



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

# Technology transfer and capacity building to support water quality management and water resources management in India

Bérengère Lebental, Université Gustave Eiffel, France & Senthilmurugan Subbiah, Indian Institute of Technology Guwahati, India

7th June 2023 – EU Green Week



**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.



# The LOTUS project

- **Objective:** Co-creation of innovative low-cost technology for India's water challenges
- **The LOTUS core solutions:**
- **Use cases:**
  - Water system management
  - Irrigation system management
  - Tanker-based water distribution system



Sensor chip



The LOTUS sensor



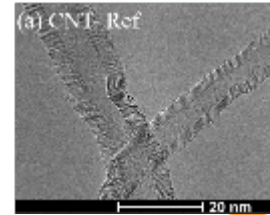
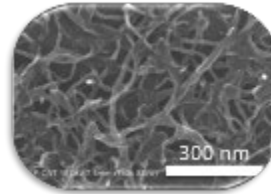
The LOTUS Box

# The principle: Integration of carbon nanotube chemistor array

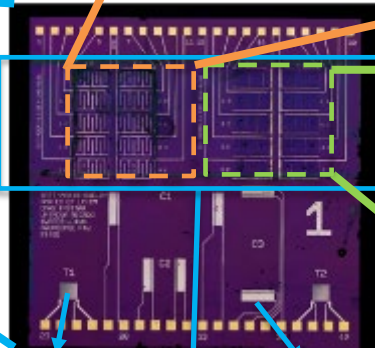


Sensor head

Non functionalized Carbon nanotube network



1 cm<sup>2</sup> sensor chip

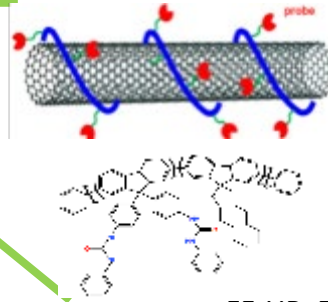


Temperature

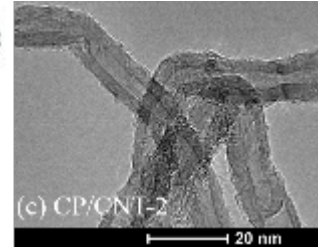
Conductivity

pH and chlorine sensors

20 (4x5) independent devices – 2 types of carbon nanotube inks



FF-UR Functionalized Carbon nanotube network



# The LOTUS sensor meets the Indian market

- **Requirements for India:**

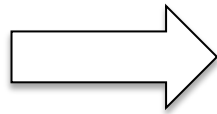
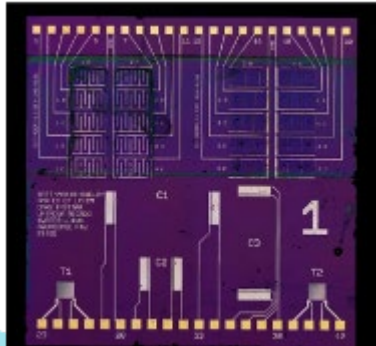
- **Multiparameter:**

- Chlorine, pH, conductivity as priority targets
    - Arsenic as critical second stage target

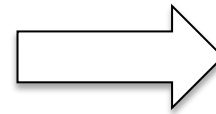
- **Extremely low cost solution : ~100 € range**

- 10 x less than European market

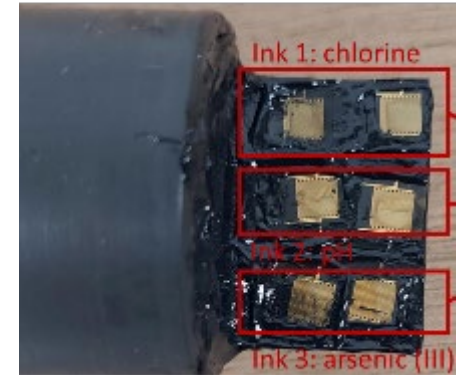
>10€/cm<sup>2</sup>



<1€/cm<sup>2</sup>



2<sup>nd</sup> version prototypes  
(preseries by July 2023)



- **Challenge**

- Lotus 1<sup>st</sup> version designed based on EU market

- **Solution: Lotus 2<sup>nd</sup> version**

- From Silicon to Plastics technology

# LOTUS sensor commercialization with Hydroscope

- Creation of an EU – Indian start-up, Hydroscope Technology Pvt Ltd
  - To commercialize the LOTUS sensor in India (and beyond)
  - **A direct outcome of LOTUS**
  - Spin-off of two universities and a private company: Uni Eiffel (Paris, France), IITG (Guwahati, Assam), Pyrotech Workforce (Udaipur, Rajasthan)
- Creation of chain of values
  - Partnership with French company for industrialization of sensor chip production
  - Partnership with Indian companies for electronics and system integration
  - Multiple client testing to start by Q3 2023
- Volumes
  - Pre series: 100 units for Q4 2023 for client testing and certification process
  - Reaching 10 000 units by Q4 2024



# Training of field service workers for managing water for irrigation

- TU Dortmund tested its algorithm aiming to support local Indian field workers to efficiently manage water for irrigation of an onion crop in this case.
- Therefore, local field workers were trained to daily use the algorithm on their mobile phone and follow the recommendations on the quantity of water to be used.
- The results were very good – no crop was damaged. The algorithm proved to have saved a significant amount of water, as compared to the traditional methods followed by farmers.



# Training Indian labor to use the water treatment units

- AUTARCON installed its water treatment unit at the IIT Guwahati, in India and provided training to the local unexperienced labor to be able to install, operate and repair it.



# Training Indian labor to use the water treatment units

- These trainings involve:
  - System installation including Drilling, sawing, screwing etc.
  - Piping, plumbing and pumping
  - Solar Power Supply systems
  - Data monitoring systems
  - Water quality analysis





# Follow LOTUS for more info



[www.lotus-india.eu/](http://www.lotus-india.eu/)



[@Lotus\\_IndiaEU](https://twitter.com/Lotus_IndiaEU)



[@LOTUS](https://www.linkedin.com/company/lotus)



[@Lotus\\_IndiaEU](https://www.youtube.com/channel/UC...)

---

# THANK YOU FOR YOUR ATTENTION