



Smarter snow removal with sensor technology in Ånge municipality

Annelie Appelvik Sundström, Ånge municipality
annelie.appelvik-sundstrom@ange.se





Being a part of IoT Xchange and its networking helped Ånge municipality getting into a project for smarter snow removal. With the help of sensor technology, data will be collected and enable better planning of snow removal, which will lead to societal benefits and greater accessibility.

Every year, Ånge municipality has a recurring problem with large amounts of snow and / or slipperiness. It is primarily the northern municipalities in Sweden that have large costs for snow removal. In total for all of Sweden's municipalities, the costs for snow removal land at around SEK 1.5 billion per year.

For the municipalities' road departments, snow removal and de-icing can be both costly and difficult to plan. The planning is often carried out based on the experiences of individuals and through physical presence. This makes the process vulnerable and difficult to optimize.

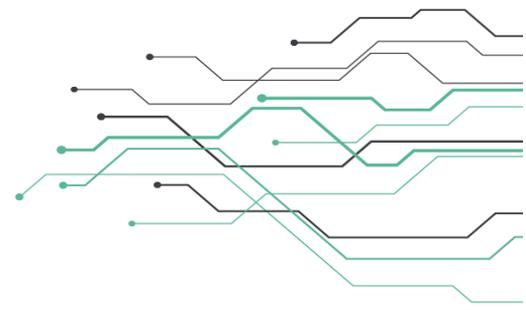


The first local group meeting

Ånge municipality held its first local IoT Xchange group meeting in September 2020. The meeting was attended by participants with varying roles from different companies across Västernorrland.

It was during the meeting that professor Mattias O'Nils, head of the STC research centre at Mid Sweden University, came with the suggestion to send in an application for the project Smart snow removal. After the meeting, Ånge sent an application form to Vinnova, which finances the Smart snow removal project.

Starbit is a project partner and has further developed the snow depth sensor for a commercial market, based on research at Mid Sweden University, where solutions have



been developed to measure snow depth, among other things. This in turn enables better planning, new analysis methods and business development of snow removal in the municipalities.

Unique sensor technology

During the winter, a first pilot was carried out with snow depth sensors in Ånge and Örnsköldsvik municipalities.

– Ånge was the first municipality in the world with this type of snow depth sensor and the solution has sparked great interest in other municipalities and companies, says Michael Jakobsson at Starbit.

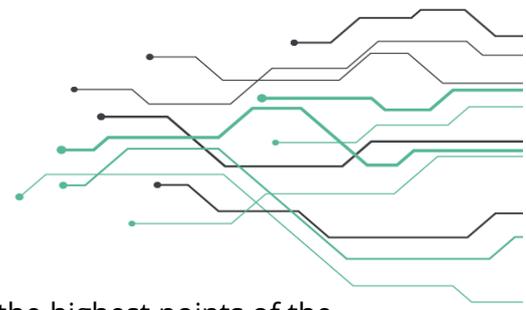
Örnsköldsvik municipality is a partner in the project Smart snow removal. The municipalities, which are different in both areal and population size, constitute a so-called test bed where the various technical solutions will be tested to develop a scalable service. In the project, Ånge's primary focus is testing the sensors automated triggers, that reports to resources for snow removal, but is like Örnsköldsvik also testing the snow depth function.

The sensors used in the project measures snow depth and weather conditions. They are designed for outdoor use and can be mounted on posts or flat vertical surfaces. The sensors are completely wireless and communicates via LoRaWAN (Long Range Wide-area network, a



telecommunication protocol for low-speed communication) or LTE (Long-Term Evolution, a standard for wireless broadband communication for mobile devices and data terminals).

In total, there are five sensors mounted in Ånge municipality: three in Ånge, one in Fränsta, the second largest town in the municipality, and one in Alby, a village located



about 10 km outside Ånge. In Ånge, two sensors are located on the highest points of the town, one in the west and one in the east. A third sensor is placed in a lower position, allowing for more variety in the collected data.

The sensors can be viewed as sustainable, and that in more than one way. Looking at sustainability from a work environment perspective, the sensors make it easier for those who need to go out and clear snow in the evenings and nights, by checking the snow depths beforehand. Environmentally, you reduce the amount of petrol and energy that would be required to go out and check the snow depths manually.

Further possibilities

Looking forward, it will be possible to place a sensor in every block in a municipality, to easily measure the snow depth in the streets. This will make the daily life and routines easier and better for both citizens and the companies who manages the snow removal. It would also be possible to have sensors outside places that are frequently visited in the municipality, such as schools, shops, and health centres.

Another possibility would be to visually display the sensor's collected data. One example is to present the data visually on the municipality's website. Another example could be an app for the citizens to use, where the data is presented in real time. In that way, would be able to plan their everyday life even better. This also applies the companies who manages the snow removal.

Håkan Lundin, manager at Ånge municipality, has been involved in the project from the start. He is very positive about the sensors and what the new technology will result in.

– It's an interesting development using the snow sensors and it will be exciting to see how we, by getting a more planned snow removal, i.e. clearing at the right time, might be able to save some money.

About the project

Bron Innovation, the project manager of Smart snow removal, expects the project to result in smart IoT solutions that support the development of snow removal and analysis-based models for business development of snow removal, that enable optimization and more efficient methods.





On their website, Bron Innovation describes the effects of the project to increase competence in companies and the public sector, new IoT-based products, new data-driven processes and increased ability for collaboration and interaction between academia, private companies, and public actors.

The project group consists of Bron Innovation, STC - Mid Sweden University, RISE, Pro & Pro, Örnsköldsvik Municipality, Ånge Municipality, ServaNet, Övik Energy, Starbit and Portal +.

The project is implemented within the strategic innovation program for the Internet of Things - IoT Sverige, a joint venture by Vinnova, Formas and the Swedish Energy Agency.

Project Smart snow removal is ongoing until spring 2023.

About the snow depth sensor

Starbit's snow depth sensor, SDM-LW, is a sensor for measuring snow depth and weather conditions. It is designed for outdoor use and mounting on poles or flat vertical surfaces. The sensor is completely wireless and communicates via LoRaWAN or LTE. The snow depth is measured optically at distances up to 50 meters.

Applications:

- Automated triggers and reports to resources for snow removal
- Calculation of snow load on property roofs
- Collection of weather data
- Measurement of snow depth in tracks, ski slopes etc.
- Snow depth forecast
- Area visualization

Functions:

- LoRaWAN
- Snow depth sensor
- Temperature measuring (-40° to +85°C)
- Humidity measuring (0 to 100%)
- Pressure measuring (300 to 1100 hPa)
- Autocalibrating





#IoT Xchange



<https://urbact.eu/iotxchange>



iotxchange.urbact@gmail.com



Câmara Municipal

