# Electronic Mood Ring

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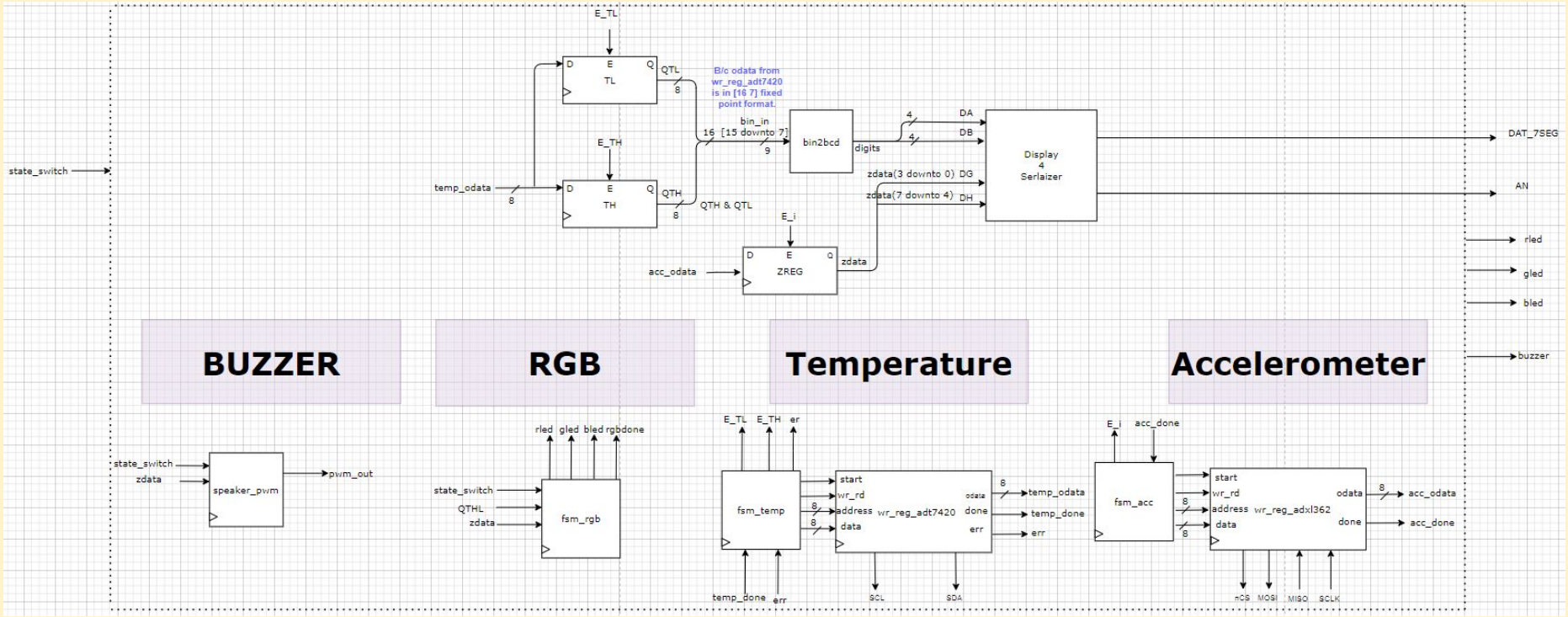
# Purpose

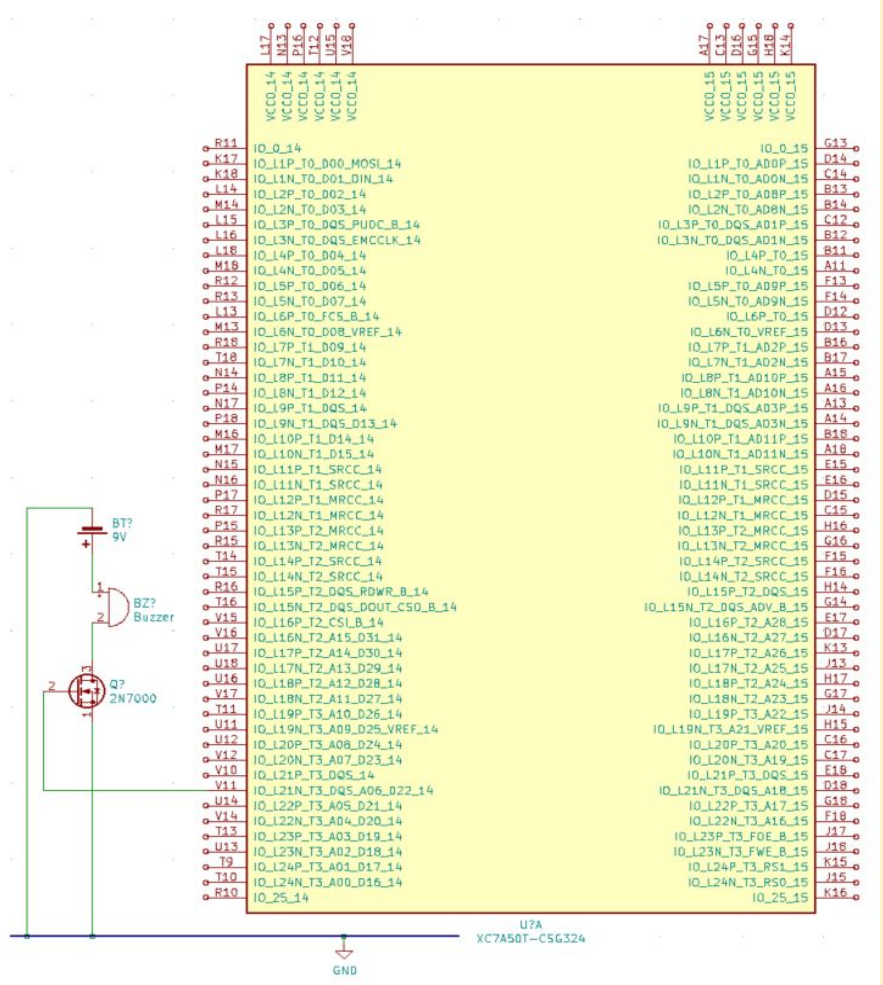
- Mood rings are fun ways to express your ‘mood’ or ‘vibe’
- The concept of a mood ring is a fun and fairly simple idea
- This project highlights the concepts of the idea and could be implemented to work with smartphone applications, electronic mood rings, and many other applications

# Datapath - Topfile

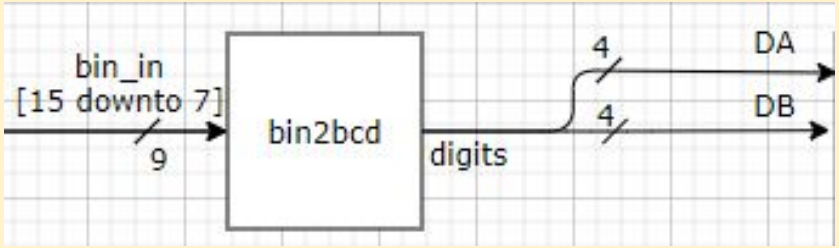


# KiCad Schematic - Buzzer

- FPGA Pmod ports draw *1A* under 3.3V
- Mosfet needed to increase current draw for buzzer



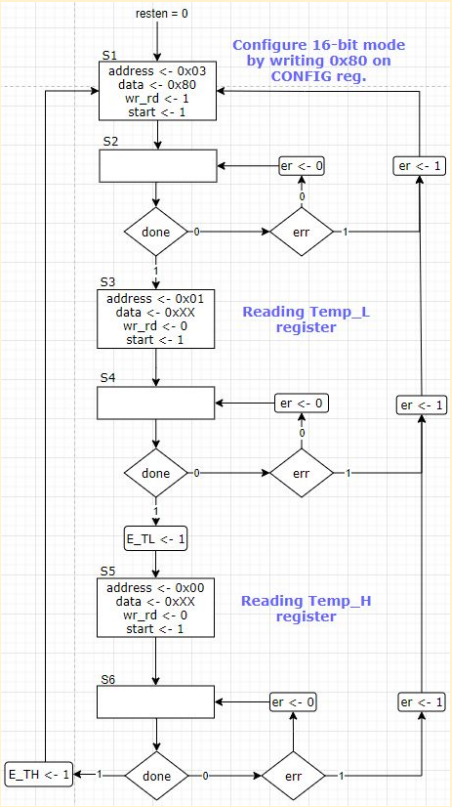
# Binary to BCD




Double Dabble Algorithm

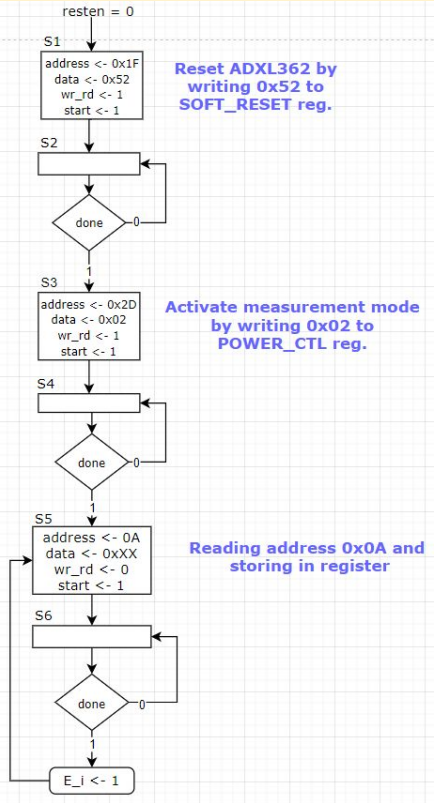
| $10^2$ | $10^1$ | $10^0$ | Binary number | Operation |
|---|---|---|---|---|
| 0000 | 0000 | 0000 | 1111101 | Start |
| 0000 | 0000 | 0001 | 111101- | 1st shift |
| 0000 | 0000 | 0011 | 11101-- | 2nd shift |
| 0000 | 0000 | 0111 | 1101--- | 3rd shift |
| 0000 | 0000 | 1010 | 1101--- | $10^0$ >4=>+3 |
| 0000 | 0001 | 0101 | 101---- | 4th shift |
| 0000 | 0001 | 1000 | 101---- | $10^0$ >4=>+3 |
| 0000 | 0011 | 0001 | 01----- | 5th shift |
| 0000 | 0110 | 0010 | 1------ | 6th shift |
| 0000 | 1001 | 0010 | 1------ | $10^1$ >4=>+3 |
| 0001 | 0010 | 0101 | ------- | 7th shift |
| 1 | 2 | 5 | | result |

# Datapath - FSM temperature sensor



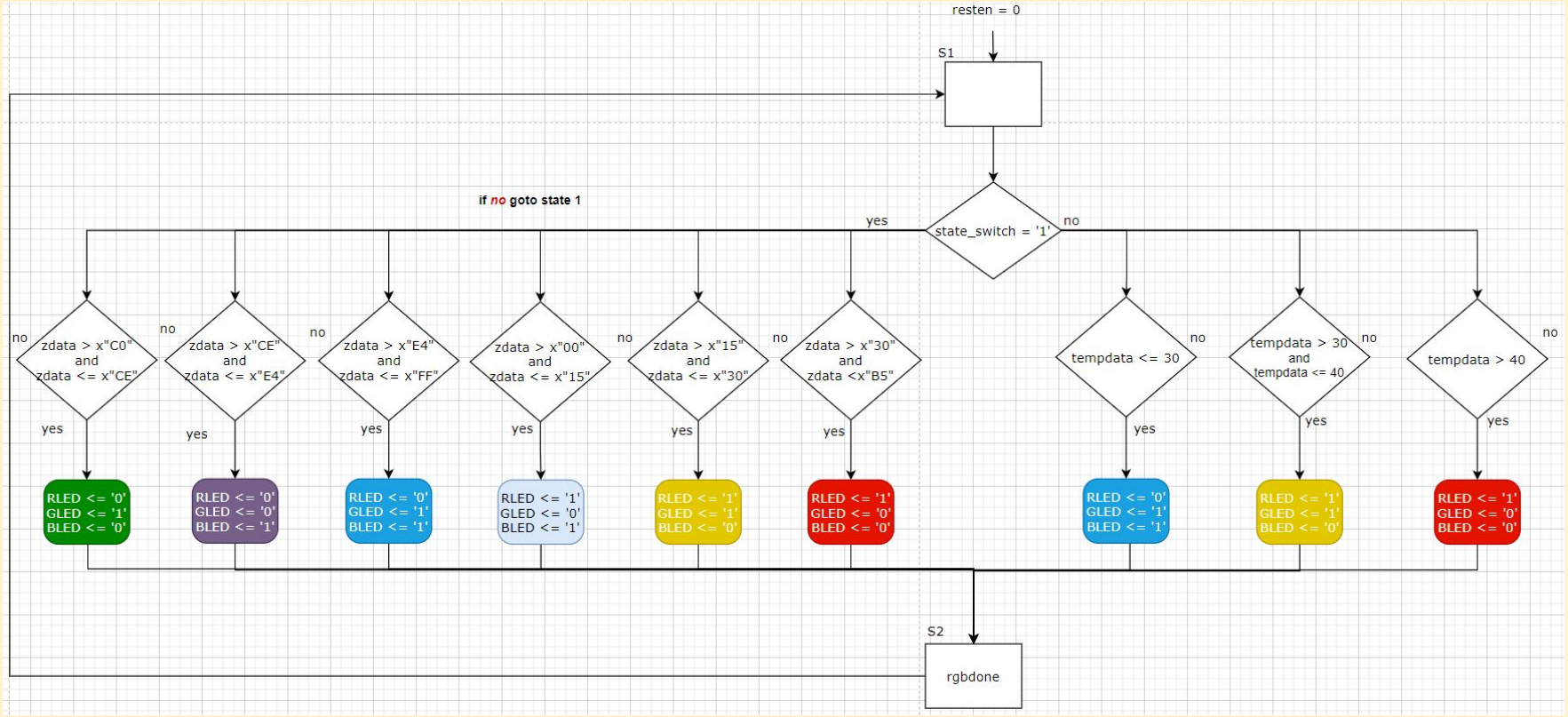

| Reg. Address | Name | Reg. Address | Name |
|---|---|---|---|
| 0x00 | TEMP_H | 0x03 | CONFIG |
| 0x01 | TEMP_L | | |
| 0x02 | STATUS | 0x0B | ID |

# Datapath - FSM accelerometer

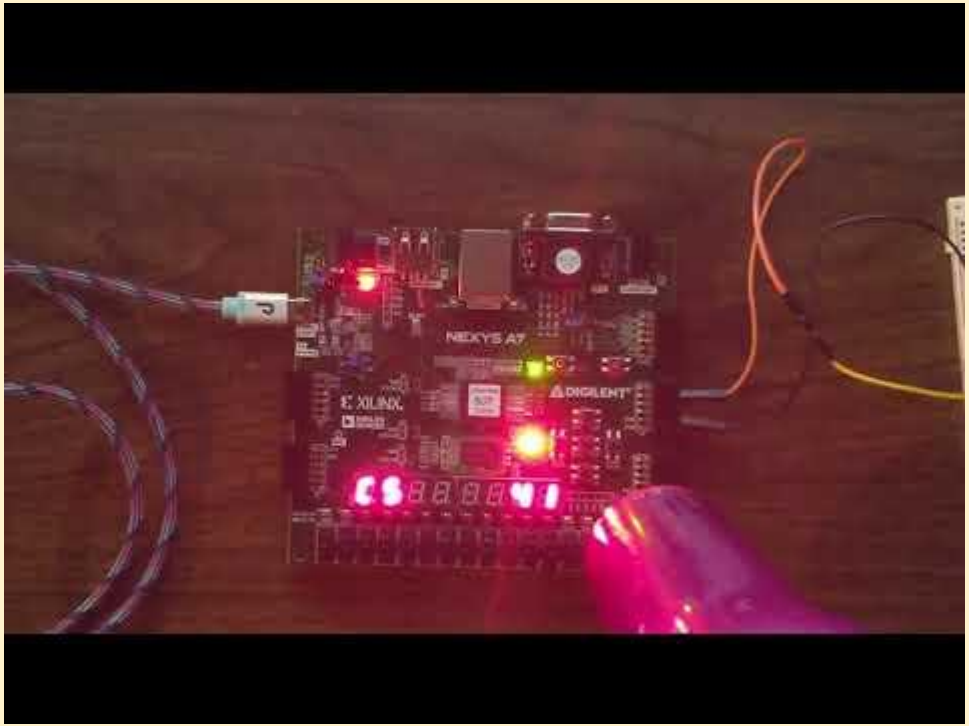



| Reg. Address | Name | Reg. Address | Name |
|---|---|---|---|
| 0x1F | SOFT_RESET | 0x0E | XDATA_L |
| 0x2D | POWER_CTL | 0x0F | XDATA_H |
| | | 0x10 | YDATA_L |
| | | 0x11 | YDATA_H |
| 0x08 | XDATA | 0x12 | ZDATA_L |
| 0x09 | YDATA | 0x13 | ZDATA_H |
| 0x0A | ZDATA | 0x14 | TEMP_L |
| 0x0B | STATUS | 0x15 | TEMP_H |

# DataPath - FSM RGB



# Demo



# Challenges and Improvements

- PWM
- Changing the temperature reading from Fahrenheit to Celsius
- Working remotely
- Change light intensity

# Questions