



Technologies
for
independent living

soline

soline
home
based
Powered by

SOLINE Cube – an adaptable and scalable environmental control system

1. General description

Soline is an environmental control platform, i.e. it allows people with a loss of autonomy to control their equipment using an interaction mode adapted to their abilities. Soline is therefore particularly suitable for people who have difficulty moving around, grasping objects or even seeing.



Thanks to its modularity, Soline can control all or part of the equipment present in a home, but also any additional functionalities that may be installed at a later date.

Due to its scalability, Soline can offer different modes of interaction with the home, which will evolve according to the needs and abilities of its user, without having to make any in-depth changes to the system. The proposed interaction modes are cumulative: they can coexist in the same home, without causing interference between them, while adapting to the different occupants of the house. The interaction modes currently supported are the following: voice, gaze, gesture, contactors, personal computers, tactile devices (tablet, smartphone, etc.), remote controls, teletheses, switches, etc.

Developed to be integrated into existing homes, Soline does not require any heavy work during installation. In general, no new cables need to be pulled, and if necessary, they can be placed in discrete ducts.

The components, carefully selected and tested before being integrated into Soline systems, are produced by manufacturers using non-proprietary means of communication, in order to guarantee the durability of the installations and the availability of functionalities over the years.

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2. Soline – what are its advantages for home care ?

Soline puts cutting-edge technology at the service of people in loss of autonomy. Its presence within the home makes it possible for the user to perform some actions, which would otherwise make him extremely dependent on those around him.

For its user, Soline allows him to live most of his time (which is long!) by deciding for himself what he wants to do, and when he wants to do it. Soline broadens the range of his activities, offering leisure activities that differ from the entertainment offered by television: music, radio, audio books, etc. It gives him the possibility to communicate with the outside world, by allowing him to make phone calls or follow his accounts on social media. It gives him access to the multitude of platforms available on the internet.

Regaining a degree of autonomy with Soline also has the advantage of freeing the persons losing their autonomy from the feeling of guilt about their situation: the embarrassment of representing a burden for those around them, who have to move around for every benign act, disappears. The feeling of being able to (again?) perform some actions by oneself is also highly rewarding, and favours the return of self-confidence.

For the caregiver, Soline offers a respite and is a calming tool. By giving back a measure of autonomy to the person using it, Soline lightens the load of the family caregivers. This is not only physical (running around to give the dependent person what he needs). It is also and above all psychological and emotional: the caregiver must be present, valiant and strong, 24 hours a day, 7 days a week, without interruption. With Soline, the family caregiver can go away in complete peace of mind: the dependent person is not left to his own sad fate, and can adapt his condition to the wishes of the moment. Alone ! And if he has a problem, he will be able, thanks to Soline, to warn the caregiver or call for help.

And that can make all the difference between home care or placement in a rest home! In these times of health crisis, the possibility of limiting the burden on the family and friends when caring for a dependent person, in order to avoid placing him in a rest home, is certainly a strong argument in the reflection that any family concerned must carry out.

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3. Presentation of Soline

Soline is a virtual assistant that allows you to control the environment, i.e. the electrical equipment that surrounds a person in his daily life.

Soline has been designed in such a way that it can be addressed in a natural way, as if a **human** helper were actually in the room next to the user. Soline responds to the voice: you speak to her, you give her an order, she understands you, responds and carries it out. The user does not therefore have to remember a series of fixed orders: all he has to do is ask Soline what he wants her to do. Thus «Soline, I want to look at the BBC», «Soline, switch to BBC», «Soline, I'd like to look at the BBC» or «Soline, could you please put the BBC on the television» are just a few examples of sentences that allow the user to zap to BBC.

In certain special cases (problems with concentration, speech, etc.), the orders that Soline has to recognise can be specifically adapted, in consultation with the patient but also, if necessary, with additional expert help (occupational therapist, speech therapist, etc.). These orders are therefore fully configurable.

Soline can turn on lights, manage the heating, control the television, dial telephone numbers, read emails, play music and even surf on the internet, to identify just a few of her faculties.

Soline is a platform specially designed for people with reduced mobility or who have a disability that could be overcome (in whole or in part) by voice (visually impaired, senior citizens, etc.), or by other modes of interaction.

Soline is able to recognize orders in any voice (male/female, high/low, etc.) without any special training.

Orders that are given to Soline generally begin with her first name, so as to create a recognizable catchphrase and avoid a sentence in a conversation being considered as an order to Soline. However, this is not an obligation.

In addition, if the first name Soline is not suitable, the user can choose another one, can have her change gender and give her a masculine voice/personality.

Some examples of orders :

- Soline, turn on the bedside lamp
- Soline, turn off all the floor
- Soline, I want to watch BBC
- Soline, turn the heating to 21°C until 11pm
- Soline, put the radio on BBC news
- Soline, call John on the phone
- Soline, I want to listen to the Beatles
- Soline, who's ringing the doorbell?
- Etc.

Soline has a range of different and complementary interaction modes. What it commands can be controlled :

- by voice
- tactile and visual: an interface available for tablets, smartphones and computers to control and view the various equipment on a screen
- in a tactile, visual and vocal way: Soline then allows you to navigate through the interface's visual menus by voice
- via additional contactors or push buttons (wireless or not) that control either the visual interface or a series of voice menus
- via an adapted telethesis
- via the joystick of a wheelchair (just connect this joystick by bluetooth to the Soline tablet)
- through the eyes, because Soline can integrate an eye control device
- by the pointing device of a personal computer
- by gesture, by means of a specific movement sensor
- by a communication aid software, which allows people who cannot express themselves to compose sentences using icons
- in the traditional way (wall switch, TV remote control, etc.)

Each interaction mode can be used simultaneously. This means that a light can be switched on by voice, switched off with a tablet, switched on again with the eye, and switched off again with a switch. Thus, the notion of combinations of interaction modes appears: it is possible and even strongly recommended to deploy Soline with several interaction modes, in order to ensure redundancy and continuity in the use of Soline, regardless of the time of day or the state of the user.

Soline Cube is the natural evolution of the first version of Soline. Based on our experience, we have gathered in Soline Cube the functionalities that were most requested from us and those that don't require additional hardware in order to offer a more standardised product :

- Control of the television and the decoder
- Telephony (landline or VoIP) (incoming and outgoing calls)
- Call to a remote assistance service
- Radio
- Music
- Audio books
- Visual interface

Other functionalities (intercom/video intercom, access control, motorised doors/beds/chairs, home automation, etc.) requiring additional hardware and specific installation are available as options.

Soline Cube is delivered with a Bluetooth audio return and two microphones, which, depending on the options, can be wired or nomadic. A «long-range» version of Soline Cube, adapted to larger homes and that can be mounted on an electric wheelchair, is also available.

Soline's voice recognition engine requires an internet connection but is, on the other hand, much more efficient: it's no longer necessary to memorize orders, you can address Soline as you would talk to a human being.

Please note that in its «for private individuals» version, Soline Cube is delivered with a small UPS. This is a device that makes it possible to smooth out fluctuations in electrical current¹ and act as a «back-up battery» in the event of a power failure. Soline Cube as well as the internet modem and the landline telephone gateway are connected to this battery² in order to allow a phone call to a relative or a remote assistance service.



1. Smoothing is suitable for small fluctuations. The UPS does not protect Soline from lightning, for example.

2. With these three components connected, the battery lasts about 15 minutes.

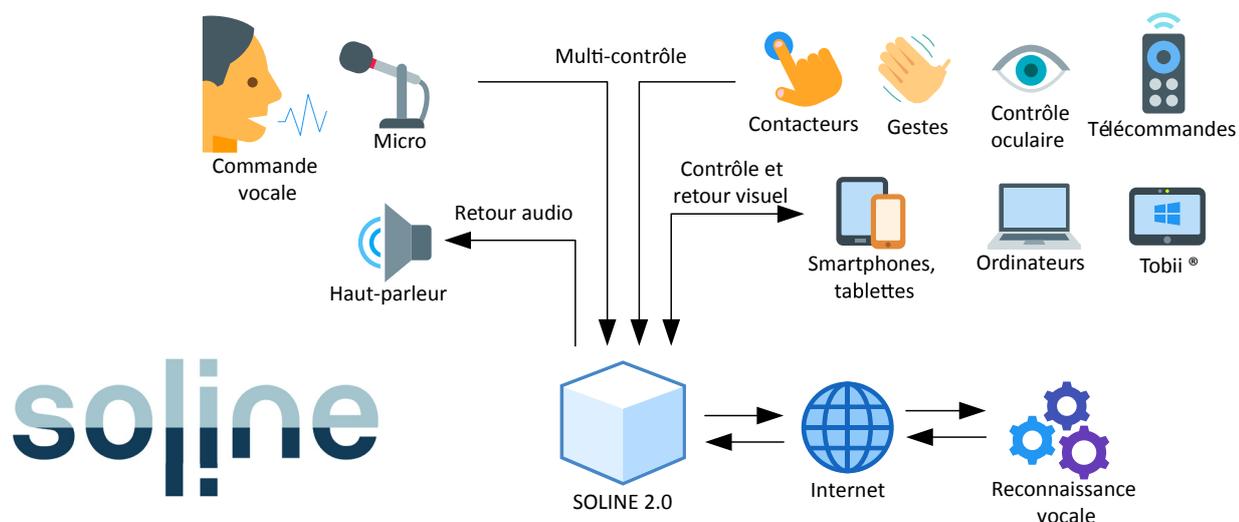
4. General principle of operation

Soline is waiting to receive a command via an interaction mode. The interaction modes are not exclusive: Soline can be vocal, have a visual interface on a tablet and be controlled by a remote control for example.

Soline centralizes the received orders and distributes them to the equipment to be controlled, possibly via a gateway (this is the case for home automation, for example).

The equipment controlled by Soline retains its normal operating mode: Soline is an additional way to control it and is not a substitute for traditional/manual control.

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Fonctionnalités de base de Soline 2.0

TV et décodeur	Téléphonie fixe ou VOIP	Appel infirmière et télé-assistance	Radios internet	Musique (mp3)
Livres audio	Interface visuelle	Contrôle PC	Navigation internet	
Emails	Services vidéo	Réseaux sociaux et de communication		

Fonctionnalités supplémentaires (options)

Lits et fauteuils médicalisés	Lecteur DVD/CD/Hi-Fi	Ascenseur	Caméras, parlophonie, vidéophonie
Eclairages	Prises	Chauffage	Hotte
Volets/stores	Contrôle d'accès	Portes motorisées	Portes de garage

5. The basic components and functions of Soline

5.1. Voice commands

Soline uses voice recognition (coupled with artificial intelligence) as its main mode of interaction. To control a piece of equipment, all you need to do is contact Soline.

There are two ways to order Soline. The first requires that the order be started with the name of Soline¹: for example, «Soline, turn on the television».

The second requires the use of a key word or phrase² so that Soline considers that everything she hears during a given period of time is intended for her. Each command recognized during this period of time causes the counter to be restarted. And so on until the time has elapsed or until Soline is told the output key phrase.

For example :

- «Ok, Soline» (the counter counts down 45 seconds)
- «Turn on the TV» (the counter is reset for 15 seconds)
- «Set the BBC» (idem)
- «I love this show!» (this sentence was heard by Soline but does not constitute an order and therefore the time counter continues to run without resetting)
- «Increase the sound» (the counter is reset to zero for 15 seconds)
- «Once again» (idem)
- «Again» (idem)
- «Thank you Soline» (this is the key phrase to exit, from now on you will have to either say «Ok Soline» again or start an order with «Soline»)

Soline does not require you to learn an order by heart. You can therefore address Soline as you would address a person, which is much more intuitive.

As an example, the following orders are equivalent :

- «Soline, I'd like to watch the BBC»
- «Soline, set the BBC»
- «Soline, switch to BBC
- «Soline, will you change on BBC ?»
- «Soline, I want to look at the BBC»
- «Soline, BBC»
- «Soline, my friend and I would like to watch BBC»
- «Soline, please go on to BBC»
- «Soline, what's on BBC at the moment ?»
- Etc.

Everyone is therefore free to use the most natural or most suitable way according to his abilities.

1. The (first) name of Soline can be modified according to the user's choice. It can also be given a male voice.

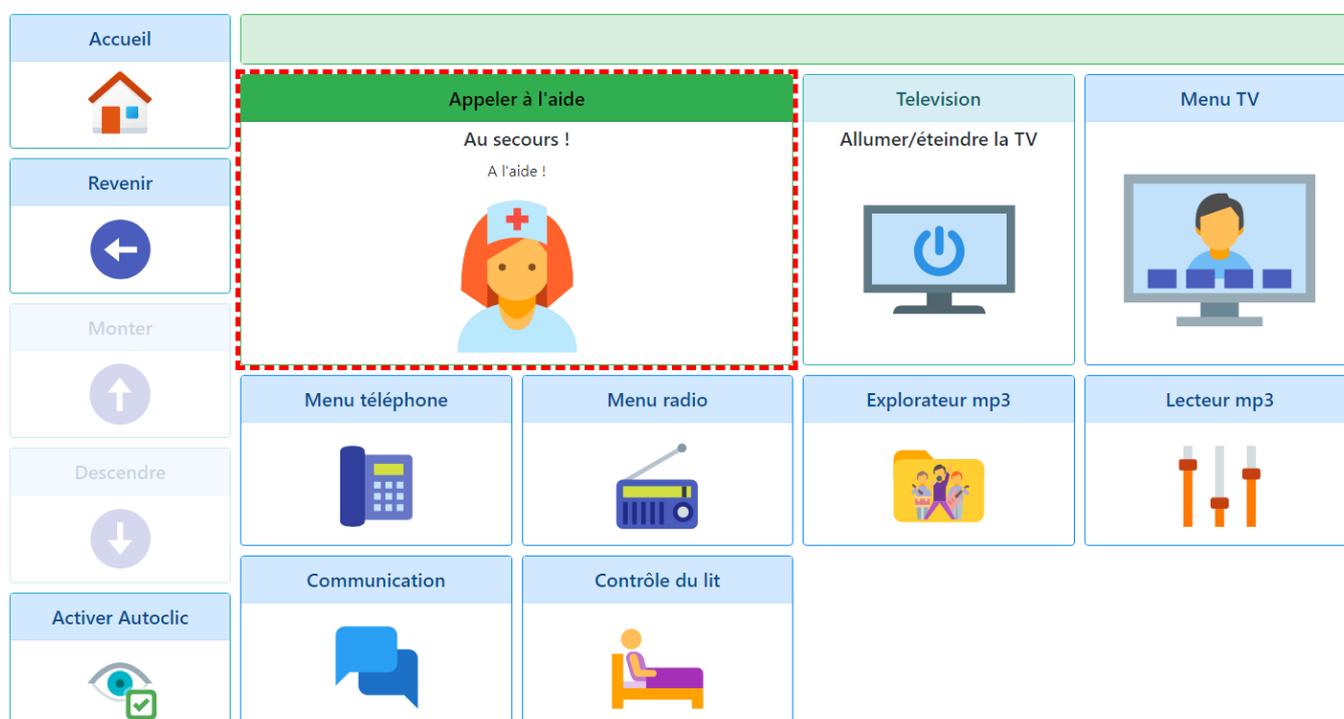
2. By default, the key phrase is «Ok Soline». This phrase can be changed at will like most system settings.

5.2. Visual interface

In order to facilitate some commands, Soline can also control a visual interface that represents the equipment controlled by Soline in the form of icons. This will be displayed on Soline's tablet. It can also be displayed on any device with a screen and an internet browser (smartphone, tablet, PC, etc.). Soline can be supplied with a device that allows the tablet's screen to be duplicated on any screen with an HDMI port, which is generally the case with television. Sets this makes it possible to enjoy a larger screen.

The visual interface can also be controlled by touch on touch-sensitive devices, or by means of the pointers that these devices may be equipped with.

Soline can be equipped with contactors that can also control the visual interface. Finally, the visual interface, displayed on the shelf, can be controlled by eye control.



5.3. Microphones

Soline can be equipped with wired (connected by a USB cable to the cube) and wireless microphones. These microphones are essential tools for communicating with Soline.

5.3.1. USB wired microphones

These microphones are table microphones, placed on a bedside table to be close to the patient's bed, and placed in the bathroom if necessary to allow the continuity of the voice tele-assistance call.



5.3.2. Wireless microphones

The professional-quality tie mike that's provided is composed of a transceiver system that works with UHF radio waves. Each set of transceivers is paired and uses different channels to avoid interference between the different sets. The transmitter can be plugged into an electric wheelchair, so you don't have to worry about recharging the batteries.



5.4. Audio feedback

Soline responds via loudspeakers but also uses them to broadcast the sound of music, a door phone or a telephone.

The ideal is to broadcast the sound of Soline through a fixed audio installation. This is how the Cube is connected to a wired loudspeaker.



Alternatively, it is also possible to broadcast the sound of Soline through a small Bluetooth speaker, which can then be moved at will and follow the user. This loudspeaker can be mounted on an electric wheelchair, so that you don't have to worry about recharging the battery.



5.5. Tele-assistance call

The user can call the remote assistance service of his choice by voice command («Soline! Call the nurses») or via the visual interface of Soline, and therefore by means of the various usable interaction modes.

Depending on the model and brand of the telemonitoring system, it will be connected to the Soline Cube by means of a transmitter that can be activated by Soline. As this transmitter is linked to the chosen service, the telemonitoring operator must provide it.

5.6. Television control



To control infrared equipment, Soline uses a universal remote control that can be controlled via the computer network. Such a remote control can control all the equipment that is in its field of vision or up to six different pieces of equipment if the module is «hidden» in a wardrobe. The user can control it with simple commands such as «Soline, I want to watch BBC» or «Soline, next channel».

Soline has everything you need to record the learning of any infrared television remote control. If a user has a television unknown by Soline, it is possible to teach her the remote control of the television in question.

As Soline controls the decoder, the user has access to all the functionalities integrated into it: video on demand, third-party services (e.g. Netflix, YouTube, etc.), games, etc.

5.7. Phone management

Soline allows you to make and receive phone calls. Either Soline is connected to the home's landline and acts as an additional handset, or Soline is configured as an internet telephone¹ («VoIP»).

In both cases, Soline detects incoming calls and asks whether to pick up. If the answer is yes, the caller is connected. The call is made through Soline's microphone and loudspeaker.

Outgoing calls are very easy, as you only need to ask Soline to call the correspondent whose name and number(s) have been configured beforehand.

For example :

- « Soline, call John » (John's default number will be called)
- «Soline, call Mark at work» (the number linked to Mark's «work» will be called)
- « Soline, phone Mary on her mobile » (Mary's mobile number will be called)
- Etc.

To manage the phone, a small device is installed, which is called analogue - digital interface. It connects to the landline and allows Soline to manage all the functionalities of a conventional phone.

The phone ringing will be heard through the system's loudspeakers: Soline indicates that someone is calling and asks the user if he wishes to pick up. Once the call has been established, the conversation takes place through Soline's microphone and the system's loudspeakers.

¹ NB: Additional subscription and communication charges may apply.



5.8 Management of music and audio books

Soline is delivered with a USB key to allow the user to host his music in MP3 format as well as his audio books.

He can then ask Soline to listen to such and such a book, album or artist. The visual interface is also available to make it easier to choose music and books to listen to.

It is recommended to organize the audio files according to the directory structure.

«Artist/Album/Song» or «Author/Book/Chapter».

Example of mp3 key content :

```
Books
  Harry Potter
    Harry Potter and the Philosopher's Stone
      01 - Chapter 1.mp3
      02 - Chapter 2.mp3
      Etc.
    Harry Potter and the Chamber of Secrets
      01 - Chapter 1.mp3
      02 - Chapter 2.mp3
      Etc.
  Agatha Christie
    Murder on the Orient Express
      01 - Chapter 1.mp3
      02 - Chapter 2.mp3
      Etc.
Music
  Coldplay
    Parachutes
      01 - Don't panic.mp3
      02 - Shiver.mp3
      03 - Spies.mp3
      04 - Sparks.mp3
      05 - Yellow.mp3
      Etc
  The Beatles
    Abbey Road
      01 - Come Together.mp3
      02 - Something.mp3
      03 - Maxwell's Silver Hammer.mp3
      Etc.
    1962 - 1966
      Etc.
  Etc.
```

It is then possible to ask Soline to make a playlist of an artist's songs, to listen to an album or even a specific song, based on the name of the folder or file that will have been encoded.

- « Soline, I want to listen to Coldplay » (Soline plays all Coldplay's albums in order)
- « Soline, I want to listen to Parachutes » (the album « Parachutes » is played)
- « Soline, I want to listen to Yellow » (the song « Yellow » is played)
- « Soline, I want to listen to the song Parachutes » (in this case, it is necessary to specify that you want to listen to a song otherwise Soline takes the whole album of the same name)
- « Soline, I want to listen to Without you, by Nilsson » (here we have specified « by Nilsson » to avoid playing Mariah Carey's version for example - the example presumes that both versions are on the USB key, otherwise this precision is not necessary).

This also applies to audio books:

- « Soline, I want to listen to « Harry Potter and the Philosopher's Stone ».
- « Soline, I want to listen to « Murder on the Orient Express ».
- Etc.

Unlike music, audio books pick up where we left off.

5.9. Management of internet radios

Soline allows you to listen to internet radio stations, or mp3 streams from official radio stations, via the internet.

Once again, the orders are very natural. For example:

- Soline, I want to listen to BBC radio »
- « Soline, BBC radio »
- « Soline, put BBC radio on »
- «Soline, please, can you put BBC radio on ? »
- Etc.

5.10. Surfing on the Internet

Soline allows its user to surf on the Internet, in the true sense of the word. He can choose the link he wants to follow, and is not limited to trivial questions such as «What will the weather be like tomorrow? ».

Browsing the internet with Soline is based on a totally new technology that consists of displaying a number next to each internet link. All you have to do is ask Soline to click on the number of the link to which you wish to navigate («Soline, click on link n°18»).

This internet surfing functionality gives access to all current internet services, such as news sites, Netflix, Spotify, Facebook, YouTube, ...

It also allows you to consult and write e-mails, through the web interface of the provider of this service.

5.11. Communication module

Soline has a communication module, which allows users who have difficulty expressing themselves to indicate their wishes or feelings using icons.

This communication module is fully customisable and can be adapted to the situation of each user.

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6. Optional additional features

6.1. Light and sockets

The lighting can be controlled by switching (On/Off) or dimming (Dimmer), single or toggle control, by remote switch and/or timer. All types of lighting can be controlled (filament bulbs, halogens, LEDs, neon tubes, ...).

Power sockets (and associated electrical circuits) can be controlled (On/Off), and even supervised by measuring current consumption. An hourly security can be introduced: checking consumption at a certain time and switching off (after questioning or automatically).

As far as possible, Soline takes control of this equipment by means of devices included in its own Wifi network. This avoids the need to add an additional home automation controller, certainly when only a few such items need to be controlled.

6.2. Motorized beds and armchairs

Soline can control beds and armchairs in two different ways :

- Either by infra-red if the device to be controlled allows it and is already equipped with an IR receiver.
- Either in addition to the wired remote control of the device¹

Simple and intuitive controls are then used to operate the device.

For example :

- «Soline, raise the backrest»
- «Soline, get the feet up»
- «Soline, lower the backrest for 5 seconds»
- Etc.

6.3. Intercom, video intercom and access control

The inhabitant can be put in communication with a visitor at his door thanks to the integration of a doorkeeper (audio or video, with or without keyboard). If there is a video signal, it can be displayed on the television or on a screen of his choice.

The addition of a keypad to the doorphone makes it possible to grant an access code to regular visitors, according to a set schedule. These visitors then have access to the residence only if they enter their code during the authorized time slot.

1. In this case, as in the case of the nurse call bulb, it is necessary to provide us with the model brand of the remote control, and if necessary, a remote control that will be «sacrificed» in order to understand how it works.

6.4. Heating

The heating times of a boiler can be controlled (at the thermostat), as well as the individual temperature of the radiators (at the thermostatic valve).

6.5. DVD/Blu-Ray/CD player, hi-fi system and other infra-red equipment

Soline incorporates an infra-red transmitter and can of course control any equipment controlled by an infra-red remote control.

This includes CD/DVD/Blu-Ray players to hi-fi systems, kitchen hoods, some stoves, lighting, etc.

6.6. Motorized shutters, blinds, curtains, doors and windows

The opening and closing of shutters, blinds, curtains, motorized doors (internal or external, swinging or sliding), garage doors, gates or motorized windows can be operated through the Soline system and the associated strikes and electric locks.

Once again, Soline takes control of this equipment, as far as possible, by means of devices included in its own Wifi network.

6.7. Lift

Soline can call a lift at a given level, or send it back to a storage location, superimposing itself on the controls of these devices.

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7. Partners

7.1. Belgium

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