

# Introduction to ESP32 using Vaman

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## Contents

1	Software	1
2	Hardware Setup	1
3	Blink LED	1
4	ESP IDF	2
5	Raspberry Pi	2
5.1	Enable Serial Communication . . . . .	2
5.2	Flash Vaman-ESP . . . . .	2
6	OTA	3
7	OTA	3

Abstract—This document provides a simple introduction to programming the ESP32 on Vaman using the Arduino framework

## 1 Software

All codes used in this document are available at the following link

<https://github.com/gadepall/vaman/tree/master/esp32/setup/codes/>

## 2 Hardware Setup

2.1. Connect the USB-UART to raspberry pi through USB.

2.2. On the rpi

```
dmesg | tail
lsusb
```

you should see the USB-UART connector detected.

2.3. Connect the USB-UART pins to the Vaman ESP32 pins according to Table 2.3.1

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VAMAN LC PINS	UART PINS
GND	GND
ENB	ENB
TXD0	RXD
RXD0	TXD
0	IO0
5V	5V

TABLE 2.3.1

2.4. Connect the Vaman-ESP pins to the seven segment display according to Table 2.4.1  
The GPIO pins are listed in Table 2.4.2

ESP	SEVEN SEGMENT DISPLAY
5V	COM
2	DOT

TABLE 2.4.1

Note that these pins can be used for several functions, refer to the ESP32 datasheet for details. The Vaman pin diagram is available in Fig. 2.4.1

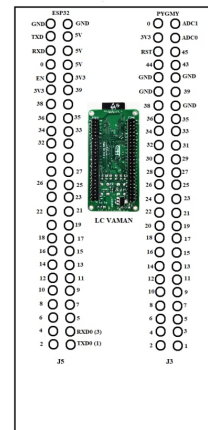


Fig. 2.4.1

## 3 Blink LED

3.1. On termux on your phone,

GPIO	Input	Others
2	34	1
4	35	3
5	36	6
10	37	7
12	38	8
13	39	9
14		10
15		11
16		
17		
18		
19		
21		
22		
23		
25		
26		
27		
32		
33		

TABLE 2.4.2

```
svn co https://github.com/
gadepall/vaman/trunk/esp32/
setup/codes/ide/blink
cd blink
pio run
```

3.2. Transfer the ini and bin files to the rpi

```
scp platformio.ini pi@192
.168.50.252:./hi/platformio.
ini

scp .pio/build/esp32doit-devkit
-v1/firmware.bin pi@192
.168.50.252:./hi/.pio/build/
esp32doit-devkit-v1/firmware
.bin
```

3.3. On rpi,

```
cd /home/pi/hi
pio run -t nobuild -t upload
```

3.4. On your phone, open

```
src/main.cpp
```

and change the delay to

```
delay(2000);
```

and execute the code by following the steps above.

#### 4 ESP IDF

4.1. Earlier, we were using the arduino framework, where the programming language was arduino. In the following directory, the same functionality is achieved through a C program.

```
svn co https://github.com/
gadepall/vaman/trunk/esp32/
setup/codes/idf/blink
cd blink
pio run
```

4.2. The flashing process remains the same.

#### 5 Raspberry Pi

##### 5.1 Enable Serial Communication

5.1.1. On the RPi,

```
sudo raspi-config
```

5.1.2. Select Interfacing Options

5.1.3. Then select Serial Port

5.1.4. Reply no to login shell over serial

5.1.5. Say yes to running hardware over serial port.

5.1.6. Connect the rpi tx (pin 8) and rx (pin 10)

5.1.7. Install minicom and start it

```
sudo apt install minicom
minicom -b 115200 -o -D /dev/
serial0
```

Type namaste. If you see it displayed on screen, your serial port is working.

##### 5.2 Flash Vaman-ESP

5.2.1. Since the RPi supports UART through its GPIO pins, a separate USB UART adapter is not required. Table 2.3.1 can be accordingly modified to obtain Table 5.2.1.1 On RPi, the pin numbers for serial

VAMAN LC PINS	RPI/UART PINS
GND	GND
ENB	GND
TXD0	RXD
RXD0	TXD
0	GND
5V	5V

TABLE 5.2.1.1

communication are Tx=8, Rx=10.

- 5.2.2. Modify your platformio.ini file by adding the line

```
upload_port = /dev/serial0
```

- 5.2.3. After executing

```
pio run -t nobuild -t upload
```

while the dots and dashes are printed on the screen, disconnect the EN wire from GND. Make sure that the Vaman board is not powering any device while flashing. The Vaman-ESP should now flash.

- 5.2.4. After flashing, disconnect pin 0 on Vaman-ESP from GND. Power on Vaman and the appropriate LED will blink.

## 6 OTA

- 6.1. Flash the following code through USB-UART using a laptop. We faced some issues with RPi.

```
https://github.com/gadepall/
vaman/tree/master/esp32/
codes/ide/ota/setup
```

after entering your wifi username and password (in quotes below)

```
#define STASSID "... " // Add
your network credentials
#define STAPSK "... "
```

in src/main.cpp file

- 6.2. You should be able to find the ip address of your vaman-esp using

```
ifconfig
nmap -sn 192.168.231.1/24
```

where your computer's ip address is the output of ifconfig and given by 192.168.231.x

- 6.3. Assuming that the username is gvv and password is abcd, flash the following code wirelessly

```
https://github.com/gadepall/
vaman/tree/master/esp32/
codes/ide/blink
```

through

```
pio run
pio run -t nobuild -t upload --
upload-port 192.168.231.245
```

where you may replace the above ip address with the ip address of your vaman-esp.

- 6.4. Connect pin 2 to an LED to see it blinking.

## 7 OTA

- 7.1. Connect the pins between Vaman-ESP32 and Vaman-PYGMY as per Table 7.1.1

ESP32	Vaman
GPIO2	GPIO18
GPIO4	GPIO21
GPIO5	GPIO22

TABLE 7.1.1

- 7.2. Flash the following code OTA

```
https://github.com/gadepall/
vaman/tree/master/esp32/
codes/ide/ota/blinkt
```

You should see the onboard green LED blinking.

- 7.3. Change the blink duration to 100 ms.