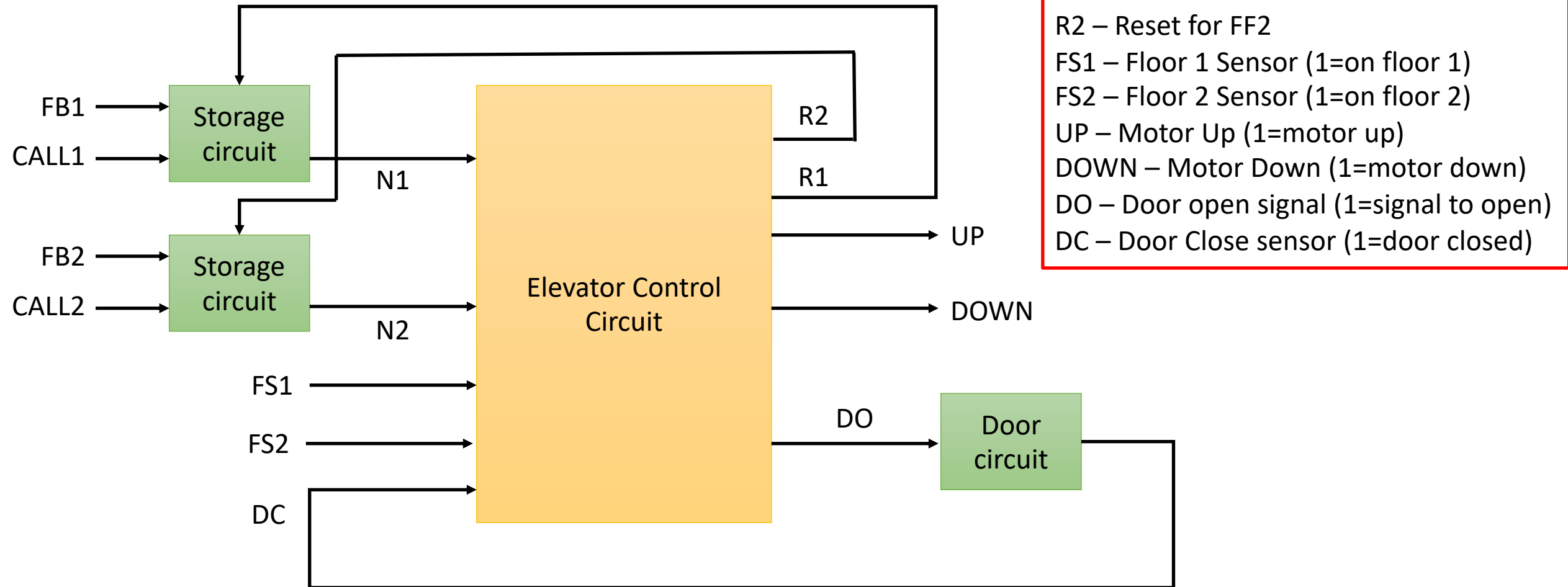


ECE 316 – Assignment 4

Elevator Control

Hardware Implementation

2-Floor Elevator Design



Operation

- Elevator initial state:
 - Floor 1, Door Closed, Motor Off (UP=DOWN=0)
- Elevator remains on last floor visited:
 - Floor $\frac{1}{2}$, Door Closed, Motor Off
- On Elevator Call (FBn or CALLn), either
 - If current Floor \neq n: Motor UP or DOWN until FSn, Door Open (10s), Reset N
 - Else: Door Open (10s), Reset N
- Elevator cannot move unless Door Closed

Design the Elevator Control Circuit

Pin/Bus	I/O	Size	Name	DE1
N1	Input	1-bit	Floor 1 Call (1=call to floor 1)	SW9
N2	Input	1-bit	Floor 2 Call (1=call to floor 2)	SW8
FS1	Input	1-bit	Floor 1 Sensor (1=at floor 1)	SW0
FS2	Input	1-bit	Floor 2 Sensor (1=at floor 2)	SW1
DC	Input	1-bit	Door is closed (1=closed)	SW2
R1	Output	1-bit	Reset Floor 1 Call when arrive at Floor 1 after call (1=reset)	LED9
R2	Output	1-bit	Reset Floor 2 Call when arrive at Floor 2 after call (1=reset)	LED8
UP	Output	1-bit	Motor Up (1=on)	LED0
DOWN	Output	1-bit	Motor Down (1=on)	LED1
DO	Output	1-bit	Open door (1=open)	LED2
FLOOR	Output	7-bits	7-Segment display of current floor	HEX0
CLOCK	Input	1-bit	Manual Clock (falling-edge)	PB0
RESET	Input	1-bit	Manual Reset (0=reset)	PB0

Project Description

- Design a Moore sequential state machine
 - Minimize the number of states
- Show the state graph and state tables (state transition, output)
- Create a VHDL implementation and simulate in Modelsim
- Upload to DE1 board and demonstrate operation
- Extra Credit:
 - Display 'u' and 'd' on 7-segment Hex1 to indicate UP or DOWN
 - Add a FIRE input that clears all calls and returns elevator to Floor 1 with Door Open