Relay-Board-RDP Bluetooth and WIFI

Document:

Document:	Relay-Board-RDP Bluetooth and WIFI	Document Content: User guide for the Bluetooth and WIFI
Version:	V002	interface.
Author:	MIZ	
Date:	2020.07.06	
Release-State:	Approved	Pages: 12

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Revision History:

Rev.:	Date:	Name:	Change:
001	09.06.2020	MIZ	Initial Version
002	18.06.2020	MIZ	Relay Board RDP Control Tool with Bluetooth

- Relay-Board-RDP_V110
- USB-B-Cable for power supply of the Relay-Board
- Adafruit HUZZAH32 ESP32 FEATHER BOARD (Product ID: 3405)
- USB-Micro-B-Cable for programming of the Adafruit board
- PC with bluetooth support

2. Relay-Board-RDP V110 with Adafruit HUZZAH32-Board

A Huzzah32-Boad will be mounted on the Relay-Board to make the control of the Relay-Boad via bluetooth or wifi possible. Therefor you need to place it in the provided holes and solder it to the holes of the IC12 connector. Alternatively you can solder two socket connectors to the holes of IC12 and plug the HUZZAH32-Board into them. The HUZZAH32-Board will be supplied directly through the 5 Volt of the USB0 PC connector of the Relay-Board.





3. Flashing of the Adafruit HUZZAH32

First a Demo-program for controlling the Relay-Boad via the serial bluetooth or the wifi interface will be flashed on the HUZZAH32-Boad. Therefor the following software is needed.

3.1 <u>Needed Software</u>

The arduino IDE will be used to flash the Demo-program. It can be downloaded for free at the following link (*Windows Installer, for Windwos 7 and up*):

<u>https://www.arduino.cc/en/main/software</u>

The USB-Driver for the CP210x USB to UART Bridge of Silicon Labs can be downloaded at the following link (*Windows 10 Universal* \rightarrow *Download VCP*), if Windows doesn't recognize the HUZZAH32-Boad:

<u>https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers</u>

The IDE, as well as the USB-Driver need to be installed to flash the HUZZAH32-Boad.

The Code for the Demo-Programm can be downloaded at the EBS-SYSTART-Homepage. It is located in the *Relay-Board-RDP_BT-Demo_V100.ino* or *Relay-Board-RDP_WLAN-Demo_V100.ino* file.

<u>https://www.ebs-systart.com/relais-board</u>

3.2 Setup of the Arduino IDE

To upload a program with the Arduino IDE to the HUZZAH32, the assigned COM-Port will be looked up first in the Device-Manager. Connect the HUZZAH32-Board to the PC (the USB-Driver needs to be installed).

- Windows-Key + X \rightarrow Device-Manager
- In this case, the COM-Port *COM110* is assigned to the HUZZAH32



In the next step, the HUZZAH-Board will be added to the Arduino IDE. Start the IDE by clicking on arduino.exe.

Under the tab *File* \rightarrow *Preferences* the HUZZAH32-Board will be added to the Arduino IDE. Copy the following link into the the field *Additional Boad Manager URLs*:

 https://raw.githubusercontent.com/espressif/arduino-esp32/ghpages/package_esp32_index.json

Relay-Board-RDP Bluetooth und WLAN

Voreinstellungen	
Einstellungen Netzwerk	
Sketchbook-Speicherort:	
C:\Users\m.zimmermann\Documents\Arduino	Durchsuchen
Editor-Sprache: System Default	 (erfordert Neustart von Arduino)
Editor-Textgröße: 12	
Oberflächen-Zoomstufe: Automatisch 100 🖨	% (erfordert Neustart von Arduino)
Thema: Standardthema v (erfo	rdert Neustart von Arduino)
Ausführliche Ausgabe während: Kompilierung Hochl	aden
Compiler-Warnungen: Keine 🗸	
Zeilennummern anzeigen	Code-Faltung aktivieren
Code nach dem Hochladen überprüfen	Externen Editor verwenden
Beim Start nach Updates suchen	Speichern beim Überprüfen oder Hochladen
Use accessibility features	
Zusätzliche Boardverwalter-URLs: https://raw.githubuserc	ontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json
Mehr Voreinstellungen können direkt in der Datei bearbeitet	werden
C:\Users\m.zimmermann\AppData\Local\Arduino15\preferen	ices.txt
(nur bearbeiten, wenn Arduino nicht läuft)	
	OK Abbruch

Click then on the button OK.

The HUZZAH32-Board can now be added in the Boards Manager.

• Tools \rightarrow Board: ... \rightarrow Boards Manager... \rightarrow search for esp

00	В	pardverwalter			×
Ту	p [Alle	\sim	esp	
	Ard Bu In Ard Ce Or <u>Mo</u>	luino AVR Boarc ilt-In by Arduin diesem Paket duino Yún, Ardu onardo, Arduino LilyPadUS mma, Adafruit <u>line Help</u> ore Info	is Venth ino b Leo B, A Circ	arsion 1.8.2 INSTALLED Jaltene Boards: Uno, Arduino Uno WiFi, Arduino Diecimila, Arduino Nano, Arduino Mega, Arduino MegaADK, Arduino onardo Ethernet, Arduino Micro, Arduino Esplora, Arduino Mini, Arduino Ethernet, Arduino Fio, Arduino BT, rduino Lilypad, Arduino Pro, Arduino ATMegaNG, Arduino Robot Control, Arduino Robot Motor, Arduino uit Playground, Arduino Yùn Mini, Arduino Industrial 101, Linino One.	^
•	by In ES Mo	32 Espressif Syste diesem Paket P32 Dev Module ore Info	ems enth e, W	altene Boards: EMOS LoLin32, WEMOS D1 MINI ESP32. 1.0.4 V Installieren	
					~
				Schließe	n .

Click on the button Install and close the Boads Manager afterwards.

Choose Adafruit ESP32 Feather under the tab Tools \rightarrow Boad: Upload Speed should be set to 921600 and Flash Frequency to 80 MHz. The Port will be set to the previously identified COM-Port (section 3.2).

Relay-Board-RDP Bluetooth und WLAN

💿 Relay-Board-RDP_BT-Der	mo Arduino 1.8.12		- 🗆 ×
Datei Bearbeiten Sketch We	erkzeuge Hilfe		
	Automatische Formatierung	Strg+T	Ð
	Sketch archivieren		
Relay-Board-RDP_B1-	Kodierung korrigieren & neu laden		₩
(+ TD C) (1(CT) DT ()	Bibliotheken verwalten	Strg+Umschalt+I	^
/* EBSA-SISIARI [/	Serieller Monitor	Strg+Umschalt+M	Relay-Board-RDP
* Bluetooth acts	Serieller Plotter	Strg+Umschalt+L	
* * More information	WiFi101 / WiFiNINA Firmware Upda	ter	systart.com/relais-board
* More Informweti	Board: "Adafruit ESP32 Feather"	:	ruit.com/product/3405
* To use this exam	Upload Speed: "921600"	:	he Huzzah32 installed.
* You will also no	Flash Frequency: "80MHz"	:	rd Software
*/	Partition Scheme: "Standard"	:	
finclude "Bluetooth	Core Debug Level: "Keine"	:	,
Finerade Blaccootin	Port: "COM110"	:	
<pre>#if !defined(CONFIG</pre>	Boardinformationen holen		
#error Bluetooth :	D		enable it
#enuir	Programmer: "AVRISP mkli"		
BluetoothSerial Ser	Bootloader brennen		
<pre>void setup() { Serial.begin(115200) Serial1.begin(115200) SerialBT.begin("Rela Serial.println("Star }</pre>	; // "USB"-5e); // Serial 1 y=Board-RDP"); // set Blue ted. Pair now!"); // some inf	rial . connected to Rela tooth device name ormation on "USB"	y-Board to "Relay-Board-RDP" Serial
<pre>void loop() {</pre>			
if (Serial1.availabl	e()) { // if new I	ata recieven from i	Relay-Board
SerialBT.write(Ser	<pre>nall.read()); // send it</pre>	to PC over blueto	oth
if (SerialBT.availab	le()) { // if new o	lata revieved via B	luetooth
Serial1.write(Seri	<pre>alBT.read()); // send it</pre>	to Relay-Board ov	er UART
} delav(20);	// some del	av for Bluetooth s	tack etc.
}		-	~
1			Adafruit ESP32 Feather auf COM110

Additional information about the HUZZAH32 setup can be found at the Adafruit-Homepage:

• https://learn.adafruit.com/adafruit-huzzah32-esp32-feather

3.3 Flashing of the Adafruit HUZZAH32

Load the code of the Demo-Program into the Arduino-IDE:

- File → Open → *Relay-Board-RDP_BT-Demo_V100.ino* (Bluetooth-Demo)
- File → Open → *Relay-Board-RDP_WLAN-Demo_V100.ino* (Wifi-Demo)

The code will be compiled and uploaded to the HUZZAH32 by clicking on the Upload button.

💿 Relay-Board-RDP_BT-Demo Arduino 1.8.12	-		×
Datei B <u>e</u> arbeiten <u>S</u> ketch Werkzeuge <u>H</u> ilfe			
👽 📀 🗈 🛃 Hochladen			ø
Relay-Board-RDP_BT-Demo			
<pre>#include "BluetoothSerial.h"</pre>			^
<pre>#if !defined(CONFIG_BT_ENABLED) !defined(CONFIG_BLUEDROID_ENABLED) #error Bluetooth is not enabled! Please run `make menuconfig` to and #endif</pre>	enable it		ł
BluetoothSerial SerialBT;			- 1
<pre>void setup() { Serial.begin(115200); // "USB"-Serial</pre>			~
Hochladen abgeschlossen.			
Leaving			^
Hard resetting via RTS pin			~
٢			>
10 A	dafruit ESP32 Feat	heraufC(DM110

After the successful upload of the desired Demo-Programm, the HUZZAH32 is ready for use.

4. Controlling the Relay-Board via Bluetooth (GUI)

The bluetooth control can be achieved with the *Relay Board Control Tool* or with an arbitrary serial communication program (section 5). This section will show the control with the SYSTART-Tool.

4.1 <u>Needed Software</u>

- HUZZAH32 with flashed Bluetooth-Demo (section 3.3)
- Relay Board RDP Control Tool
 - o https://www.ebs-systart.com/relais-board

4.2 Connect PC with HUZZAH32

First a connection between the HUZZAH32 and the PC will be established:

- Windows-Key + X \rightarrow Control Panel \rightarrow Devices \rightarrow Bluetooth & other devices
- Add Bluetooth or other device → Bluetooth → Relay-Board-RDP
- As soon as the Relay-Board is paired, the PC is able to communicate with it.

← Einstellungen	- 🗆 X
命 Startseite	Bluetooth- und andere Geräte
Einstellung suchen	+ Bluetooth- oder anderes Gerät hinzufügen
Geräte	Bluetooth
Bluetooth- und andere Geräte	Ein
品 Drucker & Scanner	Jetzt als "CLIENT21" sichtbar
() Maus	Maus Tastatur & Stift



4.3 Identify the assigned COM-Port

As soon as the HUZZAH32 is connected to the PC via Bluetooth, it will be displayed as a serial COM-Port. The assigned COM-Port can be looked up in the Device-Manager. If there is more than one with the exact same name, the corresponding COM-Ports need to be tried in the Control-Tool.

- Windows-Key + X \rightarrow Device-Manager
- In this case, the serial Bluetoothconnection is at *COM8*







4.4 Controlling the Relay-Board

Start the *Relay Board RDP Control Tool*. Beside the USB-Port, an alternative COM-Port can be set under settings (gearwheel symbol on the low right). Choose the previously identified Port.



Close the settings by clicking on the X. If establishing a connection was successful, a green USB-Symbol will be displayed at the lower left corner. The Inputs will now be automatically updated. Furthermore the relays can now be toggled by clicking on the slide control above the corresponding output.



5. <u>Controlling the Relay-Board via Bluetooth (Console)</u>

The Relay-Board can also be controlled by a communication program like HTerm. A serial interface is used to communicate with the Relay-Board. Therefore another arbitrary serial communication program can be used as well.

5.1 <u>Needed Software</u>

- HUZZAH32 with flashed Bluetooth-Demo (section 3.3)
- HTerm (Download for Windows):
 - o http://der-hammer.info/pages/terminal.html
- HTerm-Command-File (*hterm_commands_V100.hts*):
 - o https://www.ebs-systart.com/relais-board

5.2 Connect PC with HUZZAH32

First a connection between the HUZZAH32 and the PC will be established:

- Windows-Key + X → Control Panel → Devices → Bluetooth & other devices
- Add Bluetooth or other device → Bluetooth → Relay-Board-RDP
- As soon as the Relay-Board is paired, the PC is able to communicate with it.

← Einstellungen	- 🗆 X
命 Startseite	Bluetooth- und andere Geräte
Einstellung suchen	+ Bluetooth- oder anderes Gerät hinzufügen
Geräte	
Bluetooth- und andere Geräte	Bluetooth
品 Drucker & Scanner	Jetzt als "CLIENT21" sichtbar
🖰 Maus	Maus_Tastatur & Stift



5.3 Setup HTerm

As soon as the HUZZAH32 is connected to the PC via bluetooth, it will be displayed as serial COM-Port. The assigned COM-Port can again be looked up in the Device-Manager. If there is more than one with the exact same name, the corresponding COM-Ports need to be tried in HTerm.

- Windows-Key + X Device-Manager
- In this case, the serial Bluetoothconnection is at *COM113*



Open HTerm and choose the corresponding Port. Click at Connect.

💑 HTerm 0.8.1beta	- 🗆 ×
File Options View Help	
Disconnect Port COM113 V R Baud 115200 V Data 8 V Stop 1 V Parity None V	CTS Flow control
Rx 0 Reset Tx 0 Reset Count 0 - 0 Reset Newline at None	✓ ✓ Show chara
Clear received	Show errors
Sequence Overview X Received Data	
1 5 10 15 20 25 30 35 40 45 50 55 60 65	70
New File	
Load File	~
Input control	^
Clear transmitted Asci Hex Dec Bin Send on enter None Send file DTR	RTS
Type ASC V	ASend
Transmitted data	×
1 5 10 15 20 25 30 35 40 45 50 55 60 65	70 75
History -/0/10 Connect to COM113 (b:115200 d:8 s:1 p:None)	

Now load the command list into HTerm:

• Right-click in the Sequence Overview field \rightarrow Load File \rightarrow hterm_commands_V100.hts

5.4 Send Commands

By double-clicking on the desired item, the corresponding command will be transmitted to the Relay Board and executed.

- O 0 1h etc	
HIErm 0.8. Ibeta	
<u>File Options View He</u>	lp
Disconnect Port C	0M113 V R Baud 115200 V Data 8 V Stop 1 V Parity None V CTS Flow control
Rx 70 F	keset Tx 70 Reset Count 0 Cunt 0 Reset None Shore
Clear received	cii 🗌 Hex 🗋 Dec 🗋 Bin 🕴 Save output 💌 🕴 Clear at 🛛 🔹 🐘 Newline every 🔍 🔹 🖡 🖉 Autoscroll 🗋 Show errors 👘
Sequence Overview X	Received Data
IN8 ?	
INB ?	REL1:1, REL1:0,
INH ?	
IND ?	
REL1 ?	
REL2 (
REL3 (
REL4 (
RELI ON	Selection (-)
REL2 ON	
RELS ON	Input control ×
REL1 off	Input options
REL2 off	Clear transmitted Ascii Hex Dec Bin Send on enter None V Send file DTR RTS
REL3 off	
REL4 off	Type ASC V ASend
USB1 ?	Transmitted data X
USB2 ?	
USB1 on	REFLICERFLICE
USB2 on	
USB1 off	
USB2 off 🗸 🗸	
	History -/0/10 Connect to COM113 (b:115200 d:8 s:1 p:None)



6. Controlling the Relay-Board via Wifi

The control via Wifi will be exemplary shown by using a web browser. Therefor the Wifi Demo-program will be flashed on the HUZZAH32-Board. With the Wifi-demo it works as a Webserver, which can be accessed by entering the IP-address in a web browser. The Relay-Board can be controlled by clicking on the corresponding link on the website.

6.1 <u>Needed Software</u>

- HUZZAH32 with flashed Wifi-Demo (section 3.3)
- Web browser
- HTerm (Download for Windows):
 - o <u>http://der-hammer.info/pages/terminal.html</u>

6.2 Connect to Wifi-Router

The access data for the Wifi-Router is stored in the code of the Wifi-Demo. Accordingly the SSID and the password need to be inserted into the code. Replace yourssid and yourpasswd in the code with your specific access data.

- const char* ssid = "yourssid";
- const char* password = "yourpasswd";



After the code is successfully uploaded (section 3.3), the HUZZAH32 automatically connects to the Wifi-Router and outputs its IP-address via USB-Interface. The IP-address can be received by a communication program like HTerm.

Connect HTerm with the COM-Port of the HUZZAH32 and reset the HUZZAH32 by pressing the reset button. As soon as the connection to the Wifi-Router is established, the IP-Adress of the webserver will be displayed in the "Received Data" window.

💤 HTerm 0.8.5 − □ ×
<u>File Options View</u> Help
Disconnect Port COM4 ~ R Baud 115200 ~ Data 8 ~ Stop 1 ~ Parity None ~
Rx 432 Reset Tx 0 Reset Count 0 - 0 Reset Newline
Clear received
Sequence Overview X Received Data
1 5 10 15 20 25 30 35 40 45 50 WiFi connected.ww IP address: ww 192.168.43.74ww Selection (-)
Input control ×
Clear transmitted Ascii Hex Dec Bin Send on enter None v end fil
Type ASC V
Transmitted data ×
1 5 10 15 20 25 30 35 40 45 50 55
History -/0/10 Connected to COM4 (b:115200 d:8 s:1 p:None)

6.3 Control the Relay-Board

The webserver of the HUZZAH32 can be accessed by entering the previously listed IPaddress in a web browser. The desired commands will be transmitted to the Relay-Board by clicking on the corresponding link.



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