



Railways

Michael
Reichert
(Nakaner)

Tagging

Tracks

Stations

Signals

Train Protection

Mapping by

Foot or
Bicycle

Mapping by
Train

Numbers

Community

Railway Mapping at OpenStreetMap

Michael Reichert (Nakaner)

Brussels

24 September 2016



Outline

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- 1 Tagging
 - Tracks
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 - Stations
 - Signals
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- 2 Mapping by Foot or Bicycle
- 3 Mapping by Train
- 4 Numbers
- 5 Community



Tagging Tracks

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- `railway=rail/tram/*`
- other types: `light_rail`, `subway`, `monorail`, `funicular`
- Please always add `gauge=<value in mm>!`
- `rack=yes/abt/locher/*`
- `electrified=contact_line/rail/...`,
`voltage=<value in Volt>`,
`frequency=<value in Hz>/0`
- `railway:preferred_direction=`
`forward/backward/both`



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The lifecycle:

- `railway=disused + disused=rail/tram/*`
- or `railway=disused + disused:railway=rail/tram/*`
- `abandoned`: tracks missing, ballast already there
- `construction`: under construction



Tagging Tracks

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Always disputed

railway=dismantled



railway=proposed



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Tagging Tracks

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railway=razed





Tagging Tracks

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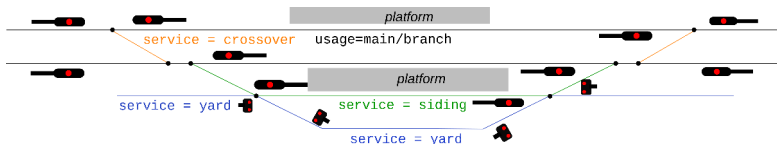
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- `usage=main/branch/industrial/military/test` – usage of the railway line
- `service=siding/spur/crossover/yard` – minor tracks in station



Tagging Stations

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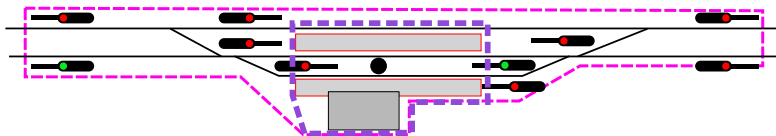
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Tagging Stations

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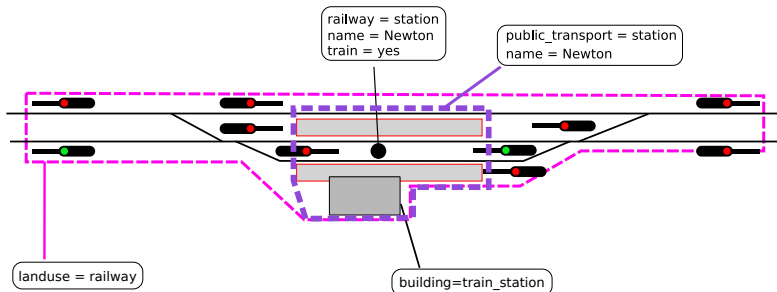
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Tagging Stations

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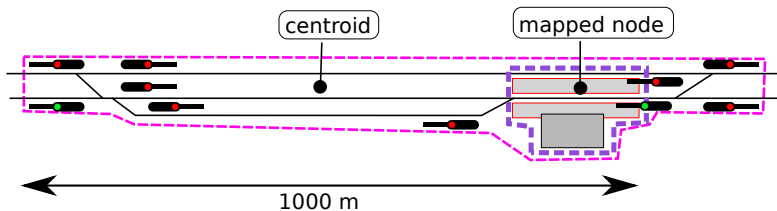
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Stations can be assymmetric. This happens quite often.





Tagging Signals

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Basic signal tags:

- `railway=signal`
- `railway:signal:direction=forward/backward/both`
- `railway:signal:position=left/right/bridge/
in_track/catenary`
- `ref=*`





Tagging Signals

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34 signal types

main

distant

combined

minor

shunting

crossing

electricity

speed_limit

...

- `railway:signal:<type> =`
`<country>-<operator/ruleset>:<name>`
- Example: `railway:signal:main = DE-ESO:hp`



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...

- `railway:signal:<type> =`
`<country>-<operator/ruleset>:<name>`
- Example: `railway:signal:main = DE-ESO:hp`
- `railway:signal:<type>:form =`
`light/semaphore/sign`
- Example: `railway:signal:main:form = light`



Tagging Signals

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- `railway:signal:<type> = <country>-<operator/ruleset>:<name>`
- Example: `railway:signal:main = DE-ESO:hp`
- `railway:signal:<type>:form = light/semaphore/sign`
- Example: `railway:signal:main:form = light`
- `railway:signal:<type>:states = [list]`
- Example: `railway:signal:main:states = DE-ESO:hp0;DE-ESO:hp1`
- `railway:signal:<type>:height = normal/dwarf`



Tagging Signals

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34 signal types

main	minor	electricity
distant	shunting	speed_limit
combined	crossing	...

- `railway:signal:<type> = <country>-<operator/ruleset>:<name>`
- Example: `railway:signal:main = DE-ES0:hp`
- `railway:signal:<type>:form = light/semaphore/sign`
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Taggings

Signals

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Country	Tagging	OpenRailwayMap
Germany DB	full	few signals left
German trams	partially	similar to tagging
Austria	full	important signals
Finnland	full	some signals
Switzerland	draft	no
UK	early draft	no



Tagging

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- **country-specific topic**
- `railway:pzb=yes/no` for German PZB system
- `railway:lzb=yes/no` for German LZB
- `railway:etcs=yes/1/2/3` for European Train Control System
- `railway:*=yes/no/*`



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- `railway:*=yes/no/*`
 - unlimited number of keys
 - impossible to tag "no train protection"
 - tagging system needs rework



Tagging

Train Protection

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Mapping

Overview

Railways

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Tagging

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Mapping by Foot or Bicycle

Mapping by Train

Numbers

Community

- by foot or bicycle
- by train
 - taking notes
 - GPS waypoints with notes
 - geotagged photos
 - videos (with and without geotagging)
- Bing, Mapbox Aerial and other imagery sources
- photos published on forums by railway fans (ask them beforehand!)
- open data (data.deutschebahn.com) if license is compatible



Mapping by Foot or Bicycle

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Mapping by Foot or Bicycle

Mapping by Train

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Java-OpenStreetMap-Editor

Menü: Datei Bearbeiten Ansicht Werkzeuge Weitere Werkzeuge Daten Auswahl Vorlagen Hintergrundbild Fenster Audio Hilfe

Menü: Ebene Ebene 1
Wegpunkte von Wegpunkte_03-APR-15.gpx
Track: 130x800-BEWAHRUNG-NORD-OST-+E-LERN.gpx
Bing Luftbild

Merkmale: 8 / Mitgliedschaften: 0

OpenRailwayMap Signale DE ESO/Schutzsignale/Schutzhaltsignale

Schlüssel	Wert
railway	signal
railway:signal:direction	backward
railway:signal:minor	DE-ESO-sh
railway:signal:minor:form	light
railway:signal:minor:height	default
railway:signal:minor:status	DE-ESO-hp0.DE-ESO-sh1
railway:signal:position	left

Hinzufügen Bearbeiten Entfernen

Ausw.: Rel.:0(Lin...0(Pkte):1

3435657291 (49.1213261, 9.1683063)

Auswahl Suche Chronik

Prüfergebnisse

Auswahl Nachsch... Prüfung Reparatur Ignorier...

MapPaint-Stile

© 2016 Repox 0-Dev/Convent/01/Anzahl:0/2016 R124 © 2016 Microsoft Corporation

49.1254417 9.1628295

(Kein Objekt)

te zum Hinzufügen zur Auswahl (Strg festhalten), Umschalttaste-Strg zum Drehen der Auswahl; Alt-Strg zum Skalieren der Auswahl; oder Auswahl ändern



Mapping by Foot or Bicycle

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Java-OpenStreetMap-Editor

Datei Bearbeiten Ansicht Werkzeuge Weitere Werkzeuge Daten Auswahl Vorlagen Hintergrundbild Fenster Applio Hilfe

Manuëlräge suchen

Ebenen

- Datenebene 1
 - Wegpunkte von Wegpunkte_03-APR-15.gpx
 - Track_1318483-BEHMAPPING-NORDHEIM-FELDEN.gpx
 - Bng Luftbild

Merkmale: 8 / Mitgliedschaften: 0

OpenRailwayMap Signale DE ESO/Schutzsignale/Schutzhalt signa

Schlüssel	Wert
railway	signal
railway:signal:direction	backward
railway:signal:minor	DE-ESO-sh
railway:signal:minor:form	light
railway:signal:minor:height	short
railway:signal:minor:status	DE-ESO-hp3-DE-ESO-ah1
railway:signal:position	left

Hinzufügen Bearbeiten Entfernen

Ausw.: Rel.: 0/Ln.: 0/Pkte.: 1

3435657291 (49.1213263, 9.1683063)

Auswahl Suche Chronik

Prüfergebnisse

Auswahl Nachsc... Prüfung Reparier... Ignorier...

MapPaint-Stile

4900 (30 Punkte) te zum Hinzufügen zur Auswahl (Strg festhalten); Umschalttaste-Strg zum Drehen der Auswahl; Alt-Strg zum Skalieren der Auswahl; oder Auswahl ändern



Mapping by Foot or Bicycle

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Mapping by Foot or Bicycle

Mapping by Train

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The screenshot shows the Java-OpenStreetMap-Editor interface. The main map area displays a railway track with various colored lines and markers. The right-hand panel shows the 'Ebenen' (Layers) list with 'Mapillary Bilder', 'Datenebene 1', and 'Brng Luftbild'. Below that, the 'Merkmale / MRGliederungen' (Features / Memberships) list includes 'Auswahl', 'Prüfergebnisse', 'MapPaint-Stile', and 'Mapillary picture -- nakaner -- 06/03/2015 - 3:14:26 PM (MEZ)'. A photo of a railway track is visible in the bottom right corner of the editor. The status bar at the bottom shows the coordinates 48.9890179, 11.3989185 and the text '(kein Objekt)'. The status bar also contains the text 'sthaben); Umschaltaste-Strg zum Drehen der Auswahl; Alt-Strg zum Skalieren der Auswahl; oder Auswahl ändern'.



Mapping by Train

Waypoints and Notes

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- GPS signal is weak
- prefer a GPS+GLONASS receiver
- find the best location inside the train



Mapping by Train

GPS Signal Strength

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http://wiki.osm.org/wiki/WikiProject_Germany/Railways#GPS-Empfang_im_Zug

Bezeichnung	Baureihe(n)	Einsatz	Empfänger	Position	Empfang (0-5)	Anmerkung	Eintragender/Datum
	611	RB, RE, IRE	Samsung Galaxy S5	Faltenbalg am Wagenübergang	4	Garmin Dakota 20 etwas schlechter wegen fehlendem GLONASS	--Nakaner (talk) 19:32, 18 April 2016 (UTC)
			Samsung Galaxy S5	Einstiegstüren hinter dem Führerstand	2		--Nakaner (talk) 19:32, 18 April 2016 (UTC)
			Samsung Galaxy S5	andere Stellen im Zug	0		--Nakaner (talk) 19:32, 18 April 2016 (UTC)
"RegioSwinger"	612	RE, IRE	-	-	0	kein Empfang außer am Fenster des Zugführers	--Nils 13:51, 12 July 2007 (BST)
			Samsung Galaxy S5, Garmin Dakota 20	an vielen Stellen im Zug	3-5	allgemein gut geeignetes Mappingfahrzeug, Erfahrung aus mehreren Fahrten	--Nakaner (talk) 19:39, 18 April 2016 (UTC)
	628 🔗	RB, RE	Garmin eTrex Hcx, Garmin Dakota 20	direkt am Fenster der Einstiegstür neben Zugspitze/ende	2	empfindlicher Empfänger erforderlich (bei Garmin eTrex Vista/Legend auf das H im Namen achten!), GPS-Fix vor Einstieg sehr empfohlen	--gypakk, --Nakaner (talk) 10:07, 28 July 2014 (UTC)

name class usage receiver location strength comment sign



Mapping by Train

Photo Mapping

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photo mapping ... through the drivers cab





Mapping by Train

Photo Mapping

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photo mapping ... through the rear drivers cab





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Photo Mapping

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photo mapping ... at the left window





Mapping by Train

Video Mapping

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video mapping ... at the left windows





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Video Mapping

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video mapping ... at the left windows





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Video Mapping

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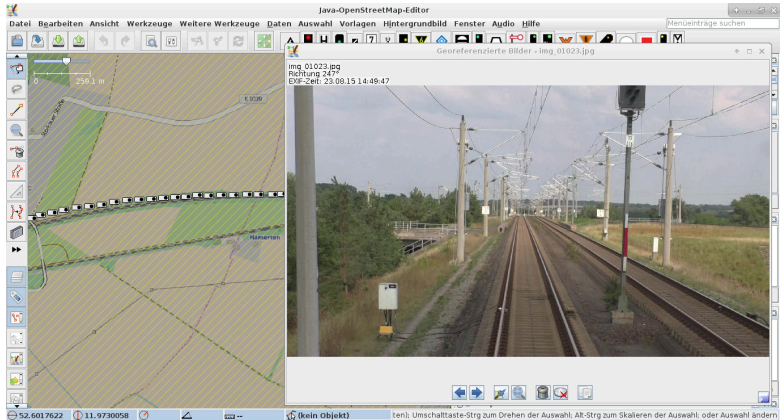
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InterCity train, 200 kph, 2 frames/second
extracted frames using ffmpeg, geotagging with
github.com/Nakaner/mapillary_tools/tree/float-seconds



Mapping by Train

Video Mapping

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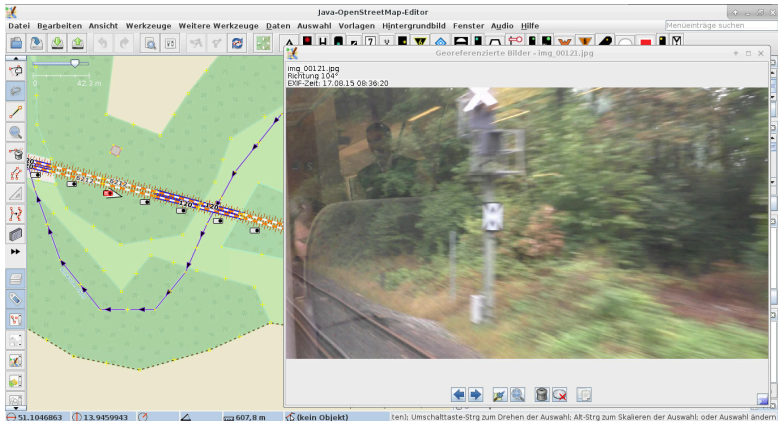
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local train, 120 kph, 4 frames/second
extracted frames using ffmpeg, geotagging with
github.com/Nakaner/mapillary_tools/tree/float-seconds



Mapping by Train

Lessons Learned

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- cameras with optical zoom are better
- Don't zoom in to much.
- Use right/left side windows only as a replacement.
- Avoid filming against the sun!
- dirty windows
- GPS logging!
- extract 4 frames per second – always
- Wear an OSM T-shirt and people will ask you less often.



Mapping

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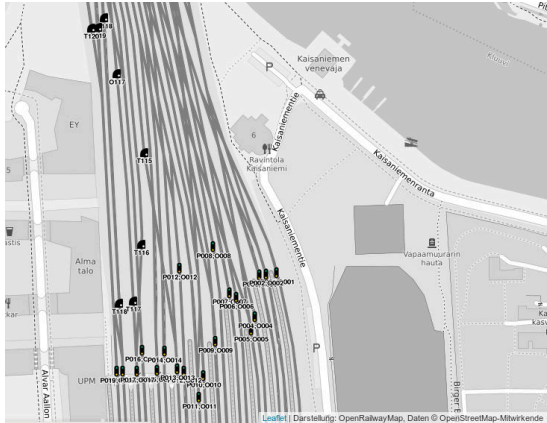
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Some Numbers

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Numbers

Community

- world-wide:
 - 78,779 nodes with `railway=signal`
 - 76,693 nodes with `railway:signal:direction=*`
 - 39,102 nodes with `railway=milestone`
- Germany yesterday (November 2015 in brackets):
 - 48,163 signals total
 - 10,987 main signals properly tagged (7,917)
 - 9,766 distant signals properly tagged (4,758)
 - 3,828 combined signals properly tagged (2,605)



Some Numbers

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 - 3,828 combined signals properly tagged (2,605)
 - 27,365 milestones properly tagged
 - 81,591 km railway track in total (81,235)
 - 29,730 km track with speed limit information (26,415)
 - 49,467 `railway=switch` (35,398)
 - 12,913 of them have `ref=*` (10,240)



Some Numbers

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Community

- dominated by Germans in terms of contributors, data and rendering
- Wiki documentation: [OpenRailwayMap/Tagging](#)
- Mapping tricks at OSM wiki:
[DE:OpenRailwayMap/Tutorial](#) (only German)
- Mailing list: <http://lists.openrailwaymap.org/>
- IRC [irc.oftc.net](irc://irc.oftc.net), [#openrailwaymap](#)



Credits

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- slide 5: image by Niklas Bildhauer, Flickr, CC-BY-SA 2.0
- slide 7: image by Sebastian Terfloth, CC-BY-SA 2.5
- slide 10: image by Christian Liebscher, CC-BY-SA 4.0
- slide 17: image by Mapillary, CC-BY-SA
- slide 30: image by Ferres, CC-BY-SA
- slide 24: map rendering CC-BY-SA 2.0
- all maps are made of OSM data



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