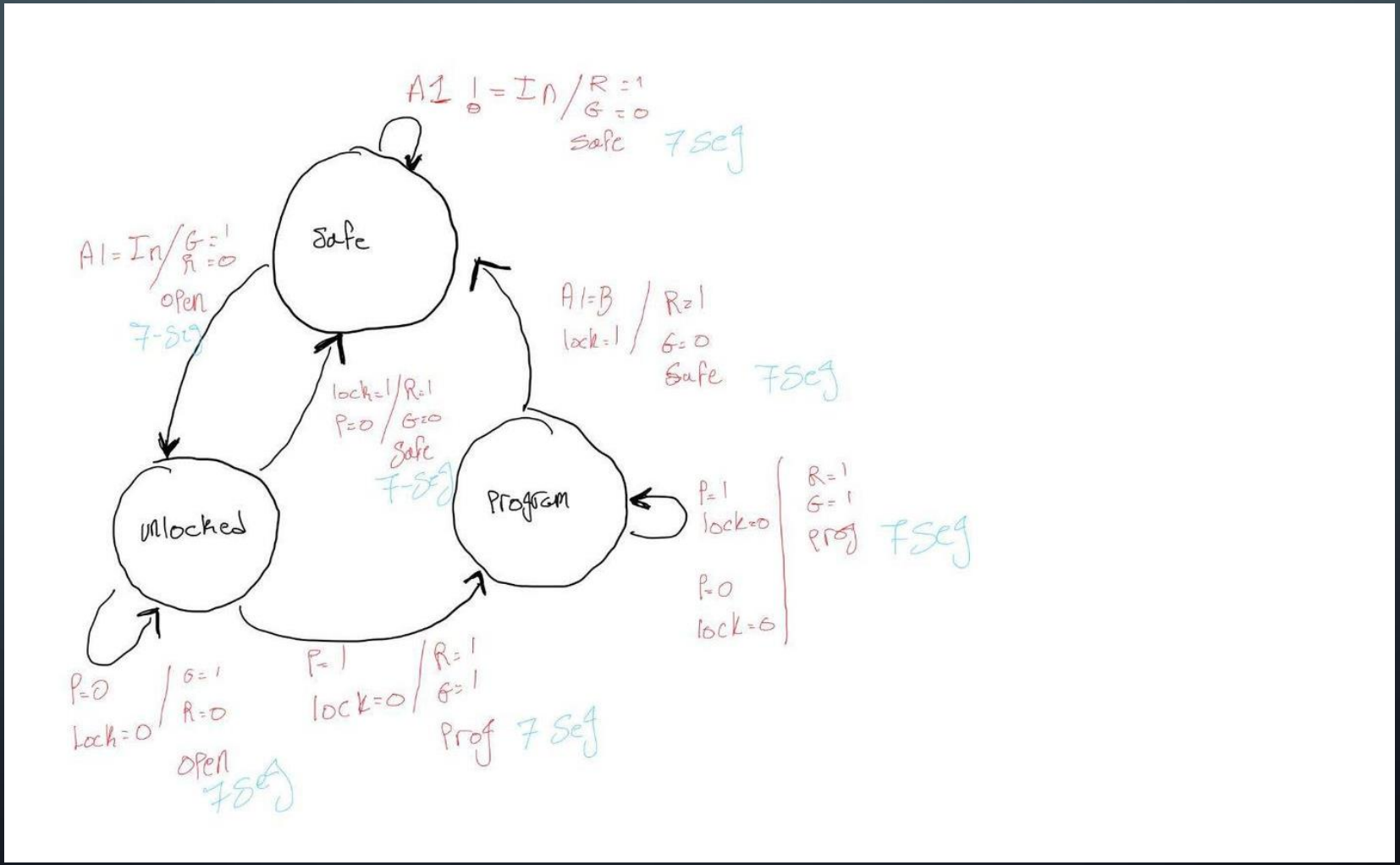
The finite state machine almost deals with everything it takes in 3 input pins. Initial state is safe our predefined code for the safe is 111. The user enters this PIN to go into the next stage which is the UNLOCKED Stage from There the user can use the same PIN or use a new one. The user can press Program button to set a new pin or Lock to use the existing PIN and lock the Safe. If the user presses the Program button he will enter the program state where he can set the new pin from the switches after he sets the new pin the user presses the lock button to set the new pin and lock the safe.

The seven segment display shows which state the program is in.

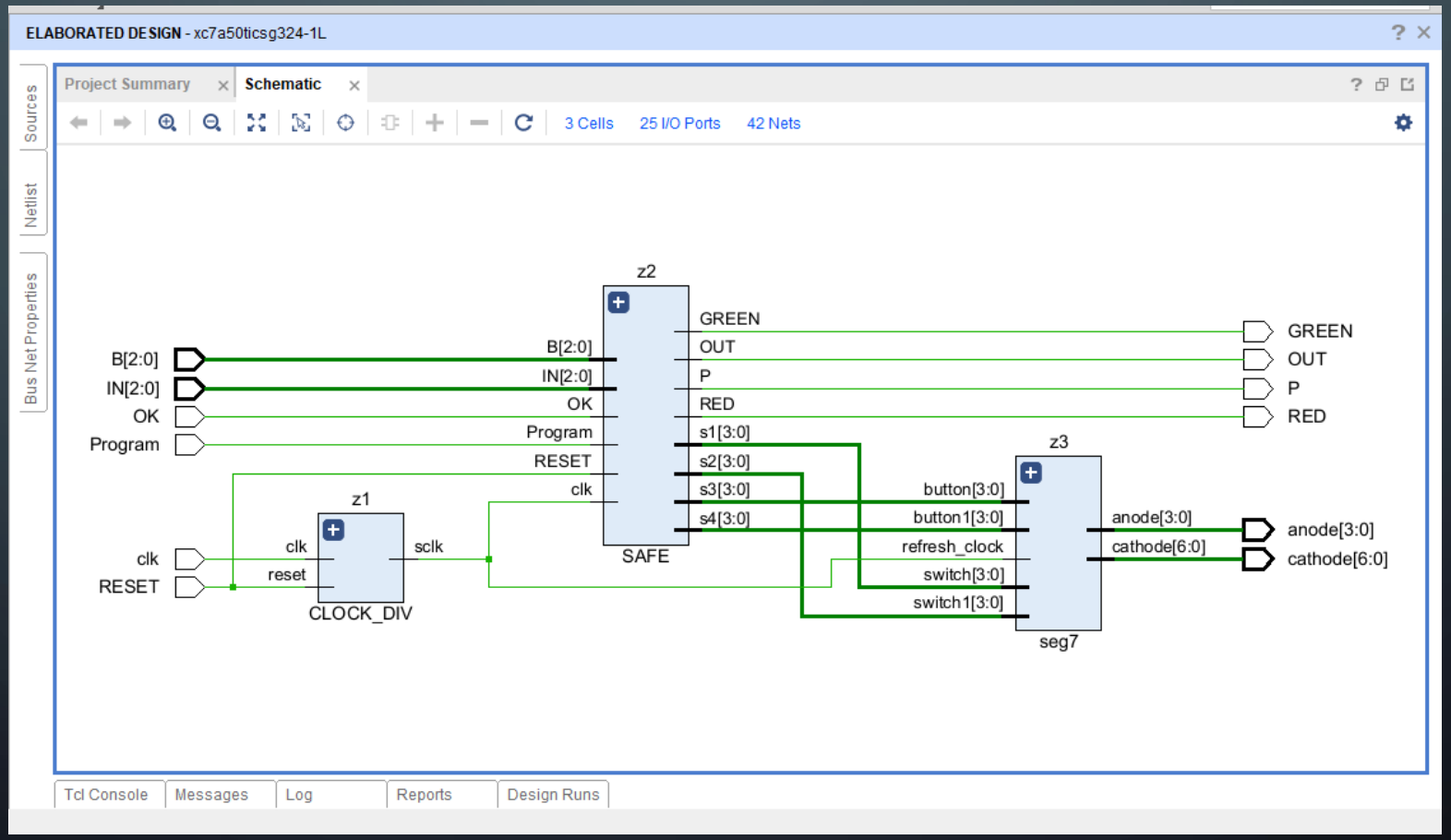
The clock divider set the required clock.

The Top module is responsible for connecting all of the sub modules.

STATE DIAGRAM/SYSTEM DIAGRAM



SCHEMATIC


ELABORATED DESIGN - xc7a50ticsg324-1L
Sources
Netlist
Bus Net Properties
Project Summary
Schematic
3 Cells
25 I/O Ports
42 Nets
z2
B[2:0]
IN[2:0]
OK
Program
RESET
clk
GREEN
OUT
P
RED
s1[3:0]
s2[3:0]
s3[3:0]
s4[3:0]
SAFE
z1
clk
reset
sclk
CLOCK_DIV
z3
button[3:0]
button1[3:0]
refresh_clock
switch[3:0]
switch1[3:0]
anode[3:0]
cathode[6:0]
seg7
Tcl Console
Messages
Log
Reports
Design Runs

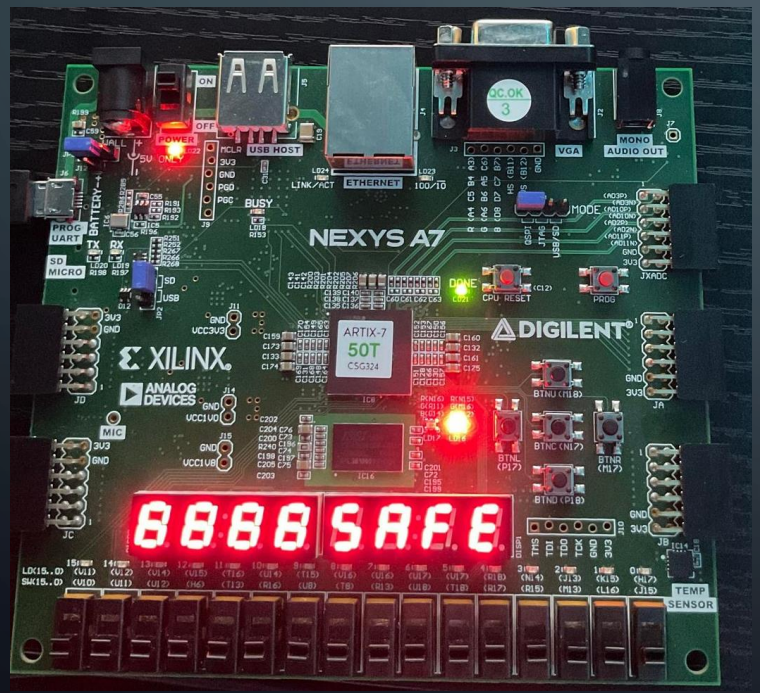
FEATURES

- Finite State Machine
- Program button
- Lock button
- Input switches
- Clock Divider
- Timing management
- 7-segment display of current state

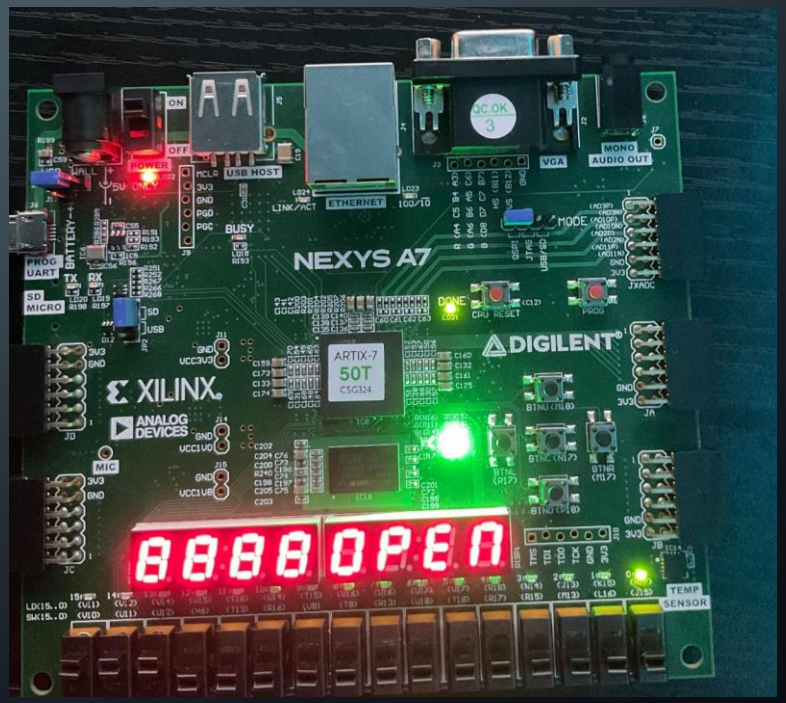
OPERATION

LOCKED STATE

Enter the initial pin 111



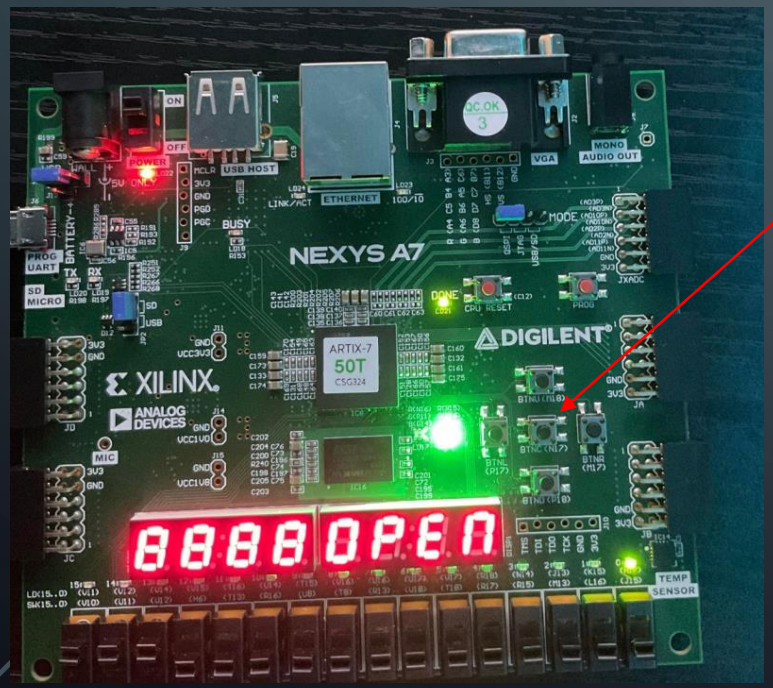
UNLOCK state



OPERATION

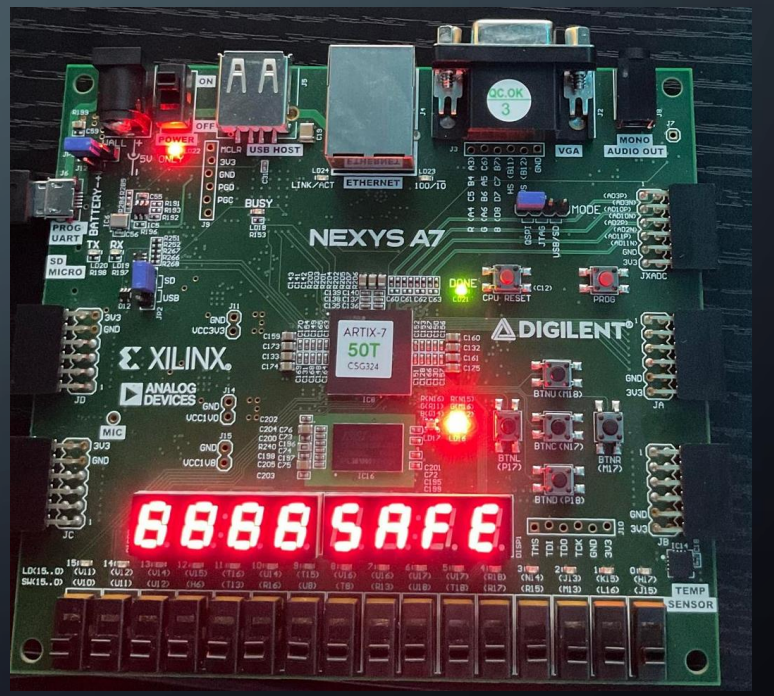
UNLOCKED State

PRESS LOCK BUTTON TO LOCK



LOCK
BUTTON

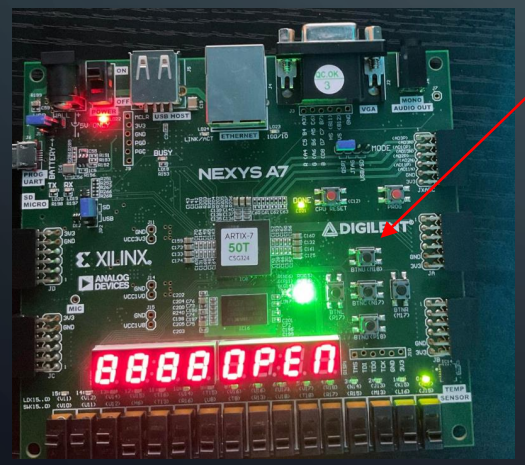
LOCK State



OPERATION

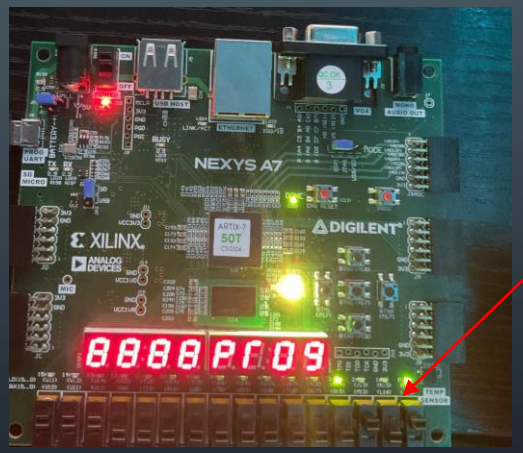
UNLOCKED State

PRESS Program button to change pin



Program BUTTON

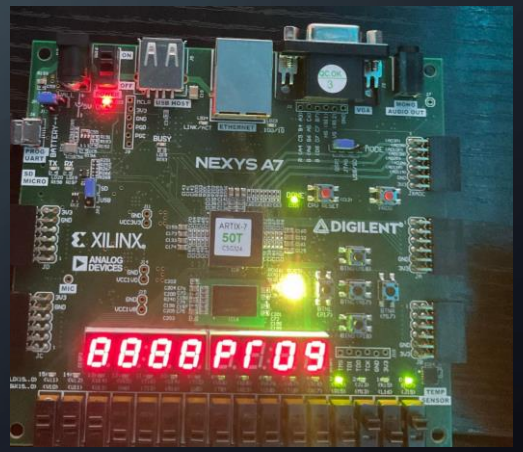
Program state



Choose new pin

Program state

Press lock button to set new state



DISCUSSION/SUMMARY

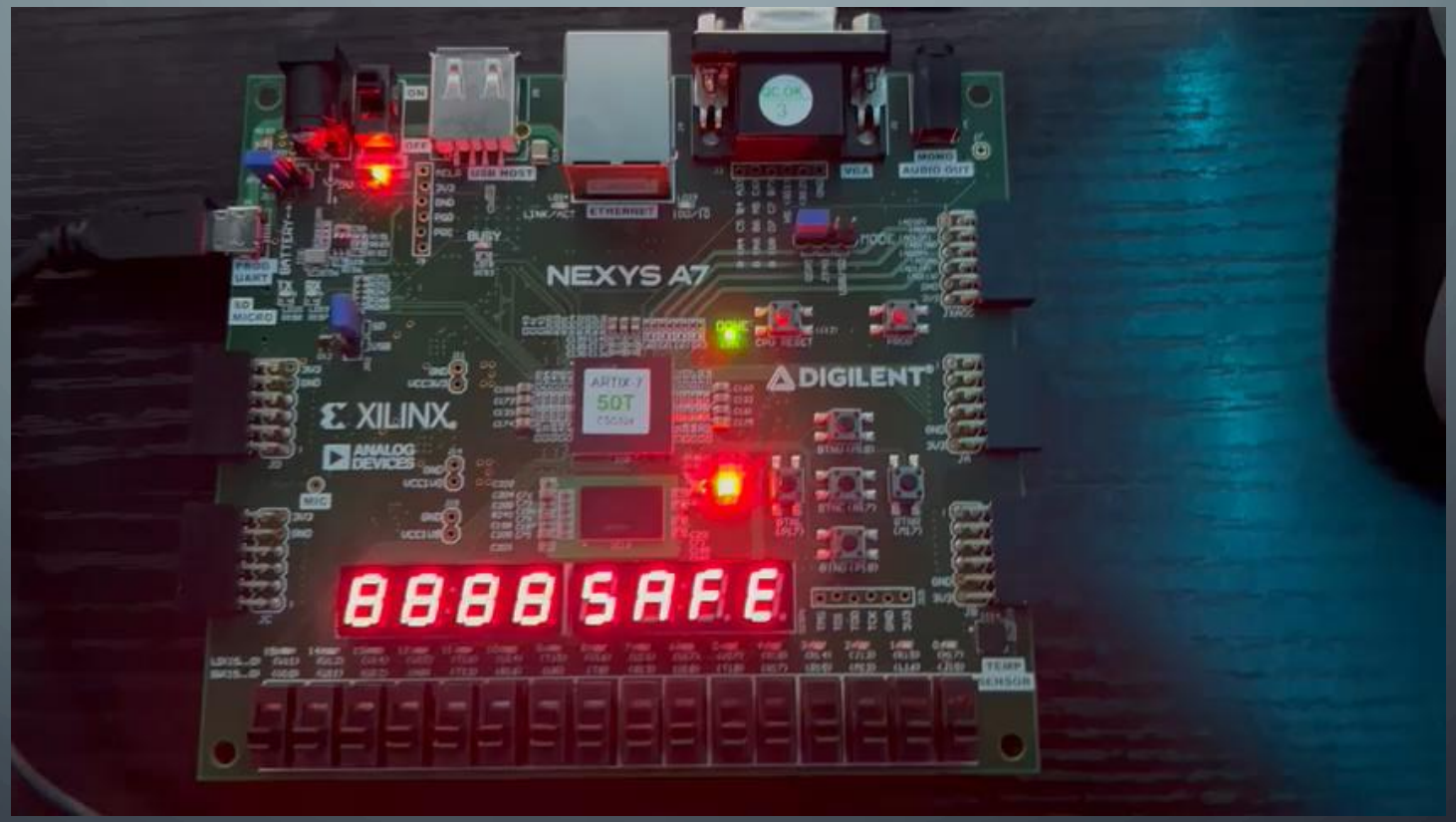
This project was an excellent opportunity to combine a lot of what we have learned throughout the semester.

For demonstration purposes we made our safe operate on 3 pins we could have it operate on as much pins as the user wants.

CHALLENGES

- We have faced a lot of challenges with combining our modules together, since they were consisted of 8 different modules. But at the end we got it to work we have changed our entire code multiple times especially our finite state machine.
- We faced problems with the Clock until we have used the static timing analysis technique to get the right clock.

DEMO



QUESTIONS