Automated Home Security System

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Chapter 1

Automated Home Security System

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My system is a basic version of a home security system, emphasising the characteristics that would make it useful for clients that have impairements or certain disabilities. In its current state I would apply it mainly to small home scenarios however with the functionality being extended, I believe it could be used for any building/home environment. Consists of touchscreen panel that can control most aspects, button/led for lighting, keypad and touch sensor for locking/unlocking of the system and flame sensor for detecting fires. Sometimes using the threaded version of the code causes stackoverflows in the main thread, to which dedicating more memory to it doesn't seem to fix the bug. As can be demonstrated however, when using a superloop, although it is not theoretically realtime, it does produce the desired results without fail after much testing. System was intended to make use of an ADC however elements of this have had to be removed due to memory limitations on the device so when looking at the code, certain pane id's may jump due to the removal of initially intended panes such as temperature.

Chapter 2

File Index

2.1 File List

Here is a list of all files with brief descriptions:

Chapter 3

File Documentation

3.1 Button.c File Reference

```
#include "stm32f7xx_hal.h"
#include "stm32f7xx_hal_gpio.h"
#include "Led.h"
```

Functions

- void initButton ()
- void getButton ()

Variables

- int lights

3.1.1 Function Documentation

3.1.1.1 getButton()

```
void getButton (
            void  )
```

```
Button.c For Automated Home Security System
                      By Harry Yelland
```

Controls Lighting of Home by reading switch input (pulldown).

```
               18/05/2021 - Added Comments
```

3.1.1.2 initButton()

```
void initButton (
             void  )
```

3.1.2 Variable Documentation

3.1.2.1 lights

```
int lights  [extern]
```

```
Button.c For Automated Home Security System
                       By Harry Yelland
```

Controls Lighting of Home by reading switch input (pulldown).

```
                18/05/2021 - Added Comments
```

3.2 Button.h File Reference

Functions

- void getButton (void)
- void initButton (void)

3.2.1 Function Documentation

3.2.1.1 getButton()

```
void getButton (
             void  )
```

```
Button.c For Automated Home Security System
                       By Harry Yelland
```

Controls Lighting of Home by reading switch input (pulldown).

```
                18/05/2021 - Added Comments
```

3.2.1.2 initButton()

```
void initButton (
            void  )
```

3.3 Buzzer.c File Reference

```
#include "stm32f7xx_hal.h"
#include "stm32f7xx_hal_gpio.h"
```

Functions

- void initBuzzer (void)
- int setBuzzer (void)
- int resetBuzzer (void)

Variables

- int buzzer

3.3.1 Function Documentation

3.3.1.1 initBuzzer()

```
void initBuzzer (
            void  )
```

3.3.1.2 resetBuzzer()

```
int resetBuzzer (
            void  )
```

3.3.1.3 setBuzzer()

```
int setBuzzer (
            void  )
```

```
Buzzer.c For Automated Home Security System
                        By Harry Yelland
```

Acts as Alarm of Home, set and reset functions setup.

```
               18/05/2021 - Added Comments
```

3.3.2 Variable Documentation

3.3.2.1 buzzer

```
int buzzer  [extern]
```

```
Buzzer.c For Automated Home Security System
                        By Harry Yelland
```

Acts as Alarm of Home, set and reset functions setup.

```
                18/05/2021 - Added Comments
```

3.4 Buzzer.h File Reference

Functions

- void setBuzzer (void)
- void resetBuzzer (void)
- void initBuzzer (void)

3.4.1 Function Documentation

3.4.1.1 initBuzzer()

```
void initBuzzer (
             void  )
```

3.4.1.2 resetBuzzer()

```
void resetBuzzer (
             void  )
```

3.4.1.3 setBuzzer()

```
void setBuzzer (
            void  )


Buzzer.c For Automated Home Security System
                       By Harry Yelland
```

Acts as Alarm of Home, set and reset functions setup.

```
               18/05/2021 - Added Comments
```

3.5 Flame.c File Reference

```
#include "stm32f7xx_hal.h"
#include "stm32f7xx_hal_gpio.h"
#include "Buzzer.h"
```

Functions

- void initFlame ()
- void getFlame ()

Variables

- int warnings
- char warninglist [128]

3.5.1 Function Documentation

3.5.1.1 getFlame()

```
void getFlame (
            void  )


Flame.c For Automated Home Security System
                       By Harry Yelland
```

Detects Fire within Home by reading input (pulldown).

```
               18/05/2021 - Added Comments
```

3.5.1.2 initFlame()

```
void initFlame (
            void  )
```

3.5.2 Variable Documentation

3.5.2.1 warninglist

```
char warninglist[128]  [extern]
```

3.5.2.2 warnings

```
int warnings  [extern]
```

```
Flame.c For Automated Home Security System
                        By Harry Yelland
```

Detects Fire within Home by reading input (pulldown).

```
                18/05/2021 - Added Comments
```

3.6 Flame.h File Reference

Functions

- void getFlame (void)
- void checkFlame (void const *argument)
- void initFlame (void)

3.6.1 Function Documentation

3.6.1.1 checkFlame()

```
void checkFlame (
            void const * argument )
```

3.6.1.2 getFlame()

```
void getFlame (
            void  )
```

```
Flame.c For Automated Home Security System
                       By Harry Yelland
```

Detects Fire within Home by reading input (pulldown).

```
               18/05/2021 - Added Comments
```

3.6.1.3 initFlame()

```
void initFlame (
            void  )
```

3.7 keypad.c File Reference

```
#include "keypad.h"
#include "stm32f7xx_hal.h"
#include "stm32f7xx_hal_gpio.h"
```

Functions

- void initializeMembranePins (void)
- int convertPinsToNum (int k, int r)
- void turnOn (int pinNo)
- void turnOff (int pinNo)
- GPIO_PinState readPin (int number)
- void setColsIn ()
- void setColsOut ()
- int getInput (void)

3.7.1 Function Documentation

3.7.1.1 convertPinsToNum()

```
int convertPinsToNum (
            int k,
            int r )
```

3.7.1.2 getInput()

```
int getInput (
             void  )
```

3.7.1.3 initializeMembranePins()

```
void initializeMembranePins (
             void  )
```

```
Keypad.c For Automated Home Security System
```

Reference - From keypad.c Provided on BlackBoard

```
        Detects passcode entered for home.
```

Keypad Matrix Configuration

3.7.1.4 readPin()

```
GPIO_PinState readPin (
             int number )
```

3.7.1.5 setColsIn()

```
void setColsIn ( )
```

3.7.1.6 setColsOut()

```
void setColsOut ( )
```

3.7.1.7 turnOff()

```
void turnOff (
             int pinNo )
```

3.7.1.8 turnOn()

```
void turnOn (
             int pinNo )
```

3.8 keypad.h File Reference

Functions

- void initializeMembranePins (void)
- int getInput (void)

3.8.1 Function Documentation

3.8.1.1 getInput()

```
int getInput (
             void  )
```

3.8.1.2 initializeMembranePins()

```
void initializeMembranePins (
             void  )
```

```
Keypad.c For Automated Home Security System
```

Reference - From keypad.c Provided on BlackBoard

```
        Detects passcode entered for home.
```


```
Keypad.c For Automated Home Security System
```

Reference - From keypad.c Provided on BlackBoard

```
        Detects passcode entered for home.
```


Keypad Matrix Configuration

3.9 Led.c File Reference

```
#include "stm32f7xx_hal.h"
#include "stm32f7xx_hal_gpio.h"
#include "Flame.h"
#include "cmsis_os.h"
```

Functions

- void initLed (void)
- void led (void)
- void ledOff (void)

3.9.1 Function Documentation

3.9.1.1 initLed()

```
void initLed (
            void  )
```

```
           Led.c For Automated Home Security System
                          By Harry Yelland

    Controls Lighting of Home, Either via Toggle.
```

Added functionality for setting to off incase issue with toggle.

```
                  18/05/2021 - Added Comments
```

3.9.1.2 led()

```
void led (
            void  )
```

```
           Led.c For Automated Home Security System
                          By Harry Yelland

    Controls Lighting of Home, Either via Toggle.
```

Added functionality for setting to off incase issue with toggle.

```
                  18/05/2021 - Added Comments
```

3.9.1.3 ledOff()

```
void ledOff (
             void  )
```

3.10 Led.h File Reference

Functions

- void led (void)
- void ledOff (void)
- void initLed (void)

3.10.1 Function Documentation

3.10.1.1 initLed()

```
void initLed (
             void  )
```

```
            Led.c For Automated Home Security System
                            By Harry Yelland

    Controls Lighting of Home, Either via Toggle.
```

Added functionality for setting to off incase issue with toggle.

```
                    18/05/2021 - Added Comments
```

3.10.1.2 led()

```
void led (
             void  )
```

```
            Led.c For Automated Home Security System
                            By Harry Yelland

    Controls Lighting of Home, Either via Toggle.
```

Added functionality for setting to off incase issue with toggle.

```
                    18/05/2021 - Added Comments
```

3.10.1.3 ledOff()

```
void ledOff (
             void  )
```

3.11 main.c File Reference

```
#include <stdio.h>
#include "stm32f7xx_hal.h"
#include "GLCD_Config.h"
#include "Board_GLCD.h"
#include "Board_Touch.h"
#include "Led.h"
#include "Buzzer.h"
#include "Button.h"
#include "Flame.h"
#include "Touch.h"
#include "keypad.h"
#include "cmsis_os.h"
```

Macros

- #define wait_delay HAL_Delay

Functions

- void SystemClock_Config (void)
- int main (void)
- void loadMenu (void)
- void loadWarnings (void)
- void loadBuzzer (void)
- void loadLights (void)
- void lock (void)
- void unlock (void)
- void getPasscode (void)
- int checkPasscode (void)
- void loadLocked (void)
- void checkCoords (int x, int y)
- void paneSetup (char title[ ])
- void setupPasscode (void)
- void initPins ()
- void Thread_flame (void const ∗arg)
- void Thread_button (void const ∗arg)
- void Thread_main (void const ∗arg)
- osThreadDef (Thread_main, osPriorityHigh, 1, 0)
- osThreadDef (Thread_flame, osPriorityRealtime, 1, 0)
- osThreadDef (Thread_button, osPriorityRealtime, 1, 0)

Variables

- GLCD_FONT GLCD_Font_6x8
- GLCD_FONT GLCD_Font_16x24
- TOUCH_STATE tsc_state
- char buffer [128]
- char warninglist [128]
- int passcode [4]
- int attempt [4]
- int lineHeight = 24
- int warnings = 0
- int loadPane = 0
- int lights = 0
- int touch = 0
- int buzzer = 0

3.11.1 Macro Definition Documentation

3.11.1.1 wait_delay

```
#define wait_delay HAL_Delay
```

```
            Main.c For Automated Home Security System
                        By Harry Yelland
```

Main controlling class for system, calling for setup of pins, functionality for GLCD panes and creating CMSIS_OS Threads.

```
                    18/05/2021 - Added Comments
```

3.11.2 Function Documentation

3.11.2.1 checkCoords()

```
void checkCoords (
             int x,
             int y )
```

3.11.2.2 checkPasscode()

```
int checkPasscode (
             void  )
```

3.11.2.3 getPasscode()

```
void getPasscode (
             void  )
```

3.11.2.4 initPins()

```
void initPins ( )
```

3.11.2.5 loadBuzzer()

```
void loadBuzzer (
             void  )
```

3.11.2.6 loadLights()

```
void loadLights (
             void  )
```

3.11.2.7 loadLocked()

```
void loadLocked (
             void  )
```

3.11.2.8 loadMenu()

```
void loadMenu (
             void  )
```

3.11.2.9 loadWarnings()

```
void loadWarnings (
             void  )
```

3.11.2.10 lock()

```
void lock (
            void  )
```

3.11.2.11 main()

```
int main (
            void  )
```

End of snippet.c

3.11.2.12 osThreadDef() [1/3]

```
osThreadDef (
            Thread_button ,
            osPriorityRealtime ,
            1 ,
            0  )
```

3.11.2.13 osThreadDef() [2/3]

```
osThreadDef (
            Thread_flame ,
            osPriorityRealtime ,
            1 ,
            0  )
```

3.11.2.14 osThreadDef() [3/3]

```
osThreadDef (
            Thread_main ,
            osPriorityHigh ,
            1 ,
            0  )
```

3.11.2.15 paneSetup()

```
void paneSetup (
            char title[] )
```

3.11.2.16 setupPasscode()

```
void setupPasscode (
            void  )
```

3.11.2.17 SystemClock_Config()

```
void SystemClock_Config (
            void  )
```

Reference - From Snippet.c Provided on BlackBoard

```
    System Clock Configuration
```

3.11.2.18 Thread_button()

```
void Thread_button (
            void const * arg )
```

3.11.2.19 Thread_flame()

```
void Thread_flame (
            void const * arg )
```

3.11.2.20 Thread_main()

```
void Thread_main (
            void const * arg )
```

3.11.2.21 unlock()

```
void unlock (
            void  )
```

3.11.3 Variable Documentation

3.11.3.1 attempt

```
int attempt[4]
```

3.11.3.2 buffer

```
char buffer[128]
```

3.11.3.3 buzzer

```
int buzzer = 0
```

```
Buzzer.c For Automated Home Security System
                        By Harry Yelland
```

Acts as Alarm of Home, set and reset functions setup.

```
                18/05/2021 - Added Comments
```

3.11.3.4 GLCD_Font_16x24

```
GLCD_FONT GLCD_Font_16x24  [extern]
```

3.11.3.5 GLCD_Font_6x8

```
GLCD_FONT GLCD_Font_6x8  [extern]
```

3.11.3.6 lights

```
int lights = 0
```

```
Button.c For Automated Home Security System
                        By Harry Yelland
```

Controls Lighting of Home by reading switch input (pulldown).

```
                18/05/2021 - Added Comments
```

3.11.3.7 lineHeight

```
int lineHeight = 24
```

3.11.3.8 loadPane

```
int loadPane = 0
```

3.11.3.9 passcode

```
int passcode[4]
```

3.11.3.10 touch

```
int touch = 0
```

```
Touch.c For Automated Home Security System
                        By Harry Yelland
```

Detects Touch to unlock Home by reading input (pulldown).

```
                18/05/2021 - Added Comments
```

3.11.3.11 tsc_state

```
TOUCH_STATE tsc_state
```

3.11.3.12 warninglist

```
char warninglist[128]
```

3.11.3.13 warnings

```
int warnings = 0
```

```
Flame.c For Automated Home Security System
                        By Harry Yelland
```

Detects Fire within Home by reading input (pulldown).

```
                18/05/2021 - Added Comments
```

3.12 README.dox File Reference

3.13 Touch.c File Reference

```
#include "stm32f7xx_hal.h"
#include "stm32f7xx_hal_gpio.h"
```

Functions

- void initTouch ()
- void getTouch ()

Variables

- int touch

3.13.1 Function Documentation

3.13.1.1 getTouch()

```
void getTouch (
             void  )
```

```
Touch.c For Automated Home Security System
                        By Harry Yelland
```

Detects Touch to unlock Home by reading input (pulldown).

```
                18/05/2021 - Added Comments
```

3.13.1.2 initTouch()

```
void initTouch (
            void  )
```

3.13.2 Variable Documentation

3.13.2.1 touch

```
int touch  [extern]
```

```
Touch.c For Automated Home Security System
                        By Harry Yelland
```

Detects Touch to unlock Home by reading input (pulldown).

```
                18/05/2021 - Added Comments
```

3.14 Touch.h File Reference

Functions

- void getTouch (void)
- void initTouch (void)

3.14.1 Function Documentation

3.14.1.1 getTouch()

```
void getTouch (
            void  )
```

```
Touch.c For Automated Home Security System
                        By Harry Yelland
```

Detects Touch to unlock Home by reading input (pulldown).

```
                18/05/2021 - Added Comments
```

3.14.1.2 initTouch()

```
void initTouch (
            void  )
```

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