Computer-assisted analysis is changing the way we see our roads. How far will this new technology take us?

Opinion
Nico Anten talks smart freight, beer and ketchup; Jim Misener bids TTI a fond farewell; and much more...

PLUS
Mapping the future
The live-update GIS systems that will guide the autonomous vehicles of tomorrow

Testing LED safety
We scrutinise the latest smart streetlighting setups to discover if they are suitable for any location

Defeating winter weather
Intelligent techniques that direct and control snowplow fleets to clear snow and ice from roads fast
Winter began early in Michigan. Just as in 2013, mid-November 2014 saw the northern state blanketed in the kind of deep snow residents are more used to seeing in January. In fact, on November 20, 2014, the Grand Rapids region officially announced its snowiest November on record with still 10 days of the month left to go (28.4in had fallen by 7:00pm that day; the previous record of 28.2in was set in 1895). But at least Michigan residents can take comfort from the fact that state snowplows are operating at maximum efficiency – controlled using an advanced system implemented by the DOT just in time for the early whiteouts.

Road-level forecasting
Critically, the kind of weather forecasting needed to direct snowplows not only on the correct routes, but also in the application of the correct type and amounts of deicing chemicals in real time, is highly detailed. A regular weather forecast can tell you what is
2DRoad from MetSense

World first and only sensor for friction and road condition monitoring in 2 dimensions

2DRoad from MetSense helps you to make the right maintenance decision. The 2DRoad gives you a highly detailed multi-lane description of road friction and road surface conditions. You are also presented with a visual image of the road together with contactless road surface temperature.

Key Features
- Full 2D description of road friction and road surface condition
- Measurement area from 2x2m to 6x6m
- Integrated road surface temperature sensor and visual camera
- Easy to understand visual presentation of measured data

www.metsense.com

Accept only the full picture! 2DRoad™ gives you road condition description in 2D

www.MeteorologicalTechnologyWorldExpo.com

For further information please contact Simon Willard at:
UKIP Media & Events Ltd, Abinger House, Church Street, Dorking, Surrey, RH4 1DF, UK
Tel: +44 1306 743744 Email: simon.willard@ukipme.com
13, 14, 15 October 2015
BRUSSELS BELGIUM

DO YOU NEED BETTER WEATHER PREDICTION TECHNOLOGIES AND SERVICES?
Plows become an extremely valuable resource at times of heavy snowfall.

about to fall from the sky and what the air temperature will be. However, what it can’t predict is the exact effects of this weather on pavement condition. This is due to the variable nature of many influencing factors, including pavement characteristics, environmental influences and atmospheric conditions, as well as previous maintenance activities and traffic levels.

This is where HiCAPS (Highway Condition Analysis and Prediction System), developed by Iteris, comes into play. The MDOT report AVL/GPS Use For Winter Maintenance states, “HiCAPS forecasts pavement and bridge deck temperatures using complex models to represent heat and moisture exchanges between the road, the atmosphere and pavement substrate. A key distinction setting HiCAPS apart from other models in the industry is the coupling between the mass and energy balances in the model. In simple terms, this means that when moisture (as snow, rain, frost, dew) is deposited onto the road, it also transfers energy to or from the road, and that evaporation or sublimation of moisture from the road requires the road to have an adequate amount of energy available to support those processes.”

This kind of super-accurate forecast meant that recently an MDOT supervisor was able to call in more operators several hours before the TV news predicted snow. “If you are planning to do something outside, you turn on the local news for a weather forecast,” says Croze. “But the forecast we get is weather, plus it’s forecasting what that weather is going to do to our roadways. It provides us with treatment recommendations based on science. So we know if we should treat our road with salt or some other chemical. And it gives us an application rate because we know the temperature of the roadway and how much snow is falling. So there’s a formula that tells us how much salt to apply to be just enough to melt the snow and ice.” This means precious resources are conserved, without compromising safety.

The USDOT’s assistant secretary for research and technology, Gregory Winfree, agrees efficiency in winter maintenance is paramount: “Forecasting and planning is a key consideration,” he says. “Salt and equipment repair and maintenance have very real budgetary impacts on the state.”

“Iteris updates its forecast every hour, or as necessary,” adds Croze. “Treatment recommendations are updated almost immediately. They are sent to the driver via a monitor in the cab. And they are posted online so supervisors can monitor the situation.” It’s this monitoring that initially created more problems than it solved...

Winning hearts and minds

While MDOT and its contractors concentrated on the technical side of the system, they failed to anticipate there would be problems of a more human nature. Many snowplow operators initially regarded the new system with suspicion. Some viewed it not as a helpful aid to more efficient working, but as unnecessary interference – an unwelcome eye over the shoulder.

A key lesson learned, outlined in the MDOT report, was that, “A great deal of effort is needed to promote buy-in for these technologies. To gain buy-in, it is necessary to focus more on how these tools can help with current tasks and reduce manual reporting of labor, equipment and material usage by the operator so they can focus on their maintenance activities. If buy-in, or at least tolerance, of these technologies cannot be accomplished at all levels, it will be difficult to maintain a successful program.”

Future thinking

One of Croze’s coworkers is Collin Castle, connected vehicle technical manager at MDOT. He is looking at ways of using the...
Sensing the road

Complete sensor solutions for winter road maintenance

A ssessing the condition of a road surface without the benefit of a human at the roadside is often a pressure point for roadside weather information systems (RWIS). Now a new NIR (near-infrared) camera sensor from MetSense has made a giant leap forward for RWIS. As opposed to the currently available sensors, which can show the condition of only one point of the road, the 2D Road sensor reads more than 4,000 separate points. It offers a full multilane description of the road surface condition in two dimensions: giving a visual image of one or several lanes with a semi-transparent overlay of current condition (dry, wet, icy or snowy).

“This camera sensor can monitor and detect road status and friction on a two-dimensional surface up to 6 x 6m with full resolution,” says MetSense’s Johan Edblad. “The system has created a lot of interest from winter maintenance authorities and operators as it gives them an overview of the entire road. No other system can do this.”

An early adopter of the system is the Norwegian road authority, which uses it to inform its winter maintenance operators and help plan the salting and plowing of roads. “Anyone who sees the camera immediately realizes that this creates totally new opportunities for users in various fields,” says Edblad. “The best technology previously available were single-point sensors that can give you one single data point, whereas ours actually gives 2D images with many thousands of measurement points (pixels). We are the only ones in the market with this technology.”

Beyond roads, MetSense have started to look at additional applications and to detect ice and snow on any surface, such as the wing of an airplane or on railroads. “On railroads you can heat the track when ice or snow is detected to avoid freezing,” says Edblad. “The camera can also be used on racetracks: drivers and teams can get information about where the water is collecting on bends so they can select the best racing line to take.”

Transportation Joint Programs Office in using DSRC technology to assist its plows,” reveals the USDOT’s Winfree. “Part of it is using DSRC so that the plows know what the boundaries of the roads are. I used to live in a very snowy state up north and it wasn’t uncommon for a plow to knock your mailbox over – they couldn’t see the curb. By extension, they would damage the plow blades so that’s an extra cost. DSRC technology will address all that.”

The other side of winter

Once all the snow and ice has finally melted from the roads and spring returns to the Great Lakes, MDOT is planning ways to use its forecasting technology for other purposes. “We are looking at ways of expanding the use of this tool into other maintenance functions, not just winter maintenance,” says Croze. “We do things like herbicide spraying on our roadsides. There are very specific parameters that we need to work at. We can’t have a whole lot of wind or rain. So we think we can use this MDSS program to help us in our roadside herbicide spraying applications as well.”

As weather forecasting, and more specifically pavement forecasting, become more and more accurate, its potential applications are becoming evermore varied, as are the number of ways such information can be accessed. It seems likely that the connected vehicle of the future could add weathermen to the growing list of professions it may render redundant.

Gregory Winfree, assistant secretary for research and technology, USDOT

PHOTOGRAPHS: BENOIT DAOUST/SHUTTERSTOCK.COM

Traffic Technology International January 2015
www.TrafficTechnologyToday.com
The mobile data tracking system by Delcan Technologies, a Parsons company, collects real-time information on weather and roadway conditions, providing operators and supervisors with recommendations as weather conditions change.

Built upon the advanced transportation management system (ATMS) solution of Intelligent NETworks®, the technology saves time and material costs while keeping operations ahead of the storm. To learn more, visit DelcanTechnologies.com.

Computer dashboard image courtesy of MDOT