Microbit features

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Chapter 1

Class Index

1.1 Class List

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Chapter 2

File Index

2.1 File List

Here is a list of all files with brief descriptions:

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Chapter 3

Class Documentation

3.1 i2c_dev Struct Reference

`#include <i2c_util.h>`

Public Attributes

- struct device * dev
- char name [I2C_DEVICE_NAME_LENGTH]
- u16_t addr
- u8_t reg_test
- u8_t reg_test_expected_val

3.1.1 Member Data Documentation

3.1.1.1 u16_t i2c_dev::addr

3.1.1.2 struct device* i2c_dev::dev

3.1.1.3 char i2c_dev::name[I2C_DEVICE_NAME_LENGTH]

3.1.1.4 u8_t i2c_dev::reg_test

3.1.1.5 u8_t i2c_dev::reg_test_expected_val

The documentation for this struct was generated from the following file:

- /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/include/i2c_util.h

3.2 mstate_t Struct Reference

Public Attributes

- state_t events [3]
- void(* action)(void)

3.2.1 Member Data Documentation

3.2.1.1 void(* mstate_t::action)(void)

3.2.1.2 state_t mstate_t::events[3]

The documentation for this struct was generated from the following file:

- /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/src/main.c

Chapter 4

File Documentation

4.1 /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/include/display_acc.h File Reference

```
#include <display/mb_display.h>
#include <misc/printk.h>
#include "i2c_util.h"
```

Macros

- #define ACC_DEV_ADDR 0x1D
- #define ACC_WHO_AM_I_REG 0x0D
- #define ACC_TEST_VALUE 0x5A
- #define ACC_OUT_X_MSB 0x01

Functions

- void acc_read (struct i2c_dev acc, struct mb_display *disp, uint16_t delay)

  Get readings from the accel. and shows an interactive point on display.

Variables

- uint8_t acc_data [2]

4.1.1 Macro Definition Documentation

4.1.1.1 #define ACC_DEV_ADDR 0x1D

4.1.1.2 #define ACC_OUT_X_MSB 0x01

4.1.1.3 #define ACC_TEST_VALUE 0x5A

4.1.1.4 #define ACC_WHO_AM_I_REG 0x0D

4.1.2 Function Documentation

4.1.2.1 void acc_read (struct i2c_dev *acc*, struct mb_display * *disp*, uint16_t *delay*)

Get readings from the accel. and shows an interactive point on display.

X-Offsets to position the board

Y-Offsets to position the board

4.1.3 Variable Documentation

4.1.3.1 uint8_t acc_data[2]

4.2 /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/include/display_compass.h File Reference

```
#include <display/mb_display.h>
#include <misc/printk.h>
#include "i2c_util.h"
#include "display_acc.h"
```

Macros

- #define COMPASS_DEV_ADDR 0x0e
- #define COMPASS_WHO_AM_I_REG 0x07
- #define COMPASS_TEST_VALUE 0xC4
- #define COMPASS_OUT_X_MSB 0x01
- #define COMPASS_OUT_Y_MSB 0x03
- #define COMPASS_OUT_Z_MSB 0x05

Functions

- void compass_read (struct i2c_dev compass, struct i2c_dev acc, struct mb_display *disp, uint16_t delay)

  Get readings from the compass and shows interactive arrows on display.

Variables

- uint8_t compass_x_data [2]
- uint8_t compass_y_data [2]
- uint8_t compass_z_data [2]

4.2.1 Macro Definition Documentation

4.2.1.1 #define COMPASS_DEV_ADDR 0x0e

4.2.1.2 #define COMPASS_OUT_X_MSB 0x01

4.2.1.3 #define COMPASS_OUT_Y_MSB 0x03

4.2.1.4 #define COMPASS_OUT_Z_MSB 0x05

4.2.1.5 #define COMPASS_TEST_VALUE 0xC4

4.2.1.6 #define COMPASS_WHO_AM_I_REG 0x07

4.2.2 Function Documentation

4.2.2.1 void compass_read (struct i2c_dev *compass*, struct i2c_dev *acc*, struct mb_display * *disp*, uint16_t *delay*)

Get readings from the compass and shows interactive arrows on display.

Calibration with accelerometer

Device positioning: Valid accelerometer range

Thresholds for compass

Display on LED Matrix

Device positioning: Offset for adjust accelerometer range

X-Offsets to position the board

Y-Offsets to position the board

Display on LED Matrix

4.2.3 Variable Documentation

4.2.3.1 uint8_t compass_x_data[2]

4.2.3.2 uint8_t compass_y_data[2]

4.2.3.3 uint8_t compass_z_data[2]

4.3 /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/include/display_temp.h File Reference

```
#include <display/mb_display.h>
#include <misc/printk.h>
#include <sensor.h>
#include <zephyr.h>
#include <stdio.h>
```

Functions

- void temp_read (struct device *temp_dev, struct mb_display *disp, uint16_t delay)

  Get readings from the thermometer and prints it on LED Matrix display.

4.3.1 Function Documentation

4.3.1.1 void temp_read (struct device * *temp_dev*, struct mb_display * *disp*, uint16_t *delay*)

Get readings from the thermometer and prints it on LED Matrix display.

4.4 /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/include/i2c_util.h File Reference

```
#include <zephyr.h>
#include <misc/printk.h>
#include <board.h>
#include <gpio.h>
#include <device.h>
#include <i2c.h>
#include <string.h>
#include <logging/sys_log.h>
```

Classes

- struct i2c_dev

Macros

- #define SYS_LOG_DOMAIN "PROJECT"
- #define I2C_DEVICE_NAME_LENGTH 10

Functions

- int i2c_util_dev_init (struct i2c_dev *i2c_dev, u16_t addr, const char *name, u8_t reg_test, u8_t reg_test_expected_val)
- int i2c_util_write_bytes (struct i2c_dev *i2c_dev, u8_t reg, u8_t *data, u32_t num_bytes)
- int i2c_util_read_bytes (struct i2c_dev *i2c_dev, u8_t reg, u8_t *data, u32_t num_bytes)
- int i2c_util_test_connection (struct i2c_dev *i2c_dev)

4.4.1 Macro Definition Documentation

4.4.1.1 #define I2C_DEVICE_NAME_LENGTH 10

4.4.1.2 #define SYS_LOG_DOMAIN "PROJECT"

4.4.2 Function Documentation

4.4.2.1 int i2c_util_dev_init (struct i2c_dev * *i2c_dev*, u16_t *addr*, const char * *name*, u8_t *reg_test*, u8_t *reg_test_expected_val*)

4.4.2.2 int i2c_util_read_bytes (struct i2c_dev * *i2c_dev*, u8_t *reg*, u8_t * *data*, u32_t *num_bytes*)

4.4.2.3 int i2c_util_test_connection (struct i2c_dev * *i2c_dev*)

4.4.2.4 int i2c_util_write_bytes (struct i2c_dev * *i2c_dev*, u8_t *reg*, u8_t * *data*, u32_t *num_bytes*)

4.5 /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/src/display_acc.c File Reference

```
#include "display_acc.h"
```

Functions

- void acc_read (struct i2c_dev acc, struct mb_display *disp, uint16_t delay)
  Get readings from the accel. and shows an interactive point on display.

4.5.1 Function Documentation

4.5.1.1 void acc_read (struct i2c_dev *acc*, struct mb_display * *disp*, uint16_t *delay*)

Get readings from the accel. and shows an interactive point on display.

X-Offsets to position the board

Y-Offsets to position the board

4.6 /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/src/display_compass.c File Reference

```
#include "display_compass.h"
```

Functions

- void compass_read (struct i2c_dev compass, struct i2c_dev acc, struct mb_display *disp, uint16_t delay)
  Get readings from the compass and shows interactive arrows on display.

4.6.1 Function Documentation

4.6.1.1 void compass_read (struct i2c_dev *compass*, struct i2c_dev *acc*, struct mb_display * *disp*, uint16_t *delay*)

Get readings from the compass and shows interactive arrows on display.

Calibration with accelerometer

Device positioning: Valid accelerometer range

Thresholds for compass

Display on LED Matrix

Device positioning: Offset for adjust accelerometer range

X-Offsets to position the board

Y-Offsets to position the board

Display on LED Matrix

4.7 /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/src/display_temp.c File Reference

```
#include "display_temp.h"
```

Functions

- void temp_read (struct device *temp_dev, struct mb_display *disp, uint16_t delay)

Get readings from the thermometer and prints it on LED Matrix display.

4.7.1 Function Documentation

4.7.1.1 void temp_read (struct device * *temp_dev*, struct mb_display * *disp*, uint16_t *delay*)

Get readings from the thermometer and prints it on LED Matrix display.

4.8 /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/src/i2c_util.c File Reference

```
#include "i2c_util.h"
```

Functions

- int i2c_util_dev_init (struct i2c_dev *i2c_dev, u16_t addr, const char *name, u8_t reg_test, u8_t reg_test_expected_val)
- int i2c_util_write_bytes (struct i2c_dev *i2c_dev, u8_t reg, u8_t *data, u32_t num_bytes)
- int i2c_util_read_bytes (struct i2c_dev *i2c_dev, u8_t reg, u8_t *data, u32_t num_bytes)
- int i2c_util_test_connection (struct i2c_dev *i2c_dev)

4.8.1 Function Documentation

4.8.1.1 int i2c_util_dev_init (struct i2c_dev * *i2c_dev*, u16_t *addr*, const char * *name*, u8_t *reg_test*, u8_t *reg_test_expected_val*)

4.8.1.2 int i2c_util_read_bytes (struct i2c_dev * *i2c_dev*, u8_t *reg*, u8_t * *data*, u32_t *num_bytes*)

4.8.1.3 int i2c_util_test_connection (struct i2c_dev * *i2c_dev*)

4.8.1.4 int i2c_util_write_bytes (struct i2c_dev * *i2c_dev*, u8_t *reg*, u8_t * *data*, u32_t *num_bytes*)

4.9 /home/israel/Dropbox/Ufal/2017.2/SE/06_Projeto/src/main.c File Reference

```
#include <pwm.h>
#include <gpio.h>
#include <board.h>
#include <zephyr.h>
#include <device.h>
#include <misc/printk.h>
#include <display/mb_display.h>
#include "version.h"
#include "i2c_util.h"
#include "display_acc.h"
#include "display_temp.h"
#include "display_compass.h"
```

Classes

- struct mstate_t

Macros

- #define RESET_ALL_SENSORS()

Enumerations

- enum state_t {
  Q1, Q2, Q3, Q4,
  Q5 }

  Base structures for the table-driven state machine.
- enum event_t { IDLE, FORWARD, BACKWARD }

Functions

- void s1_display ()

  The functions below handles the flags with state machine.
- void s2_accelerometer ()
- void s3_compass ()
- void s4_temperature ()
- void s5_bluetooth ()
- void main (void)

  Main execution.

Variables

- bool acc_enabled = false

  Sensor flags.
- bool scroll_enabled = false
- bool compass_enabled = false
- bool bluetooth_enabled = false
- bool temperature_enabled = false
- mstate_t machine []

4.9.1 Macro Definition Documentation

4.9.1.1 #define RESET_ALL_SENSORS( )

Value:

```
({      \
    acc_enabled = false;        \
    scroll_enabled = false;      \
    compass_enabled = false;    \
    bluetooth_enabled = false;    \
    temperature_enabled = false;    \
})
```

4.9.2 Enumeration Type Documentation

4.9.2.1 enum event_t

Enumerator

IDLE

FORWARD

BACKWARD

4.9.2.2 enum state_t

Base structures for the table-driven state machine.

Enumerator

Q1

Q2

Q3

Q4

Q5

4.9.3 Function Documentation

4.9.3.1 void main (void)

Main execution.

Version info

Starting general variables

Initializing and enabling thermometer sensor

Initializing and enabling magnetometer sensor

Initializing and enabling accelerometer sensor

< Scroll a text on LED Matrix

< Avoid unwanted disp. flush

< Accelerometer flag is enabled

< Compass flag is enabled

< Thermometer flag is enabled

< Bluetooth flag is enabled

4.9.3.2 void s1_display ( )

The functions below handles the flags with state machine.

< Show some scrolling text

4.9.3.3 void s2_accelerometer ( )

< Enable the accelerometer with LED Matrix

4.9.3.4 void s3_compass ( )

< Enable the compass and point to the north

4.9.3.5 void s4_temperature ( )

< Enable the thermometer and scroll the temperature

4.9.3.6 void s5_bluetooth ( )

< Enable the bluetooth and transmit some data

4.9.4 Variable Documentation

4.9.4.1 bool acc_enabled = false

Sensor flags.

4.9.4.2 bool bluetooth_enabled = false

4.9.4.3 bool compass_enabled = false

4.9.4.4 mstate_t machine[]

Initial value:

```
= {
    { .events={Q1, Q2, Q5}, .action=s1_display},
    { .events={Q2, Q3, Q1}, .action=s2_accelerometer},
    { .events={Q3, Q4, Q2}, .action=s3_compass},
    { .events={Q4, Q5, Q3}, .action=s4_temperature},
    { .events={Q5, Q1, Q4}, .action=s5_bluetooth}
}
```

4.9.4.5 bool scroll_enabled = false

4.9.4.6 bool temperature_enabled = false

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