

Advanced I/O controller

USER MANUAL

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1 Introduction

Advanced intellectual I/O controller

1.1 General Information

Advanced I/O controller, is an intelligent powerful device, designed to control embedded configurable Inputs/outputs in order to collect data from multiple sensors, switches, buttons, pull cords, old legacy NCS systems, fire panels, doors, contacts and to control through the configured outputs, multiple devices such as dome lights, relays, buzzers, sirens, or integrate to the third party solutions.

Controller is capable to detect any type of sugaring from such systems as analog NCS,- inverted, regular, pulsing, toggle, larch etc.

It is a TCP/IP device, working in any network environment, capable to proceed up to 20.000 signals per second in total.

It is also Wi-Fi enabled, with the BLE scanner, RFID compatibility, 1wire support for environmental sensors, and many other.

It is using standard industrial electrical enclosure, can be from 32 to 248 inputs/outputs. Increment per module is 32.

Different modules are available,- opto isolated inputs, high power outputs, relay and 24V DC and 12V DC versions of any of them.



1.2 Description

Advanced Controller is modular based. To the main panel board, you can attach any required satellite modules:

- Galvanic isolated over the opto-coupler inputs module. 32 inputs per module, 24V DC version, common VCC
- Galvanic isolated over the opto-coupler inputs module. 32 inputs per module, 12V DC version, common GND
- Galvanic isolated over the opto-coupler inputs module. 32 inputs per module, 24V DC version, common GND
- Galvanic isolated over the opto-coupler inputs module. 32 inputs per module, 12V DC version, common VCC
- Galvanic isolated High Power darlington type outputs module, 32 outputs per module, 24V DC version
- Galvanic isolated High Power darlington type outputs module, 32 outputs per module, 12V DC version

- Galvanic isolated High Power Relays (Com,NO,NC) type outputs module, 32 relays per module, 24V DC version
- Galvanic isolated High Power Relays (Com,NO,NC) type outputs module, 32 relays per module, 12V DC version

Compatibility

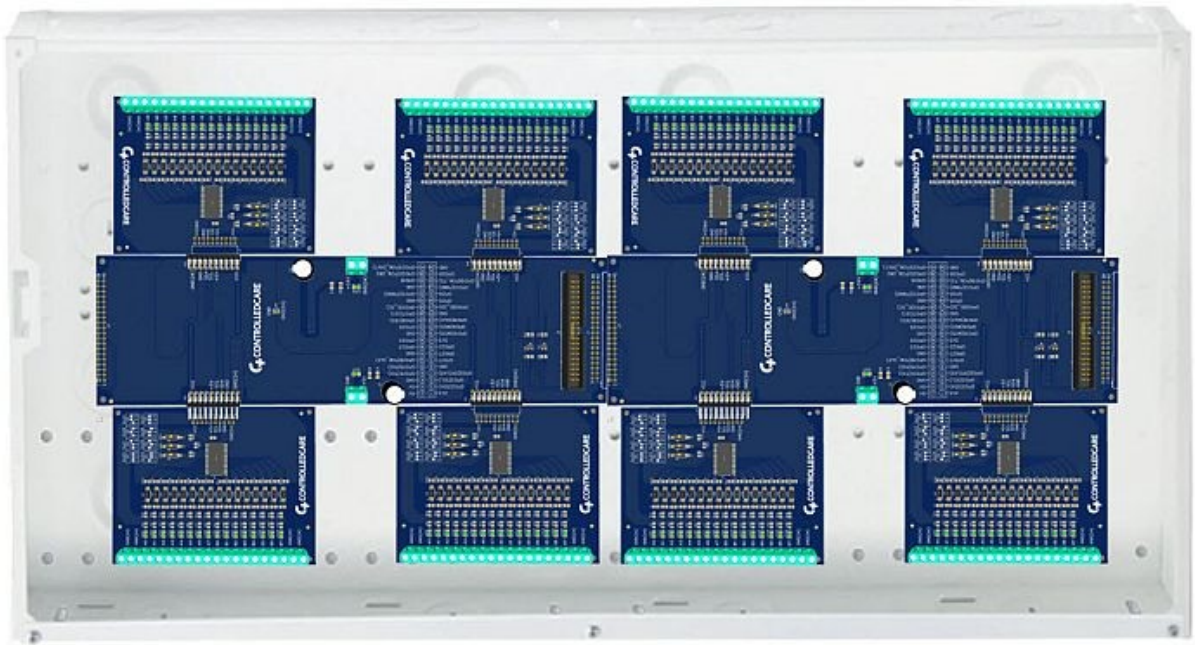
- Mass notification PA systems
- Any SIP compliant standard Phone System
- BLE positioning and location support
- RFID embedded reader, 25.000 records
- LoRa WAN compatible, packet forwarder and concentrator
- Wi-Fi 2.4GHz and 5,8GHz versions

Signaling

- Any type of signaling supported, Analog, Digital, POST, GET, PUT, TAP, UART, I2C, 1W, SPI etc.
- Outputs grouping, zoning, inverting
- Camera broadcasting, RTSP, MJPG, H264
- Automated Provisioning

Services

- SIP full featured PBX
- Video Surveillance server up to 16 4K cameras
- Paging and mass notification
- RFID reader support
- BLE scanning up to 100 meters and Kalman library
- Multiple actions per event
- Access Control integration
- Thermal Vision Matrix and management
- Devices monitoring
- Temperature control up to 256 sensors per controller



2 System

Here are the status and main generic settings

2.1 Settings

The screenshot shows the 'System Settings' page in the LV CONTROL interface. The sidebar on the left lists various system components. The main content area is divided into two sections. The first section, labeled '1', contains network configuration fields: IP Address (172.16.16.177), Net Mask (255.255.255.0), Gateway (172.16.16.1), DNS server (8.8.8.8), DHCP (OFF), and MAC Address (B8:27:EB:2A:8E:42). The second section, labeled '2', contains optional parameters for auto-discovery: Location, Facility, Floor, Department, Room, and Device Description. A 'Save' button is located at the bottom of the form. A red circle with the number '3' is positioned in the top right corner, near the 'Admin' link.

1. Network status of the Ethernet default is DHCP. You can over-write manually required settings in these fields.

2. Optional parameters used for the auto-discovery, it is not required, only if used as a mini controller installed per Room or Zone.

2.2 EMS

EMS Settings

1 EMS server http://172.16.16.175/authcode/ 2 Server auth 555666777

3 Extra parameters 7 Trig send period Config server

4 BLE EMS server BLE send period 5 6

5 Base Name STAND-MID-%TrigName% MAC address B8:27:EB:2A:8E:42

Use macros: %MAC% %TrigId% %TrigName%

Save

1. URL address where the EMS server is located, it is a URL where the controller will send data signaling for calculations processing, alarms etc.
2. This is a authentication code, when you have to control from third party systems Inputs, Triggers or Outputs direct on the Controller. If this authentication parameter is present in the incoming to the Controller URL, then it will be authorized and execute required command
3. In this section you may add extra parameters to be send to the EMS URL, these parameters will be added to the end of the URL string
4. Here is the address of the URL where to send positioning and location data. Controller is compatible with any of the standard BLE broadcasting devices
5. Base name is used as an unique identification of the controller in the network. Name can be dynamic if to complete with the listed variable names.
6. Interval in seconds of how often to send positioning and location of the scanned positioning points (RSSI, Tx Power etc.)

2.3 Alarm Type

The screenshot displays the 'Alarm Types' configuration page in the LV CONTROL system. The sidebar on the left lists various system components, with 'Alarm types' currently selected. The main panel shows a form for defining an alarm type. Red callouts highlight the following fields:

- 1**: Alarm ID (01)
- 2**: Alarm Name (Alarm)
- 3**: Trigger (Alarm)

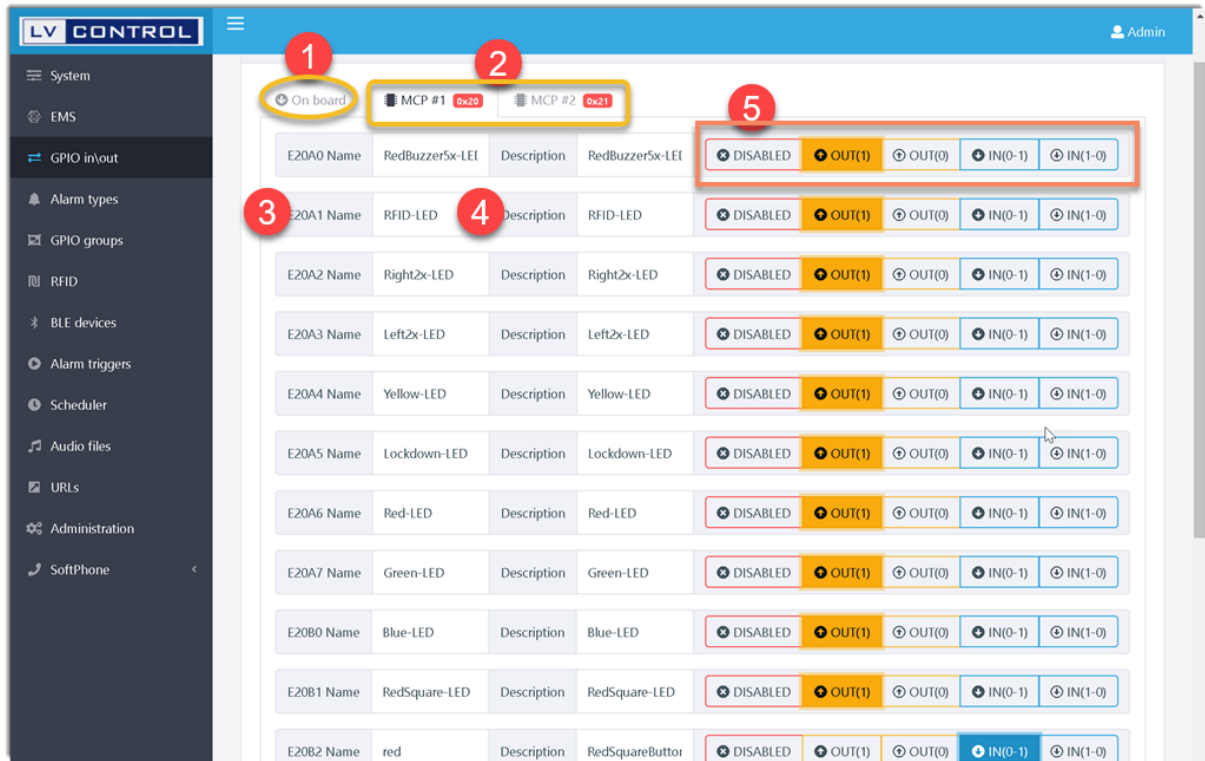
Below the form fields, there are buttons for 'Cancel', 'Normal', a red trash icon, a green '+ Add alarm type' button, and a blue 'Save' button.

Here you can define alarm types that reflect Activated and deactivated status of the Alarm. This is for universal compatibility and integration with the third party systems. Also is used to differentiate alarm types such as Thermo-Vision, Temperature levels, Fire Panels, Sensors etc.

3 GPIO

General Purpose Inputs Outputs

3.1 Input/Outputs



There two type of configurable inputs/Outputs on the Controller, internal ones and from the plug-gable satellite modules.

1. Internal GPIO from the pins directly from the Controller. These are used in mini version, when no modules attached to the master board.
Or can be used together with the additional modules if require to expand standard amount of inputs/outputs.
2. MCP I/O modules, in total can be up to 8 per one board. Each module coming with the 32 I/O. Total 2 layers allow 248 GPIO per case.
3. Input Name, It is also used as a parameter of the signaling URL. Can be alpha-numeric with the maximum of 128 characters
4. Input description, it is used for the friendly identification when triggers are created.
5. GPIO configuration, can be set as:
 - a) Digital Output (High Level)
 - b) Digital Output (Low Level)
 - c) Digital Input (Logical Low)
 - d) Digital Input (Logical High)

3.2 Outputs Grouping

ID	Group Name	Group Action	Group items
01	Lockdown-Pulsing	Flash slow	Lockdown-LED (Lockdown-LED) X
02	RedBuzLed	Flash fast	RedBuzzer5x-LED (RedBuzzer5x-LED) X
03	Beep	Flash fast	RedBuzzer5x-LED (RedBuzzer5x-LED) X Lockdown-LED (Lockdown-LED) X Red-LED (Red-LED) X RedSquare-LED (RedSquare-LED) X

+ Add group

Save

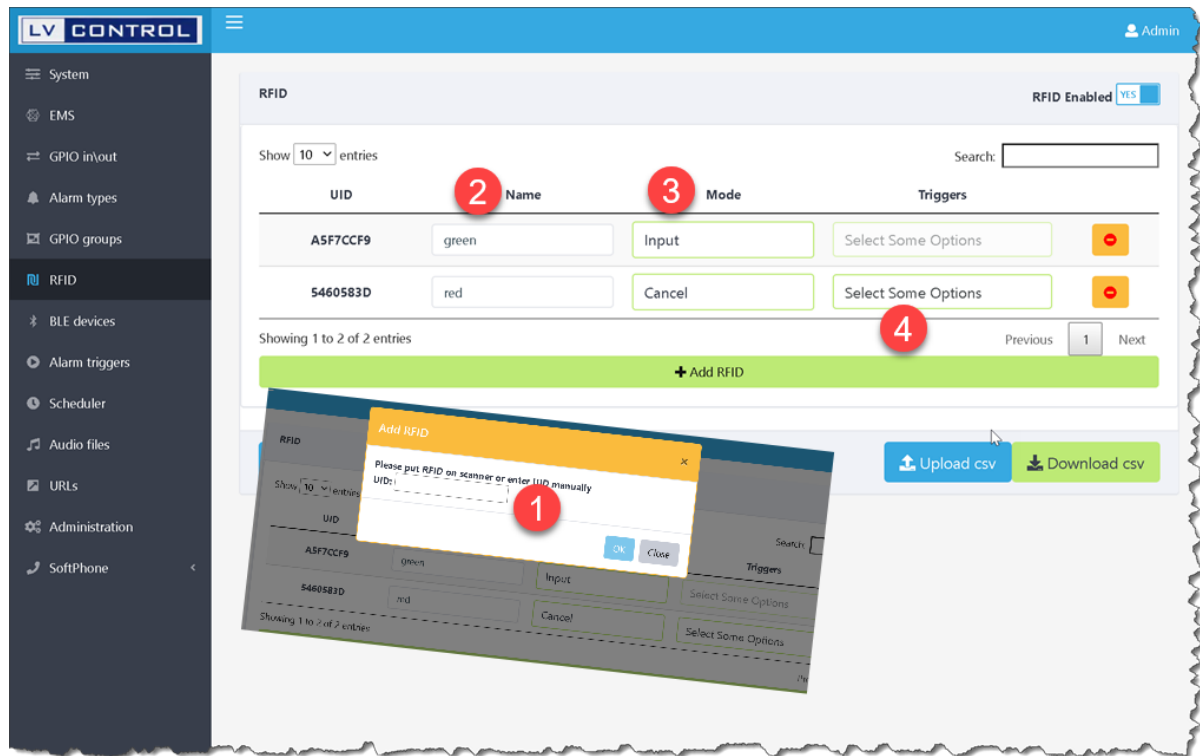
Digital Outputs can be grouped together in order to be called from the configured alarm trigger.

1. Each group identity number
2. Group Name is used in the trigger configuration
3. Group Actions, in total three
 - a) Steady, when output stay always On
 - b) Flash Slow, when output goes On/Off every second
 - c) Flash fast, when output goes On/Off twice per second
4. Here you can include any existing outputs available in the system.

4 Readings

Controller Interfaces

4.1 RFID



Advanced Controller can read and proceed standard RFID cards, and NFC keys, tags or labels. It is capable to store 20.000 units per board.

1. In order to add a card, token or any identification device, place to the reader in auto-add mode, after beep the authentication code will appear in the field.
2. Give a friendly name to it in order to be populated later in the database
3. Mode is defining the action to be made when the card is identified as trusted.
 - a) Use as an Digital Input
 - b) Use as an access control standard mode
 - c) Use as a alarm Cancel method, in order to identify who is canceling the Alarm
4. Select one of the Options to be executed (Turn On/Off trigger, Output, Playn Audio, make call etc.)

4.2 BLE

Available BLE Devices

4 Only stored ☐ Pause ☐ Update

Show 10 entries Search: Save Clear

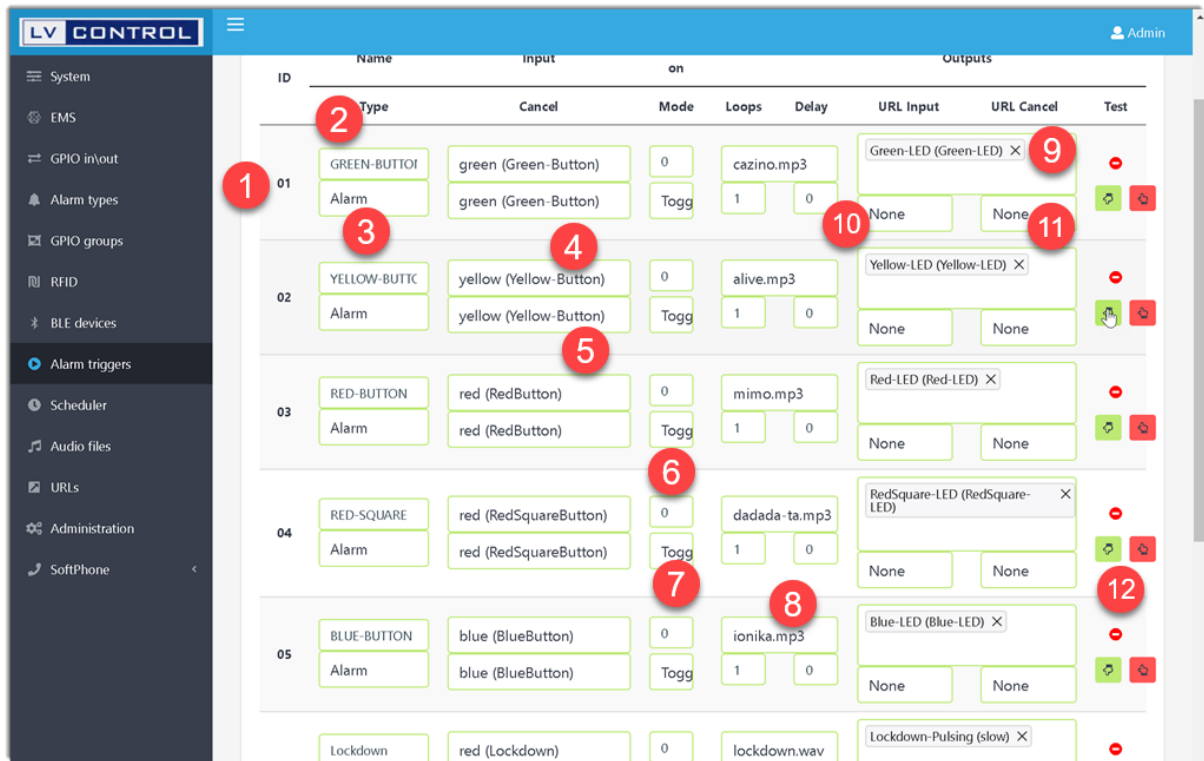
BLE Name	MAC	RSSI (Avg)	RSSI (Kalman)	Distance (Avg)	Distance (Kalman)	Updated		
1 Unkonwn	02:bb:d6:02:34:93	-72.5	-71.38	0.42	0.36	2021/02/23 17:48:00	2	3
Unkonwn	07:1d:83:58:cc:6f	-71	-69.91	0.34	0.29	2021/02/23 17:48:00		
Unkonwn	29:82:81:86:e2:2b	-88.5	-87.14	1.48	1.38	2021/02/23 17:48:00		
Unkonwn	29:84:a0:98:29:e3	-89	-87.63	1.51	1.41	2021/02/23 17:48:00		
Unkonwn	2faa:f0:0d:ee:2a	-97	-94.06	2.3	1.96	2021/02/23 17:48:00		
Unkonwn	30:52:3b:67:59:13	-82.5	-81.24	1.12	1.06	2021/02/23 17:48:00		
Office speaker	43:85:46:e1:c3:a7	-79	-77.79	0.97	0.86	2021/02/23 17:48:00		
Unkonwn	5cc1:d7:63:32:05	-69	-67.94	0.26	0.22	2021/02/23 17:48:00		
Unkonwn	5cc1:d7:63:32:17	-65	-64.01	0.14	0.12	2021/02/23 17:48:00		
Unkonwn	71:1e:e3:8b:27:95	-89.5	-88.13	1.55	1.45	2021/02/23 17:48:00		

Advanced controlled is equipped with the Ultra BLE scanner, and can detect any standard positioning and location broadcasting devices.

It is detecting encoded industrial formats, RAW data and formatting conform regulations.

1. Detected Manufacturer specific name (if assigned). If to expand you will see decoded and RAW data from it.
2. Calibration if required. Put the BLE device in a distance of 1 meter from the controller, controller will adjust settings and give recommended value.
3. Add to the trusted list, and configure parameters for the location and positioning, such as detection radius, Tx Power, advertisement interval.

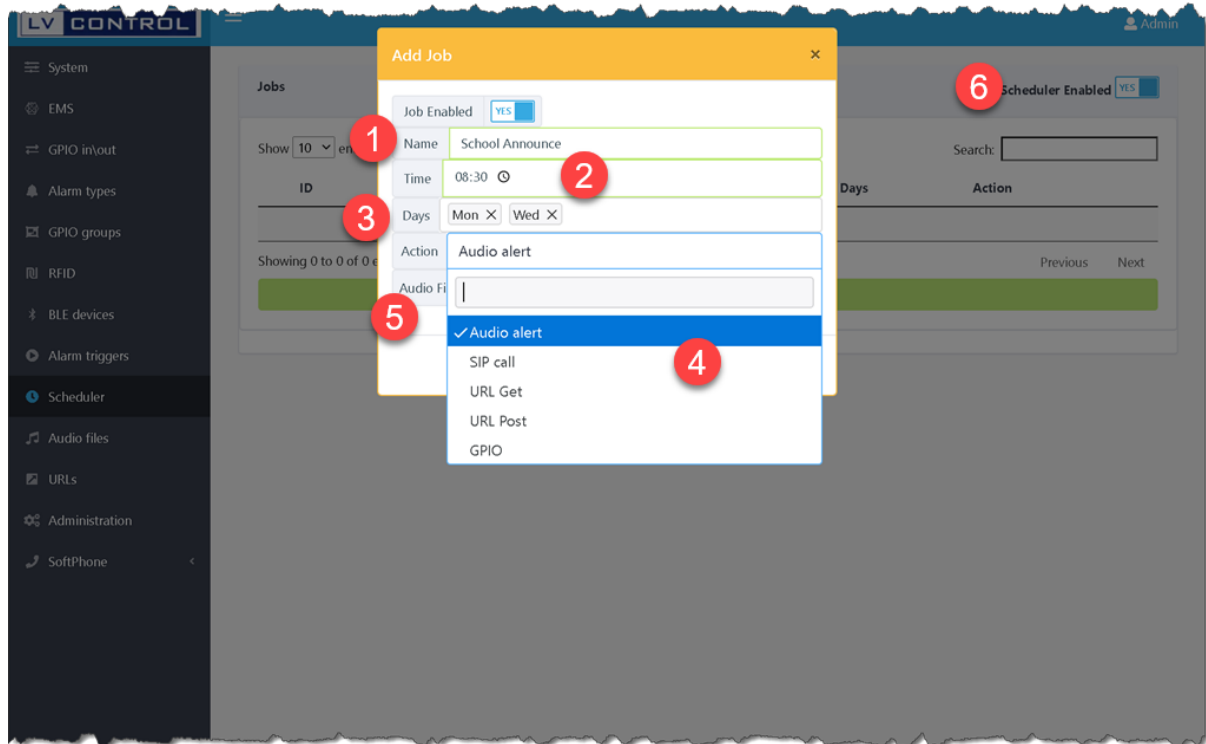
5 Alarm Triggers



Most important element of the alarm processing. Here you defining alarm rules.

1. Unique trigger identification
2. Name of the trigger, Is used as a Control type, or as a variable for the BaseName
3. Alarm type from the list
4. Who is enameing this trigger in to the alarm mode (what input or virtual input)
5. Who is canceling the alarm, who will reset to normal (what input or virtual input).
6. Duration in seconds, after the trigger will be activated, it is also used to detect pulsing mode
7. Trigger Mode,- Toggle, Momentary, Hold or Hold to reset
8. What audio message to play when trigger is activated, how many times to repeat and delay between them
9. What outputs or groups to enable during alarm mode
10. What additional URL to execute when alarm is On
11. What additional URL to execute when alarm is Off
12. Virtual buttons to test trigger in On and Off mode.

6 Scheduler



Our Controller comes with the advanced scheduler and can be used in Schools, NCS facilities in order to automate some tasks.

1. Create a task and give a friendly name to it
2. Define scheduled time to start the task execution
3. define the days when the task is active
4. Select the action to be provided,- can be audio alert, a phone call over the SIP, an action URL, or trigger existing GPIO.
5. If audio alert action is set, then select audio file to be played.

Inventroy

7 Inventory

7.1 Audio Files



Advanced controller can deliver pre-recorder audio messages or TTS generated on the event of the alarm, scheduled task or triggered task, and on demand.

This is good if you want to assign audio alerts for the PA mass notification system, local speaker, paging or SIP broadcasting.

Controller is supporting WAV and MP3 formatted files. Bitrate and other parameters of the audio, advanced controller is adjusting automatically.

7.2 Action URL's

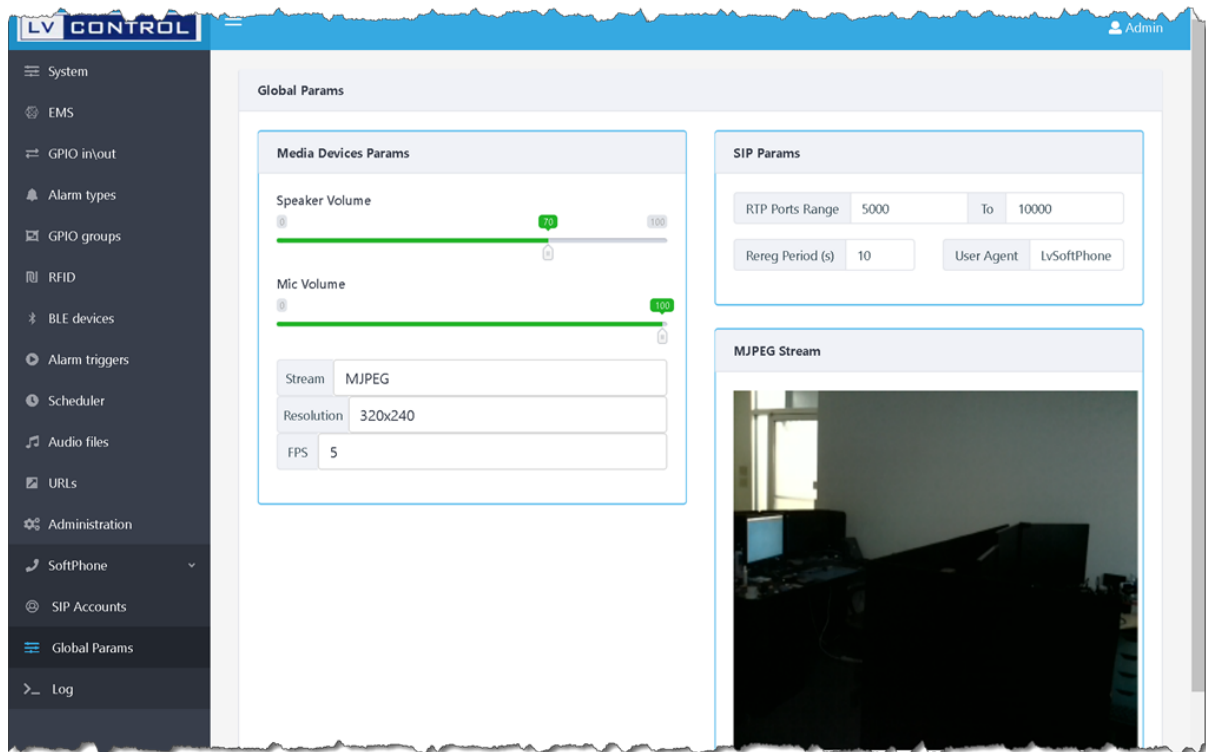
The screenshot shows the 'URLs' configuration page in the LV CONTROL interface. The sidebar on the left lists various system components, with 'URLs' currently selected. The main panel contains a form for adding or editing a URL. The form includes four fields, each marked with a red circle and a number: 1. 'URL ID' (pre-filled with '01'), 2. 'URL Name', 3. 'URL', and 4. 'URL Data (POST)'. Below the form is a green '+ Add URL' button and a blue 'Save' button.

Here is the list of available actions that can be executed by the action trigger per alarm

1. Unique ID for each action URL
2. Give a friendly name which will describe the action to execute
3. URL to be executed in GET format
4. If POST format is required to send,- then data to enter here

8 Administration

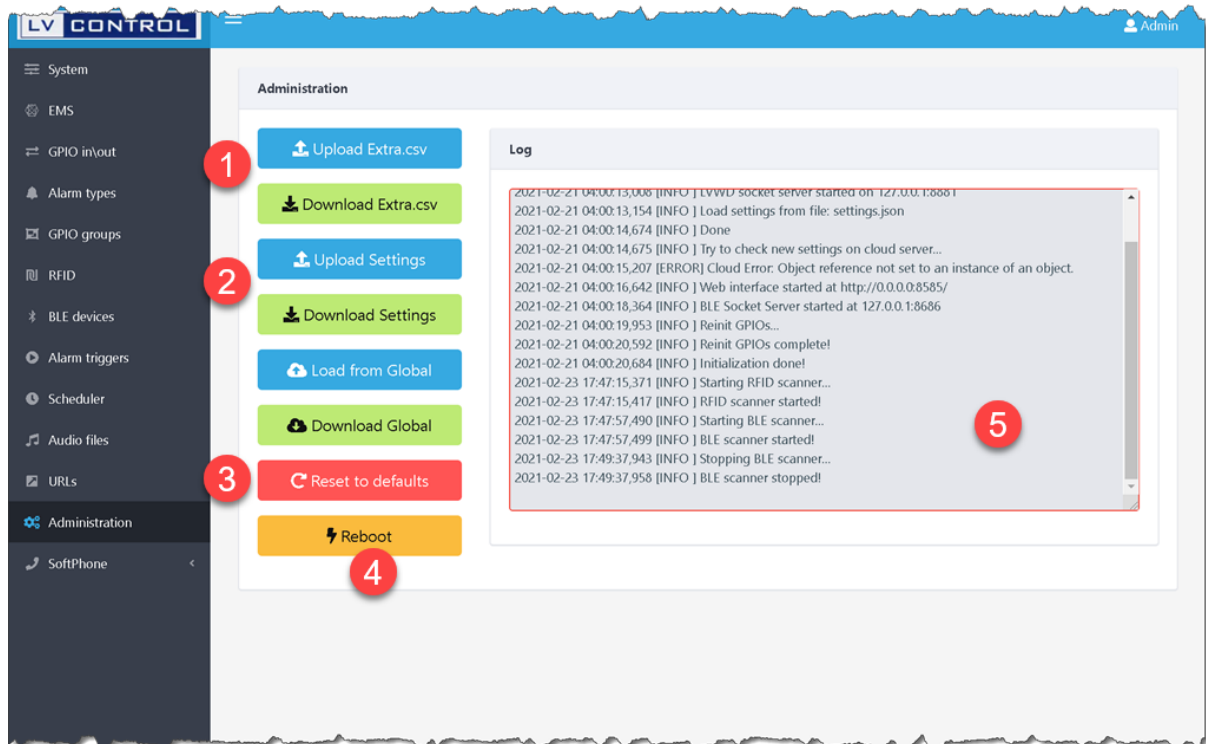
8.1 Camera



You can connect a camera direct, and have a broadcasting server using RTSP and MJPG format.

At the same time advanced controller can run a VMS application with up to 16 cameras in 4K format H264 and H265 coding.

8.2 Settings



1. Extra CSV file can be uploaded here. This file is to execute additional actions not implemented in to the Web interface. A sample file can be downloaded here
2. To backup setting,- just download the json file, and to recover from the backup, just upload here as well
3. If are not satisfied, or make it wrong one,- just reset to factory defaults.
4. If require a reboot, just press this button and after confirmation our controller will reboot
5. Log screen, is live

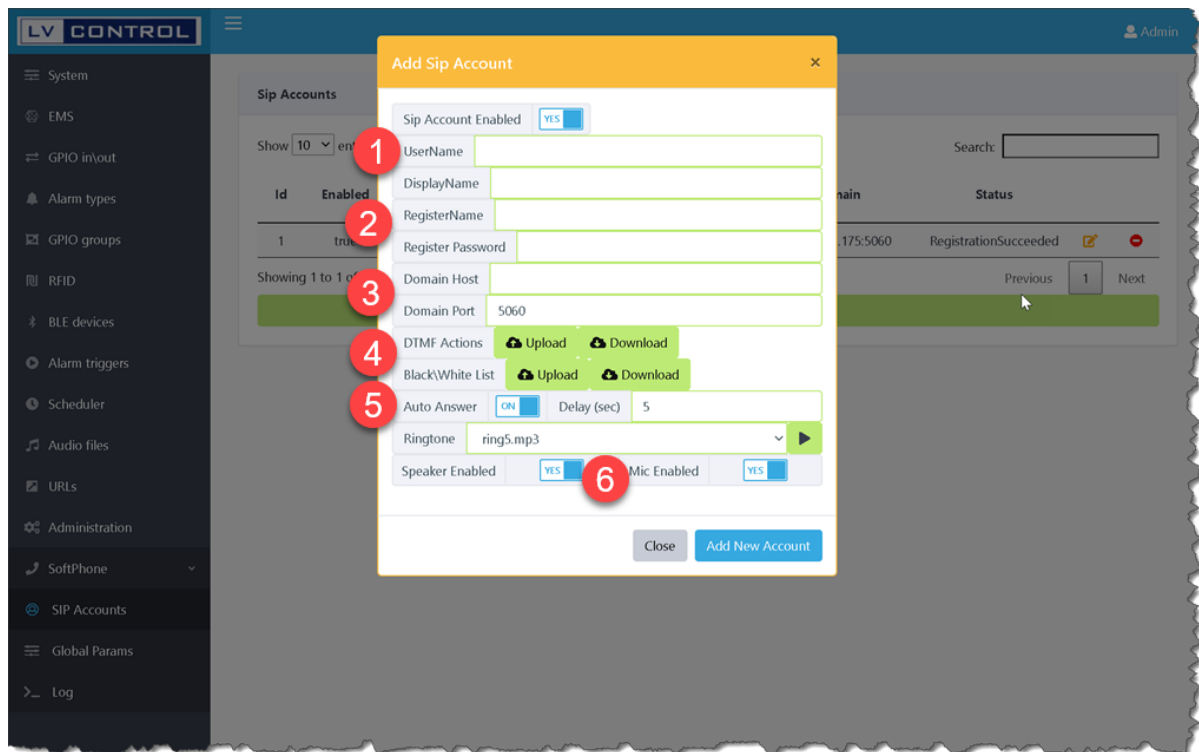
8.3 Control

You can control advanced controller over the VNC and SSH protocols

9 SIP client

Advanced controller can be in multiple modes. as a client, embedded PBX or both
If embedded PBX, then is using full featured SIP server with up to 200 extensions and unlimited fetures

9.1 Accounts



This advanced controller is SIP compliant and can work with any standard SIP server, any phone system or PBX.

1. SIP username
2. Display Name, sometimes is used by the server as a CID
3. Registration name used for the SIP authentication, and SIP password
4. DTMF action can be executed after call is established, and are executed from the CSV file. sample file can be downloaded here
5. Can Auto Answer incoming calls and the delay before answer can be configured here too
6. The way how to change the Speaker and Microphone during the answered calls
7. Ring tone can be set from the list.

9.2 Logs

Logs and call logs can be checked through PBX page

10 Use Cases

Enter topic text here.

10.1 Multi Room Scenario

Currently Controlledcare LV controller is capable to manage up to 168 DI or DO.

In another words can collect information from up to 168 different Rooms. Is also detecting pulse signaling in order to identify Bath, Bed, zone etc. signaling from old Systems such as Mircon, Tectone, Executone etc.

In order to configure properly for this scenario have to follow these steps:

For a BaseName identification have to set a combination of MAC address and TriggerName or Trigger ID

In this mode controller will will represent each input as a separate virtual device in Room (or per bed)

Base Name %MAC%%TrigName%

Use macros: %MAC% %TrigId% %TrigName%

Save

Next step is to assign Name and description for each Input (good idea to define as a room# or so).

Also have to set type of input depending on the signaling received (Optocoupler level, Relay etc.)

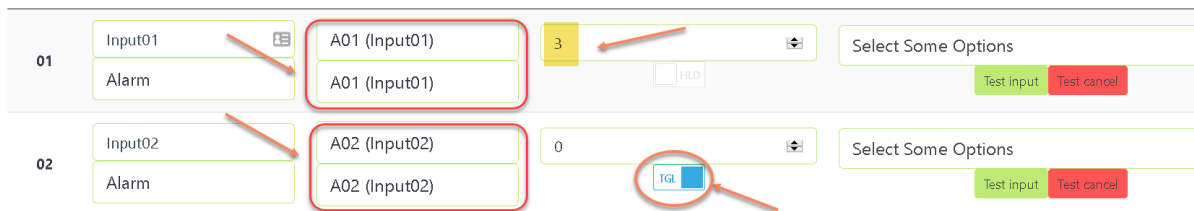
Very important to give same Name for all pin inputs, and description optional per Room Name/Number



This scenario same Input is configured for Alarm and Cancel and is connected to each room individually.

There are three modes in this config:

- 0 seconds delay, - usually connected to the bulb, LED, Dome Light, Relay and hold is Alarm, release is Cancel
- x seconds delay, same but also capable to detect pulsing in order to differentiate different buttons on same DI
- TGL is when first signal is Alarm, and second one is cancel



10.2 Common Cancel scenario

Scenario when multiple buttons are used for Alarm and one Cancel for all
(i.e. remote bath pull cord, balcony button, wireless pendant, multi-zone etc.)

First is to configure Basename per MAC address only under EMS section

EMS server

Extra parameters

BLE EMS server

Base Name

Use macros: %MAC% %TrigId% %TrigName%

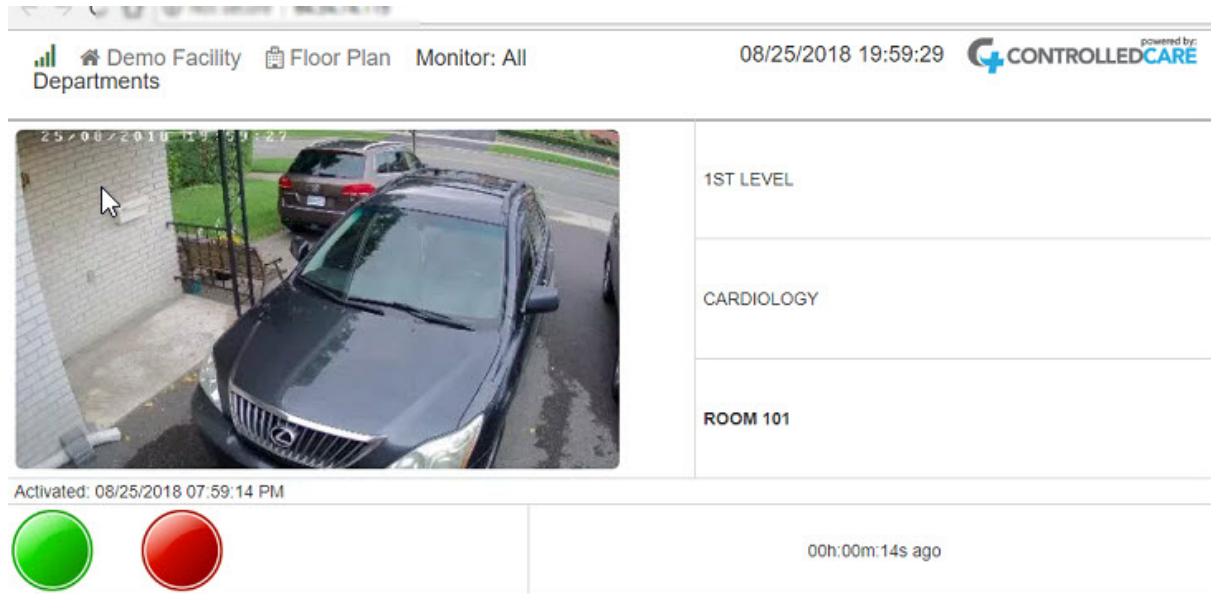
Second is to define properly Digital Inputs under GPIO section. Very important Control Type per button
and to give names for better understanding later on under Alarm Triggers Section.
Also depending on button station used to set type of buttons on it (Pull-In or Pull-Down)

Name	Description	Control Options
E22A0 Name: A01	Input01	DISABLED, OUT(1), OUT(0), IN(0-1), IN(1-0)
E22A1 Name: A01	Input02	DISABLED, OUT(1), OUT(0), IN(0-1), IN(1-0)
E22A2 Name: A02	Input03	DISABLED, OUT(1), OUT(0), IN(0-1), IN(1-0)
E22A3 Name: A02	Input04	DISABLED, OUT(1), OUT(0), IN(0-1), IN(1-0)
E22A4 Name: A03	Input05	DISABLED, OUT(1), OUT(0), IN(0-1), IN(1-0)

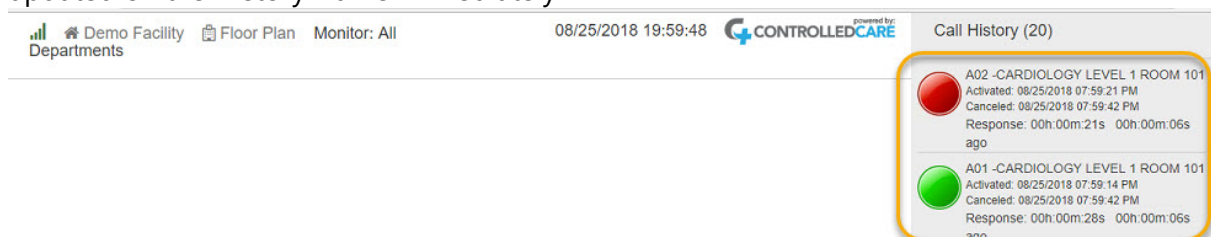
Next important step is to add new triggers depending on amount of inputs used.
Attention to Cancel type, all triggers have different Input for Alarm, but same for Cancel

ID	Name	Input	Duration	Outputs
Type	Cancel	Mode	Test	
01	Input01	A01 (Input01)	0	Select Some Options
02	Input02	A02 (Input02)	0	Select Some Options

If everything is done as explained, on any button pressed, Alarm is activated and reflected on Live Panel



All active Alarms can be canceled all together form one button now. When are Canceled all events will be updated on the History frame immediately



10.3 4xButtons shared Room example

4xButtons station, or 4xbuttons + 2xPull Cords station in shared Room with individual Cancel per Bed
(i.e.Room with two beds, require to show Alarm per Room and each bed individual status)

First is to configure BaseName parameter under EMS section

Second is to define DI (Digital Inputs) for buttons to use under GPIO section.

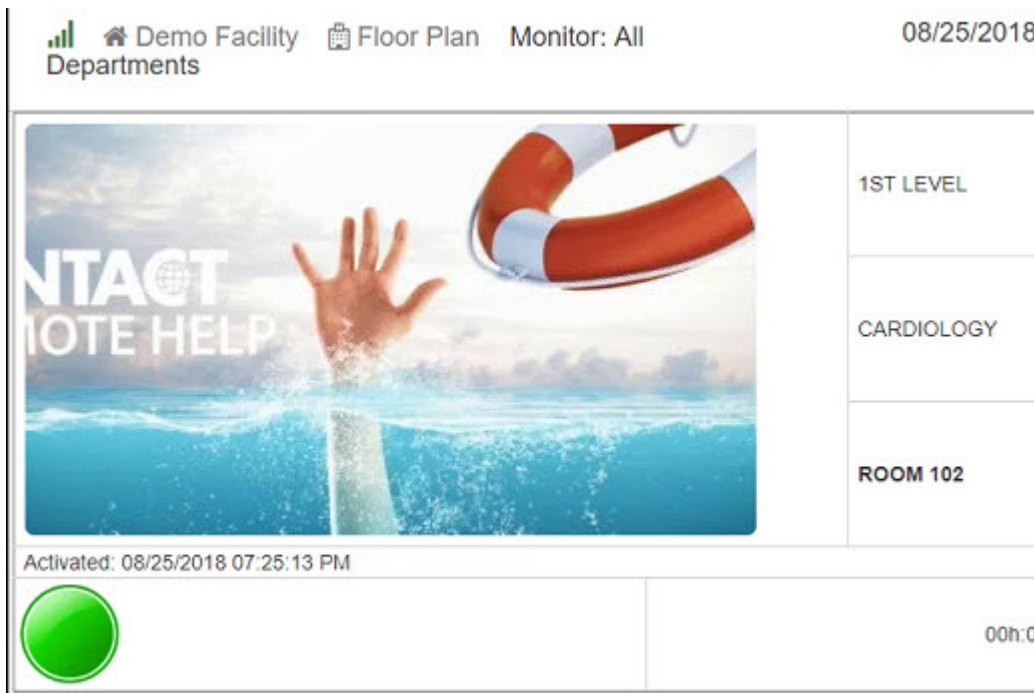
Is very important to assign same Control Type for a group of inputs per each bed.
 For example if you using button station with two buttons on left (Alarm and Cancel for Bed A) and two buttons on right (Alarm and Cancel for Bed B). Same idea with the Pull Cords.
 Also depending of the Button Station used to set type button (Pull-In or Pull-Up)

On board	MCP #1 0x20	MCP #2 0x21	MCP #3 0x22	MCP #4 0x23	MCP #1 0x20			
E22A0 Name	A01	Description	Input01	DISABLED	OUT(1)	OUT(0)	IN(0-1)	IN(1-0)
E22A1 Name	A01	Description	Input02	DISABLED	OUT(1)	OUT(0)	IN(0-1)	IN(1-0)
E22A2 Name	A02	Description	Input03	DISABLED	OUT(1)	OUT(0)	IN(0-1)	IN(1-0)
E22A3 Name	A02	Description	Input04	DISABLED	OUT(1)	OUT(0)	IN(0-1)	IN(1-0)
E22A4 Name	A03	Description	Input05	DISABLED	OUT(1)	OUT(0)	IN(0-1)	IN(1-0)

Next step is to configure how the Alarm Trigger will be controlled by buttons.
 Go to Alarm Triggers section and create two triggers per each section of the buttons.

ID	Name	Input	Duration	Outputs
Type	Cancel	Mode	Test	
1	BedA	A01 (Input01)	0	Select Some Options
	Alarm	A01 (Input03)		Test input Test cancel
2	BedB	A02 (Input02)	0	Select Some Options
	Alarm	A02 (Input04)		Test input Test cancel

As a result of this configuration, each group 1 and 2 will use own Cancel button. If Alarm Button for Bed A will be pressed,
 then Alarm per this Room will pop-up on the Live panel and will reflect button used. If the Room is configured and right
 Screen template is selected, then Bed number will be displayed on the screen as well.

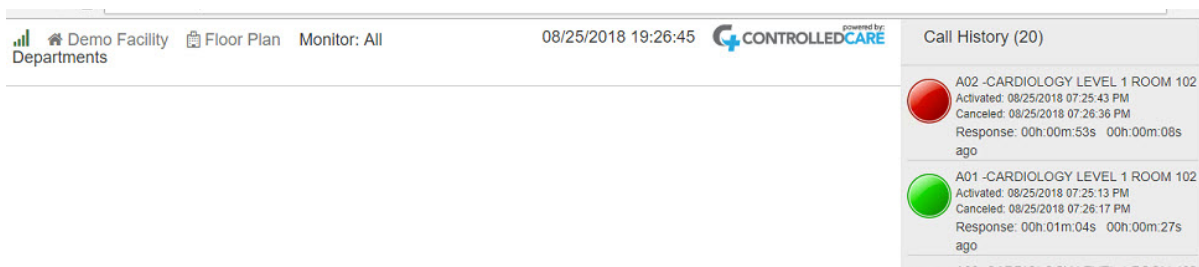


If the button from the second Bed B will be triggered, then Live Panel will update the Room alarm with the effective button and will show both



If Cancel from one of the Bed will be pressed, - Alarm applet continue to be active and respective button deactivated

If Cancel from last Bed is pressed,- Alarm Screen will disappear and history frame will be update with the new records



10.4 API calls, GPIO and Audio

SIP

`http://192.168.1.99:8586/api/call`

Where IP - address of the RPI

POST or GET method

If POST then in format JSON, if GET then parameters separated by &

There are 4 type of actions: call, answer, hangup, media

call:

```
{'account':1,'action':'call','to':'123456','speaker':'on','mic':'off'}
```

```
?account=1&action=call&to=123456&speaker=on&mic=off
```

account - id of the account from who to make a call

to - number where to call

speaker and mic - ON or OFF- to mute or un-mute during the call

answer:

```
{'account':1,'action':'answer'}
```

```
?account=1&action=answer
```

to answer the call on particular account

hangup:

```
{'account':1,'action':'hangup'}
```

```
?account=1&action=hangup
```

to kill the call

media:

```
{'account':1,'action':'media','speaker':'on','mic':'off'}
?account=1&action=media&speaker=on&mic=off
```

way to control Microphone and speaker on specific account during the active call

GPIO

<http://192.168.1.99:8585/api/remote>

Where IP - RPI address

POST or GET request

If POST then JSON format, if GET then parameters separated by &

Control Inputs / Outputs

```
{'auth':'12345abcd','cmd':'onoff','gpio':'P1Pin7','duration':1000}
?auth=12345abcd&cmd=on&gpio=P1Pin7
```

where auth - authentication string under field 'EMS'

gpio - this is ID of the required GPIO or of the MCP

duration - in milliseconds

If gpio is set as an Output:

cmd=on - turn On output (LED On)

cmd=off - turn Off output (LED Off)

cmd=onoff - turn On, wait duration x milliseconds and turn Off

If gpio configured as an Input:

cmd=on - emulate a unui signal aplicat gpio (pressed and Hold)

cmd=off - emulate a disparitiei unui signal pe gpio (Released)

cmd=onoff - emulate unui impuls pe gpio (Pressed and Released)

cu impuls lung = duration in milliseconds

parametrul duration e necesar numai chind avem cmd=onoff

Exemplu:

`http://172.16.16.205:8585/api/remote?
auth=12345abdc&cmd=onoff&gpio=P1Pin40&duration=5000`

Audio will play on any trigger if selected.

`http://172.16.16.107:8585/api/remote?auth=555666777&cmd=on&gpio=P1Pin36`

`http://172.16.16.107:8585/api/remote?auth=555666777&cmd=off&gpio=P1Pin36`

10.4.1 First Steps

1. Enter the raspberry web UI

1.1 Make sure when entering the IP address you enter the port 8585, ie
192.168.1.2:8585

1.2 Enter username and password, if prompted, by default it is admin : 123

1.3 Go to BLE page and turn ON the scanning by toggling the switch at the top right

1.3.1 The list will populate with the found BLE peripherals

1.3.1.1 If you have configured a beacon name, or have a pre-defined one, you can use the search field to easily locate your beacons in the list

1.3.1.2 Find the beacon of interest from the list and add it to the 'Stored BLE Devices' list by pressing on the green button in the row that looks like a handshake

1.3.1.3 Please note, by adding the beacon to the 'Stored BLE Devices' list, beacon information will be sent to the EMS server defined on the EMS page

1.3.2 In the 'Stored BLE Devices' list you can define BLE Name to easier identify the device, if it has not been assigned a friendly name yet, and assign a Distance

1.3.2.1 Please note, 'Distance Radius' restricts the distance, above which, the beacon information is not sent out to the EMS server

1.3.2.2 Example, Distance Radius is set to 3 meters, and beacon distance is calculated to be 3.5 meters,

beacon information is not sent out, where if the calculated distance was 2.95 meters, it would be sent out to the EMS server

1.3.2.3 Please be AWARE, RadBeacon Dot working on Eddystone protocol displays very high distance on LV Control,

about 4-5 times higher, thus set the distance accordingly accounting for the distance factor,

ie if you would like beacon information to be sent out for 4 meters or less, set 25 meters

1.3.3 MAC address is displayed in the Stored BLE Devices list, for use later in LV Monitor (EMS)

1.3.4 Please note, you can program all the beacons on a single Raspberry system and then use 'Export to csv' and

'Import from csv' functionality on the BLE page to transfer beacon settings to any other LV Control Raspberry system