ESP-WROOM-02U UV Sensor Board

This board was designed and built by Geppetto

Free automated documentation anytime.
Design for free @ https://geppetto.gumstix.com/
Thanks for using Geppetto to design this board!

One Stop Design-to-Order
Simply place displays, sensors, processors, and Geppetto connects it all.
No routing needed.

Gumstix, Inc. shall have no liability of any kind, express or implied, arising out of the use of the Information in this document, including direct, indirect, special or consequential damages.

Gumstix, Inc. may have patents, patent applications, trademarks, copyrights, trade secrets or other intellectual property rights pertaining to Gumstix products described in this document (collectively “Gumstix Intellectual Property”).

Except as expressly provided in any written license or agreement from Gumstix, Inc., this document and the information contained therein does not create any license to Gumstix’s Intellectual Property.

The Information contained herein is subject to change without notice. Revisions may be issued regarding changes and/or additions.

Copyright © 2019, Gumstix, Inc. All rights reserved.
Board Description

Uses Espressif ESP-WROOM-02U as its COM/processor.

Functional modules include:
Vishay VEML6070 UV Light Sensor
Bosch BME280 Environmental Sensor
USB-UART
USB Micro-B Jack

Board Dimensions

3cm x 4.5cm
Contents

1 Modules on Board ........................................ 1
  1.1 Lights and Switches .................................. 2
      1.1.1 Tactile Switch (v21) (1) ..................... 2
      1.1.2 Top-side LED (v8) (5) ...................... 2
      1.1.3 Tactile Switch (v21) (9) ..................... 2
  1.2 Converters ......................................... 2
      1.2.1 USB-UART (v20) (2) ......................... 2
  1.3 Power ............................................. 2
      1.3.1 3.3V/1.5A Regulator (v20) (3) ............ 2
  1.4 Headers .......................................... 3
      1.4.1 NC (v17) (4) .................................. 3
      1.4.2 NC (v17) (11) .................................. 3
  1.5 Sensors .......................................... 3
      1.5.1 Vishay VEML6070 UVA Light Sensor (v1) (6) 3
      1.5.2 Bosch BME280 Environmental Sensor (v2) (7) 3
  1.6 Processors ........................................ 4
      1.6.1 Espressif ESP-WROOM-02U (v1) (8) ......... 4
  1.7 USB ............................................. 4
      1.7.1 USB Micro-B Jack (Vertical) (v1) (10) .... 4

2 Module Connections Graph .................................. 5

3 Module Power Graph ...................................... 6
1 Modules on Board

- I2C -> I2C (7)
- GPIO4 -> ACK (6)
- I2C -> GPIO (6)
- SYSTEM ENABLE (5)
- UART0 -> UART (2)

USB DEVICE -> USB DEVICE (10)

5.0V -> VIN (3)

3.3V -> 3.3V (8)
3.3V -> 3.3V (6)
3.3V -> 3.3V (7)
3.3V -> 3.3V (5)
1.1 Lights and Switches

1.1.1 Tactile Switch (v21) (1)

This 4.9 sq. mm pull-down touch switch provides a user input for the signal NC2 on NC (4).

1.1.2 Top-side LED (v8) (5)

The top-side LED module contains a 1608 standard size LED of a user-selected color, mounted on the top side of a Geppetto board.

The LED is active-high on SYSEN from Espressif ESP-WROOM-02U (8).

1.1.3 Tactile Switch (v21) (9)

This 4.9 sq. mm pull-down touch switch provides a user input for the signal NC2 on NC (11).

1.2 Converters

1.2.1 USB-UART (v20) (2)

Also known as an FTDI, this USB to UART converter allows a USB connection to the board to behave as a virtual RS232 serial connection. It offers direct and complete access to the system from a development machine by way of the FTDI FT232RQ USB – UART IC.

Technical documentation for the FT232RQ is available at:


This USB to UART converter connects a host machine from USB Micro-B Jack (Vertical) (10) to UART0 on Espressif ESP-WROOM-02U (8).

1.3 Power

1.3.1 3.3V/1.5A Regulator (v20) (3)

This DC to DC step down regulator provides a 3.3V DC output at 1.5A needed by certain components on this board. It is capable of accepting an input voltage between 3.1 to 16V DC and output is controlled by the TI TPS6211 buck regulator.

It receives VIN from USB Micro-B Jack (Vertical) (10).

The datasheet for the TPS6211 regulator is available at:


This regulator provides 3.3V to:

- Top-side LED (5)
- Bosch BME280 Environmental Sensor (7)
• Vishay VEML6070 UVA Light Sensor (6)
• Espressif ESP-WROOM-02U (8)

1.4 Headers

1.4.1 NC (v17) (4)

No connection

1.4.2 NC (v17) (11)

No connection

1.5 Sensors

1.5.1 Vishay VEML6070 UVA Light Sensor (v1) (6)

VEML6070 is an advanced ultraviolet (UV) light sensor with I2C protocol interface and designed by the CMOS process. It is easily operated via a simple I2C command. The active acknowledge (ACK) feature with threshold windows setting allows the UV sensor to send out a UVI alert message. Under a strong solar UVI condition, the smart ACK signal can be easily implemented by the software programming.

The datasheet for the VEML6070 IC is available at:

http://www.vishay.com/docs/84277/veml6070.pdf

Highlights

- Peak Sensitivity: 355 nm
- I2C slave address: 0x71

Connections

The ambient light sensor module is connected to I2C on Espressif ESP-WROOM-02U (8). The acknowledge pin is connected to GPIO4 on Espressif ESP-WROOM-02U (8).

1.5.2 Bosch BME280 Environmental Sensor (v2) (7)

The BME280 is as combined digital humidity, pressure and temperature sensor based on proven sensing principles. The sensor module is housed in an extremely compact metal-lid LGA package with a footprint of only 2.5 2.5 mm2 with a height of 0.93 mm. Its small dimensions and its low power consumption allow the implementation in battery driven devices such as handsets, GPS modules or watches. The BME280 is register and performance compatible to the Bosch Sensortec BMP280 digital pressure sensor. It communicates over I2C or SPI.

Download the datasheet for the BME280 at:


Highlights

- I2C slave addr: 0x76
Its I2C bus is connected to I2C on Espressif ESP-WROOM-02U (8)

1.6 Processors

1.6.1 Espressif ESP-WROOM-02U (v1) (8)

ESP-WROOM-02D and ESP-WROOM-02U are ESP8266EX-based modules developed by Espressif. Compared to ESP-WROOM-02, the RF performance of ESP-WROOM-02D and ESP-WROOM-02U are optimized. Besides, ESP-WROOM-02U integrates a U.FL connector

3.3V operation. Requires:

- 3.3V from 3.3V/1.5A Regulator (3)
- EN from NC (4)
- RESET from NC (11)

Provides:

- UART0 to USB-UART (2)
- SYSEN to Top-side LED (5)
- I2C to:
  - Vishay VEML6070 UVA Light Sensor (6)
  - Bosch BME280 Environmental Sensor (7)
- GPIO4 to Vishay VEML6070 UVA Light Sensor (6)

1.7 USB

1.7.1 USB Micro-B Jack (Vertical) (v1) (10)

The vertical USB micro-B port module allows your design to connect as a USB device to a USB host. This module is connected to USB_DEVICE on USB-UART (2).

It supplies 5.0V to:

- 3.3V/1.5A Regulator (3)
2 Module Connections Graph

Figure 1: excludes power modules
3 Module Power Graph

USB Micro-B Jack (Vertical)

5.0V: 1920mW

3.3V/1.5A Regulator

3.3V: 33mW
3.3V: 5mW
3.3V: 1mW
3.3V: 1650mW

Top-side LED

Bosch BME280 Environmental Sensor

Vishay VEML6070 UVA Light Sensor

Espressif ESP-WROOM-02U