PULSELAB

PULSERESCUE

Integration of emergency medical systems

The following documentation describes how emergency medical systems can interact in a programmatic way with an instance of PULSERESCUE, a system for managing and alerting first responders.

DESCRIPTION

PULSERESCUE is a system for managing and keeping track of first responders, so that they can be alerted and notified in case of emergencies, and for maintaining a registry of automatic external defibrillators (AED), to be used during an active rescue operation. The system will not only alert the certified first responders with the highest chances of reaching the emergency in time, but also provide all tools to support them during this task.

The system is aimed primarily at emergency operations centres with the goal to provide the means to strengthen the chain of survival, specifically during the stages before the arrival of the ambulance, and therefore to help increase the number of saved lives.

First responders will be able to use one of the supported smartphone applications to interact with the system that is active for a predefined geographical region/area. After the registration to the system associated to the region/area, that can be followed by an approval process right from the system control's panel, the first responder will be tracked geographically by the application so that he/she can be notified in case of nearby emergencies.

The notification will be delivered using various communication channels and will provide first responders with partial information about the location of the victim. After they have given their explicit consent to participate, all the details of the emergency in order to reach the victim or to pickup a nearby automatic external defibrillator (AED) will be given.

The application will guide the first responder to the exact location of the emergency and once there will provide all tools to perform life saving techniques and to get updates about the status of the emergency, like the estimated time of arrival of the ambulance.

First responders that have actively participated in an emergency will be asked to compile a feedback form, that is used to detect issues and problems that the first responder has encountered.

ARCHITECTURE

PULSERESCUE is a highly scalable and reliable system that can be used to manage not only a single area/region, but can be configured to serve and cover multiple areas. It can, for example, be therefore used not only for a single district, but also for states that would like to activate it for all or some of it's districts.

Each area/region can be associated and covered by a system instance of PULSERESCUE, providing full control of all the registered first responders of the respective instance and which allows a programmatic interaction with external systems, as outlined in this document.

The system is offered as a service by means of a scalable cloud infrastructure, that can host multiple system instances to be associated with single areas or regions. If necessary, it is also possible to install and maintain the PULSERESCUE system on a private server.

API

The interaction with the PULSERESCUE system is accomplished by means of HTTP requests based on information encoded using the JSON format. The communication will only available on a secure channel encrypted using a valid SSL certificate. As long as the the encoded information represents valid JSON and adheres to the provided specification, then the information can also be compressed or minified.

The endpoints of the API is composed of modules, each providing different kind of endpoints.

AUTHENTICATION AND AUTHORISATION

In order to use the API endpoints described in this document a custom HTTP header with the name **X-Auth-Token** and a valid authentication token as it's value has to be provided during the request. This token will not only be used to authenticate and authorise request attempts but also to uniquely identify the external server that is associated to an instance of the PULSERESCUE system.

The authentication token is composed by a hexadecimal hash generated by the PULSERESCUE system and is available from the respective system's control panel.

MODES

There exists different ways to interact with the API endpoints and this section will briefly describe the available interaction modes. The following information refers to the managed PULSERESCUE cloud infrastructure.

The necessary information for integrating and using the different interactions modes with a private PULSERESCUE instance will be defined and made available for each instance separately.

SANDBOX MODE

This mode can be used to perform tests during the development phase of the integration between PULSERESCUE and emergency medical systems. All sent data will be stored, but will be clearly separated from the rest. When invoking API endpoints using this mode, **NO** real-world user will ever be notified and alerted.

In order to use this mode on the managed PULSERESCUE cloud infrastructure, the following host has to be used during requests

```
sandbox.api.pulserescue.com
```

PRODUCTION MODE

This mode is used in production and will alert all relevant first responders accordingly through the available communication channels.

In order to use this mode on the managed PULSERESCUE cloud infrastructure, the requests ought to be sent to the following host

```
api.pulserescue.com
```

REQUESTS

Requests to the API's endpoints are performed using the following scheme, where **HOST** is determined by the chosen interaction mode and **RESOURCE** depends on the endpoint to interact with.

```
https://{HOST}/{RESOURCE}
```

RESPONSES

All API endpoints will contain either no response, when the operation was successful and no relevant information is available, or a response encoded using JSON. The outcome of the operation can be determined by the status code of the HTTP response.

STATUS CODE	DESCRIPTION
200: OK	The operation was completed successfully.
400: BAD REQUEST	Invalid request, details are found in the response's body.
401: UNAUTHORIZED	Authentication token is either missing or invalid.

EMERGENCIES API

This module of the API is meant to forward all information about emergencies handled by emergency medical systems and for which the first responders of the PULSERESCUE system have to be alerted. The following endpoints allow to dispatch new emergencies, to mark active emergencies as completed and to request information from the system about the dispatched emergency.

EMERGENCY DISPATCH

This endpoint is used to dispatch emergencies and will result in an alert and notification to all first responders tracked by the respective instance of the PULSERESCUE system that have the required competences.

For dispatching a new emergency all details about the address and location of the emergency have to be specified. All components of the address will have to be specified separately, so that it is possible to show only partial information to first responders that still haven't given their consent to participate. If available, the exact geographical position of the emergency has to be defined.

Additionally, some details about the emergency's victim, like gender and age, can be defined which can be used to perform statistical analysis and inferences.

REQUEST

METHOD	RESOURCE
POST	v1/ems/emergencies/dispatch

NAME	DEFINITION
datetime	**TIMESTAMP** - Optional UNIX timestamp (in milliseconds) of the reported emergency, if not defined the current time will be used.
address	**OBJECT** - Required Complete address of the emergency.
address.street	**STRING** - Required Street name.
address.number	**STRING** - Required House number.
address.place	**STRING** - Optional Name of the place, if different from the municipality.
address.municipality	**STRING** - Required Municipality name.
address.state	**STRING** - Required State of the address.

NAME	DEFINITION
position	**OBJECT** - Optional Exact geographical position of the emergency.
position.latitude	**NUMBER** - Required Latitude in decimals.
position.longitude	**NUMBER** - Required Longitude in decimals.
details	**STRING** - Optional Additional details about the place/location of the emergency.
victim	**OBJECT** - Optional Statistical information about the victim.
victim.gender	**STRING** - Required Gender of the victim. Only the following values are allowed: "M" and "F".
victim.age	**NUMBER/STRING** - Required The victim's age in years, either as number or as range.

RESPONSE

NAME	DEFINITION
id	**STRING** Unique ID of the emergency, that can be used for further interactions.

EMERGENCY COMPLETION

Active emergencies can be completed, which will notified to the participating first responders accordingly. As soon as this operation is performed, no further interaction for this emergency is allowed.

If active emergencies are not completed explicitly, then they will be completed automatically by the system after a predefined time.

REQUEST

METHOD	RESOURCE
POST	v1/ems/emergencies/complete

NAME	DEFINITION
id	**STRING** - Required Unique ID of the dispatched emergency.
datetime	**TIMESTAMP** - Optional UNIX timestamp (in milliseconds) of the completion of the emergency, if not defined the current time will be used.

RESPONSE

No particular response content is expected from this endpoint.

EMERGENCY INFORMATION

This API endpoint is used to get information about a dispatched emergency, like number of active first responders, their estimated time of arrival and other useful statistical values.

REQUEST

METHOD	RESOURCE
GET	v1/ems/emergencies/{ID}

Where **ID** is the identifier generated when an emergency has been dispatched.

RESPONSE

NAME	DEFINITION
activeFirstResponders	**NUMBER** Number of active first responders.
candidateFirstResponders	**NUMBER** Total number of notified first responders.
firstResponders	**ARRAY** Information about first responders.
firstResponders[*].join	**TIMESTAMP** UNIX timestamp (in milliseconds) when the first responder has joined the emergency.
firstResponders[*].eta	**NUMBER** Number of seconds until arrival of the first responder. Can be set to NULL if unknown.

MESSAGING API

This API module allows to send textual or audio messages to all first responders that are actively participating in a dispatched emergency. This feature is meant for delivering important information easily and in a reliable way to multiple first responders.

Depending on the available communication channels towards the first responders only some message types will be delivered.

TEXT MESSAGE BROADCAST

This endpoint allows to send a short textual message to all first responders that have given their consent to participate to the emergency. The length of the message is limited, so that this type of message can be delivered using almost all available communication channels.

REQUEST

METHOD	RESOURCE
POST	v1/ems/messaging/broadcast/text

NAME	DEFINITION
id	**STRING** - Required Unique ID of the dispatched emergency.
content	**STRING** - Required Text message. Length is limited to 140 characters.

RESPONSE

No particular response content is expected from this endpoint.

AUDIO MESSAGE BROADCAST

This endpoint allows to send an audio-based message to all active first responders that have are using a compatible communication device. If an alternative "fallback" textual message is also specified, then the message can be delivered to all first responders that are not using a communication device capable of playing back audio-based messages.

It is possible to define provide the audio content using either a lossless format like WAV or lossy formats like AAC and MP3.

REQUEST

METHOD	RESOURCE
POST	v1/ems/messaging/broadcast/audio

NAME	DEFINITION
id	**STRING** - Required Unique ID of the dispatched emergency.
content	**STRING** - Required Audio message encoded as a BASE64 string, limited to a total duration of 60 seconds. Only WAV, AAC and MP3 formats are supported.
message	**STRING** - Optional Text message for first responders that can't listen to this type of message. Length is limited to 140 characters.

RESPONSE

No particular response content is expected from this endpoint.

STATUS API

This module allows to define all emergency services that have been activated by the emergency operations centre and continuously update their position or estimated time of arrival. This information is crucial to the first responders that are en-route or already at the location of the emergency.

SERVICE DEPARTURE

By using this endpoint it is possible to define and signal the dispatch and departure of emergency service for a specific emergency.

REQUEST

METHOD	RESOURCE
POST	v1/ems/status/services/departed

NAME	DEFINITION
id	**STRING** - Required Unique ID of the dispatched emergency.

NAME	DEFINITION
type	**STRING** - Required Service type. Possible values are "ROAD", "WATER" and "AIR".
ref	**STRING** - Optional Unique identifier of the service.
datetime	**TIMESTAMP** - Optional UNIX timestamp (in milliseconds) of the departure of the service, if not defined the current time will be used.

RESPONSE

NAME	DEFINITION
id	**STRING** Unique ID of the activated service, that can be used for further interactions.

SERVICE UPDATE

This endpoint allows to update the current information for an activated emergency service, like it's position/location and the estimated time of arrival.

REQUEST

METHOD	RESOURCE
POST	v1/ems/status/services/update

NAME	DEFINITION
id	**STRING** - Required Unique ID of the activated service.
position	**OBJECT** - Optional Current geographical position of the service.
position.latitude	**NUMBER** - Required Latitude in decimals.
position.longitude	**NUMBER** - Required Longitude in decimals.
eta	**NUMBER/STRING** - Optional Estimated time of arrival in either seconds or as a time interval in the form "mm:ss" (where "m" stands for minutes and "s" for seconds).

RESPONSE

No particular response content is expected from this endpoint.

SERVICE ARRIVAL

Activated emergency services can be marked as arrived by using this endpoint.

REQUEST

METHOD	RESOURCE
POST	v1/ems/status/services/arrived

NAME	DEFINITION
id	**STRING** - Required Unique ID of the activated service.

RESPONSE

No particular response content is expected from this endpoint.