lab3-ADC_PWM

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Contents

1 lab3-ADC_PWM **1**

2 File Index **3**

2.1 File List 3

3 File Documentation **5**

3.1 README.md File Reference 5

3.2 src/ADC.c File Reference 5

3.2.1 Function Documentation 5

3.2.1.1 convertWiFIREadc() 5

3.2.1.2 initWiFIREadc() 6

3.2.1.3 ReadPotentiometerWithADC() 6

3.3 src/ADC.h File Reference 6

3.3.1 Function Documentation 6

3.3.1.1 convertWiFIREadc() 6

3.3.1.2 initWiFIREadc() 6

3.4 src/configuration_bits.c File Reference 7

3.5 src/main.c File Reference 7

3.5.1 Detailed Description 7

3.5.2 Function Documentation 7

3.5.2.1 main() 7

3.6 src/user.c File Reference 8

3.6.1 Detailed Description 8

3.6.2 Function Documentation 8

3.6.2.1 init_gpio() . . . 8
3.6.2.2 init_servo() . . . 8
3.7 src/user.h File Reference . . . 9
3.7.1 Detailed Description . . . 9
3.7.2 Macro Definition Documentation . . . 9
3.7.2.1 BTN1_PORT_BIT . . . 10
3.7.2.2 LD1_PORT_BIT . . . 10
3.7.2.3 LD2_PORT_BIT . . . 10
3.7.2.4 MAX_ADC_VALUE . . . 10
3.7.2.5 PWM_FREQ_HZ . . . 10
3.7.2.6 PWM_PERIOD_COUNTS . . . 11
3.7.2.7 SERVO_0 . . . 11
3.7.2.8 SERVO_180 . . . 11
3.7.2.9 SERVO_90 . . . 11
3.7.2.10 VR1_AN_CHAN_NUM . . . 11
3.7.3 Function Documentation . . . 11
3.7.3.1 delay() . . . 12
3.7.3.2 init_gpio() . . . 12
3.7.3.3 init_servo() . . . 12

Index **13**

Chapter 1

lab3-ADC_PWM

lab3-ADC_PWM is a university laboratory project for PIC32 WiFire kit written in C language for studying basic configuring and usage of ADC and PWM.

In project was implemented controlling an angle of the servo by chaging an angle of potentiometer. By chaging an angle of potentiometer voltage on its output also changes. To convert analog voltage to digital value ADC is used. Then digital value from ADC is used to calculate duty cycle for servo's PWM.

Project was documented using doxygen, so if you have "latex" on your machine you can simply generate project's reference manual in pdf by using "make pdf" command in your console.

Chapter 2

File Index

2.1 File List

Here is a list of all files with brief descriptions:

src/ADC.c 5
src/ADC.h 6
src/configuration_bits.c 7
src/main.c
    Main project file 7
src/user.c
    Descroption for initialization and system functions 8
src/user.h
    Definitions, macroses and function prototypes 9

Chapter 3

File Documentation

3.1 README.md File Reference

3.2 src/ADC.c File Reference

```
#include <stdint.h>
#include <stdbool.h>
#include "user.h"
```

Functions

- void initWiFIREadc (void)
- int convertWiFIREadc (uint8_t channelNumber)
- int ReadPotentiometerWithADC (void)

3.2.1 Function Documentation

3.2.1.1 convertWiFIREadc()

```
int convertWiFIREadc (
            uint8_t channelNumber )
```

Definition at line 215 of file ADC.c.

3.2.1.2 initWiFIREadc()

```
void initWiFIREadc (
             void  )
```

Definition at line 68 of file ADC.c.

3.2.1.3 ReadPotentiometerWithADC()

```
int ReadPotentiometerWithADC (
             void  )
```

Definition at line 337 of file ADC.c.

3.3 src/ADC.h File Reference

Functions

- void initWiFIREadc (void)
- int convertWiFIREadc (uint8_t channelNumber)

3.3.1 Function Documentation

3.3.1.1 convertWiFIREadc()

```
int convertWiFIREadc (
             uint8_t channelNumber )
```

Definition at line 215 of file ADC.c.

3.3.1.2 initWiFIREadc()

```
void initWiFIREadc (
             void  )
```

Definition at line 68 of file ADC.c.

3.4 src/configuration_bits.c File Reference

3.5 src/main.c File Reference

Main project file.

```
#include <stdint.h>
#include "user.h"
```

Functions

- int main (void)

  main function

3.5.1 Detailed Description

Main project file.

Author

Alexandr Skopets

Date

28.11.2017

3.5.2 Function Documentation

3.5.2.1 main()

```
int main (
            void  )
```

main function

Contains GPIO and peripherals initialization and infinite loop.

Definition at line 20 of file main.c.

3.6 src/user.c File Reference

contains descroption for initialization and system functions

```
#include <stdint.h>
#include "user.h"
#include <sys/attribs.h>
```

Functions

- void init_servo (void)
  Servo initialization.
- void init_gpio (void)
  GPIO initialization.

3.6.1 Detailed Description

contains descroption for initialization and system functions

3.6.2 Function Documentation

3.6.2.1 init_gpio()

```
void init_gpio (
            void  )
```

GPIO initialization.

Initialization for pins G6, B11, G15, D4, A4, A5. Disabling analog mode and setting pins directions

Definition at line 49 of file user.c.

3.6.2.2 init_servo()

```
void init_servo (
            void  )
```

Servo initialization.

Initialization of timer to drive servo. Timer 2 configured to generate PWM with 20ms period (50Hz frequency). OC8 output mapped to E3 pin (28th pin on chipKit WiFire board)

Definition at line 21 of file user.c.

3.7 src/user.h File Reference

contains definitions, macroses and function prototypes

Macros

- #define LD1_PORT_BIT LATGbits.LATG6

  Macros that used for setting or reseting of LED1.
- #define LD2_PORT_BIT LATDbits.LATD4

  Macros that used for setting or reseting of LED2.
- #define BTN1_PORT_BIT PORTAbits.RA5

  Macros for reading button1 state.
- #define PWM_FREQ_HZ (50)

  Definition of PWM frequency.
- #define PWM_PERIOD_COUNTS (100000000/(256 ∗ PWM_FREQ_HZ))

  Definition of PWM period counts.
- #define MAX_ADC_VALUE (4095)

  Definition of maximum ADC value.
- #define VR1_AN_CHAN_NUM (8)
- #define SERVO_0 (220)

  Definition of servo angle.
- #define SERVO_90 (550)

  Definition of servo angle.
- #define SERVO_180 (880)

  Definition of servo angle.

Functions

- void init_gpio (void)

  GPIO initialization.
- void init_servo (void)

  Servo initialization.
- void delay (volatile uint32_t n)

3.7.1 Detailed Description

contains definitions, macroses and function prototypes

3.7.2 Macro Definition Documentation

3.7.2.1 BTN1_PORT_BIT

```
#define BTN1_PORT_BIT PORTAbits.RA5
```

Macros for reading button1 state.

Definition at line 13 of file user.h.

3.7.2.2 LD1_PORT_BIT

```
#define LD1_PORT_BIT LATGbits.LATG6
```

Macros that used for setting or reseting of LED1.

Definition at line 10 of file user.h.

3.7.2.3 LD2_PORT_BIT

```
#define LD2_PORT_BIT LATDbits.LATD4
```

Macros that used for setting or reseting of LED2.

Definition at line 11 of file user.h.

3.7.2.4 MAX_ADC_VALUE

```
#define MAX_ADC_VALUE (4095)
```

Definition of maximum ADC value.

Definition at line 18 of file user.h.

3.7.2.5 PWM_FREQ_HZ

```
#define PWM_FREQ_HZ (50)
```

Definition of PWM frequency.

Definition at line 16 of file user.h.

3.7.2.6 PWM_PERIOD_COUNTS

```
#define PWM_PERIOD_COUNTS (100000000/(256 * PWM_FREQ_HZ))
```

Definition of PWM period counts.

Definition at line 17 of file user.h.

3.7.2.7 SERVO_0

```
#define SERVO_0 (220)
```

Definition of servo angle.

Definition at line 21 of file user.h.

3.7.2.8 SERVO_180

```
#define SERVO_180 (880)
```

Definition of servo angle.

Definition at line 23 of file user.h.

3.7.2.9 SERVO_90

```
#define SERVO_90 (550)
```

Definition of servo angle.

Definition at line 22 of file user.h.

3.7.2.10 VR1_AN_CHAN_NUM

```
#define VR1_AN_CHAN_NUM (8)
```

Definition at line 19 of file user.h.

3.7.3 Function Documentation

3.7.3.1 delay()

```
void delay (
            volatile uint32_t n )
```

3.7.3.2 init_gpio()

```
void init_gpio (
            void  )
```

GPIO initialization.

Initialization for pins G6, B11, G15, D4, A4, A5. Disabling analog mode and setting pins directions

Definition at line 49 of file user.c.

3.7.3.3 init_servo()

```
void init_servo (
            void  )
```

Servo initialization.

Initialization of timer to drive servo. Timer 2 configured to generate PWM with 20ms period (50Hz frequency). OC8 output mapped to E3 pin (28th pin on chipKit WiFire board)

Definition at line 21 of file user.c.

Index

ADC.c
    convertWiFIREadc, 5
    initWiFIREadc, 5
    ReadPotentiometerWithADC, 6
ADC.h
    convertWiFIREadc, 6
    initWiFIREadc, 6

BTN1_PORT_BIT
    user.h, 9

convertWiFIREadc
    ADC.c, 5
    ADC.h, 6

delay
    user.h, 11

init_gpio
    user.c, 8
    user.h, 12
init_servo
    user.c, 8
    user.h, 12
initWiFIREadc
    ADC.c, 5
    ADC.h, 6

LD1_PORT_BIT
    user.h, 10
LD2_PORT_BIT
    user.h, 10

MAX_ADC_VALUE
    user.h, 10
main
    main.c, 7
main.c
    main, 7

PWM_FREQ_HZ
    user.h, 10
PWM_PERIOD_COUNTS
    user.h, 10

README.md, 5
ReadPotentiometerWithADC
    ADC.c, 6

SERVO_0
    user.h, 11
SERVO_180
    user.h, 11
SERVO_90
    user.h, 11
src/ADC.c, 5
src/ADC.h, 6
src/configuration_bits.c, 7
src/main.c, 7
src/user.c, 8
src/user.h, 9

user.c
    init_gpio, 8
    init_servo, 8
user.h
    BTN1_PORT_BIT, 9
    delay, 11
    init_gpio, 12
    init_servo, 12
    LD1_PORT_BIT, 10
    LD2_PORT_BIT, 10
    MAX_ADC_VALUE, 10
    PWM_FREQ_HZ, 10
    PWM_PERIOD_COUNTS, 10
    SERVO_0, 11
    SERVO_180, 11
    SERVO_90, 11
    VR1_AN_CHAN_NUM, 11

VR1_AN_CHAN_NUM
    user.h, 11