```
/*****************************************************************

Definitions header file for any definitiosn taht should be included throughout
entire project

*****************************************************************/

#ifndef Definitions_H
#define Definitions_H

//*****************************************************************************
************
//---------------------------------- INCLUDES ------------------------------------
--
//*****************************************************************************
************
//General Header Includes
#include "ES_Configure.h"
#include "ES_Types.h"

// the headers to access the GPIO subsystem
#include "inc/hw_memmap.h"
#include "inc/hw_types.h"
#include "inc/hw_gpio.h"
#include "inc/hw_sysctl.h"
#include "inc/hw_UART.H"
#include "inc/hw_nvic.H"

// the headers to access the TivaWare Library
#include "driverlib/sysctl.h"
#include "driverlib/pin_map.h"
#include "driverlib/gpio.h"
#include "driverlib/timer.h"
#include "driverlib/interrupt.h"

#define ALL_BITS                                    (0xff<<2)
#define TICKS_PER_MS                              40000ul
#define MICROSECONDS_DIVISOR  1000
#define BitsPerNibble                       4

//*****************************************************************************
************
//---------------------------------- PIN DEFINITIONS -----------------------------
---------
//*****************************************************************************
************

// Port A
#define DMC_SYSTCTL                               SYSCTL_RCGCGPIO_R0
#define DMC_BASE                                        GPIO_PORTA_BASE

#define SOUND_SYSTCTL         SYSCTL_RCGCGPIO_R0
#define SOUND_BASE                  GPIO_PORTA_BASE

#define COLOR_PIN                                       GPIO_PIN_2
#define PAIRED_PIN                                      GPIO_PIN_3
#define TIMING_PIN                                      GPIO_PIN_4
#define SOUND_PIN                                       GPIO_PIN_5

// Port B
#define LIFT_SYSCTL                               SYSCTL_RCGCGPIO_R1
#define LIFT_GPIO                                       GPIO_PORTB_BASE
```

```
#define ORIENTATION_SYSCTL              SYSCTL_RCGCGPIO_R1
#define ORIENTATION_GPIO                  GPIO_PORTB_BASE

#define THRUST_SYSCTL                       SYSCTL_RCGCGPIO_R1
#define THRUST_GPIO                           GPIO_PORTB_BASE

#define LIFT_FAN_PIN                          GPIO_PIN_1
#define THRUST_RIGHT_DIRECTION_PIN            GPIO_PIN_2
#define THRUST_LEFT_DIRECTION_PIN             GPIO_PIN_3
#define THRUST_RIGHT_FAN_PIN                        GPIO_PIN_4
#define THRUST_LEFT_FAN_PIN                   GPIO_PIN_5
#define LEFT_SERVO_PIN                              GPIO_PIN_6
#define RIGHT_SERVO_PIN                             GPIO_PIN_7

// Port E
#define BADGE_SYSCTL                                SYSCTL_RCGCGPIO_R4
#define BADGE_BASE                                        GPIO_PORTE_BASE

#define BADGE_PIN                                         GPIO_PIN_1


//*****************************************************************************
************
//--------------------------------- INTERRUPTS ----------------------------------
----
//*****************************************************************************
************
//Timer Definitions
#define WT0CCP0   0, 0
#define WT0CCP1   0, 1
#define WT1CCP0   1, 0
#define WT1CCP1   1, 1
#define WT2CCP0   2, 0
#define WT2CCP1   2, 1
#define WT3CCP0   3, 0
#define WT3CCP1   3, 1
#define WT4CCP0   4, 0
#define WT4CCP1   4, 1
#define WT5CCP0   5, 0
#define WT5CCP1   5, 1

#define NULL_INTERRUPT_PERIOD 0     //Use this if it is a capture interrupt and not
a periodic interrupt

//Paramaters to Pass our Initialization Functions
#define undefined_CAPTURE_initialization_paramaters
undefined_interrupt,
undefined_priority, NULL_INTERRUPT_PERIOD
#define undefined_PERIODIC_initialization_paramaters
undefined_interrupt,
undefined_priority, undefined_period

//*****************************************************************************
************
//---------------------------------- PWM ----------------------------------------
//*****************************************************************************
************
//Module 1
#define M0PWM0    0, 0, 0 //B6
#define M0PWM1    0, 0, 1 //B7
#define M0PWM2    0, 1, 0 //B4
```

```
#define M0PWM3    0, 1, 1 //B5

//Module 2
#define M1PWM2    1, 1, 0 //E4
#define M1PWM3    1, 1, 1 //E5

//ASSIGN THE PWM PINS

#define     LEFT_SERVO_PWM          M0PWM0
#define     RIGHT_SERVO_PWM   M0PWM1
#define     THRUST_RIGHT_FAN_PWM          M0PWM2
#define THRUST_LEFT_FAN_PWM         M0PWM3
#define LEFT_THRUST_OFFSET 0 //offsets in duty cycles
#define RIGHT_THRUST_OFFSET 0

//PERIODS ARE IN MICROSECONDS
//ASSIGN THE PERIODS
#define orientation_servo_periods         20000 //servo frequency needs to be at
50Hz
#define lift_period                                   50
#define thrust_period                           50
#define TURN_THRESHOLD                  10
#define     LEFT_BRAKE_UP                             4.5
#define LEFT_BRAKE_DOWN                   5.8
#define     RIGHT_BRAKE_UP                        7.7
#define RIGHT_BRAKE_DOWN                6.4
#define MAX_PWM_DC                                    80

//Init Definitions
#define LEFT_SERVO_PWM_PARAMATERS               LEFT_SERVO_PWM,
orientation_servo_periods
#define RIGHT_SERVO_PWM_PARAMATERS        RIGHT_SERVO_PWM,
orientation_servo_periods

#define LIFT_PWM_PARAMATERS                                   LIFT_FAN_PWM,
lift_period
#define THRUST_LEFT_PWM_PARAMATERS        THRUST_LEFT_FAN_PWM, thrust_period
#define THRUST_RIGHT_PWM_PARAMATERS       THRUST_RIGHT_FAN_PWM, thrust_period


//*************************************************************************
************
//--------------------------------- PROTOCOL DEFINITIONS ----------------------
--------------
//*************************************************************************
************
//Define Zero Byte for Clarity
#define     ZERO_BYTE 0x00

//Define Indexes assuming we have a byte zero
//Transmit
#define TX_INDEX_START_DELIM              0
#define TX_INDEX_LENGTH_MSB                     1
#define TX_INDEX_LENGTH_LSB                     2
#define TX_INDEX_API                                        3
#define TX_INDEX_FRAME                                4
#define TX_INDEX_DESTINATION_MSB  5
#define TX_INDEX_DESTINATION_LSB  6
#define TX_INDEX_OPTIONS                              7
#define TX_INDEX_HEADER                               8

//Receive as a response from Transmit
```

```
#define RXt_INDEX_START_DELIM            0
#define RXt_INDEX_LENGTH_MSB             1
#define RXt_INDEX_LENGTH_LSB             2
#define RXt_INDEX_API                                    3
#define RXt_INDEX_FRAME                          4
#define RXt_INDEX_STATUS                 5


//Receive
#define RX_INDEX_START_DELIM             0
#define RX_INDEX_LENGTH_MSB                      1
#define RX_INDEX_LENGTH_LSB              2
#define RX_INDEX_API                                     3
#define RX_INDEX_SOURCE_MSB              4
#define RX_INDEX_SOURCE_LSB              5
#define RX_INDEX_RSSI                                    6
#define RX_INDEX_OPTIONS                         7
#define     RX_INDEX_HEADER                              8
#define RX_INDEX_PAIR_BYTE                       9
#define RX_INDEX_THRUST_BYTE             9
#define     RX_INDEX_FIRST_KEY                   10
#define RX_INDEX_ORIENT_BYTE             10
#define RX_INDEX_SPECIAL_BYTE            11
#define RX_INDEX_INT_CKSUM                       12
#define RX_INDEX_CTRL_FINAL_CKSUM 13


//Packet Data Lengths (measured post length byte excluding checksum)
#define     PAIR_LENGTH 0x07
#define     ENCR_LENGTH 0x26 //32 bytes + 5 bytes
#define     CTRL_LENGTH 0xA
#define     STATUS_LENGTH 0x08

//Other Lengths
#define PRE_LENGTH_LENGTH 3 //amount of bytes before we start counting the
length
#define     PROLOGUE_TRANSMIT_LENGTH 8
#define CHECKSUM_LENGTH 1

//Possible XBee Prologues
#define     START_DELIMITER 0x7E

#define     API_IDENTIFIER_SEND 0x01
#define     API_IDENTIFIER_ACK 0x89
#define     API_IDENTIFIER_RECEIVE 0x81

#define FRAME_ID_SEND 0x55    //Confirm what the frame ID should be (changes send
                                                                    to send?)
#define ZERO_FRAME_ID 0x00 //Updated Comm Protocol

//Destination
#define BROADCAST_1 0xFF
#define BROADCAST_2 0xFF

//Options
#define OPTIONS_ACK 0x00
#define OPTIONS_INCOMING_ADDRESS_BROADCAST 0x00

//The Lobbyist number we should use when debugging to command or Lobbyist
#define DEBUGGING_LOBBYIST_NUMBER 0x0D

#define HEADER_INDEX    0
```

```
//Headers to indicated Packet Types
#define PAIR_HDR                    0x00
#define ENCR_HDR                    0x01
#define CTRL_HDR                    0x02
#define STATUS_HDR                  0x03

//Maximum Packet Length
#define MAXIMUM_PACKET_LENGTH 41

//Pair Bytes
#define COLOR_BLUE                              BIT7HI
#define COLOR_DEACTIVATE            0xFF
#define     DEBUG_NUMBER                        0x08
#define PAIRING_NUMBER              0x7F

//Encryption
#define     ENCRYP_LENGTH     32

//Control Packet
#define     UNPAIR_BIT                                  BIT1HI
#define     BREAK_BIT                                         BIT0HI
#define SPECIAL_ACTION_BIT          BIT2HI
#define SPECIAL_ACTION_TIME   2000


#define THRUST_INDEX 1
#define ORIENT_INDEX 2
#define     SPECIAL_INDEX 3
#define     CKSUM_INDEX 4

//Status Packet from Lobbyist
#define STAT_LENGTH 3
#define     PAIR_BYTE   1
#define     PAIRED_BIT  BIT0HI
#define DECRYPTION_BIT  BIT1HI

//Status Packet from Transmit
#define TX_SUCCESS_BYTE 0X00

//timers
#define PAIRING_TIME 45000
#define TRANSMIT_TIME 1000


//*************************************************************************
************
//--------------------------------- PWM VALUES ---------------------------------
----
//*************************************************************************
************
//Lift Fan
#define LIFT_ON_PWM 100
#define LIFT_OFF_PWM 0

//*************************************************************************
************
//--------------------------------- Other --------------------------------------
//*************************************************************************
************
#define     INPUT                   1
#define           OUTPUT                  0
```

```
#define DMC_TIMING_TIMER_TIME 5000 //i.e. pulse the clock every 5 seconds

#define           LIFT_OFF                0
#define           LIFT_ON                 1

#endif
```