

**Vision apps – GPIO Gateway**



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## 1 Preface

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## 2 GPIO Gateway vision app

The GPIO Gateway vision app allows you to switch the IDS NXT camera outputs depending on the results of the CNN manager vision app . The CNN manager vision app is required to use the GPIO Gateway vision app.

### Symbols and hints

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This symbol indicates hints with useful information for better understanding and using features and functions.

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This symbol indicates important warnings for product safety to prevent damage.

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### 2.1 Overview

You activate and configure the vision app in IDS NXT Cockpit.

1. Open the IDS NXT Cockpit.
2. Go to the "VApp Manager" section.
3. Activate the GPIO Gateway vision app via the slider. As soon as the vision app is activated, it is displayed in the navigation on the left.
4. When the vision app is running, you can connect the result sinks of the vision app with the result sources of the CNN manager vision app.
5. Connect the 1st entry with the result source "Inference" and the 2nd entry with the result source "Probability".
6. [You can make further settings directly in the vision app.](#)

VApp Manager

The screenshot shows the VApp Manager interface with five VApp tiles: CNN manager (Running), Crawler (Running), GPIO gateway (Running), RS-232 gateway (Not running), and Install VApp (+). The 'GPIO gateway' tile is selected, opening a configuration window for 'GPIO gateway v2.0.3' by 'IDS Imaging Development Systems GmbH'. The window includes a description: 'Switches an output on a specific result of the CNN manager. Only the result with the highest probability is evaluated.' Under 'Result sinks', there are two columns of dropdown menus. The first column has 'VApp' set to 'CNN manager' and 'Result source' set to 'Inference'. The second column has 'VApp' set to 'CNN manager' and 'Result source' set to 'Probability'. At the bottom, there are two 'Connected' status indicators with Android robot icons.

Fig. 1: Activate GPIO Gateway



For each image, only the result with the highest probability is transferred, i.e. only one output per image is switched.

## 2.2 Settings

### Actions

With the "Query last inference" button, you can query the last inference (the result with the highest probability). The result is displayed in the "Last inference" field in the "Settings" area.

### Settings

- Class 1 / Class 2  
Via the input fields "Class 1 / Class 2" you set the result classes which are to be evaluated for the activation of the assigned output.



Make sure to write the class names exactly as they are displayed in the "Last inference" field, as a different spelling or an additional space will lead to errors in the evaluation.

- Threshold 1 / Threshold 2  
Use the slider to define the probability at which the assigned output is to be switched.
- Output class 1 / Output class 2  
With the dropdown lists, you assign an output to class 1 or class 2.
- Activation time  
Use the slider to define the duration in milliseconds that an output is active.  
In triggered mode, the activation time should be adjusted to the trigger rate (1/fps). This prevents that a new signal for activation arrives before the activation time of the previous signal is finished. In free-running mode, the frame rate must be considered accordingly.

- Last Inference  
Displays the last result with the highest probability. The field is empty until you click the "Get Last Inference" button in the "Actions" area. You can copy the result and paste it into the fields Class 1 or Class 2.

Configurables

Class 1	dog
Threshold 1	
	<small>If the probability threshold is exceeded, the connected output is activated.</small>
Class 2	cat
Threshold 2	
	<small>If the probability threshold is exceeded, the connected output is activated.</small>
Output class 1	<input type="text" value="Output 1"/>
Output class 2	<input type="text" value="Output 2"/>
Activation time	
	<small>Defines the duration for how long an output is active when the threshold value is exceeded.</small>
Last inference	dog
	<small>Last result of the CNN Manager with the highest probability</small>

Fig. 2: Settings in GPIO Gateway

### 3 REST interface

The description of the REST interface here is limited to the parameters/values that are specific for the GPIO Gateway vision app. A more detailed description of the IDS NXT REST interface can be found in the manual "IDS NXT - REST interface".

REST queries of IDS NXT vision apps are only possible if the corresponding vision app is activated, as they are generated dynamically during runtime.

Depending on the action and parameters, the used HTTP methods are color-coded and assigned to the permission of IDS NXT user profiles (see manual "IDS NXT - Setup").

USER

SERVICE

ADMIN

#### 3.1 /vapps/gpiogateway

/vapps/gpiogateway

- GET **USER**
- OPTIONS **USER**

Provides information about the GPIO Gateway vision app.

##### Response format

The content of the HTTP response is transferred in JSON format (application/json).

##### Return values

- **Activated** (Boolean): Activation status of the vision app
- **Brief** (string): Short description of the vision app
- **Description** (string): Long description of the vision app
- **Manufacturer** (string): Manufacturer of the vision app
- **Name** (string): Name of the vision app
- **Status** (string): Runtime status of the vision app "NotRunning", "Starting", "Running", "Crashed", "FailedToStart", "TimedOut", "ReadError", "WriteError", "UnknownError", "Incompatible"
- **Title** (string): Vision app title
- **Type** (string): Vision app type (vision app, plugin, system)
- **Version** (string): Version of the vision app

##### Error response

See [Error codes](#)

##### Sample code

```
curl -i -X GET -u admin:ids "http://<ip>/vapps/gpiogateway"
```

#### 3.2 /vapps/gpiogateway/actions/x\_refreshlastresult

/vapps/gpiogateway/actions/x\_refreshlastresult

- GET **USER**

- OPTIONS **USER**
- POST **SERVICE**

Updates the result of the last inference (the result with the highest probability), see </vapps/gpiogateway/configurables>.

#### Response format

The content of the HTTP response is transferred in JSON format (application/json).

#### Return values

- **Active** (Boolean): True when the action is executed.
- **Brief** (string): Short description of the action
- **Description** (string): Description of the action
- **Enabled** (Boolean): True, if the execution of the action is allowed
- **Title** (string): Title of the action
- **ZIndex** (integer): Z-Index of the action

#### Error response

See [Error codes](#)

### 3.3 /vapps/gpiogateway/configurables

#### /vapps/gpiogateway/configurables

- GET **USER**
- OPTIONS **USER**
- PATCH **SERVICE**

Shows the current settings of the vision app or changes the settings via the PATCH command.

#### Response format

The content of the HTTP response is transferred in JSON format (application/json).

#### Return values

- **a\_keyword1** (string): Class 1
- **b\_threshold1** (integer): Threshold 1. The threshold defines which minimum inference class 1 must reach to switch the assigned output.
- **c\_keyword2** (string): Class 2
- **d\_threshold2** (integer): Threshold 2. The threshold defines which minimum inference class 2 must reach to switch the assigned output.
- **f\_out1** (GPIOOutput): Output class 1
- **g\_out2** (GPIOOutput): Output class 2
- **h\_timeout** (integer): Activation time in milliseconds
- **x\_lastresult** (string): Last inference that was detected, for updating use [/vapps/gpiogateway/actions/x\\_refreshlastresult](/vapps/gpiogateway/actions/x_refreshlastresult).

#### Error response

See [Error codes](#)



**Sample code**

```
curl -i -X GET -u admin:ids "http://<ip>/vapps/gpiogateway/configurables"
```

**3.4 /vapps/gpiogateway/resultsinks/<resultsink>**

/vapps/gpiogateway/resultsinks/<resultsinks>

- GET **USER**
- OPTIONS **USER**
- PATCH **SERVICE**

Returns the data of the connected result sink or sets a result sink via the PATCH command.

**Response format**

The content of the HTTP response is transferred in JSON format (application/json).

**Return values**

- **Brief** (string): Brief description of the result sink
- **Connected** (Boolean): Connection status
- **Description** (string): Description of the result sink
- **Source** (string): Specific result sink
- **Title** (string): Name of the result sink
- **Type** (string): Type of result sink
- **VApp** (string): Vision app which provides the result sink

**Error response**

See [Error codes](#)

**Sample code**

```
curl -i -X GET -u admin:ids
"http://<ip>/vapps/gpiogateway/resultsinks/<resultsink>"
```

**3.5 Error codes**

For the REST queries, HTTP response codes are used as return values. The following HTTP codes are possible return values of the REST queries, in general any HTTP code would be possible:

HTTP code	Description
200	Success
404	The requested object could not be found (e. g. wrong path)
405	The query must be made using other HTTP methods, e. g. OPTIONS instead of GET.
500	Internal device error
503	Result not available (e.g. no code read yet)

		threshold	5
<b>- A -</b>			
Action	7		
inference	5		
Activation time			
output	5		
<b>- C -</b>			
CNN manager			
result	4		
Configurables	8		
<b>- E -</b>			
Error code	9		
<b>- G -</b>			
GPIO Gateway	4		
activate	4		
result sink	4		
result source	4		
<b>- I -</b>			
Inference			
last	5		
Interface			
REST	7		
<b>- O -</b>			
Output			
activate	5		
assign	5		
duration	5		
<b>- P -</b>			
Probability			
threshold	5		
<b>- R -</b>			
REST			
action	7		
configurables	8		
result sink	9		
vision app	7		
result class	5		
Result sink	9		
connect	4		
Result source			
inference	4		
probability	4		
<b>- S -</b>			
Settings			
result class	5		