Waste Management solution
based on real-time data
SCENARIO
Currently, planning the collection of solid urban waste is based on predefined routes and experience, causing unnecessary costs and underutilization of equipment. Often empty containers are collected and full containers overloaded causing an increase in cleaning costs. Knowing the content level of waste containers is critically important.

SOLUTION
The Quamtra system optimizes collection routes by constantly monitoring the content level of waste containers. By installing sensors in the containers it is possible to receive real-time alerts for collection based on container content level, temperature variation (fires) or movement (shaking) enabling a reduction in damage liability and response time.

BENEFITS

Municipalities
✓ Operational costs reduction by up to 35%.
✓ Reduce collection costs by optimizing routes and fuel.
✓ Real time filling status of containers.
✓ Real time fire alarms to reduce response time and damage compensations and liability.
✓ Container location monitoring (optional GPS module).
✓ ROI < 2 years.
✓ Emissions reduction through optimization of routes.
✓ Better quality of service and street cleaning.
✓ Civic awareness (App.)

Waste management companies / Utilities
✓ Easy installation and deployment.
✓ Remote configuration of dispositives.
✓ Routes and fuel optimization.
✓ Integrable with client waste management solutions.
✓ ROI < 2 years.
✓ Installable in wide range of existing containers in the market.

Citizens
✓ Improved perception about quality of service.
✓ Citizen participation (App).
✓ Traffic descongestion.
✓ GHG emissions reduction.
SOLUTION

SENSORING DEVICE + ON-LINE MANAGEMENT PLATFORM

WHERE CAN IT BE INSTALLED?

Bilateral load  Black load  Lateral load  Igloo  Double-hook  Textiles  Underground

SOLUTION OUTLINE

Internet

2G/3G/GPRS/LPWA

System GPS

Sensor

Deployment and Server Maintenance APP

System GPS

Sensor

Server

Citizen APP

Web 3.0

System GPS

Sensor

CoWitness Mobile APP
Quamtra_V1: volumetric measurement sensor for waste containers

Quamtra_v1 is the monitoring device installed inside the containers responsible for gathering real-time data turning every container into an active and intelligent element. Each sensor is capable of measuring the filling level of the container autonomously, the interior temperature or detect a sudden movement. Each device can be configured remotely via client-enabled web site.

OPERATION

The data is reported wirelessly (2G/3G/4G/LPWA) and stored on a Cloud Computing infrastructure managed by Wellness Smart Cities & Solutions. The measurements are stored in the Quamtra data repository and are displayed to the end user through the web service created for this purpose.

HARDWARE FEATURES

The Quamtra_v1 sensors are equipped with a case with fire retardant properties that allows attachment to the container by bolts or rivets, thus preventing its fall during the collection process. To withstand the conditions of the environment where it will be installed, the device has IP66 protection. In addition the material can set the colour of the case in order to merge it with the environment where it will be displayed.

Hardware Features Quamtra_V1 Sensor

Ultrasonic Sensors:
• 40kHz ultrasonic sensor.

Volumetric measurement:
• Beam opening sensor measurement: 30°.

Measurement range:
• 25cm - 300cm. Measuring accuracy: +/- 2 cm.

Alerts:
• Filling and container pick-up in near real time remotely configurable.
• Low signal coverage.

Temperature sensor:
• -55°C to +125°C ± 0.5°C. The device incorporates temperature alerts in real time for fire detection.

Dimensions (H x W x D):
• 52.75mm x 102.10mm x 145.10mm.

Wireless communications:
• 2G/3G/4G/LPWA.

Antennas:
• Indoor antenna to preserve utmost discretion when installing.

Battery:
• Lithium 3.6V. Estimated duration: 10 years*.

Case:
• IP66 fastening by rivets or self-tapping screws. Simple installation (round edges). Material easily blended into the environment. Configurable colour.

Temperature range:
• Temperature range of the measurement performance: -40 to +85°C.

Built-in accelerometer:
• Motion and shaking detector. Sends real-time alerts of vandalism and pick-ups.

Sensor:
• Remotely configurable sensor from the server.

* Depending on send conditions.
How does it work?

Deployment & installation
Operational deployment carried out autonomously by the installer.

Measurement
Real time data collection through fully autonomous and intelligent sensors installed in the containers turning them into an active and intelligent element.

Communication
Sending data it is done through Quamtra configurable sensors for measuring filling with a resolution of minutes to hours depending on the battery that requires the client. This measure is reported from these devices wirelessly through a communications solution 2G/3G/4G or LPWA. Networks widely available worldwide. Wellness Smart Cities & Solutions can provide data subscriptions if the customer wishes.

Analysis and planning
The Quamtra data repository is hosted on Wellness Smart Cities & Solutions Cloud Computing infrastructure which provides high data availability.

The application is offered in SaaS (Software as a Service) mode. This enables container content level evolution monitoring, container and route statistics exporting and optimized collection route development.

The data repository is designed with standard web technologies compatible with most management software used in the SWM (Solid Waste Management) sector to offer a broader package of waste management solutions to our customers: GPS truck tracking and control of route deviations, efficient driving, RFID container identification location...

Evolving
LPWA networks compatibility.
Wellness Smart Cities & Solutions developed a project for PROMEDIO, an environmental services management consortium in the province of Badajoz, which resulted in the proposition of a series of measures to capitalize on environmental services through fuel costs savings and optimization of employee work with the use of Quamtra, the company’s intelligent waste collection solution. PROMEDIO manages a total of 11,119 bins across the province altogether: 6,694 green bins for organic waste, 1,720 yellow bins for light containers and 2,705 blue bins for paper and cardboard. The capacity and type of bin used for collection varies according to the needs and characteristics of each municipality.

Current planning for the collection of solid urban waste in Badajoz focuses on predefined routes based on experience, which results in unnecessary costs. Likewise, the equipment is underused and the quality of service offered to citizens can be improved. Overflowing bins cannot be identified and empty bins are often collected, two factors that not only cause additional cleaning costs but dissatisfaction among citizens. In response to the needs presented by PROMEDIO, Wellness Smart Cities & Solutions proposes Quamtra, a two-fold solution that provides remote monitoring of bin fill level and urban solid waste collection service tracking. In order to audit PROMEDIO’s current urban waste collection system and implement the necessary measures to achieve savings and improved service quality, Wellness Smart Cities & Solutions proposed a project for monitoring 50 bins for 12 months.

In conclusion, 3 types of bins were defined according to their fill rate and collection frequency:

- Bins requiring weekly collection as they are consistently 75% to 80% full on the day of collection.
- Bins that are collected weekly but whose content is not sufficient for such collection to be optimal.
- Bins that do not have enough content on a weekly basis and are collected every two weeks.

From these findings, Wellness Smart Cities & Solutions proposed the following measures to PROMEDIO:

- Identify a list of bins (between 7 and 10) that need to be collected weekly due to a higher service demand. Locate collection sites geographically and enhance service availability, with additional bins in nearby locations, that allows for collection every 15 days.
- The rest of the bins should be collected every two weeks.
Quamtra an ally in optimization of waste collection services

- Cost reduction
- Operational costs reduction by up to 35%
- Return of investment < 2 years
- Civic awareness
- Better quality of service
- Emissions reduction

30 Municipalities

References

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Wellness Smart Cities & Solutions is a company specialized in technological solutions for Smart Cities.

Our smart solutions based on the new paradigm of Internet of things: we devise, build and deploy solutions in both hardware and software development.

Solutions are focused on several areas: intelligent lighting; monitoring and energy optimization; waste management; leakage management and quality of the drinking water; intelligent management of urban parking; open government and citizen participation; quality of life.

We design our own intelligent infrastructures and technologies to provide and create more efficient and liveable cities.