LOTUS

LOW-COST INNOVATIVE TECHNOLOGY FOR WATER QUALITY MONITORING AND WATER RESOURCES MANAGEMENT FOR URBAN AND RURAL WATER SYSTEMS IN INDIA

LOTUS COMMUNICATION N°18 | MARCH 2024

# Results of the LOTUS journey

*Figure 1: The LOTUS team in India*

India is facing severe challenges related to the provision of drinking water, to waste-water treatment and to management of water systems. To support India to overcome these challenges, the European Commission and the Government of India have co-funded the LOTUS project for 5 years, starting from February 1, 2019.

The project gathered 22 partners from Europe and India who worked together with the following objectives:

1. To co-design and co-produce, jointly with EU and Indian partners, an innovative multi-parameters chemical sensor as an advanced solution for water quality monitoring in India

2. To develop a range of tailor-made software tools, combined into a platform with cloud-based implementation

3. To demonstrate and showcase the LOTUS sensor and software solution in a wide variety of Indian use cases across the whole value chain

4. To investigate, co-design and plan the business model and market uptake of the LOTUS solutions, with industrial production and further development and production of the sensor in India

5. To promote social innovation, by introducing co-creation, codesign and co-development with universities, research centres, SMEs, NGOs, utilities and local stakeholders

The main outcome of the LOTUS project is a novel multi-parameter water quality sensor. The LOTUS sensor is an electronic tongue using a carbon nanotube-based chemistor array that is capable of measuring in real time different parameters as pH, concentrations of chlorine and arsenic, conductivity and temperature in water. It can be installed directly in a pipeline or through a patented bypass structure in which it is protected from fouling and abrasion caused by solid material in the water. The collected data is

**LOTUS** is co-funded by the European Commission under the Horizon 2020 research and innovation programme under Grant Agreement N° 820881 and by the Indian Government, Ministry of Science and Technology.

communicated to the water quality monitoring software via the LOTUS box which is energy-autonomous and can support a wide range of communication protocols. To bring the LOTUS sensor and LOTUS box to the market in India, an Indian start-up, Hydroscope was founded with support from University Gustave Eiffel in Paris and Indian Institute of Technology Guwahati. The start-up is preparing the manufacturing of large quantities of the measurement system India.

*Figure 2: The LOTUS sensor*

The LOTUS project has also developed monitoring and water system management solutions for a variety of applications, most of them based on the LOTUS sensor. The requirements for these applications were developed in four co-creation workshops in India that gathered 80 Indian end-users. The main applications were:

- Monitoring and management of piped water distribution system

- Management and quality assurance for tanker-based water distribution systems

- Water management in irrigation.

To satisfy the needs of these applications, LOTUS has developed a number of software and hardware components:

- Algorithms for the optimal placement of sensors in piped water systems

- A Fiware-based monitoring and leak detection platform for piped water distribution systems

- A solution for the monitoring of water quality in large-scale water distribution systems based on the LOTUS sensor and for optimal dosing of disinfectants

- A solar driven electro-chlorinator that continuously produces a chlorine solution which is used in the tankers to maintain the necessary chlorine level in the water in the tanker


*Figure 3: The on-site chlorination station*

- An on-board control system for the chlorine level of the water in tankers based on the LOTUS sensor

- An efficient reverse-osmosis system to produce potable water for distribution by tankers

- A planning and scheduling software for the operation of fleets of water tankers

- A software platform for the integration of the LOTUS sensor and other sensors with applications for the monitoring and control of water distribution systems

- An algorithm for the optimisation of the water usage in irrigation.

To provide an easy and intuitive access to the project results, the LOTUS team has created a virtual fair. This is an online fair with 3D representations of the LOTUS outcomes. Visit it now: here.

**LOTUS** is co-funded by the European Commission under the Horizon 2020 research and innovation programme under Grant Agreement N° 820881 and by the Indian Government, Ministry of Science and Technology.

## STAY TUNED!

www.lotus-india.eu

@lotus_indiaEU

@lotus-eu-india

# LOTUS Consortium Members

**LOTUS** is co-funded by the European Commission under the Horizon 2020 research and innovation programme under Grant Agreement N° 820881 and by the Indian Government, Ministry of Science and Technology.