JOY-IT

RPi - Explorer700

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Dear customer,
thank you for purchasing our product.
Please find our instructions below.

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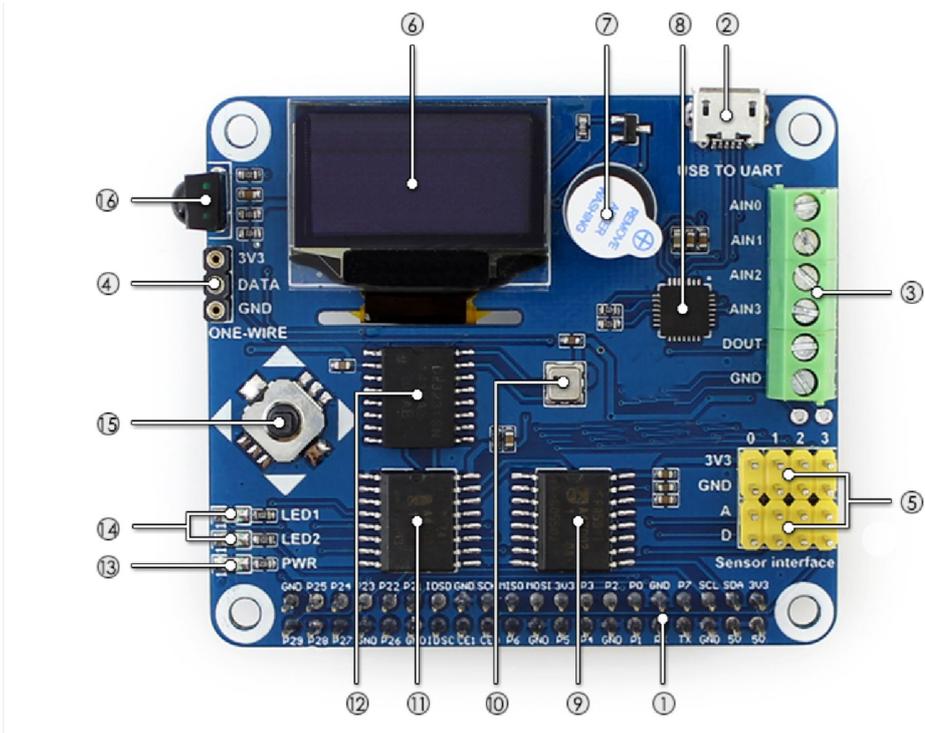
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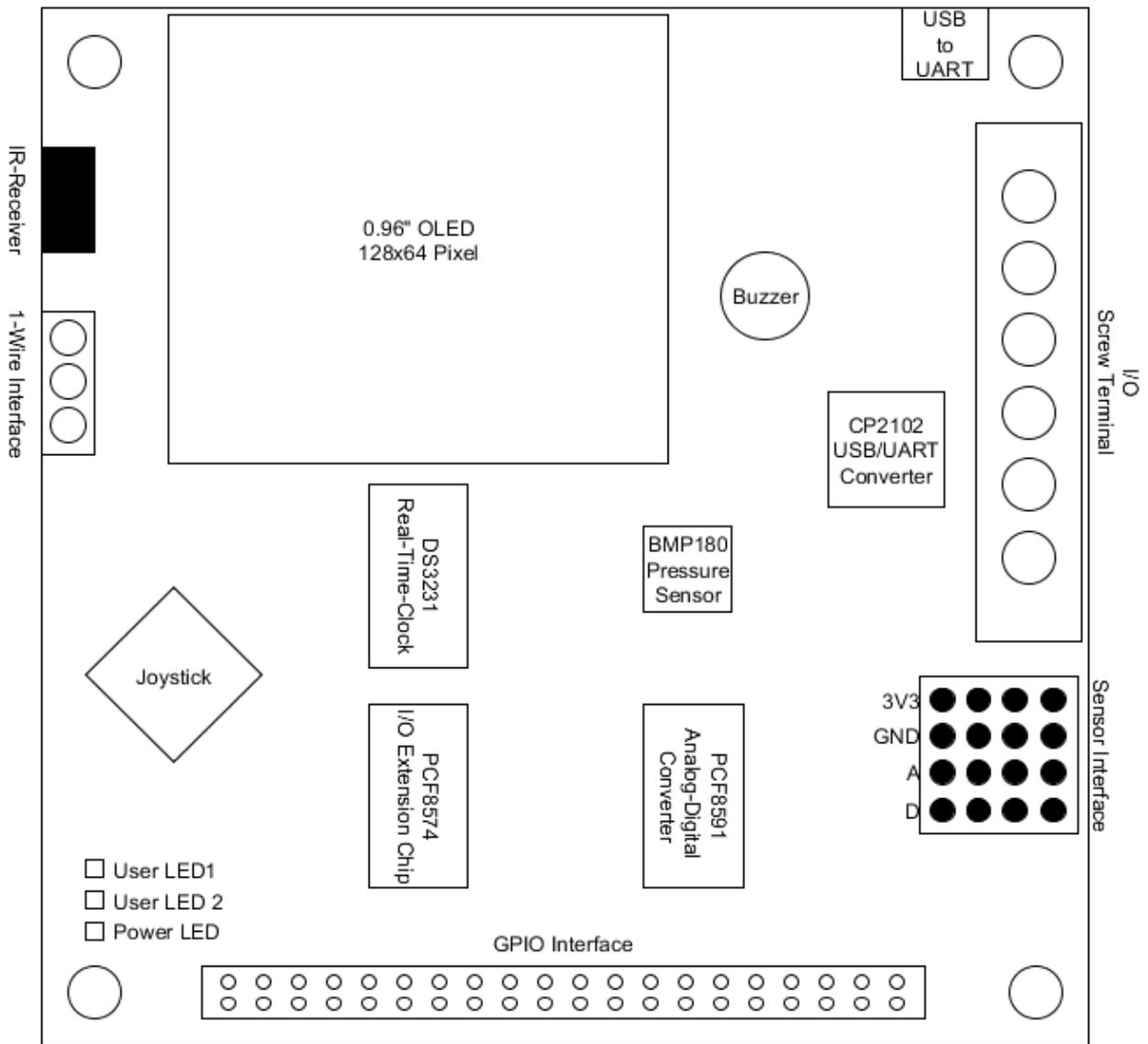
2.   Connecting the extension board

The Explorer700 extension board supports the Raspberry Pi A+ / B+ / 2 / 3 Model B. Before running the sample programs, please make sure the Explorer700 is connected to the RPi and the RPi is powered up by the USB power supply. Without the RPi main board, the sample programs cannot be used on the expansion board.

Connected to Raspberry Pi Model A+

Connected to Raspberry Pi B+/2/ 3 Model B

3.   LED Example - Changing the LED Status

BCM2835 Program:

Open the console and enter the following commands:

```
cd /Explorer700/LED/bcm2835
```

```
make
```

```
sudo ./led
```

Expected result: LED1 flashes.
Press CTRL+C to exit the program.

wiringPi Program:

Open the console and enter the following commands:

```
cd /Explorer700/LED/wiringPi
```

```
make
```

```
sudo ./led
```

Expected result: LED1 flashes.
Press CTRL+C to exit the program.

```
sudo ./pwm
```

Expected result: the brightness of LED1 is changing.
Press CTRL+C to exit the program.

sysfsProgram:

Open the console and enter the following commands:

```
cd /Explorer700/LED/fs
```

```
make
```

```
sudo ./led
```

Expected result: LED1 flashes 10 times.
The program will quit afterwards.

Python Program:

Open the console and enter the following commands:

```
cd /Explorer700/LED/python
```

```
sudo python led.py
```

Expected result: LED1 flashes.
Press CTRL+C to exit the program.

```
sudo python pwm.py
```

Expected result: the brightness of LED1 is changing.
Press CTRL+C to exit the program.

4.   Key Example

BCM2835 Program:

Open the console and enter the following commands:

```
cd /Explorer700/KEY/bcm2835
```

```
make
```

```
sudo ./key
```

Expected result: Press the centered button of the joystick. The console will push to following informations:

```
Key Test Program!!!!
KEY PRESS
KEY PRESS
KEY PRESS
```

Press CTRL+C to exit the program.

wiringPi Program:

Open the console and enter the following commands:

```
cd /Explorer700/KEY/wiringPi
```

```
make
```

```
sudo ./key
```

Expected result: Press the centered button of the joystick. The console will push to following informations:

```
Key Test Program!!!!
KEY PRESS
KEY PRESS
KEY PRESS
```

Press CTRL+C to exit the program.

Python Program:

Open the console and enter the following commands:

```
cd /Explorer700/KEY/python
```

```
sudo ./key.py
```

Expected result: Press the centered button of the joystick. The console will push to following informations:

```
Key Test Program!!!!
KEY PRESS
KEY PRESS
KEY PRESS
```

Press CTRL+C to exit the program.

5. PCF8574 Example - I/O Extension demos

BCM2835 Program:

Open the console and enter the following commands:

```
cd /Explorer700/PCF8574/bcm2835
```

```
make
```

```
sudo ./pcf8574
```

Expected result: LED2 flashes.
Press CTRL+C to exit the program.

```
make5
```

```
sudo ./pcf8574
```

Expected result: Press one of the direction-buttons. LED2 will flash up, the buzzer will buzz and the console will push the following:

```
PCF8574 Test Program !!!
up
left
down
right
```

Press CTRL+C to exit the program.

Python Program:

Open the console and enter the following commands:

```
cd /Explorer700/PCF8574/python
```

```
sudo python led.py
```

Expected result: LED2 flashes.
Press CTRL+C to exit the program.

```
sudo python pcf8574.py
```

Expected result: Press one of the direction-buttons. LED2 will flash up, the buzzer will buzz and the console will push the following:

```
PCF8574 Test Program !!!
up
left
down
right
```

Press CTRL+C to exit the program.

sysfsProgram:

Open the console and enter the following commands:

```
cd /Explorer700/PCF8574/fs
```

```
make
```

```
sudo ./led
```

Expected result: LED2 flashes.
Press CTRL+C to exit the program.

wiringPi Program:

Open the console and enter the following commands:

```
cd /Explorer700/PCF8574/wiringPi
```

```
make
```

```
sudo ./led
```

Expected result: LED2 flashes.
Press CTRL+C to exit the program.

6. BMP180 Example - Barometer Demos

BCM2835 Program:

Open the console and enter the following commands:

```
cd /Explorer700/BMP180/bcm2835
```

```
make
```

```
sudo ./BMP180
```

Expected result: the console will push the following:

```
BMP180 Test Program ...
Temperature: 34.20 C
Pressure: 1005.12 Pa
Altitude: 67.66 m
```

Press CTRL+C to exit the program.

wiringPi Program:

Open the console and enter the following commands:

```
cd /Explorer700/BMP180/wiringPi
```

```
make
```

```
sudo ./BMP180
```

Expected result: the console will push the following:

```
BMP180 Test Program ...
Temperature: 34.20 C
Pressure: 1005.12 Pa
Altitude: 67.66 m
```

Press CTRL+C to exit the program.

Python Program:

Open the console and enter the following commands:

```
cd /Explorer700/BMP180/python
```

```
sudo python BMP180_example.py
```

Expected result: the console will push the following:

```
BMP180 Test Program ...
Temperature: 34.20 C
Pressure: 1005.12 Pa
Altitude: 67.66 m
```

Press CTRL+C to exit the program.

7. DS3231 Example - Real-Time-Clock Demos

BCM2835 Program:

Open the console and enter the following commands:

```
cd /Explorer700/DS3232/bcm2835
```

```
make
```

```
sudo ./ds3231
```

Expected result: the console will push the following:

```
start..........
2015/08/12 18:00:00 Wed
2015/08/12 18:00:01 Wed
2015/08/12 18:00:02 Wed
2015/08/12 18:00:03 Wed
```

Press CTRL+C to exit the program.

wiringPi Program:

Open the console and enter the following commands:

```
cd /Explorer700/DS3232/wiringPi
```

```
make
```

```
sudo ./ds3232
```

Expected result: the console will push the following:

```
start..........
2015/08/12 18:00:00 Wed
2015/08/12 18:00:01 Wed
2015/08/12 18:00:02 Wed
2015/08/12 18:00:03 Wed
```

Press CTRL+C to exit the program.

Python Program:

Open the console and enter the following commands:

```
cd /Explorer700/DS3232/python
```

```
sudo python ds3232.py
```

Expected result: the console will push the following:

```
start..........
2015/08/12 18:00:00 Wed
2015/08/12 18:00:01 Wed
2015/08/12 18:00:02 Wed
2015/08/12 18:00:03 Wed
```

Press CTRL+C to exit the program.

8.   DS18B20 Example - Temperature sensor Demos

(Note: To use the DS18B20 program, you should append „dtoverlay=w1-gpio-pullup" to the end of the /boot/config.txt file and reboot your Raspberry.

sysfsProgram:

Open the console and enter the following commands:

```
cd /Explorer700/DS18B20/fs
```

```
make
```

```
sudo ./ds18b20
```

Open the console and enter the following commands:

```
rom: 28-00000674869d
temp: 30.437 °C
temp: 30.375 °C
```

Press CTRL+C to exit the program.

Python Programm:

Öffnen Sie die Linux Konsole und geben Sie folgende Kommandos ein:

```
cd /Explorer700/DS18B20/python
```

```
sudo python ds18b20.py
```

Expected result: the console will push the following:

```
rom: 28-00000674869d
temp: 30.437 °C
temp: 30.375 °C
```

Press CTRL+C to exit the program.

9. IRM Example - Infrared reflecting sensor program

BCM2835 Program:

Open the console and enter the following commands:

```
cd /Explorer700/IRM/bcm2835
```

```
make
```

```
sudo ./irm
```

Expected result: press one of the buttons of the infrared remote. The console will show which button you pressed:

```
irm test start:
Get the key: 0x0c
Get the key: 0x18
Get the key: 0x5e
```

Press CTRL+C to exit the program.

wiringPi Program:

Open the console and enter the following commands:

```
cd /Explorer700/IRM/wiringPi
```

```
make
```

```
sudo ./irm
```

Expected result: press one of the buttons of the infrared remote. The console will show which button you pressed. Press CTRL+C to exit the program.

```
irm test start:
Get the key: 0x0c
Get the key: 0x18
Get the key: 0x5e
```

Python Program:

Open the console and enter the following commands:

```
cd /Explorer700/IRM/python
```

```
sudo python irm.py
```

Expected result: press one of the buttons of the infrared remote. The console will show which button you pressed.

```
irm test start:
Get the key: 0x0c
Get the key: 0x18
Get the key: 0x5e
```

Press CTRL+C to exit the program.

10. UART Example - Receiving serial data

Note: The Raspberrys serial port is set to debug by default. To use this program, you have to disable this function which will disable the serial debugging function. In this case you need to use another method to debug your Raspberry Pi. You can use an external HDMI-Displayer or SSH for example.

wiringPi Program:

Open the console and enter the following commands:

```
cd /Explorer700/UART/wiringPi
```

```
make
```

```
sudo ./UART
```

Connect the extension board to a PC with the USB to UART interface und configure the serial communication-software on your pc (you can use the software „PuTTY" to show the serial ports). Choose the right serial port number and set the baudrate to 115200. Afterwards you can use your pc to send data by serial communication to your Raspberry Pi. After receiving them by your Raspberry, the data will also be displayed on the serial monitor on your pc.

Python Program:

Open the console and enter the following commands:

```
cd /Explorer700/UART/python
```

```
sudo python uart.py
```

Connect the extension board to a PC with the USB to UART interface und configure the serial communication-software on your pc (you can use the software „PuTTY" to show the serial ports). Choose the right serial port number and set the baudrate to 115200. Afterwards you can use your pc to send data by serial communication to your Raspberry Pi. After receiving them by your Raspberry, the data will also be displayed on the serial monitor on your pc.

11. OLED

BCM2835 Programm:

Open the console and enter the following commands:

```
cd /Explorer700/OLED/bcm2835
```

```
make
```

```
sudo ./main
```

Expected result: The OLED display will show the JOY-IT logo for 2 seconds and will display the current system afterwards.

Press CTRL+C to exit the program.

wiringPi Program:

Open the console and enter the following commands:

```
cd /Explorer700/OLED/wiringPi
```

```
make
```

```
sudo ./main
```

Expected result: The OLED display will show the JOY-IT logo for 2 seconds and will display the current system afterwards. Press CTRL+C to exit the program.

Python Program:

If you want to use the OLED display with python, you need to install an additional library first. To install this library, please connect your Raspberry to the internet and enter the following command:

```
sudo apt-get install python-imaging
```

Enter the following commands to execute the program. The different programs will lead to different informations.

```
cd /Explorer700/OLED/python
```

```
sudo python dispchar.py
```

```
sudo python image.py
```

```
sudo python animate.py
```

```
sudo python waveshare.py
```

12. Installing the additional libraries

In order to use the API examples we provide, related libraries are required, which should be installed manually.

bcm2835 Libaries
wiringPi Libraries

12.1 wiringPi Library

Click here to download the wiringPi libraries.
You can also download them from the wiringPi website:

https://projects.drogon.net/raspberry-pi/wiringpi/download-and-install/

Copy the installation-package with a usb-stick to your system. Now enter the wiringPi path by console and enter the following commands:

```
chmod 777 build
./build
```

Enter the following command to check your installation:

```
gpio –v
```

12.2 BCM2835 - C Library

Click here to download the BCM2835 libraries.
You can also download them from the BCM2835 website:
http://www.airspayce.com/mikem/bcm2835/
Copy the installation-package with a usb-stick to your system. Now enter the wiringPi path by console and enter the following commands:

```
./configure
make
sudo make check
sudo make install
```

12.3 Python Library

You can receive the python libraries for Raspbian (contains RPi, GPIO and spidev) by using the apt-get command.

Please note that your Raspberry Pi needs to be connected to the internet to install the libaries. Use the following command the make sure that you are going to receive the latest packages.

```
sudo apt-get update
```

Enter the following command to install the python-dev package:

```
sudo apt-get install python-dev
```

Now you can install the package:

```
sudo python setup.py install
```

Enter the following command to install the smbus library (I2C Interface):

```
sudo apt-get install python-smbus
```

Install the serial library which contains the functions for the UART interface:

```
sudo apt-get install python-serial
```

Copy the spidev installation package to your system. Enter the folder and install the library:

```
sudo python setup.py install
```

12.4 Configurating the interfaces

(Before executing the API codes, you need to activate the core-drivers of the specific interfaces. The I2C and SPI core-drivers are already activated by default.
Also the I2C and SPI drivers are active.
But the serial port is still in its debug-mode.

To enable the I2C functions, enter the following command:

```
sudo raspi-config
```

Choose **Advanced Options** -> **I2C** -> Yes
You also need to modify the configuration-file. Enter the following command:

```
sudo nano /etc/modules
```

Append the following lines to the end of the file:

```
i2c-bcm2708
i2c-dev
```

Press CTRL+X to exit the file and press Y to save it. Reboot your system afterwards.

To enable the serial functions, enter the following commands:

```
sudo raspi-config
```

Chosoe **Advanced Options** -> **Serial**.
Choose NO.
Reboot your system aferwards.

Note: The serial port auf the Raspberry Pi 3 Model B is not useable because Pin 14 and 15 is connected with the build in Bluetooth-Module.

To activate the SPI functions, enter the following command:

```
sudo raspi-config
```

Choose **Advanced Options** -> **I2C** -> **yes.**

13. Code-Example Download

To make the access to our code-example as easy as possible, you can of course also download them. Just follow this link, to get the download-package.

14. Support

We also support you after your purchase.
If there are any questions left or if you encounter any problems, please feel free to contact us by mail, phone or by our ticket-supportsystem on our website.

E-Mail: service@joy-it.net

Ticket-System: http://support.joy-it.net

Phone: +49 (0)2845 98469 – 66 (11- 18 Uhr)

For more informations, please visit our website:

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