STM32 LED CONTROL

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OUTLINE

1. Hardware Configuration
2. General Information
3. MODBUS Protocol

Hardware Configuration

1. Hardware Requirement

1. STM32F103C8 * 1
2. USB-TTL * 1
3. WS2812 LED Strip * 4

2. Software Library

1. STM32CUBEMX
2. Keil uVision5
3. HAL Library

3. Port Configuration

Port	Usage	Connection
PA8	TIM1_CH1	WS2812 DIN
PA9	TIM1_CH2	WS2812 DIN
PA10	TIM1_CH3	WS2812 DIN
PA11	TIM1_CH4	WS2812 DIN
PB6	USART1_TX	USB-TTL RX
PB7	USART1_RX	USB-TTL TX
GND	GND	WS2812 GND
5V	VCC	WS2812 4-7V

4. Default Value

BaudRate: 115200

MODBUS Address: 0x01

General Information

1. Color

Color	R, G, B
Red	0x82, 0x00, 0x00
Green	0x00, 0x82, 0x00
Blue	0x00, 0x00, 0x82
Yellow	0x81, 0x82, 0x00
Purple	0x22, 0x00, 0x22
Cyan	0x00, 0x22, 0x22
Orange	0x22, 0x08, 0x00
White	0x22, 0x22, 0x22

2. Effect

Effect	Description	Optional Color
Hold	Four lights hold one color simultaneously.	All
Flash	Four lights flash one color light and dark simultaneously.	All
Breathe	Four lights breathe one color simultaneously.	Red, Blue, Green, Yellow
Circle	Four lights lit up one colour in turn.	All
Ring	Eight color ring in four lights simultaneously.	Fixed

3. Condition Map

Condition	Command	Effect
Initial		
Initial Node	IN	Hold Yellow
Initial Map	IM	Flash Yellow
Initial Action	IA	Breathe Yellow
Standby State		
Ready and Wait	RW	Hold Green
Ready to Move	RM	Flash Green
Ready to Act	RA	Breathe Green
Working		
Working and Waiting	WW	Hold Blue
Working and Moving	WM	Flash Blue
Working and Acting	WA	Breathe Blue
Robot Error		
Error and Wait	EW	Hold Red
Error and Move	EM	Flash Red
Error and Action	EA	Breathe Red
Self condition		
Initialization	N/A	Ring and Circle Cyan
Data misalignment	N/A	Flash Purple
Communication Outage	N/A	Hold White

4.Unused Effect

Effect	Color
Hold	Purple
	Cyan
	Orange
Flash	Cyan
	Orange
	White
Circle	Red
	Green
	Blue
	Yellow
	Purple
	Orange
	White
	Cyan
Ring	

MODBUS Protocol

1. General Layout

Address	Function	regH	regL	DataH	DataL	CRC1	CRC2
0x01(Default)	0x06(Default)	high bits of reg	low bits of regL	high bits of data	low bits of data	high bits of CRC	low bits of CRC

2. Set BaudRate

Address	Function	regH	regL	DataH	DataL	CRC1	CRC2
0x01	0x06	0x01	0x01	0x00	Option	high bits of CRC	low bits of CRC

Option	BaudRate
0x00	2400
0x01	4800
0x02	9600
0x03	19200
0x04	38400
0x05	57600
0x06	115200 (Default)
0x07	230400
0x08	460800
0x09	921600

3. Set Address

Address	Function	regH	regL	DataH	DataL	CRC1	CRC2
0x01	0x06	0x02	0x02	0x00	new Address	high bits of CRC	low bits of CRC

Address = new Address

4. Set Effect

Address	Function	regH	regL	DataH	DataL	CRC1	CRC2
0x01	0x06	0x00	0x00	0x00	Option	high bits of CRC	low bits of CRC

Option	Effect
0x00	Hold Yellow
0x01	Flash Yellow
0x02	Breathe Yellow
0x03	Hold Green
0x04	Flash Green
0x05	Breathe Green
0x06	Hold Blue
0x07	Flash Blue
0x08	Breathe Blue
0x09	Hold Red
0x0a	Flash Red
0x0b	Breathe Red
0x0c	Hold Purple
0x0d	Hold Cyan
0x0e	Hold Orange
0x0f	Flash Cyan
0x10	Flash Orange
0x11	Flash White
0x12	Circle Red
0x13	Circle Green
0x14	Circle Blue
0x15	Circle Yellow
0x16	Circle Purple
0x17	Circle Orange
0x18	Circle White
0x19	Circle Cyan
0x1a	Ring
0x1b	Hold White