CMP-5045B: Embedded Systems

Demo: Secure Home System

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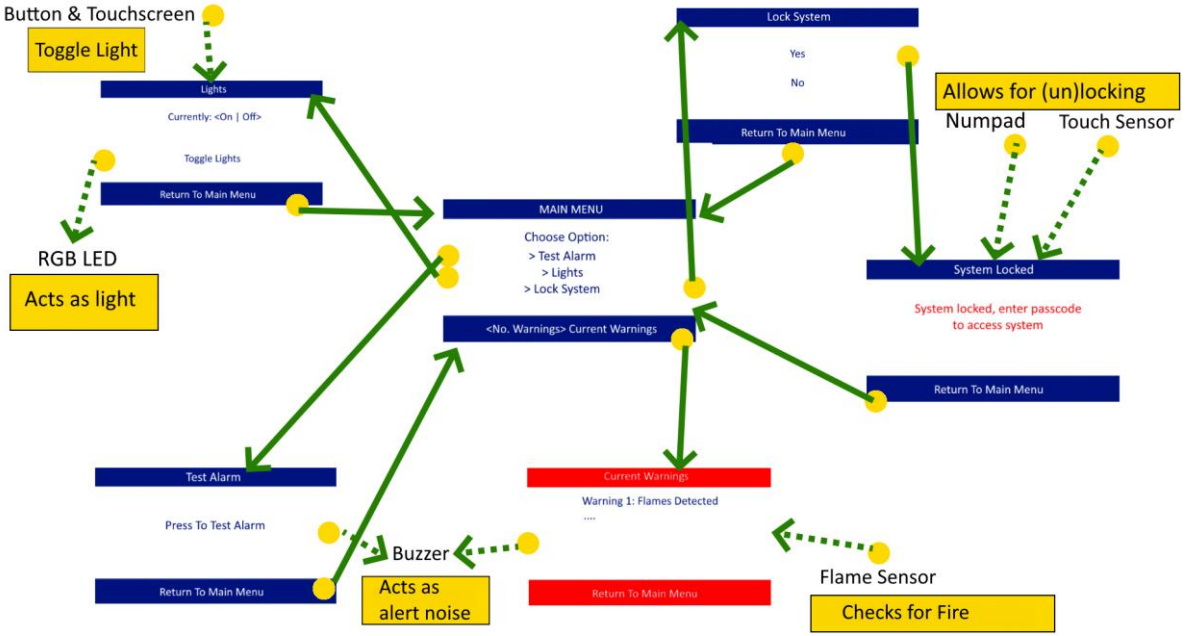
Application Scenario

- System functions as a basic home security system that could be extended with further features to enhance functionality.
- Adds small home automation functionality into the system to improve on other systems available on the market
- Can be used in other building environments if scaled upwards.



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Hardware and Software Specification

- Hardware
  - STM32f7-discovery Board (inc. GLCD, Touchscreen)
  - Button, Touch Sensor, LED
  - Flame Sensor, Buzzer, Keypad
- Software
  - Board Support: STM32F746G Discovery (v1.1.1)
  - Keil uVision5 MDK-Lite (v5.17.0.0)
  - Keil::MDK-Middleware (v7.0.0beta)
  - ARM::CMSIS CORE (v4.5.0)

Connections

- LED (D0)
- Buzzer (D1)
- Flame (D2)
- Button (D4)
- Touch (D5)
- Keypad (D7-D15)

Table 5. ARDUINO® connectors (CN4, CN5, CN6 and CN7)

Left connectors						Right connectors				
CN No.	Pin No.	Pin name	STM32 pin	Function		Function	STM32 pin	Pin name	Pin No.	CN No.
						I2C1_SCL	PB8	D15	10	CN7 digital
						I2C1_SDA	PB9	D14	9	
						AVDD	-	AREF	8	
						Ground	-	GND	7	
CN6 power	1	NC	-	-		SPI2_SCK	PI1	D13	6	
	2	IOREF	-	3.3V Ref		SPI2_MISO	PB14	D12	5	
	3	RESET	NRST	RESET		TIM12_CH2, SPI2_MOSI	PB15	D11	4	
	4	+3V3	-	3.3V input/output		TIM1_CH1	PA8	D10	3	
	5	+5V	-	5V output		TIM2_CH1	PA15	D9	2	
	6	GND	-	Ground		-	PI2	D8	1	
	7	GND	-	Ground		-				
	8	VIN	-	Power input		-	PI3	D7	8	CN4 digital
-						TIM12_CH1	PH6	D6	7	
CN5 analog	1	A0	PA0	ADC3_IN0		TIM5_CH4,SPI2_NSS	PI0	D5	6	
	2	A1	PF10	ADC3_IN8		-	PG7	D4	5	
	3	A2	PF9	ADC3_IN7		TIM3_CH1	PB4	D3	4	
	4	A3	PF8	ADC3_IN6		-	PG6	D2	3	
	5	A4	PF7 or PB(1)	ADC3_IN5 (PF7) or I2C1_SDA (PB9)		USART6_TX	PC6	D1	2	
	6	A5	PF6 or PB8(1)	ADC3_IN4 (PC0) or I2C1_SCL (PB8)		USART6_RX	PC7	D0	1	

1. Refer to *Table 12* for details.

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GPIO Clock/Pin/Modes

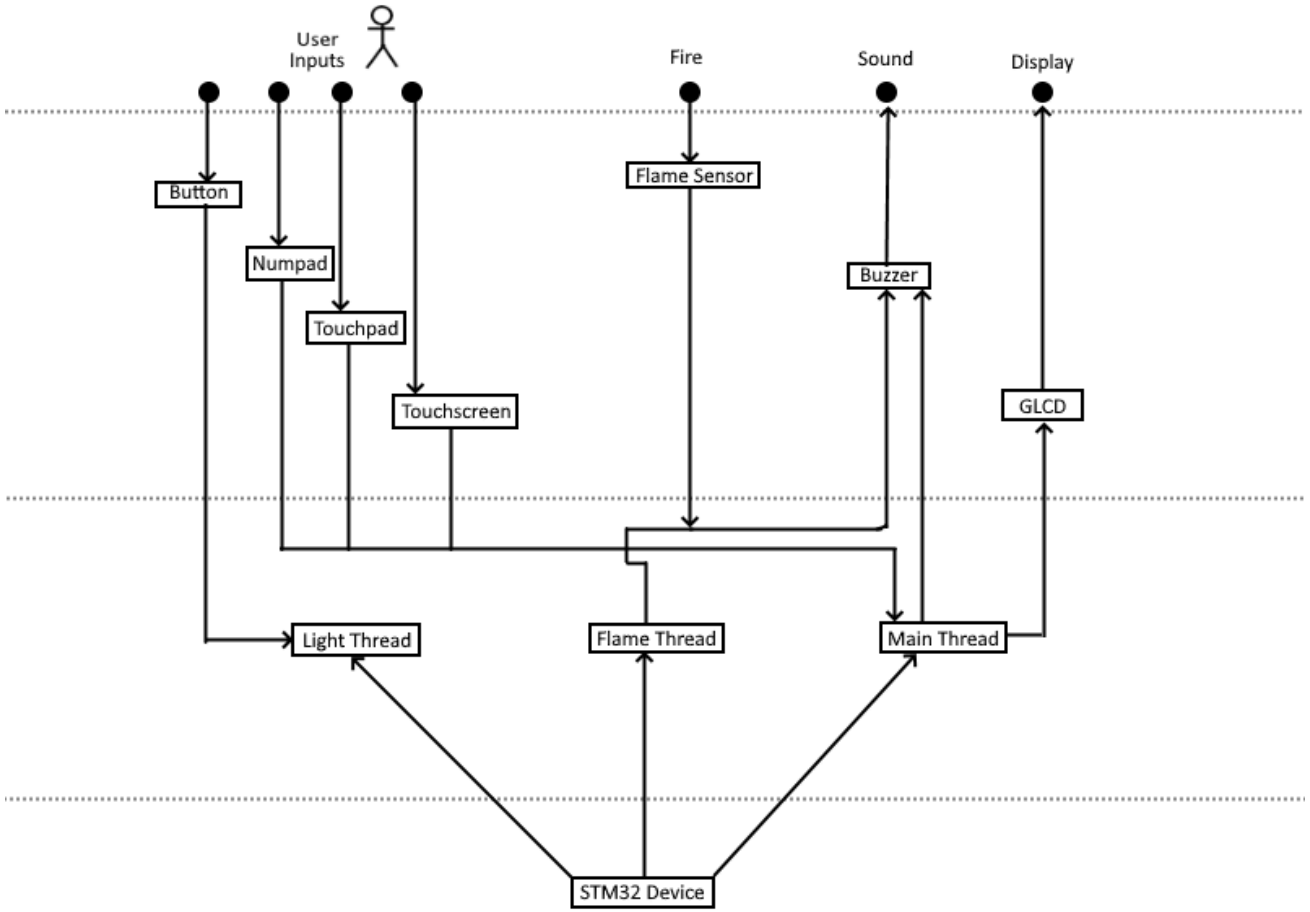
- LED – Clock C, Pin 7, Output, Pulldown
- Buzzer – Clock C, Pin 6, Output Pulldown
- Flame – Clock G, Pin 6, Input Pulldown
- Button – Clock G, Pin 7, Input Pulldown
- Touch – Clock B, Pin 4, Input Pulldown
- Keypad – Clock A Pins 8, 15

  Clock B Pins 8, 9, 14, 15

  Clock I Pins 1, 2

  Input & Output Pulldown

System Architecture



Considerations

- Hearing Impairments?

- Can use visual elements to help convey data

- Visual Impairments?

- Can use audio elements to help convey data

- Mobility Issues?

- Could implement ease-of-access features

- (i.e: light switch on screen as well as physical button)