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**FPT UNIVERSITY**

**CAPSTONE PROJECT DOCUMENT**

**pLED**

**Report #4 – Software Design Description**

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| **Project Code** | pLED |

- Hanoi, 02/2014 –

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# ARCHITECTURE DESIGN

## Choice of Architecture Design

Using state machine structure for a simple system with distinguish functions.

## Architectural Presentation

Hệ thống có 3 lớp:

* Lớp xử lí input, tính toán đầu ra mong muốn của hệ thống
* Lớp xử lí đầu ra, kiểm soát đèn và cách thức hiển thị để có được hình ảnh như mong muốn.
* Driver cho mỗi component

## Component/Package Design

+ RF receiver

+ Real Time Clock

+ Remote controller

+ AC/DC Adapter

+ Motor and stand

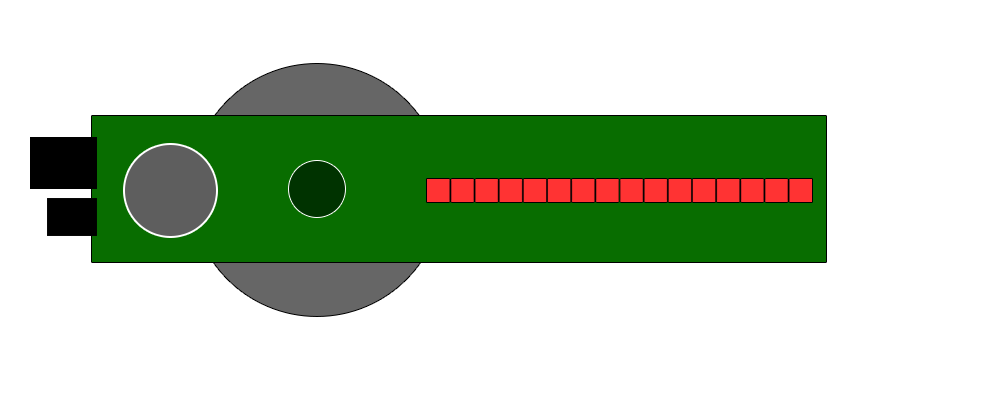
# DETAILED DESIGN

## Common Design

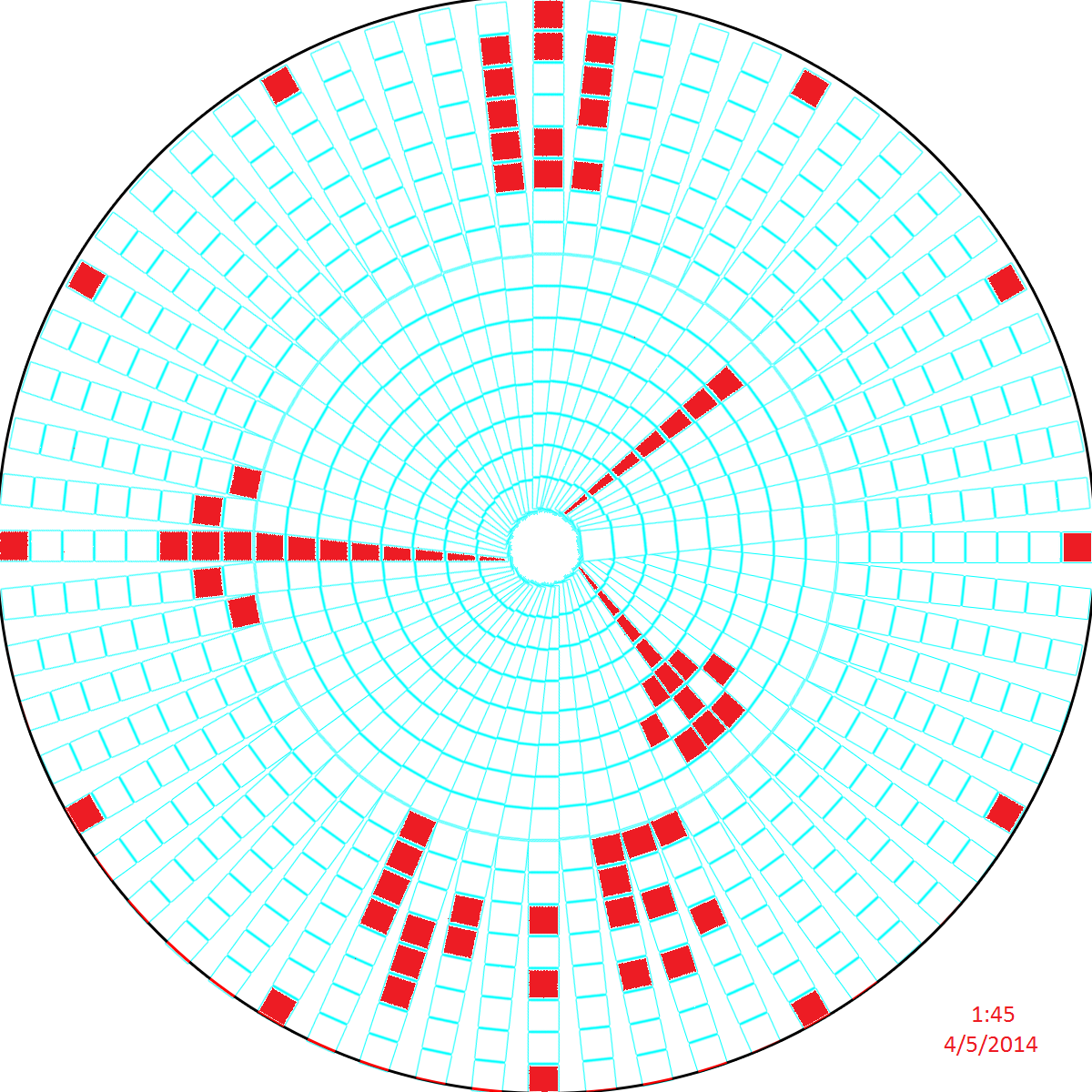
A Microchip’s PIC, control the state of 16 RBG LEDs through 6 latches, with precise timing to toggle each led in maximum 24ms. There is a RF component to receive input from user (remote controller) to switch between multiple functions of the device.

## Screen Design

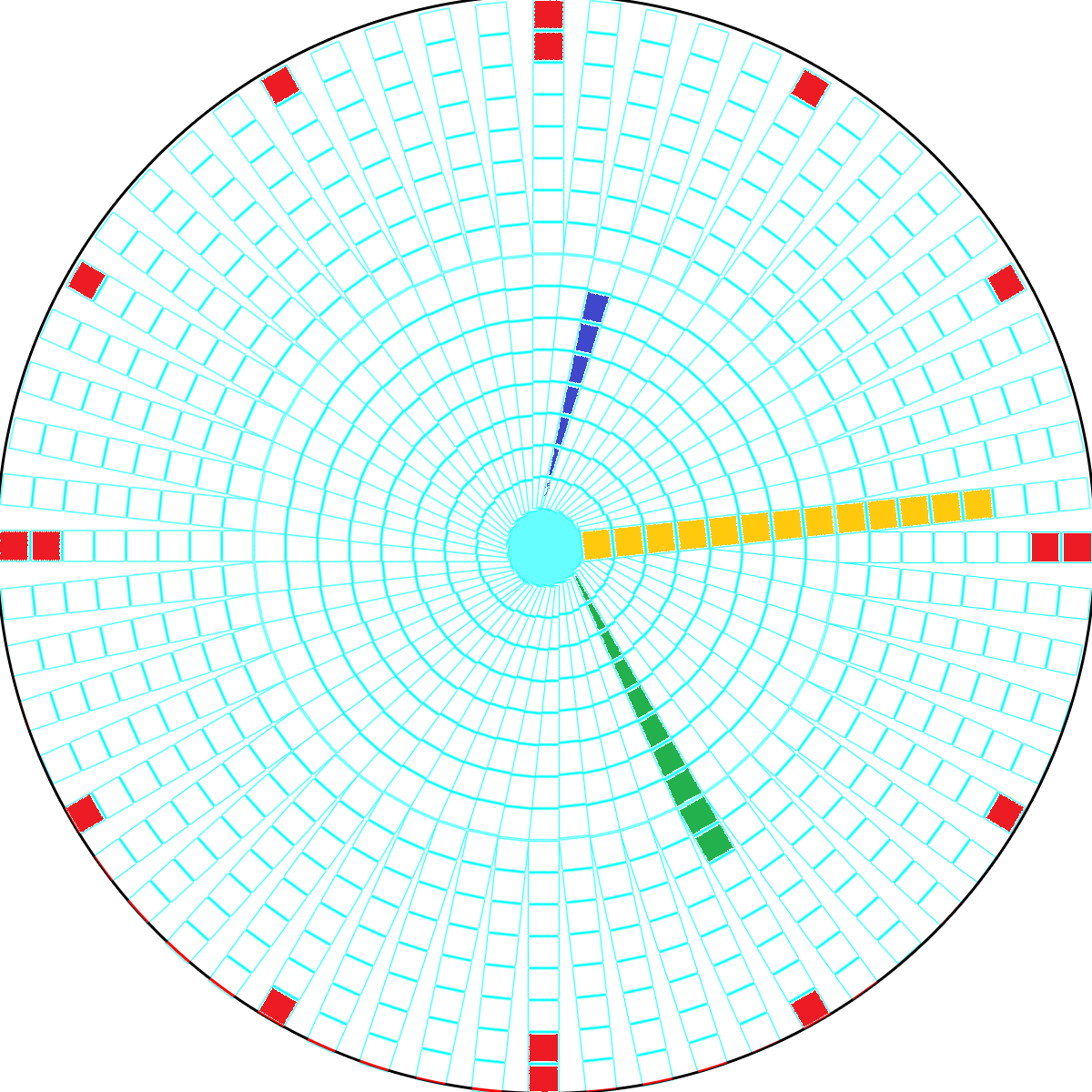
### Examples:



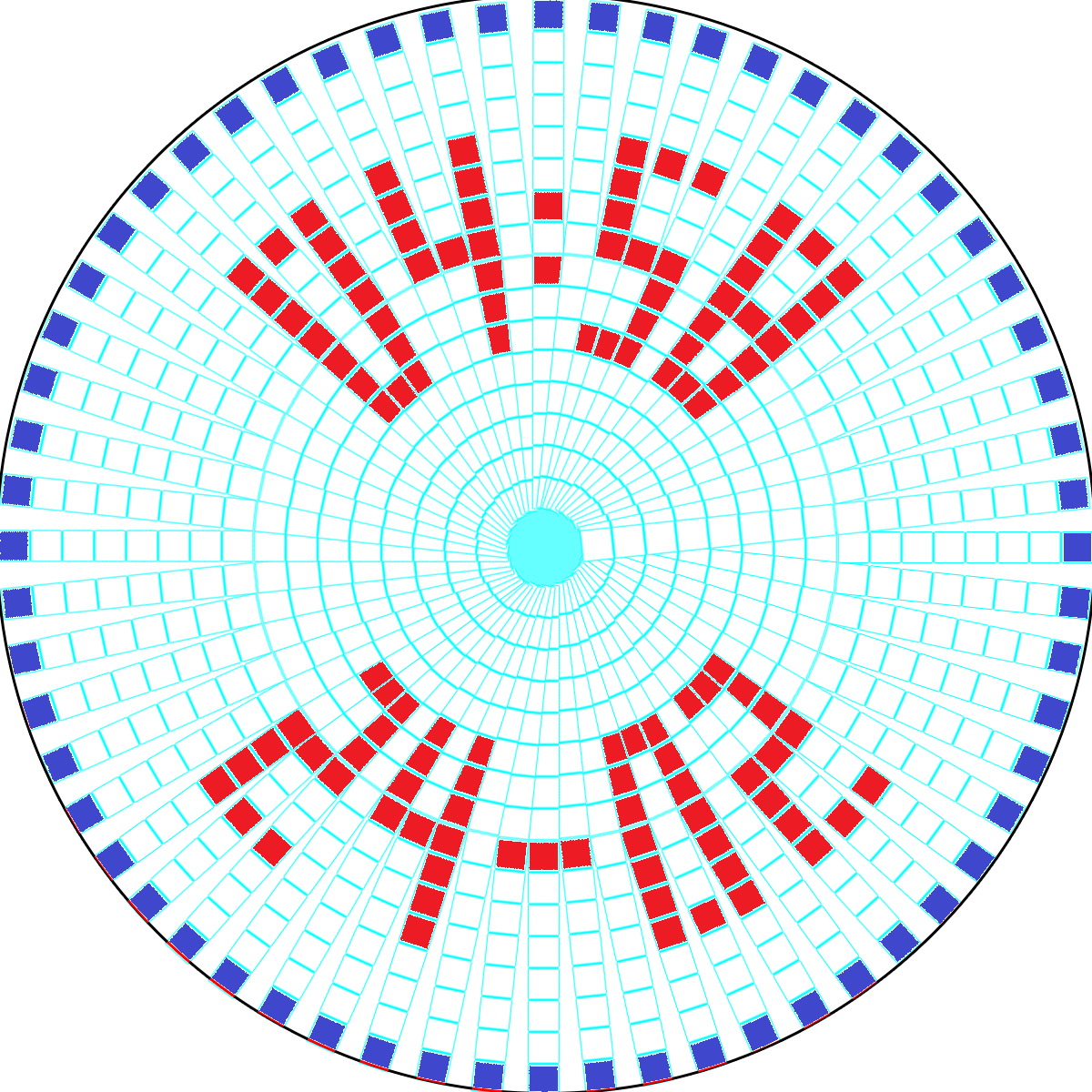
Simplified main component



Analog Screen1



Analog Screen2



Digital Screen

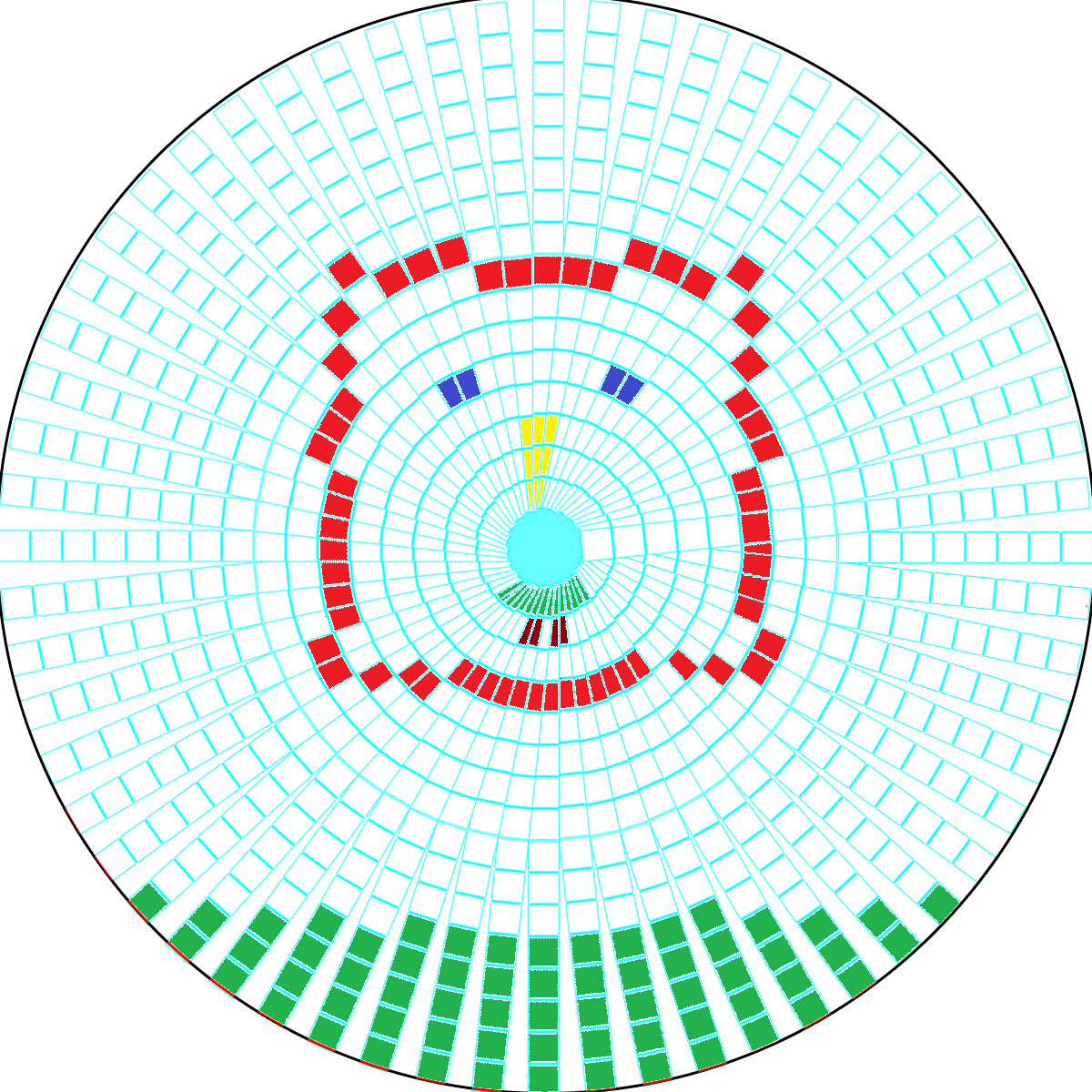
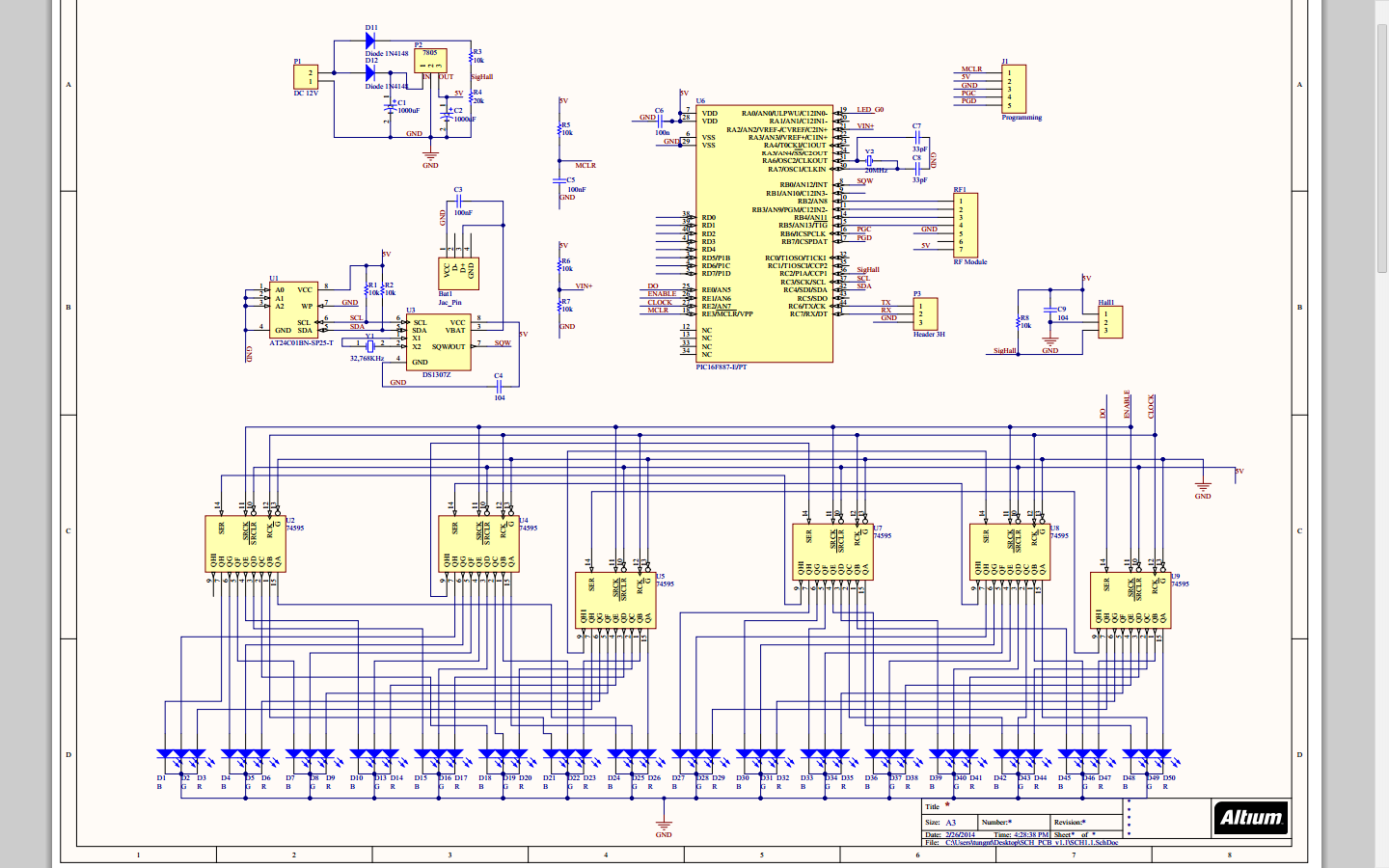
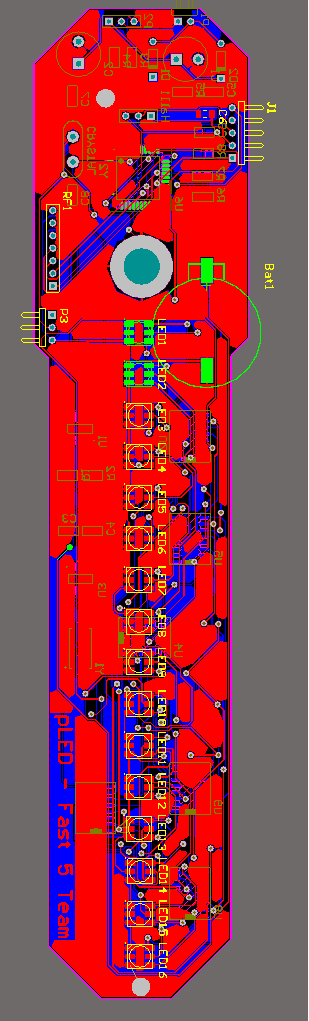


Image Screen

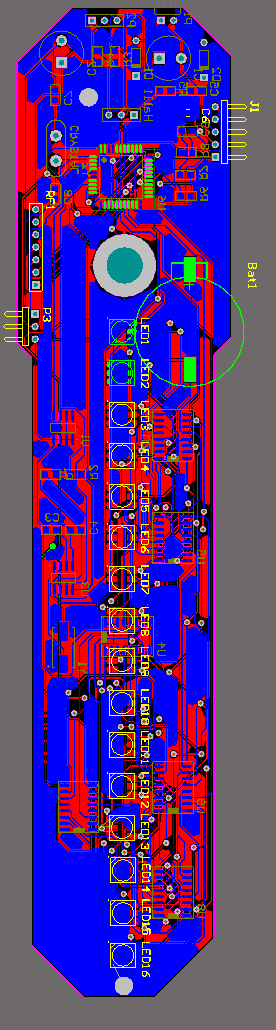
## Schematic board



Design PCH



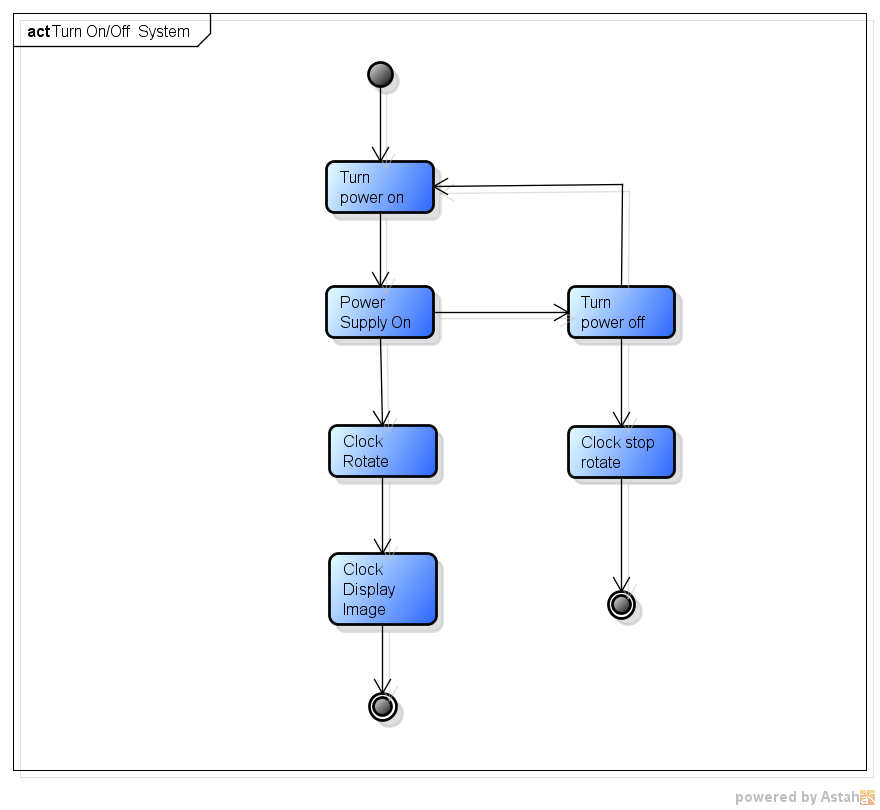
Design PCB FRONT



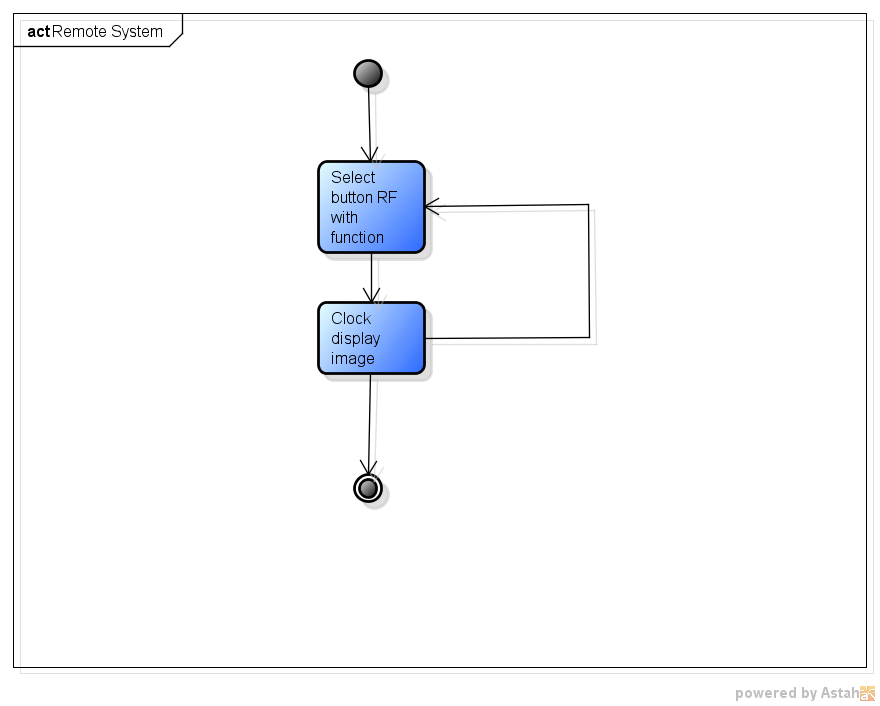
Design PCB BOTTOM

## Activity Diagram

### ACT001: Turn On/Off System



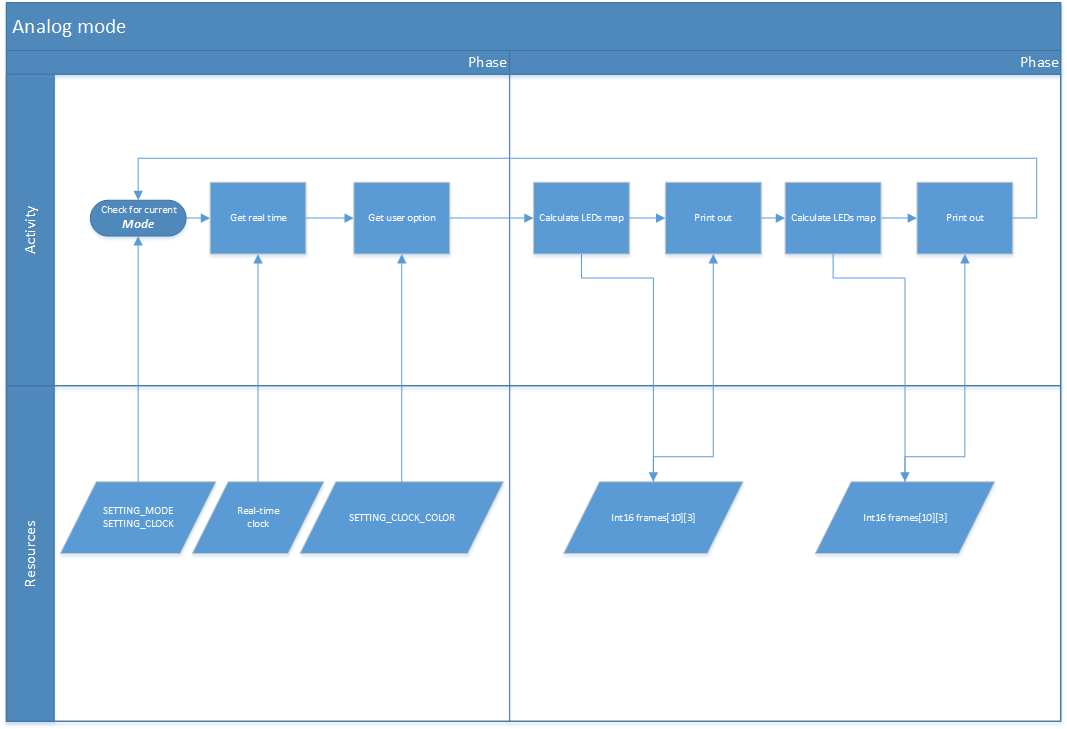
### ACT002: Remote System



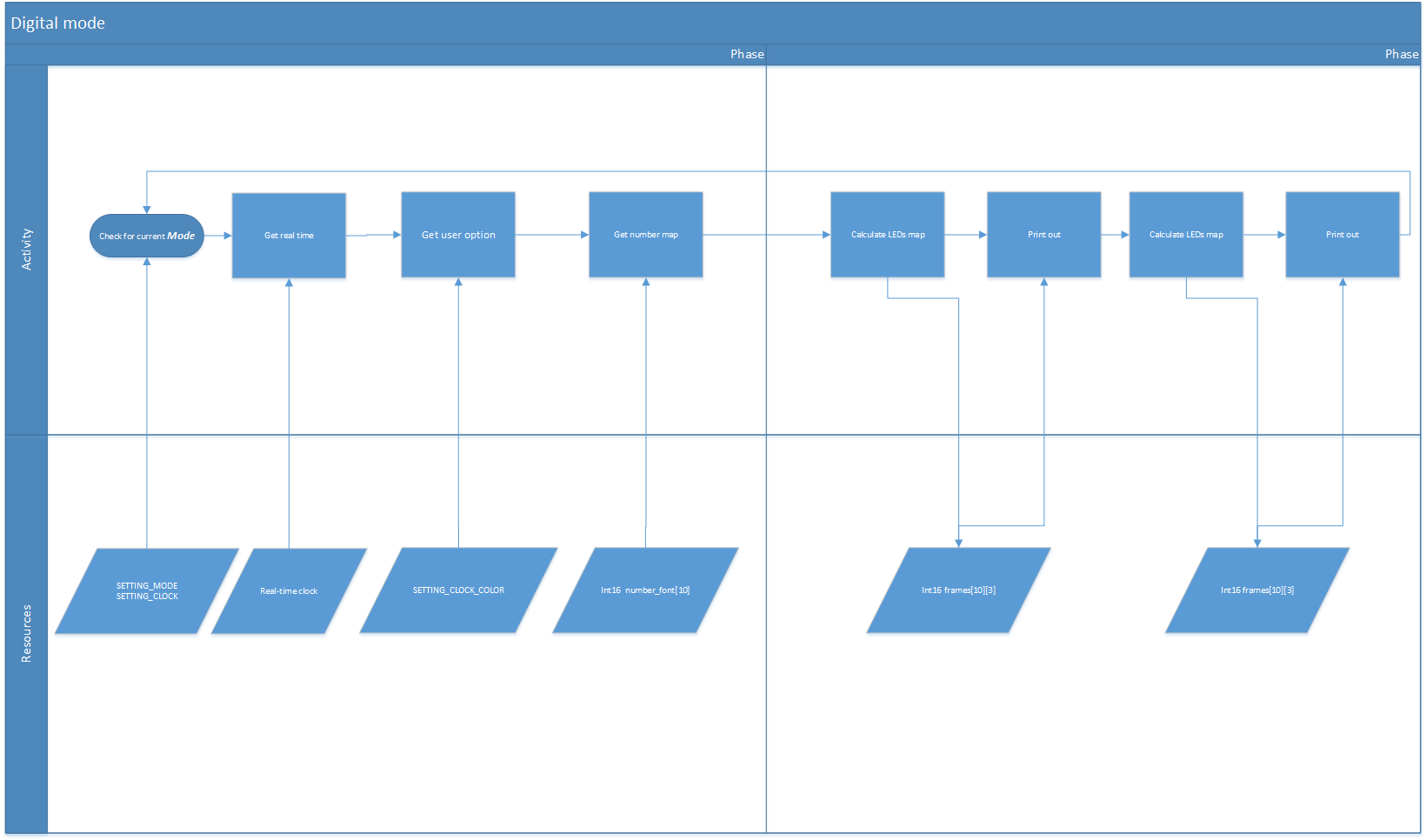
### ACT003: Setup Time

## Code-structure diagram

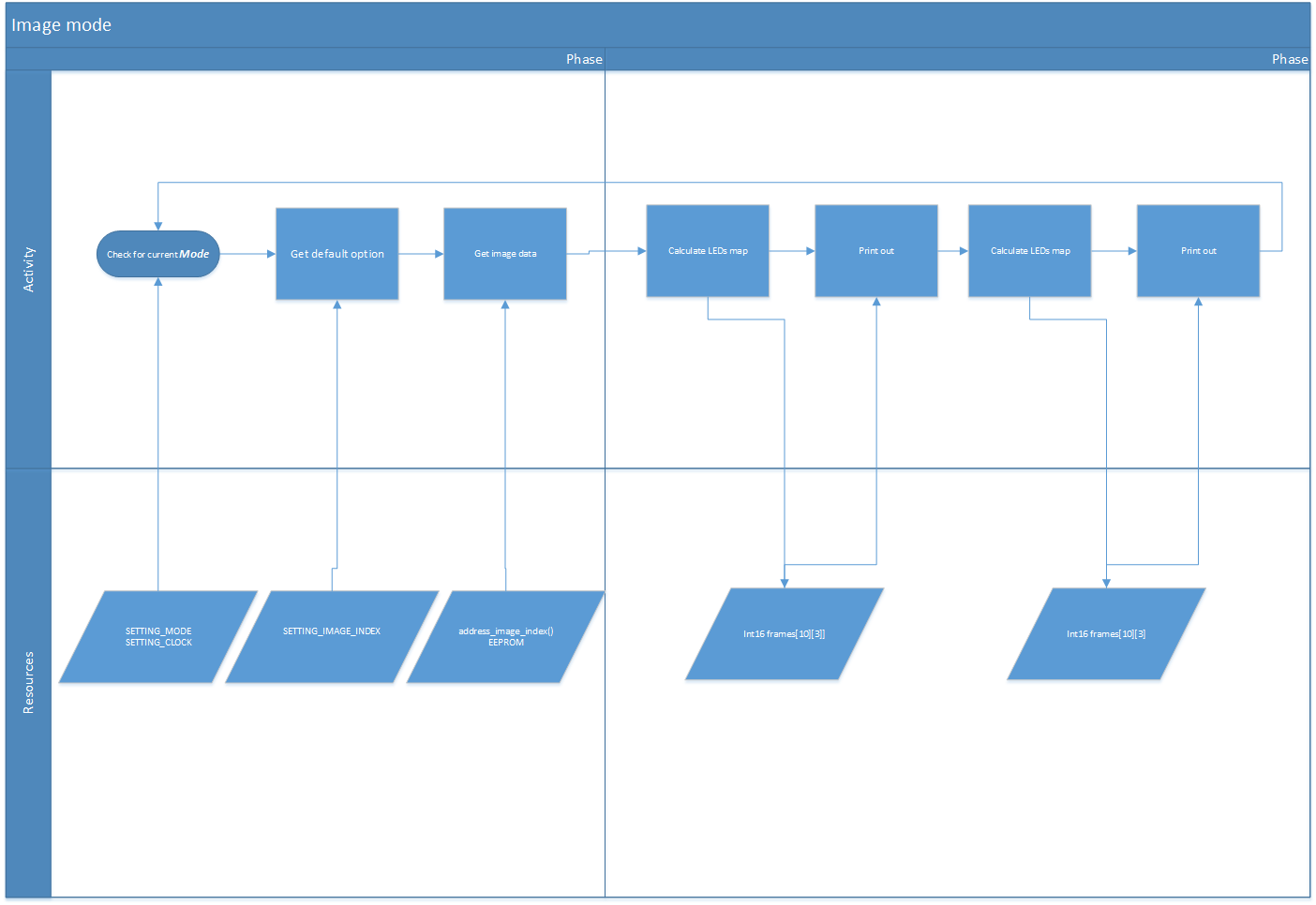
### Analog-clock Mode



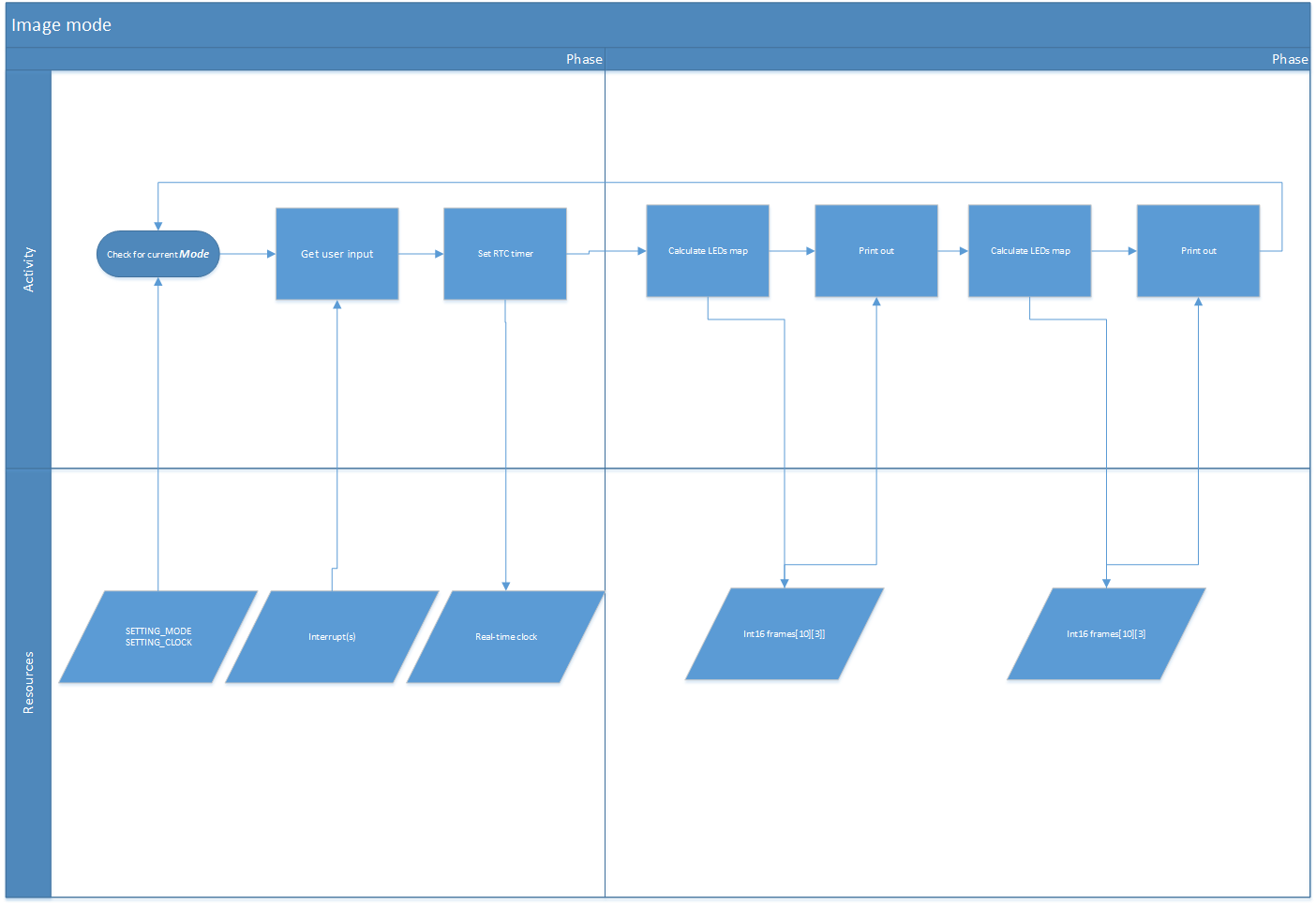
### Digital-clock Mode



### Image Mode



### Time-set Mode (Decapitated)



# Data-structure design

## External image

Struct

Int8[a][b] array

ARRAYLED

Struct

ARRAYLED [c] frame

FRAME

[a] = 2 : size of Led Array (2 x 8 bits = 16 leds)

[b] = 3 : color of each array (3 color x 16 leds)

[c] = 60 : number of pieces in each rotation (60 pieces = 60 minutes)

Int8 address

Represent for the address in external EEPROM

## Internal array LEDs

Int16 array

Basic LEDs bits

Int16 frames[10][3]

Represent 1/6 LEDs array of a rotation, for optimizing ram usage.