Cutie Cube

Embedded Systems (CPE-311) Project
Thai-Nichi Institute of Technology

Members

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Overview

LED Cube 4x4x4

Decorative led lights provide various lighting functions

Project budget: 500 Bath

Overview

Requirement

Self-study on these following topics

- Real time clock
- Pseudo-Random
- Shift register

01.

Specification

System information
Function
Project planning

System Information

MCU : STM32L152RB

Component : 5mm Blue LED x 64

5V 10A regulated switching power supply

74HC595 shift registers x 5

Software : Keil µVision

Language : C

Function

- Rain
- setVoxel
- shift

Project planning

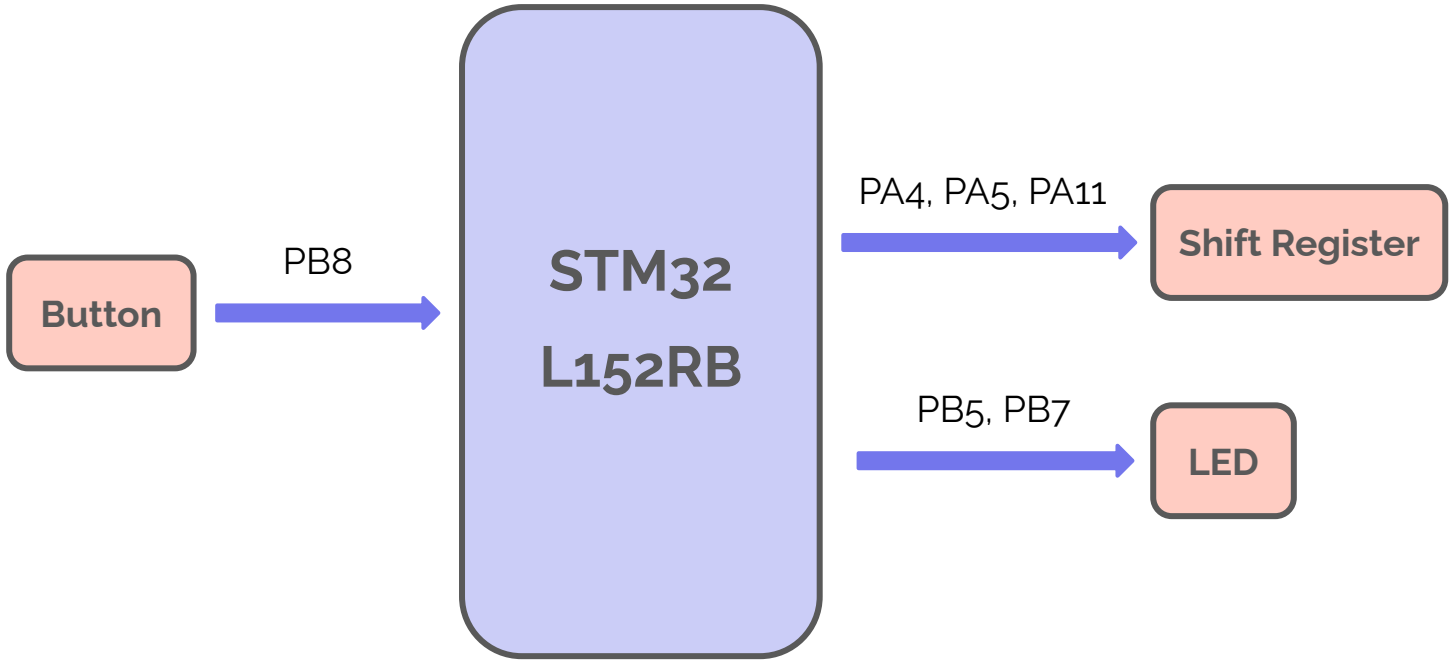
Task	January				February		
	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3
Design							
Hardware							
Coding							
Testing							

02.

Architectural Design

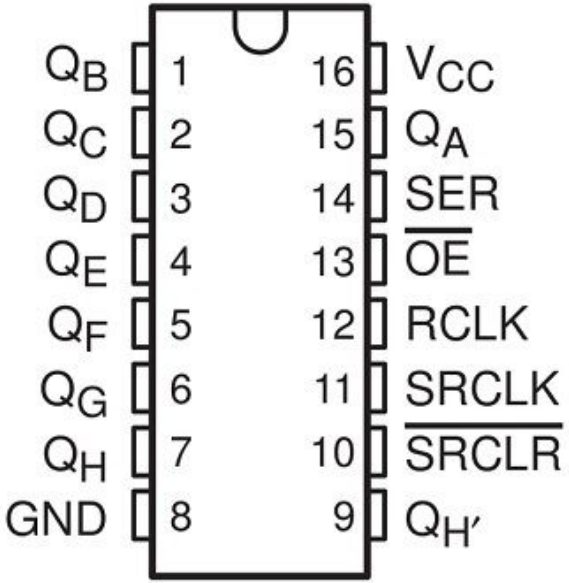
Block diagram
Hardware detail selection
STM32 Pin allocation

Block dlagram



Hardware detail selection

74HC595 Shift Register



STM32 Pin allocation

Port /Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A				■	■						■				
B					☆		☆	◉							

☆ LED

◉ Button

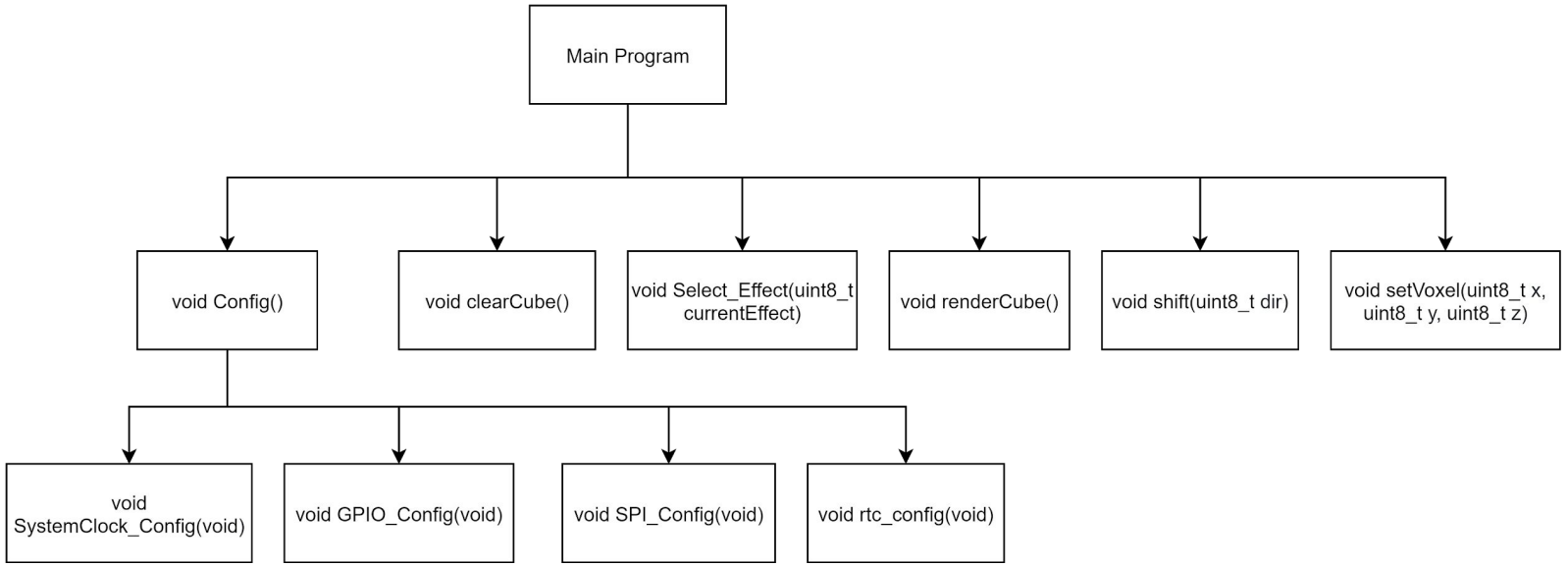
■ Shift Register

03.

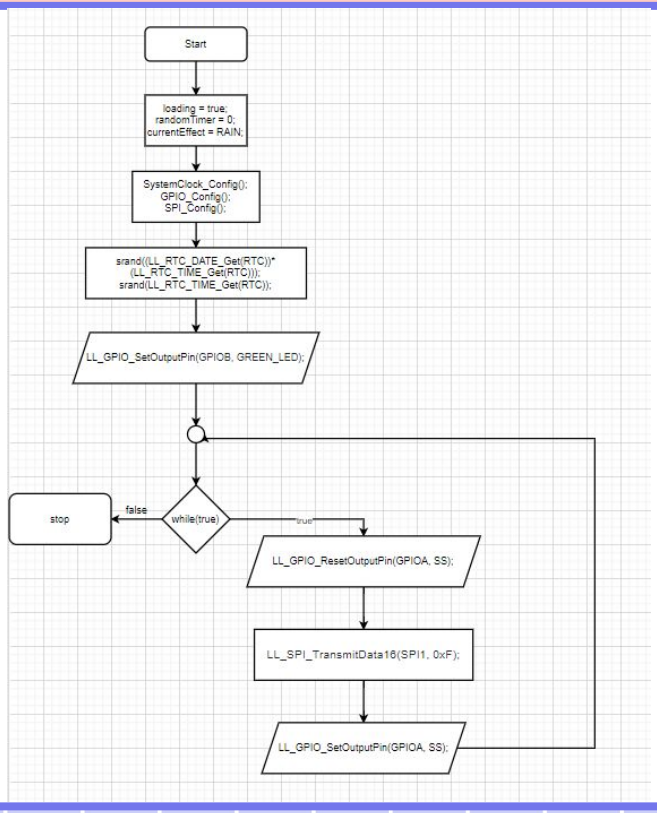
Detailed Design

Top-Down Design
Flowchart
Gantt chart

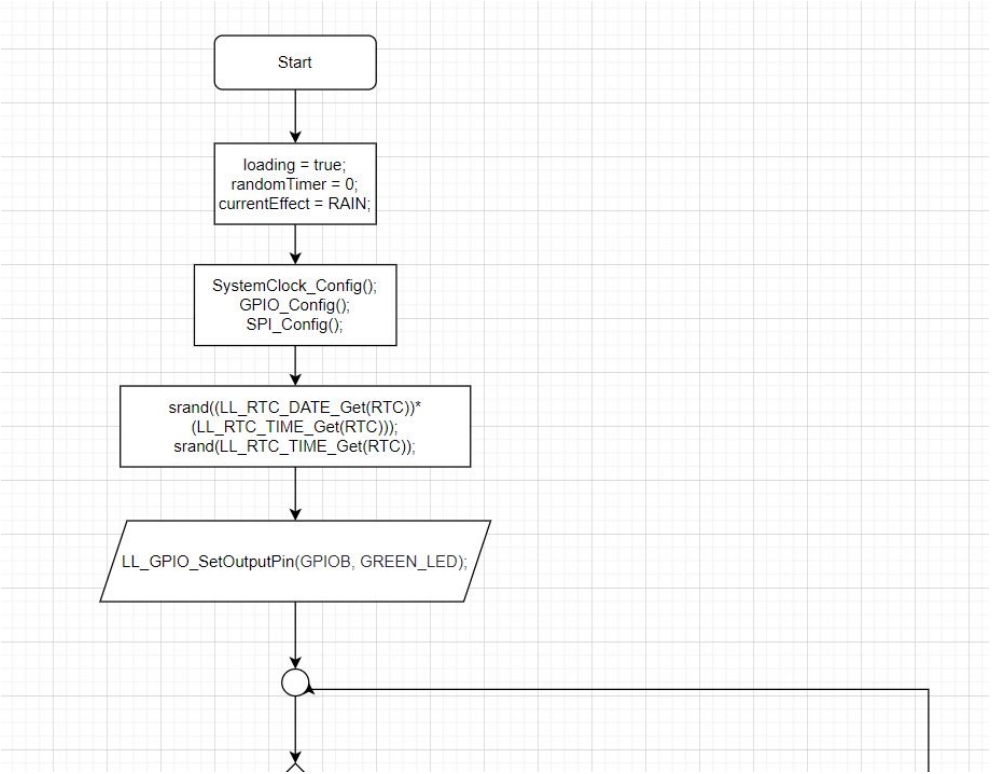
Top-Down Design



Flowchart


Start
loading = true;
randomTimer = 0;
currentEffect = RAIN;
SystemClock_Config();
GPIO_Config();
SPI_Config();
srand((LL_RTC_DATE_Get(RTC))*
(LL_RTC_TIME_Get(RTC)));
srand(LL_RTC_TIME_Get(RTC));
LL_GPIO_SetOutputPin(GPIOB, GREEN_LED);
while(true)
false
stop
LL_GPIO_ResetOutputPin(GPIOA, SS);
LL_SPI_TransmitData16(SPI1, 0xF);
LL_GPIO_SetOutputPin(GPIOA, SS);

Flowchart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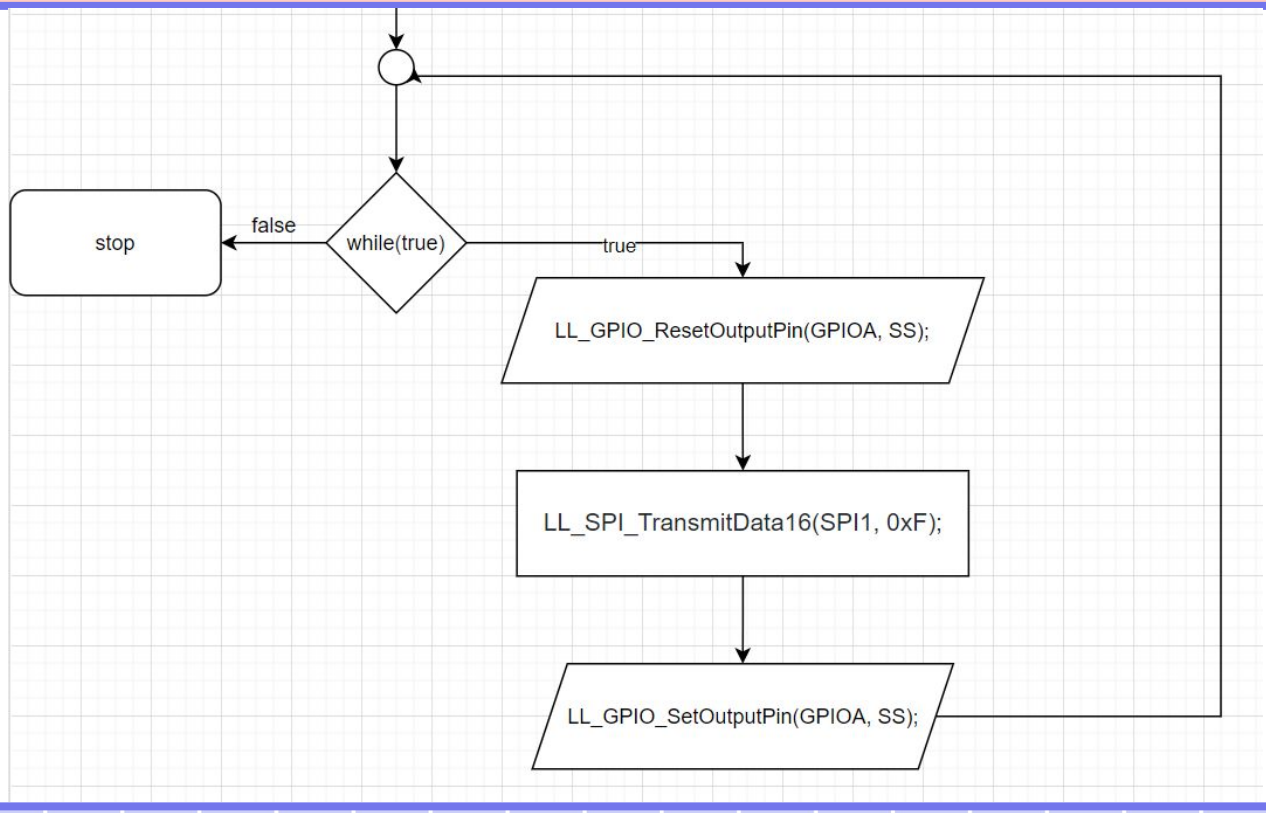
Flowchart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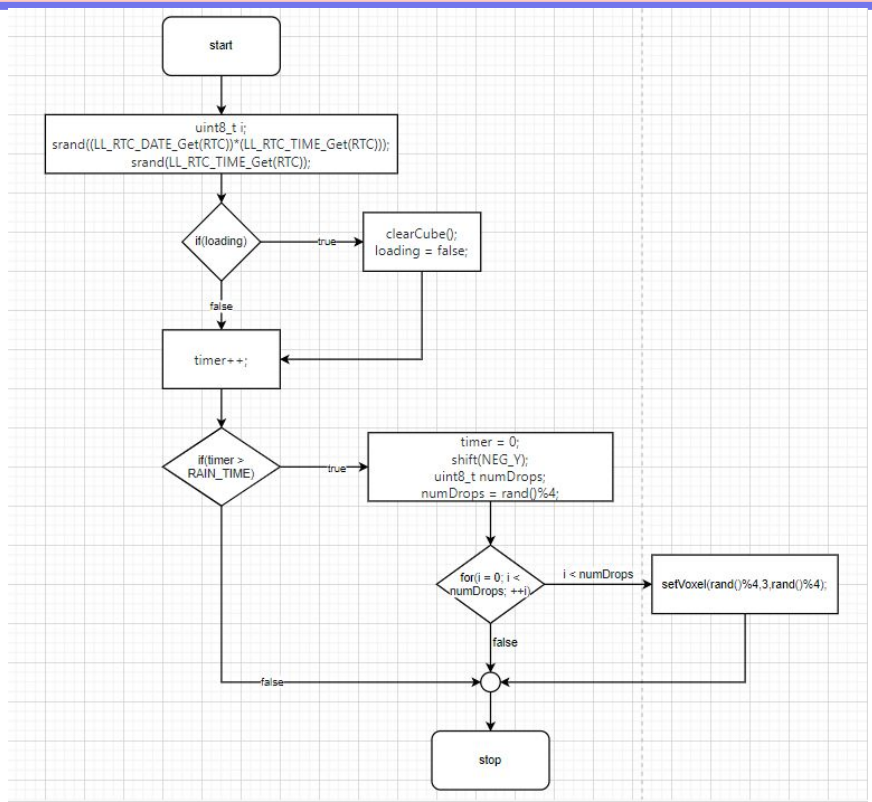
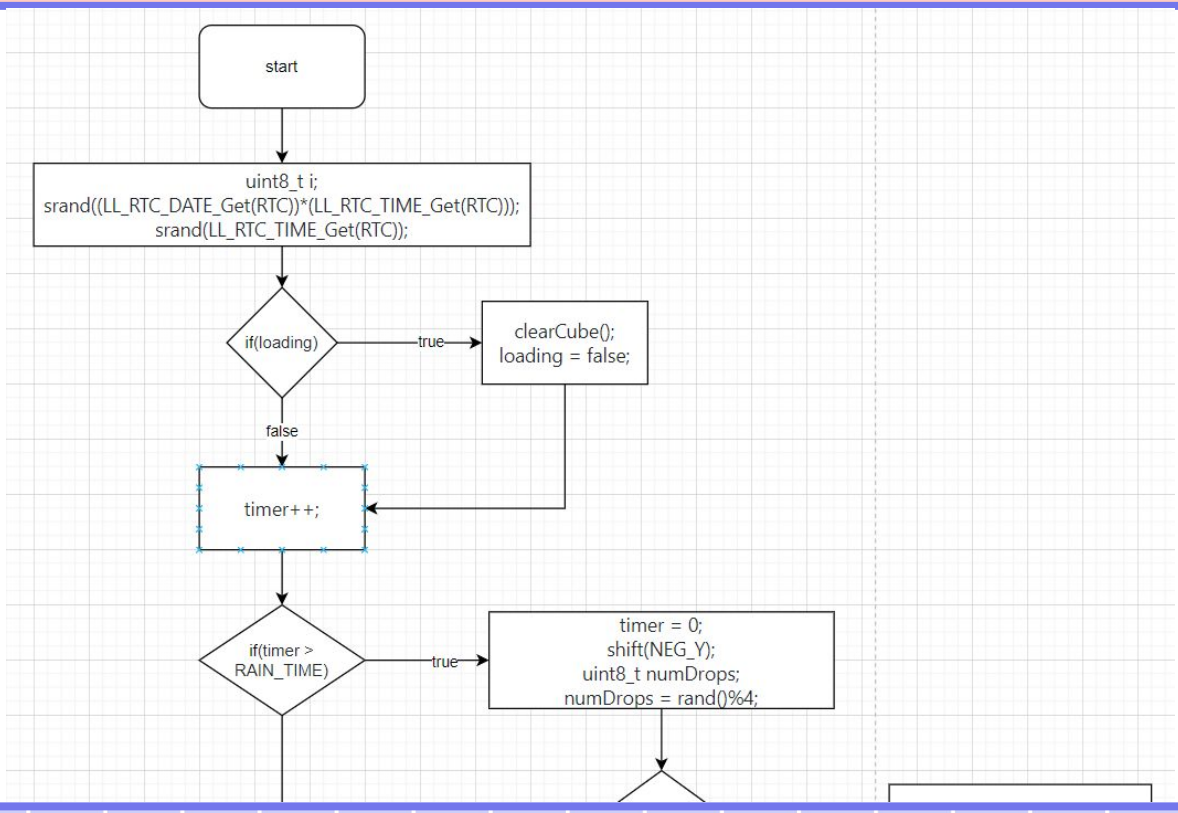
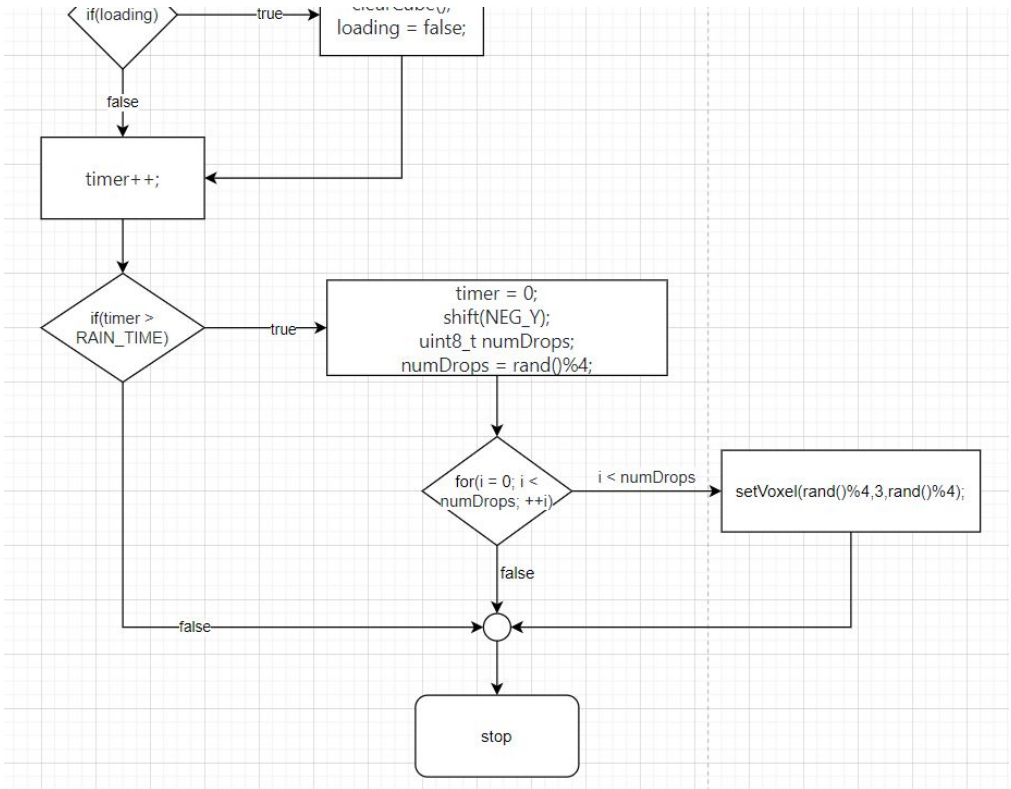
Flowchart (Rain)



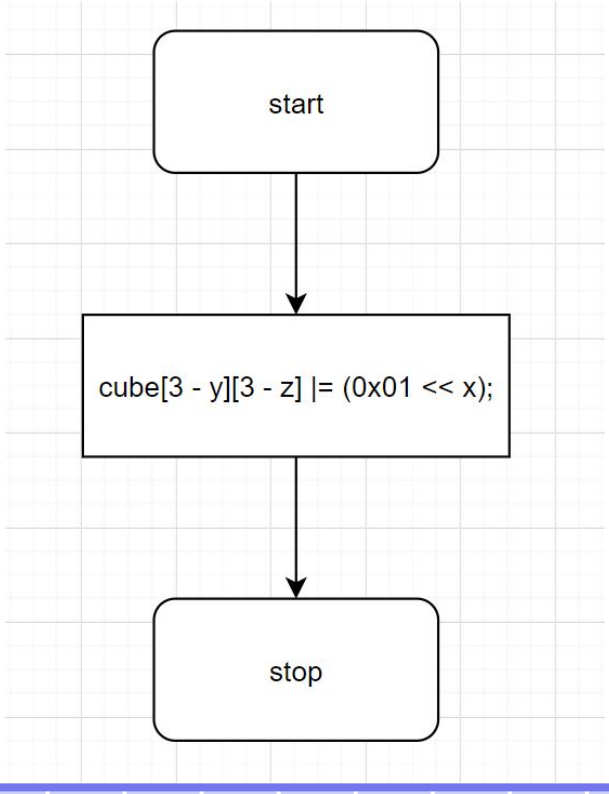
Flowchart (Rain)



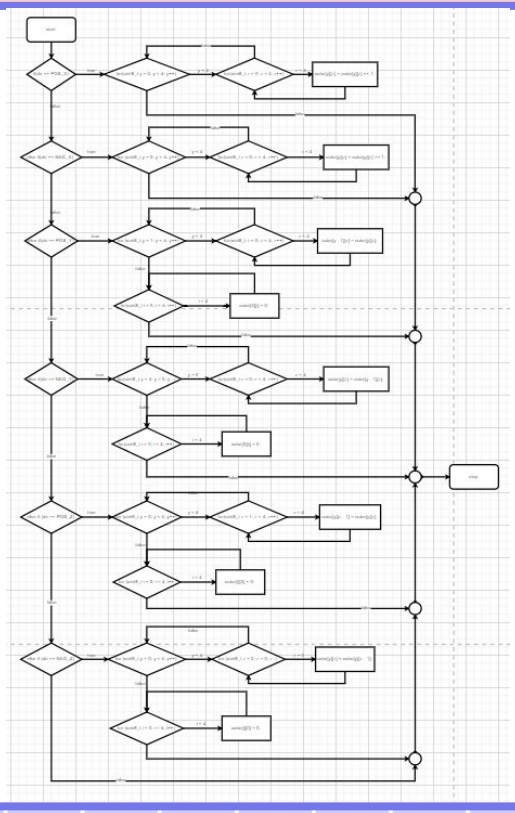
Flowchart (Rain)



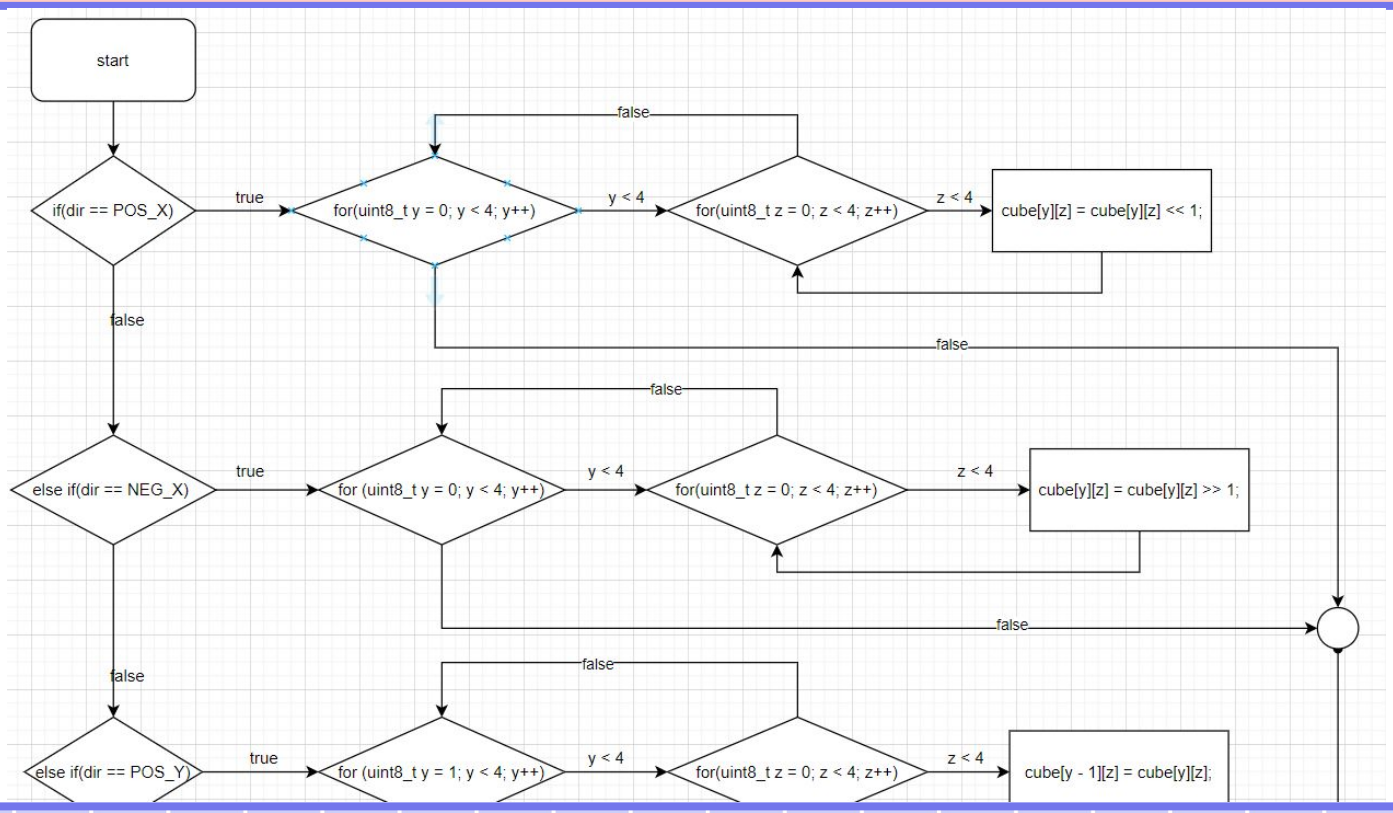
Flowchart (setVoxel)



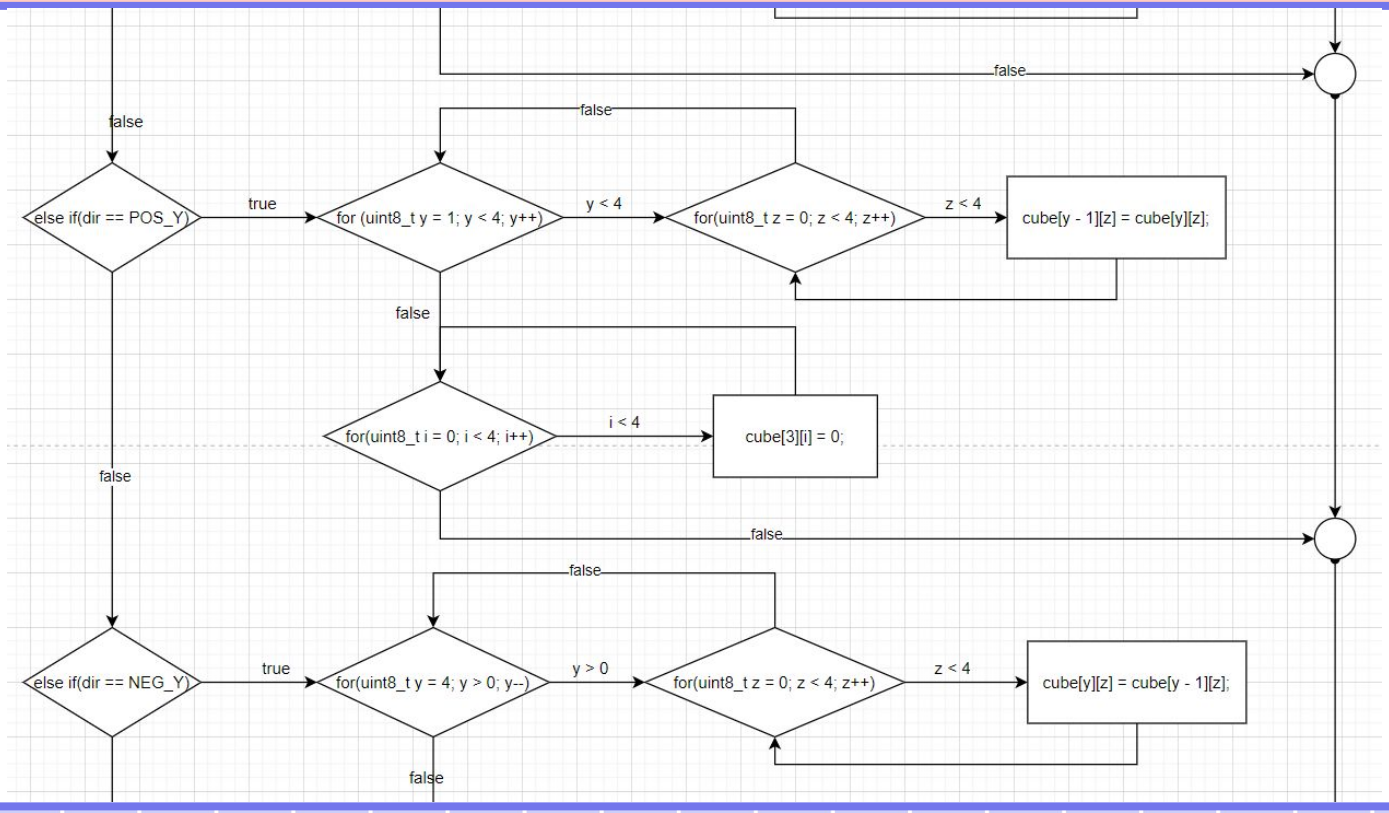
Flowchart (shift)



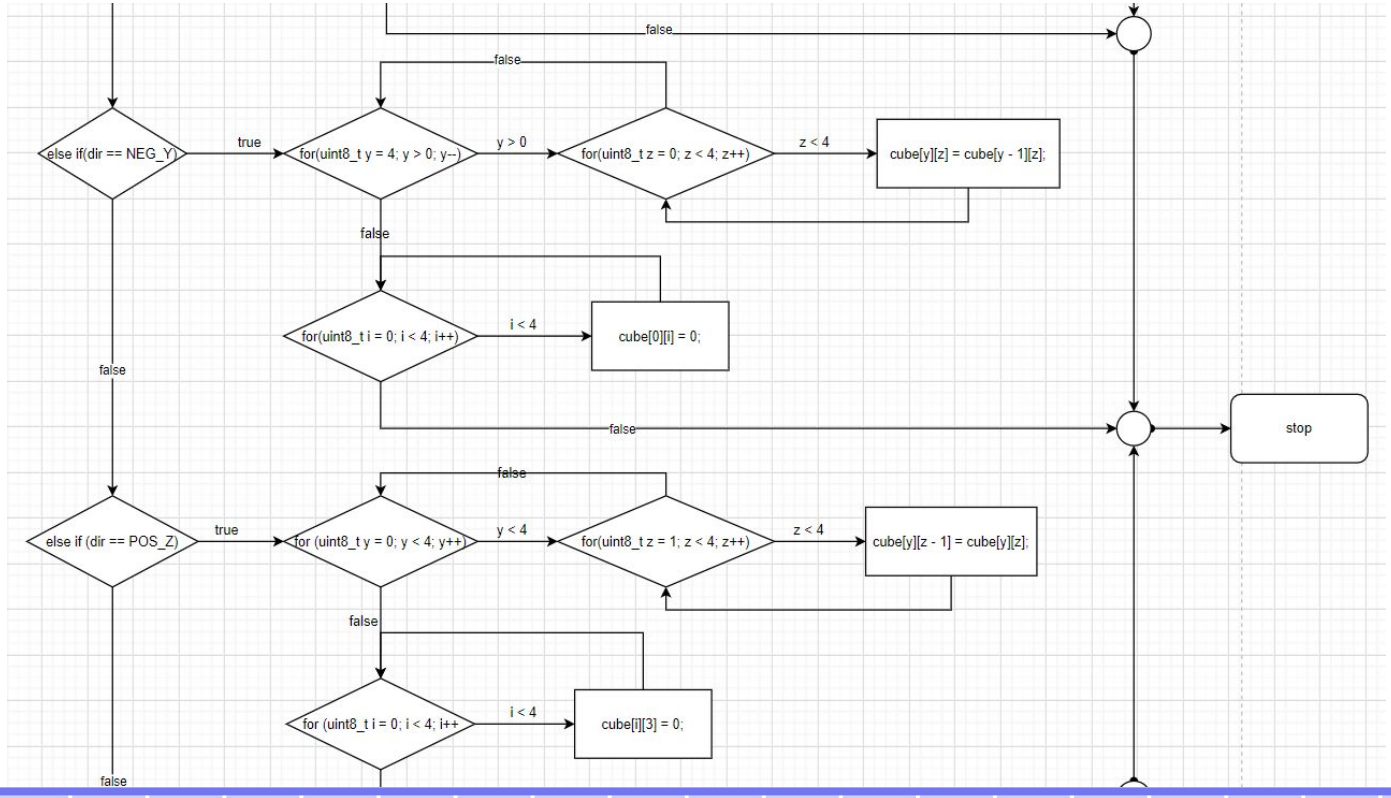
Flowchart (shift)



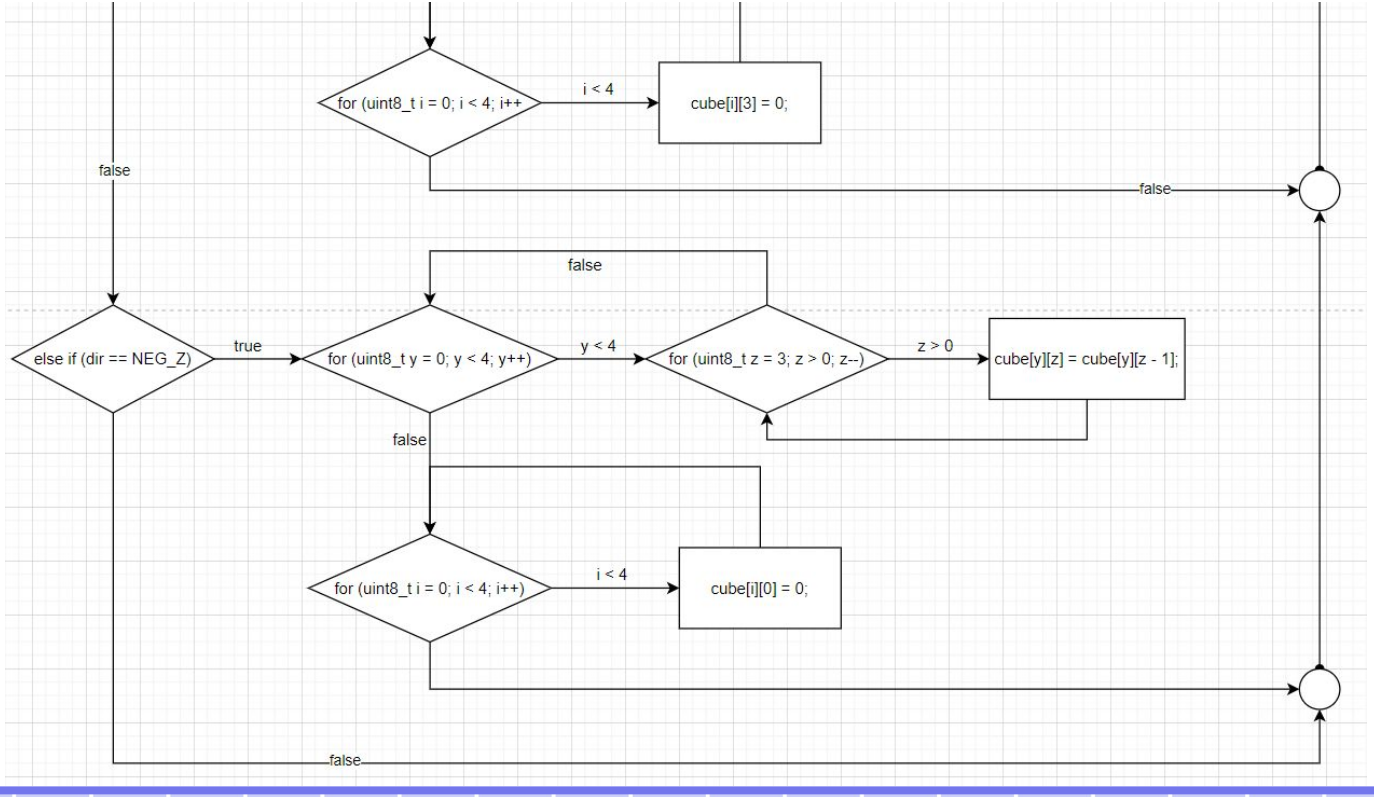
Flowchart (shift)



Flowchart (shift)



Flowchart (shift)



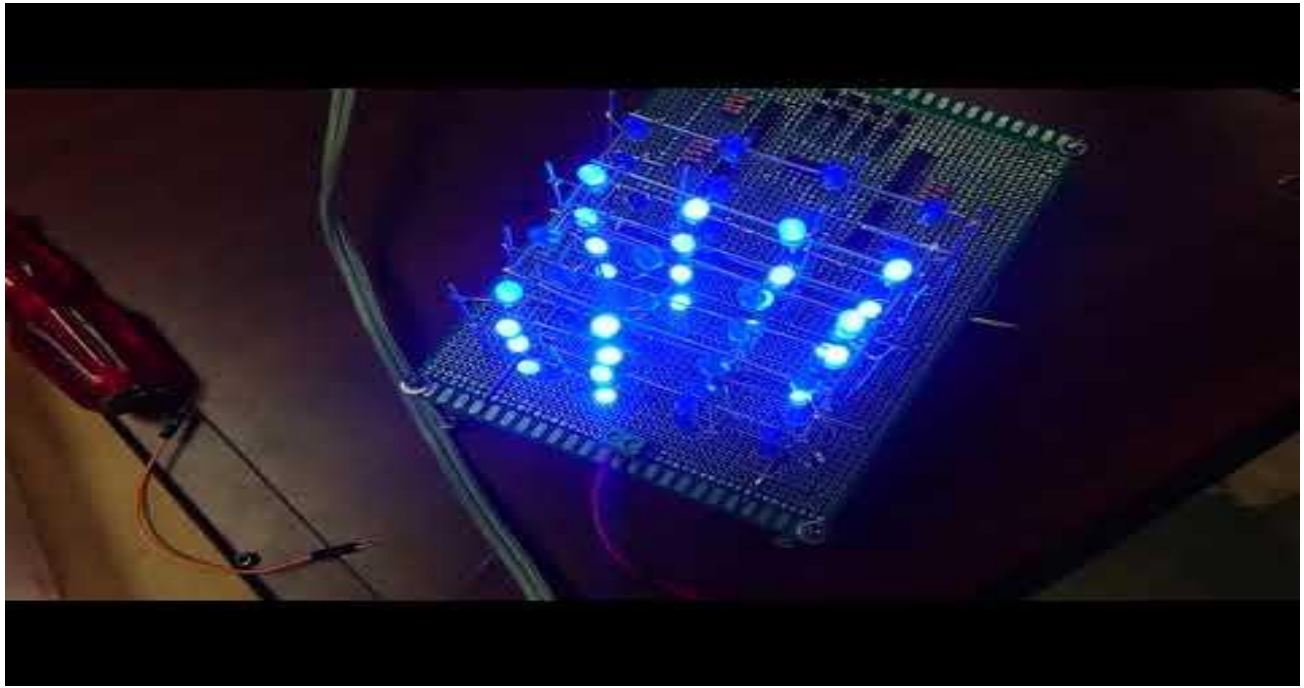
Gantt Chart

	Responsibility	January				February		
Task		Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3
Search Interest Project	All							
Discuss with teacher	All							
Planning How to make it	All							
Hardware	Kewalee, Anupat							
Coding, Assembly	Anupat							
Testing and Repair	Primsara, Sahasswas, Theetawat							
Presentation	All							

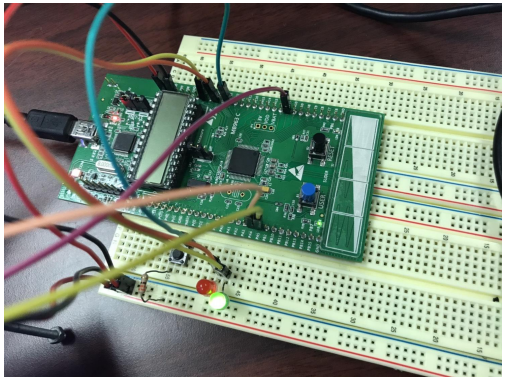
04.

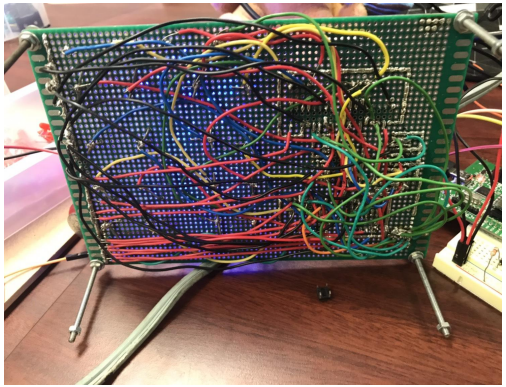
Demo Video/Picture

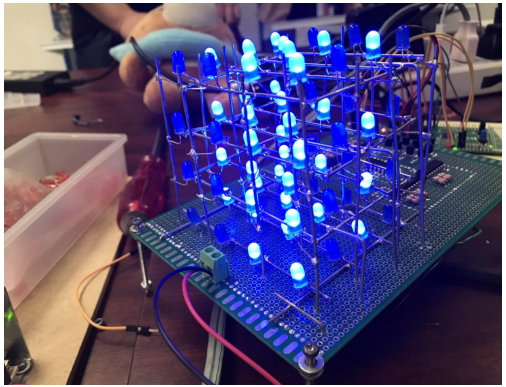
Let's see



Pictures







05.

Problem and Solution

Problem and Solution

- Problem with LEDs during the test because of circuit soldering
- LEDs didn't work as wish and can't identified that the problem happened because of source code or hardware

Problem and Solution

1.Problem with LEDs during the test

Fixed the circuit soldering and re-arranged wires to make the circuit looks easier to analyze

Problem and Solution

2.LEDs didn't work as wish and can't identified

Move some wires, try the program with easier circuit and try to change some pins on the microcontroller to search for some errors

06.

Conclusion

Conclusion

We have made a light toy which consists 64 LEDs and it's called "Cutie Cube"

During the work, we have met many problems eg. the circuit, the program, unknown device or even on LEDs but finally, our team can passed through these problems and can make "Cutie Cube" successfully

THANK YOU FOR YOUR ATTENTION

Any questions?