



Waste water management

AI Enabled non-contact water quality monitoring for sewers

Monitoring the quality of wastewater is essential for public health, environmental management, and urban planning.

However, current methods of monitoring rely on manual sampling or submerged probes, which are hard to operate, maintain, and react in time. These methods can cause unnecessary harm to the environment and/or facilities.

We have developed a cost-effective and non-contact imaging solution that uses spectral imaging and computer vision to monitor the quality of wastewater in sewers and wastewater treatment plants.

Our solution enables real-time monitoring and alert notifications, which can help prevent contamination, protect the environment, and enhance treatment efficiency.

Principle

Our solution uses multispectral imaging and machine learning algorithms to extract spectral signatures for each pixel and predict the water quality. This technique uses the diffuse reflectivity of the water, which allows non-contact and maintenance-free measurements.

We have built and tested a laboratory setup as a proof of concept, which consists of an active illumination of 13 LEDs ranging from 250 nm to 700 nm, and a 4.19 MPx grayscale camera sensitive to the same range. A custom control unit drives the LEDs in sequence to acquire a multispectral data cube. The imaging solution measures two key indicators: turbidity (TUR) and chemical oxygen demand (COD), which relate to the transparency of the water and the amount of organic compounds respectively. We have achieved a prediction accuracy for TUR and COD with a mean absolute error of less than 5%.

Applications

- Wastewater treatment plants
- Sewers canals
- Rivers and lakes

Features

- Cost-effective solution (based on LED illumination)
- Non-contact and low maintenance measurements
- Non invasive and scalable sensing
- Inline monitoring of both quality and quantity
- Multispectral imaging: from 250 nm to 700 nm
- High resolution: 4.19 MPx
- Sampling frequency ≈ 1 Hz

Our partners

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Figure 1: Optical system based on non-contact imaging measuring waste water quality.

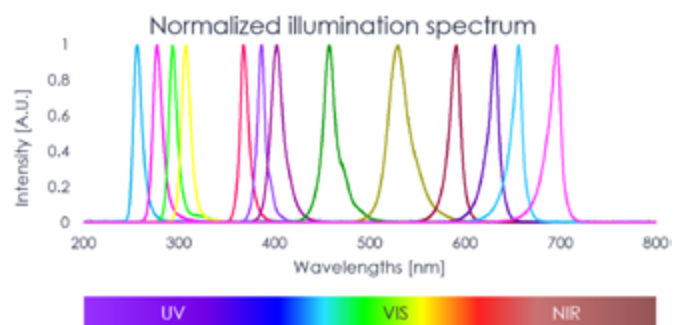



Figure 2: Spectral content generated by active illumination and captured by the optical imager.

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