Proceedings of International Scientific-Practical Conference «Sustainable Development Goals: Youth Policy and Innovative Technologies», February 15-16, 2023, Oguz Han Engineering and Technology University of Turkmenistan, Ashgabat, Turkmenistan

MONITORING TOOL FOR AIR AND WATER QUALITY PARAMETERS BASED ON IOT

Vladimir Tanasiev*

Head of Smart Buildings Laboratory, University POLITEHNICA of Bucharest, Bucharest, Romania.

*Corresponding author

DoI: https://doi.org/10.5281/zenodo.7783066

Since 2015 Sustainable Development Goals report tracks the advances of 17 interlinked objectives to monitor peace and prosperity for the people and the planet, now and into the future, calling for action of the countries in a global partnership [1].

Goals 13, 14, and 15, namely "Take urgent action to combat climate change and its impacts. Conserve and sustainably use the oceans, seas and marine resources. Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss" are calling for concrete actions in preserving the Danube Delta biosphere.

The Danube Delta, which is a UNESCO World Heritage, is one of the most diverse reserves. The Delta biosphere has more than 5500 species, out of which 1839 are plants. To monitor such a difficult and large area is a real challenge [2].

To overcome this challenge, our approach is based on the advancement made in sensing solutions and digital technologies. The solution consists of an electric boat equipped with sensors which monitor air and water quality parameters. The proposed sensing solution is based on the IoT (Internet of Things) concept, a network of devices that uses internet communication to exchange data between devices. The figure below, figure 1., shows the data paths from sensors air quality and water sensors to the local cloud computing platform.

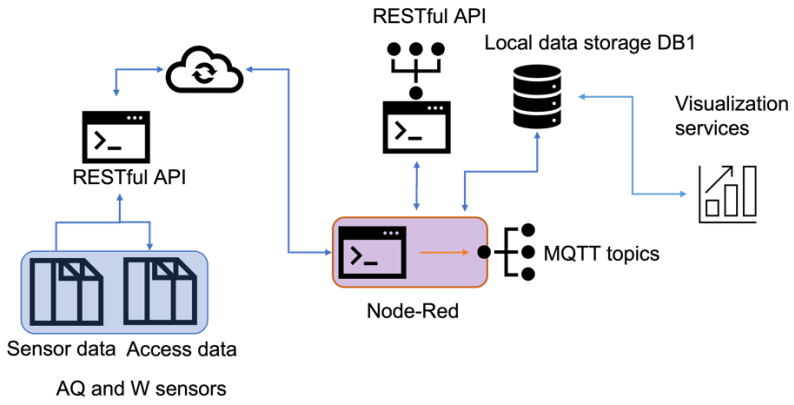

Figure 1. Water and Air quality sensor data flow diagram

The concept of data transfer is based primarily on two communication protocols, namely HTTP (RESTful API) and MQTT. The water and air quality sensors send the data based on RESTful API requests (PUT, GET, POST, and DELETE). The data is encapsulated using JSON format. The second protocol, MQTT, together with RESTful API, are used to transfer data to third-party applications, the proposed solution includes an open-source interactive analytics and visualization tool. Moreover, in order to predict the evolution of monitored parameters, the solution uses Long Sort-Term Memory (LSTM) algorithm, an artificial neural network.

In conclusion, the proposed solution for monitoring of water and air quality parameters is based on the IoT concept. The solution transfers, processes, stores and uses a web-based visualization tool. The solution was tested in real conditions, and it has proven to be reliable and efficient. As future research, the approach will include extending the network of sensors and developing the stationary system.

Acknowledgment: This research was funded by MCID grant number 1PS/09.11.2021.

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[2]. Danube Delta, the largest wetland in Europe, web link https://romaniasalbatica.ro/ro/rezervatie-biosfera/delta-dunarii