SIRWEC

International Road Weather Conference
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Intelligent UMB Road Sensors and Advanced Road Weather Information System (ARWIS)

by

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The Road Weather Information Policy

ARWIS Info- and Call- Service Platform

RWS-TTI Road Weather Service Operation Platform

Service Providing Call-Service Road Winter Maintenance

Tailored Road Weather Information provided for Service-Providers

Service Provider

Traveler and Traffic Information

Customer-specific Central Computer Info System Software

Intelligent Sensors RPU's Communication

The Road Weather Information Policy

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ID: 48
New Intelligent Sensor Technology

“All in One” atmospheric measures

“All in One” road condition measures

umb Technology = modular = extendable = low power

digital standard Interface with open protocol

radio- or line-communication

power Supply

Complete Road Weather Stations built up with a few elements

This technology makes it affordable to densify the data acquisition network in order to enhance the capability of providing optimal maintenance decision support systems.
Intelligent and compact device for atmospheric measures

- Innovative principle \((R^2S)\) of measuring precipitation by means of **microwave doppler radar**.
  - Type of Precipitation (Hail, rain, snow, drizzle)
  - Intensity of Precipitation (mm/h)

- Measurement of wind direction and wind speed by means of **ultra sonic** principle.
  = precise measurement without mechanical moving parts.

- Measurement of air pressure

- Protection shield and active ventilation for measurement of air temperature and relative humidity.

- Digital communication with open protocol
  Power supply in one cable
Intelligent and compact device for road condition measures

- Innovative microwave radar measurement of waterfilm depth up to 4 mm
  - Resolution: 0.01 mm
  - Accuracy: 0.1 mm + 20%

- Passive Measurement of salt concentration and Freeze Temperature by means of conductivity allow for waterfilm depth

- Surface condition detection by means of capacity measurement
  - dry, moisture, wet, ice, snow, slush

- Surface Temperature and also 2 Sensor Interfaces for Subsurface Temperature (30 cm)

- Digital data communication Interface (RS485) with open protocol

- Maintenance friendly removable Sensor inlet

- Makes OEM solutions easy!
Proof of the Quality and Calibration Certificates

Accurate measure of Waterfilm depth is important not only for road condition but also for passive measure of Freeze Temperature!

Every Sensor is shipped with a test certificate
Stand Alone solutions with SmartView central computer Software

Data collection / polling / GPRS

MySQL Database

Third party software
Additional calculations
Weather forecast nowcast

Warnings Alarms
SmartView3 Configuration
SmartWeb Visualisation

Indicator display of Measurements
Camera pictures of road condition

Stand Alone solutions with SmartView central computer Software
Features

- Highly modularized
- Object oriented
- Data source independent
- Data output independent
- Really quick and up-to-date
- SH70 data protocol
  - Data from all suppliers in the Czech Republic and foreign countries
- FTP, HTTP, SOAP data input/output

WWW pages

- Quick themed interface
- Viewable on mobile phones, PDA etc.
- Aimed for quick-take-in
- User configurable
ARWIS Advanced Road Weather Information System

Main Map

Regional Map
ARWIS Advanced Road Weather Information System

regional stations overview
ARWIS Advanced Road Weather Information System

detailed graph of station

data from station monitoring

Id: Kubova Hult - air temperature

<table>
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<th>Date</th>
<th>Temperature</th>
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Id: Kubova Hult - road temperature

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detailed graph of sensor
Alarm settings

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<tr>
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<tr>
<td>Pilsen <em>r</em></td>
<td>road surface</td>
<td>°C</td>
<td>Sealed</td>
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<tr>
<td>Pilsen <em>r</em></td>
<td>rain</td>
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<tr>
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<td>°C</td>
<td>Sealed</td>
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<tr>
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<td>Sealed</td>
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<tr>
<td>Pilsen <em>r</em></td>
<td>wind</td>
<td>°C</td>
<td>Sealed</td>
</tr>
<tr>
<td>Pilsen <em>r</em></td>
<td>wind gust</td>
<td>°C</td>
<td>Sealed</td>
</tr>
<tr>
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<td>fog</td>
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<tr>
<td>Pilsen <em>r</em></td>
<td>humidity</td>
<td>%</td>
<td>Sealed</td>
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In-map alarm detection
Other features

- WX70 protocol support (Weather warning)
- Receiving/sending data for Integrated Rescue System
- Display of traffic complications (crashes, work on road etc.)
RWS-TTI Road Weather Service Operation Platform for Traveler and Traffic Information

eMOTION Framework
Using Open System standards:
WFS = Web Feature Service
OpenGIS Consortium
XML, GML
ISO 191xx

Data Modelling:
Based on ISO 191xx
Meta Data Models
Quality Data Models
DATEX II
Documentation using
UML 2.0 Standard
Geographical and Meteorological Data Fusion Knowledge Base

Different geographical referenced (lamiary, punctiform, etc) Weather and Road Condition Data Sources with different actualization time schedules as well as event driven Data are processed to generate accurate high resolution Road Weather Information by means of a Data Fusion Matrix = Knowledge Base
Example of Service Data Output on Highways in Bavaria

Messages coded in TMC ALERT-C

- Aquaplaning Slippery
- Ice Slippery Road
- Strong Wind
- Strong Precipitation
Example of an authentic situation

ALERT-C Message:

Precipitation

2005 April 19. 17:00
A96 / Oberpfaffenhofen
Quality management by means of XFCD observation tours

To meet the high requirements of a premium service, a constant, automatic quality measurement and evaluation takes place which is based on defined quality scores for message and service quality. For that purpose, data from surveying and probe collecting tours by XFCD vehicles from BMW are summoned.

Example:
TF1b  28.03.2006 21:05

<table>
<thead>
<tr>
<th></th>
<th>Idealwert</th>
<th>30% Aquaplaning</th>
<th>30% Regen</th>
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<tr>
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<td>99%</td>
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Thank you very much for your attention