Mobile controller home project

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A. Introduction

Smart home is a home which is furnished with unique structured wiring to facilitate occupants to remotely control an array of home appliances by conveying a command via computer or smart phone.

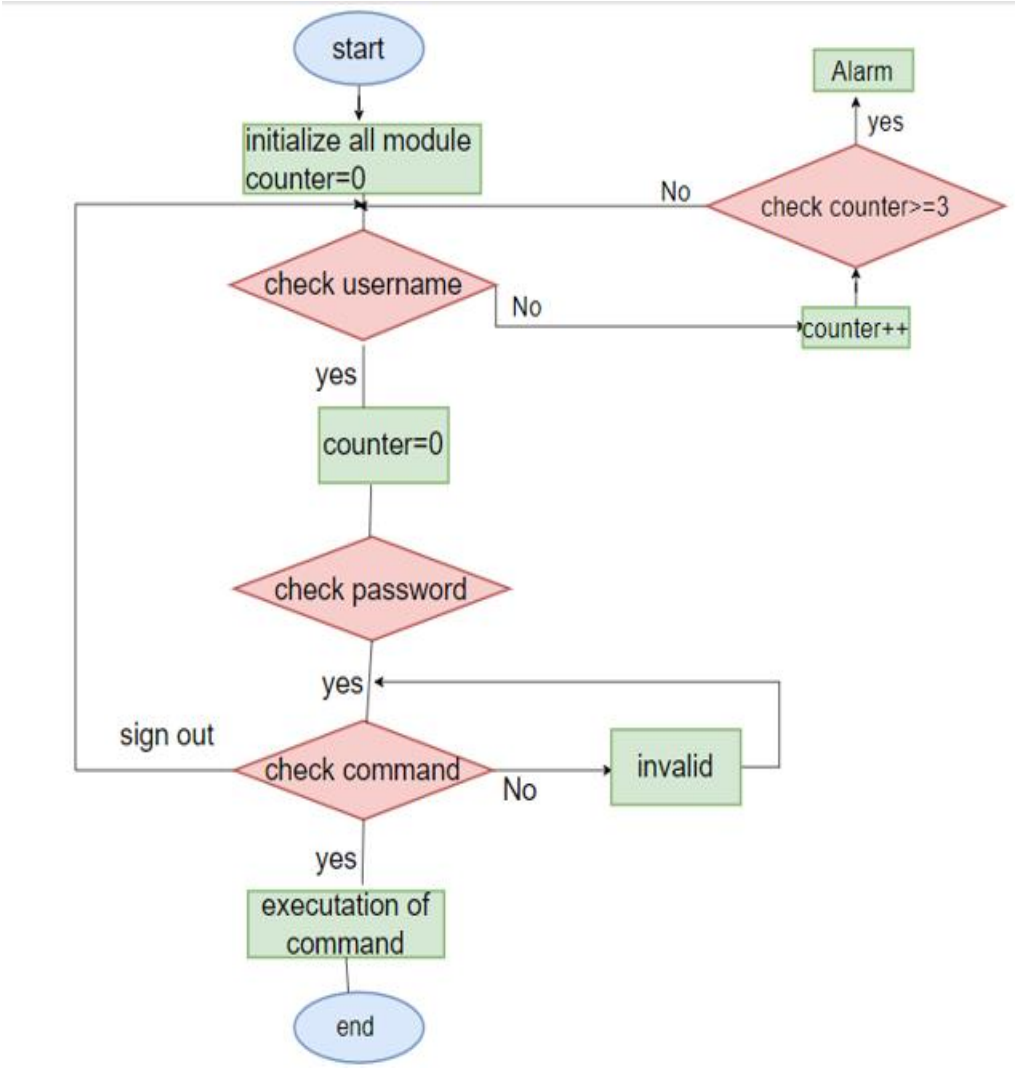
The smart house systems are recorded as security, comfort, power saving etc. As this system affords these benefits, some technical requirements should be also respected such as low cost, plug and play, flexibility, easiness of use and reliability.

The application (hardware and software combined) will thus increase the awareness and will alert the users about the wastage of electricity if any and thus will result in considerable savings in his/her monthly bill.

B. Flow of the project

- Divided into three layers they are application layer, HAL and MCAL.
- Implementing interface.h and private.h files which helps the code to be readable for everyone and easy to understand other's APIs if any one continue the work.
  Interface files: inclusion, function prototype, used macros.
  Private files: define module registers.
- **Project is done by**
  Omar adel khedr: ADC-BUZZAR-LED-AC
  Ahmed abdelhamed: Timer-Motor-Temperature sensor
  Mayar wael: DIO-UART
  App is done by all of us

C. Flow chart of the program



D. MCAL: micro controller abstraction layer

- **DIO**

Used function:

```
void MDIO_VOIDSetPinDirection (u8 Copy_U8Port, u8 Copy_U8Pin, u8 Copy_U8Direction);
void MDIO_VOIDSetPortDirection (u8 Copy_U8Port, u8 Copy_U8Direction);
void MDIO_VOIDSetPinValue (u8 Copy_U8Port, u8 Copy_U8Pin, u8 Copy_U8Value);
void MDIO_VOIDSetPortValue (u8 Copy_U8Port, u8 Copy_U8Value);
void MDIO_VOIDTogglePinValue (u8 Copy_U8Port, u8 Copy_U8Pin);
u8 MDIO_U8GetPinValue (u8 Copy_U8Port, u8 Copy_U8Pin);
u8 MDIO_U8GetPortValue (u8 Copy_U8Port);
```

Inclusion:

```
Include of Standard types header file:
#include "Std_Types.h"
Include of Bit Math header file:
#include "BIT_MATH.h"
Include of module private file:
#include "MDIO_Private.h"
```

- # ADC

Used function:

```
Description: Function to initialize the ADC module
void MADC_VOIDInit (void);
Description: Function to get the analog reading from ADC4 pin
u8 MADC_U8ReadValue (void);
```

Inclusion:

```
Include of Standard types header file:
#include "Std_Types.h"
Include of Bit Math header file:
#include "BIT_MATH.h"
Include of module private file:
#include "ADC_Private.h"
```

- # UART

Used function:

```
Description: Function to initialize the USART module and set the baud rate
void MUSART_VoidInit(u16 Copy_u16BaudRate);
Description: Function to send a character
void MUSART_VoidSendChar(u8 Copy_u8SentChar);
Description: Function to send a string (character by character)
void MUSART_VoidSendString(u8 *Copy_u8SentString);
Description: Function to recieve a character
u8 MUSART_u8ReceiveChar(void);
Description: Function to recieve a string (character by character)
u8 * MUSART_u8ReceiveString(void);
Description: Function to send a number
void MUSART_VOIDSendNumber (u32 Copy_U32Number);
```

Inclusion:

```
Include of Standard types header file:
#include "STD_TYPES.h"
Include of Bit Math header file:
#include "BIT_MATH.h"
Include of the module Private file:
#include "USART_Private.h"
```

- # Timer

Used function:

```
Description: Function to initialize the PWM mode
void MTMR0_VOIDFastPWMInit (void);
Description: Function to Set the value of the duty cycle for the PWM
void MTMR0_VOIDSetDutyCycle (u8 Copy_U8DutyCycle);
Description: Function to stop the clock and disable OC0 Pin
void MTMR0_VOIDPWMOff (void);
void MTMR2_VOIDNormalInit (void);
void MTMR2_VOIDNormalStart (u16 Copy_U16RequiredDelay);
```

Inclusion:

```
Include of Standard types header file:
#include "STD_TYPES.h"
Include of Bit Math header file:
#include "BIT_MATH.h"
Include of module private file:
#include "TIMER_Private.h"
Include of DIO module Interface file:
#include "MDIO_Interface.h"
```

E. HAL: hardware abstraction layer

- ## Buzzer

Used function:

```
Description: Function to initialize a specific pin to be output for Buzzer
void HBUZZER_VOIDInit(u8 Copy_U8Port, u8 Copy_U8Pin);
Description: Function to trigger an alarm
void HBUZZER_VOIDTriggerAlarm(void);
Description: Function to stop the alarm
void HBUZZER_VOIDStopAlarm(void);
```

Inclusion:

```
Include of Standard types header file:
#include "Std_Types.h"
Include of Bit Math header file:
#include "BIT_MATH.h"
Include of MCAL DIO header file:
#include "MDIO_Interface.h"
```

- # LED

Used function:

```
Description: Function to initialize a specific pin to be output for LED
void HLED_VOIDInit(u8 Copy_U8Port, u8 Copy_U8Pin);
Description: Function to set the LED ON
void HLED_VOIDON(void);
Description: Function to set the LED OFF
void HLED_VOIDOFF(void);
```

Inclusion:

```
Include of Standard types header file:
#include "Std_Types.h"
Include of Bit Math header file:
#include "BIT_MATH.h"
Include of MCAL DIO header file:
#include "MDIO_Interface.h"
```

- # Motor

Used function:

```
Description: Function to make the motor rotate in counterclockwise direction
void HMTR_VOIDRotateCCW(void) ;
Description: Function to make the motor rotate in clockwise direction
void HMTR_VOIDRotateCW(void) ;
```

Inclusion:

```
Include of Standard types header file:
#include "STD_TYPES.h"
Include of Bit Math header file:
#include "BIT_MATH.h"
Include of Timer module Interface file:
#include "TIMER_Interface.h"
Include of DIO module Interface file:
#include "MDIO_Interface.h"
```

- ## Temperature sensor

Used function:

```
Description: Function to Initialize the TempSensor pin
void HTEMP_VOIDInit(u8 Copy_U8Port, u8 Copy_U8Pin);
Description: Function to Get the TempSensor reading
u8 HTEMP_U8GetTemp(void) ;
```

Inclusion:

```
Include of Standard types header file:
#include "STD_TYPES.h"
Include of Bit Math header file:
#include "BIT_MATH.h"
Include of ADC module Interface file:
#include "ADC_Interface.h"
Include of DIO module Interface file:
#include "MDIO_Interface.h"
```

- ## AC

Used function:

Description: Function to initialize a specific pin to be output for the AC

void HAC_VOIDInit(u8 Copy_U8Port, u8 Copy_U8Pin);

Description: Function to toggle the value of the pin connected to the relay which is connected to the AC

void HAC_VOIDOnOff(void);

Inclusion:

Include of DIO module Interface file:

#include "MDIO_Interface.h"