INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 2 ISSUE 2 (2016) PAGES 807-812
RECEIVED : 26/03/2016. PUBLISHED : 04/04/2016
April 4, 2016

MEASUREMENT OF ESTUARIES QUALITY USING SMART SENSORS

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Abstract:
The main aim of this project to save marine organism from pollution occurred by dirty water mixed at estuaries. And also used to save people from affected water of sea. The aim of the proposed system is to capture possible extreme events and collect long-term periods of data. It can be used in oil spills in sea to avoid damage of sea. It can be used as a alert system for sea water quality measurement official worker.

Keywords – Marine, Pollution, Dirty water, Sea water quality.

1. INTRODUCTION

Usually, many events that can affect seawater quality, occur in narrow time windows making it impossible to intervene promptly using common monitoring campaigns. In fact, instru- ments involved in sea water quality measurement, like CTD (Conductivity, Temperature and Pressure) probes and other plug in devices, are generally expensive and bulky instruments, not suitable neither designed to be a part of a sensor network. Thus biologists have to perform long manual sampling cam- paigns aboard of research vessels to get to points of interest. This approach has the advantage to provide high resolution and reliable measurements, also with a vertical profile of the water column under investigation; on the other hand it can only be performed at considerable time intervals, for instance, every couple of weeks or months depending mainly on funds availability of the agency responsible of monitoring. It appears obvious at this point, that if an event of interest occurs between two given sampling instants and lasts for some days or weeks, it would leave no trace as if it has never happened and it would be impossible to take the necessary precautions in a timely manner. A case in point occurred along the coasts of Apulia region (Italy) in June 2014, when an early bloom of toxic algae known as Ostreopsis Vulgate (in the following simply O.V.), caused illnesses to swimmers, such as rhinitis, pharyngitis, laryngitis, bronchitis, high fever, dermatitis, and conjunctivitis. The damage, also involved food risks due to the accumulation of toxins in the organisms that live on the seabed, such as octopuses and seafood, as well as economic damages to the equipment of ship-owners, whose fishing nets may have been contaminated. The appearance of O.V. in the seas of Apulia dates back to the early 2000s, hence phenomena connected with it are still new and under study. Its bloom, generally expected in August, is due not only to the abundance of nutrients, but also to favorable climatic conditions, like 10-15 days of calm sea. In this case, the traditional strategy adopted by the agency in charge of data collection, typically performed with a fortnightly basis, but thickened when a maximum of O.V. Con- centration is expected, was insufficient for the purpose of prediction of such a phenomenon. Therefore, it is inefficient in inducing preventive policies and not even able to provide new information on the evolution of the phenomenon itself.

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2. PROPOSED METHOD

In this method the concept of wireless sensor network designed for real time estuaries quality monitoring. Each network node is equipped by sensors measuring

1.Ambient light
2.Dissolved ions
3.PH
4.Turbidity
5.Temparature
6.Conductivity

In this method both battery and solar panel to operate our device. In this method WI-FI and GSM technology used to send data collected by device.

ADVANTAGES OF PROPOSED MATHOD:

- Main advantages of this method to pollution control in sea and also in other water bodies
- The main aim of this project to save marine organism from pollution occurred by dirty water mixed at estuaries.
- And also used to save people from affected water of sea .
- It can be used in oil spills in sea to avoid damage of sea.
- Solar panel also used to avoid working of device.
- GSM used to alert official worker about the high chemicals mixed with sea water.

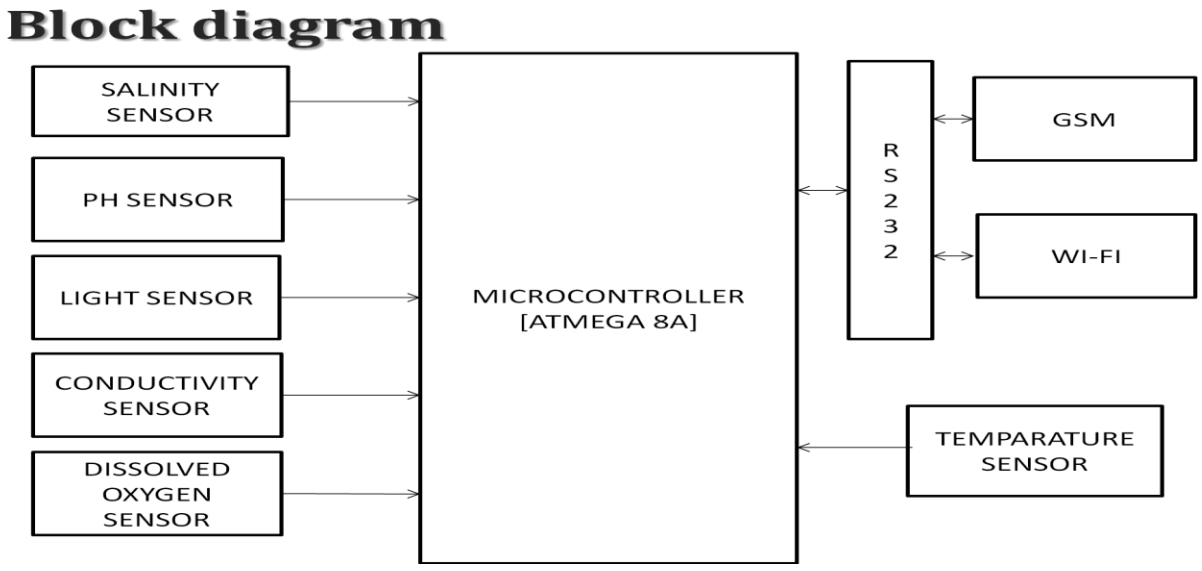

Fig.1.Block diagram of proposed method

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3. BASIC CONCEPTS OF COMPONENTS USED:

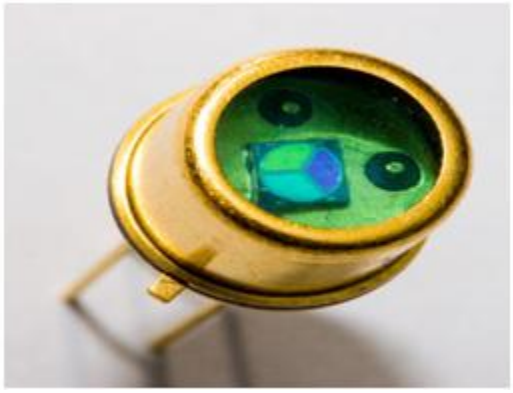

Fig.2. Ambient Light Sensors

Ambient light sensors (ALS) detect the amount of light in the environment and are used by systems that need this information such as headlight controls, interior lighting controls, and climate controls. Light sensors are generally based on one of three types of components: photoresistors, photodiodes or phototransistors

TEMPERATURE SENSOR:

Temperature sensor that uses an external diode connected transistor as the sensing element to measure temperature external to the sensor (for example on a circuit board or on die of CPU)generally produces digital output.

TEMPERATURE SENSOR

Features

- Calibrated directly in ° Celsius (Centigrade)
- Linear + 10.0 mV/°C scale factor
- 0.5°C accuracy guaranteeable (at +25°C)
- Rated for full -55° to +150°C range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 µA current drain
- Low self-heating, 0.08°C in still air
- Nonlinearity only ±¼°C typical
- Low impedance output, 0.1 Ohm for 1 mA load

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SALINITY SENSOR:

The Salinity Sensor easily and precisely measures the total dissolved salt content in an aqueous solution. Measure water with a wide variety of salinities, from brackish water to ocean water, and even hyper-saline environments. You can also study how salinity affects buoyancy or monitor salinity values in estuaries where fresh water mixes with ocean water.

GSM:

GSM is a TDMA based wireless network technology developed in Europe that is used throughout most of the world. GSM phones make use of a SIM card to identify the user's account. The use of the SIM card allows GSM network users to quickly move their phone number from one GSM phone to another by simply moving the SIM card. Currently GSM networks operate on the 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bands. Devices that support all four bands are called quad-band, with those that support 3 or 2 bands called tri-band and dual-band, respectively. In the United States, Cingular operates on the 850 and 1900MHz bands, while T-Mobile operates only on the 1900MHz band.

WI-FI:

Wi-Fi or WiFi (Wireless Fidelity) is a local area wireless computer networking technology that allows electronic devices to connect to the network, mainly using the 2.4 gigahertz (12 cm) UHF and 5 gigahertz (6 cm) SHF ISM radio bands.

4. RESULT ANALYSIS

In order to control many probes geographically spread out in a single network and grant at the same time a secure data transmission, an Internet Protocol-Virtual Private Network (IP-VPN) has to be adopted. Using a fixed IP address and a VPN router inside the control room, a secure tunnel is created over the internet, able to ensure that only eligible users have access to data during the overall transmission.

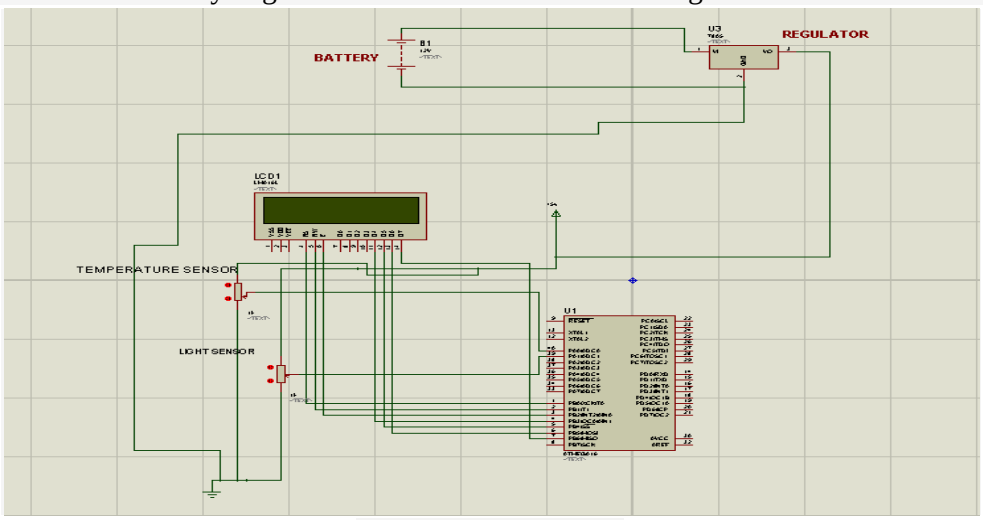

Fig.3.Output analysis

The complexity of data survey system depends on the number of elements to be monitored and on the required sampling interval, from occasional to real-time readings. For small networks with 2-3 scheduled readings per day, a manual acquisition through probe's web interface carried out by qualified personnel may be a sufficient solution. When the number of network elements increases or when a more intense and flexible access to data is required, higher per- formance solutions should be adopted. An application server (Fig. 10) inside the VPN network would provide customer defined services and applications, like for instance a user- friendly programmable interface for automatic data acquisition based on activity scheduling. Furthermore user defined set of rules may be assigned to heterogeneous group of sensor, joined by spatial, technological or semantic affinity, exploiting IEEE 21451 underlying capabilities for sensor proxy groups definition.

CONCLUSION

We have analyzed two typical scenarios involved in seawater quality monitoring and we have proposed two solutions that are not mutually exclusive, but can rather work together, extending the potential of the monitoring system. The former, fully independent, is conceived for monitoring isolated spots, whereas the latter is intended to be an extension of the first one, in those cases where a higher spatial resolution is needed. The proposed sea water monitoring system is to all effects a Decision Support System (DSS), at least according to its definition, that is any system that might support decision making. Explicit set of rules or decision it should make are a matter for biologists, anyway its implementation would result in an immediate increase of the effectiveness of the analysis as it provides support to all those who need to make strategic decisions in the face of problems that cannot be solved with a conventional approach.

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