PANTOBOT Pantograph Automated Vision Inspection SYStem

Henesis PANTOBOT 1.0

Product Overview

PANTOBOT is a software tool for the automatic monitoring of train pantographs. The system can process images acquired from trains crossing remote monitoring stations at full speed.

Organized as web service, PANTOBOT allows real-time remote classification of the pantograph model in incoming images and the recognition of the contact material on the contact bars.

PANTOBOT integrates several other modules for real time analysis on the pantograph state: in particular the excessive wear of contact bars and geometrical deformations of the pantographs.

A specific module for the automatic generation of alerts to the human operators makes their task, which is tedious and error prone, yet crucial, much easier (a reduction of more than 80% on their workload was measured).

**Technical specifications**

<table>
<thead>
<tr>
<th>Operative System</th>
<th>Platform independent</th>
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<tbody>
<tr>
<td>Communication protocol</td>
<td>Web Service; communication interface:</td>
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<tr>
<td></td>
<td>SOAP+XML/MTOM</td>
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<tr>
<td>Architecture</td>
<td>System Core + Plug-in for easier</td>
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<td></td>
<td>expandability</td>
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<tr>
<td>Processing time per image</td>
<td>&lt; 5 seconds*</td>
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*this time was measured on a standard PC and does not include network latency and transmission time of the image to the server.

**Features**

- Real time processing of images acquired while the train is running
- Classification of pantograph model (ex: ATR90, FS 52 AV…)  
- Recognition of material covering the concat bars (graphite, copper)
- Analysis of wear on the contact bars
- Deformation and morphological analysis of the pantograph
- Tolerant to non perfect alignment of the cameras
- Web Service
- Remote management (also the calibration can be done remotely)
- Easily customizable and extendable
- Automatic alarm can be inserted.

During extensive validation on Italian high-speed railway line in operative conditions, PANTOBOT allowed a reduction of the workload of human supervisors by more than 80%. PANTOBOT detected 100% of broken or damaged pantographs.

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