CS226 Project Report
IITB-Proc

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Final Circuit

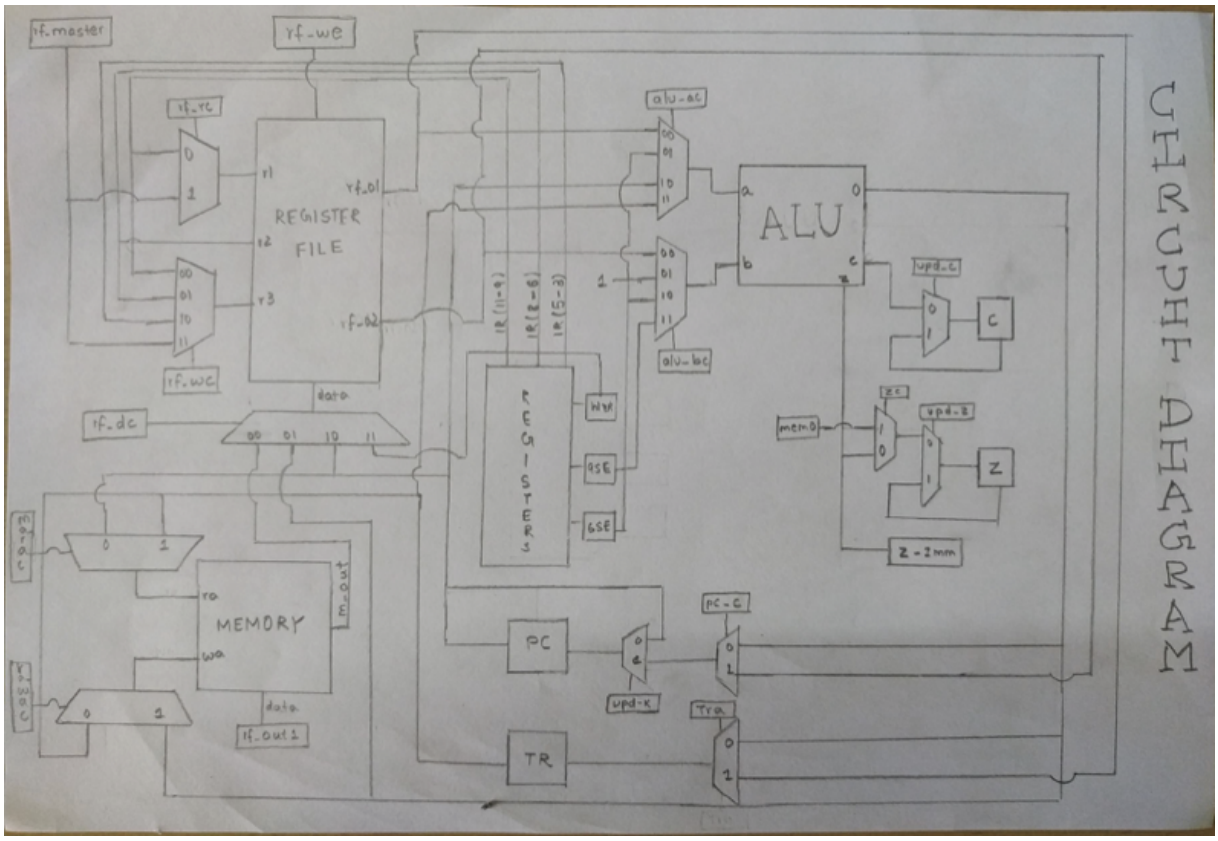

Figure 1: Final Circuit

State Transition Diagram for FSM

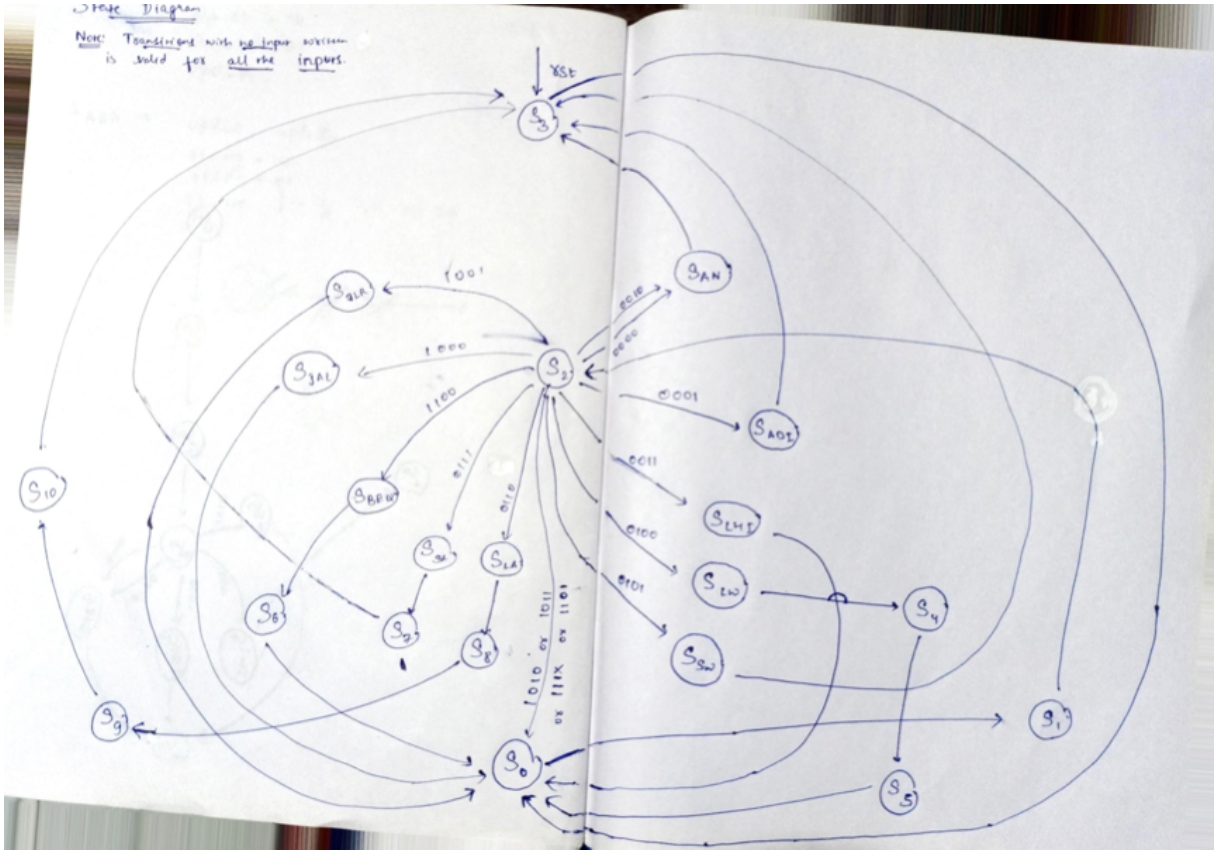

Figure 2: State Transition Diagram

States in the FSM

1. S_0: State for synchronization. Next state: S_1
2. S_1: Update instructions
3. S_2: Understand instruction and proceed to compute in single state instructions. Set appropriate controls for ADD, ADZ, … .
4. S_3: If a single state transition, reset the FSM.
    - alu_ac = 10
    - alu_bc = 01
    - upd_pc = 1
5. S_4: Activate memory read control
    - m_rac = 1
6. S_5: Reset the FSM (for LW operation)
    - rf_we = 1
    - zc = 1

- upd_pc = 1
- alu_ac = 10
- alu_bc = 01

7. S_6: Final state for BEQ operation, change the branch accordingly and reset the FSM
   - alu_ac = 10
   - upd_pc = 1
   - if z_imm is 1, alu_bc is set to "10" else is set to "01"
8. S_7: For SA operation
   - rf_rc = 1
   - m_we = 1
   - alu_ac = 11
   - alu_bc = 01
9. S_8: For LA operation read instruction from memory
   - m_rac = 1
   - alu_ac = 11
   - alu_bc = 01
10. S_9: For LA update writing controls
    - m_rac = 1
    - alu_ac = 11
    - alu_bc = 01
    - rf_we = 1
    - rf_wc = 11
11. S_10: For LA update the register and go to state 3
    - rf_we = 1
    - rf_wc = 11
12. S_{AN}: Controls for ADD / ADC / ADZ / NDU / NDC / NDZ
    - upd_c = 1, upd_z = 1
    - rf_wc = 10
    - rf_dc = 01
    - rf_we = 1
    - alu_op = 1
13. S_{ADI}: Controls for ADI

- upd_c = 1, upd_z = 1
- rf_wc = 01
- rf_dc = 01
- rf_we = 1
- alu_bc = 10

14. S_{LHI}: Controls for LHI
    - upd_pc = 1
    - rf_dc = 11
    - rf_we = 1
    - alu_ac = 10
    - alu_bc = 01
15. S_{LW}: Controls for LW
    - alu_ac = 01
16. S_{SW}: Controls for SW
    - alu_ac = 01
    - alu_a = 10
    - alu_bc = 01
    - m_wac = 1
    - m_we = 1
    - upd_pc = 1
17. S_{LA}: Controls for LA
    - trc = 1
18. S_{SA}: Controls for SA
    - trc = 1
19. S_{BEQ}: Controls for BEQ
    - alu_cin = 1
20. S_{JAL}: Controls for JAL
    - rf_dc = 10
    - rf_we = 1
    - alu_ac = 10
    - alu_bc = 11
    - upd_pc = 1

21. S_{JLR}: Controls for JLR
    - rf_dc = 10
    - rf_we = 1
    - pc_c = 1
    - upd_pc = 1