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A Review of Water Quality Monitoring Using Water Surface Drone

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ABSTRACT: This project describes Water quality monitoring system on Aquatic form is based on Arduino platform and a multi channel sensor variables are interconnected and in which the certain sensing parameters of temperature, humidity, pH, turbidity are measured and as well as ultrasonic sensor is measured with the underwater obstacle. The goal in this project is to measure water quality parameters by interfacing the sensor modules with Arduino platform. The entire setup is equipped onto the water surface drone. The quality of the water depends upon certain parameters which we will measure in this project For providing environmental sustainability and to reduce the air pollution a drone based system is used to collect different informations in different locations

I. INTRODUCTION

Water is essential for human survival, and its quality should be monitored and protected. The safety of water resources is threatened by external factors such as industrial wastes and agricultural fertilizers. Water quality monitoring programs have been developed to preserve water quality and eliminate the contamination of water sources. These sources can be monitored using event-controlled water samplers, automated real-time remote monitoring systems, and grab samples collected by individuals. Therefore, watershed managers face the challenge of integrating new tools for water quality monitoring.

II. EXPERIMENTAL

In this study, we developed a multiprobe meter and integrated it within a hexacopter UAV for autonomous in situ water quality measurements, and verified the functionality and accuracy of the system with laboratory and field tests.

III. SELECTION OF WATER QUALITY VARIABLES

The purpose of this chapter is to provide information which helps the appropriate selection of variables. Each variable is discussed with respect to its origins, sources, behaviour and transformations in the aquatic system, the observed ranges in natural and polluted freshwaters, the role of the variable in assessment programmes, and any special handling or treatment of samples that is required. The final section of this chapter suggests some combinations of variables which might be used for different water quality assessment purposes.

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IV. INTEGRATION OF WATER QUALITY MEASUREMENT WITH HEXACOPTER

In the modern world with increase in the technology there is equal growth in automobiles which creates traffic leading to sound pollution, traffic jam and air pollution. So it take more than required time to reach from one place to another, thus we must look forward to some airways. Hexacopter is one of flying unit used to lift the object from one place to another in lesser time or can be used for surveillance purpose. At industry level applications, hexacopter are made using KK board module which comes with pre programmed KK board and balanced gyroscope module which is Hexacopter system works on the principle of air lifting phenomena with high pressure. propellers. If we rotate the propellers in clock wise direction then due to this rotation, a torque will be applied over the whole system in one direction .And similarly if we rotate the propellers in anti-clock wise direction then also a torque will be produced over the whole system and the whole system will start rotating anticlockwise.

To overcome this problem we rotate three propellers in clockwise direction and remaining three propellers in anticlockwise direction. This phenomena produces torque in opposite direction and they get balanced and the system remains stable while flying.

Not economical for smaller applications. It's not a cost effective method. To make the hexacopter economical and efficient for small level applications this work is proposed, which design and develop a hexacopter using Arduino Uno board instead of pre-programmed KK flight Controller board.

V. RESULT

As per the goal of this project we designed a water surface drone to monitor the quality of the water and the result Data is received and output will be displayed on the screen through internet of things

PROJECT LAYOUT



COMPONENTS

1. Arduinouno
2. Kk 2.1.5 flightcontroller
3. Brushless dc motor
4. Propellers
5. Hexacopterframe
6. Electronic speed controller
7. pHsensor

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8. turbiditysensor
9. temperature sensor
10. IOT module
11. Transmitter and reciever

APPLICATION

1. Inspection and monitoringof:
2. Dams, lakes,bridges
3. Safety &security
4. Water quality &sampling
5. Fish counts
6. Marineecology
7. Oil spilldetection

JOURNAL PAPER

A journal is a publication that is printed periodically. It is a collection of reviewed papers. Also, journal papers are usually more elaborative than the conference papers.

P. J. Puri , M. K. N. Yenkie :

Have studied water quality index (WQI) has been calculated for different surface water resources especially lakes, in Nagpur city, Maharashtra (India), for the session January to December 2008; comprising of three seasons, summer, winter and rainy season. Sampling points were selected on the basis of their importance. Water quality index was calculated using water quality index calculator given by National Sanitation Foundation (NSF) information system.

The calculated (WQI) for various studied lakes showed fair water quality in monsoon season which then changed to medium in winter and poor for summer season. Gorewadalake showed medium water quality rating in all season except monsoon season. Futala, Ambazari and Gandhisagarlake has also declined in aesthetic quality over past decade following invasion of aquatic weeds such as hydrilla and water primrose, so the reasons to import water quality change and measures to be taken up in terms of surface water (lakes) quality management are required.

B. N. Tandel, Dr. J. Macwan, C. K. Soni :

Have studied, the water quality index is a single number that expresses the quality of water by integrating the water quality variables. Its purpose is to provide a simple and concise method for expressing the water quality for different usage. The present work deals with the monitoring of variation of seasonal water quality index of some strategically selected surface water bodies.

The index improves the comprehension of general water quality issues, communicates water quality status and illustrates the need for and the effectiveness of protective practices. It is found that in all cases the change in WQI value follow a similar trend throughout the study period. The lake water is found of good quality (WQI - 67.7 to 78.5) during both seasons. However, it is found that water quality of lake deteriorates slightly from winter to summer season on account of the increase in microbial activity as well as increase in pollutants concentration due to water evaporation.

T. M. Heidtke, A. M. Asce and W. C. Sonzogni :

Have studied, results from a study of water quality planning and management alternatives for the Great Lakes are used to identify cost-effective pollution control strategies. Mathematical models and other systems analysis techniques are applied to estimate pollutional loadings, specific water quality problem areas, costs and pollutant reductions offered through alternative management strategies. A determination of how these alternatives may be expected to achieve water quality objectives for the Great Lakes is made. Data from a diversity of Great Lakes

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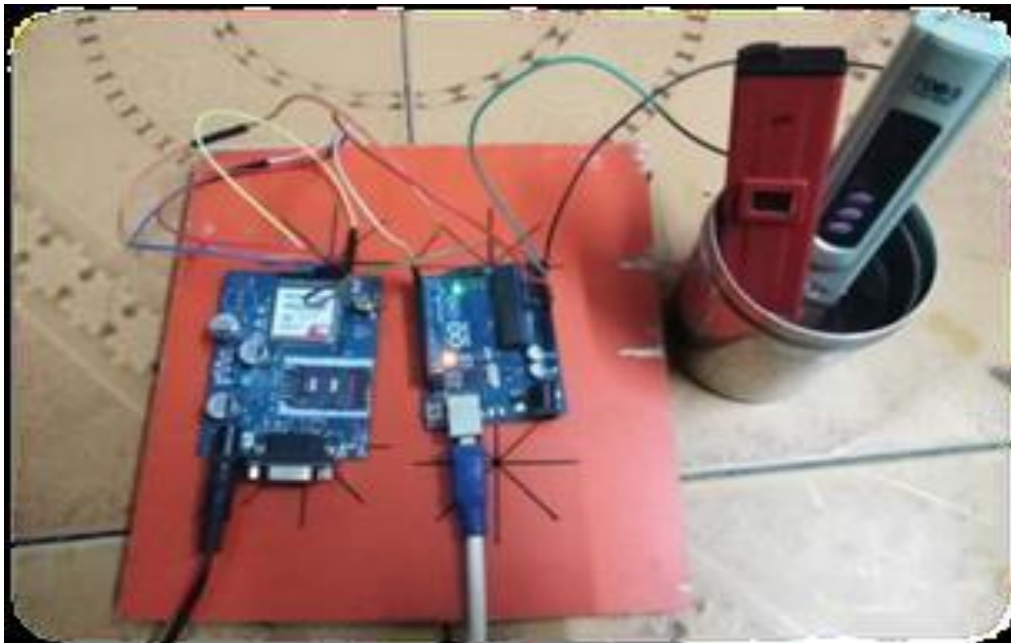
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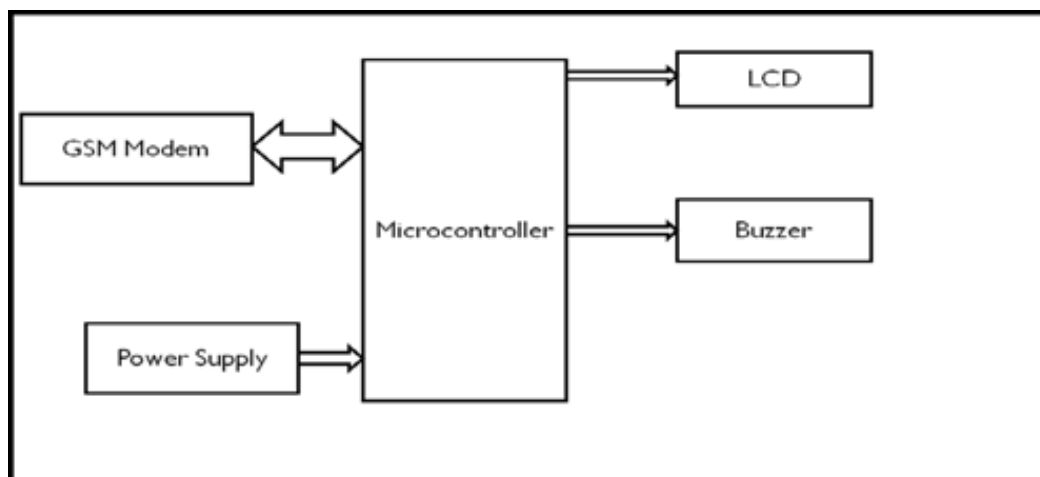
research efforts are compiled, integrated, and used to project local and lake wide water quality conditions over the next twenty years.

A set of management tools, including a near shore water quality index and a series of environmental quality maps, are developed to promote communication and interpretation of Great Lakes water quality data among technical and nontechnical interests. Findings from the study support a staged approach to pollution control, where by the most cost effective programs are implemented and their results assessed before more expensive control measures are undertaken.



V. Pradhan, M. Mohsin, B. H. Gaikwad :

Have studied, water quality of Chilika Lake was determined during the month of January 2012. It was observed that all the parameters are above permissible limit except at the sample site S2. The results are discussed in the light of findings of other workers.



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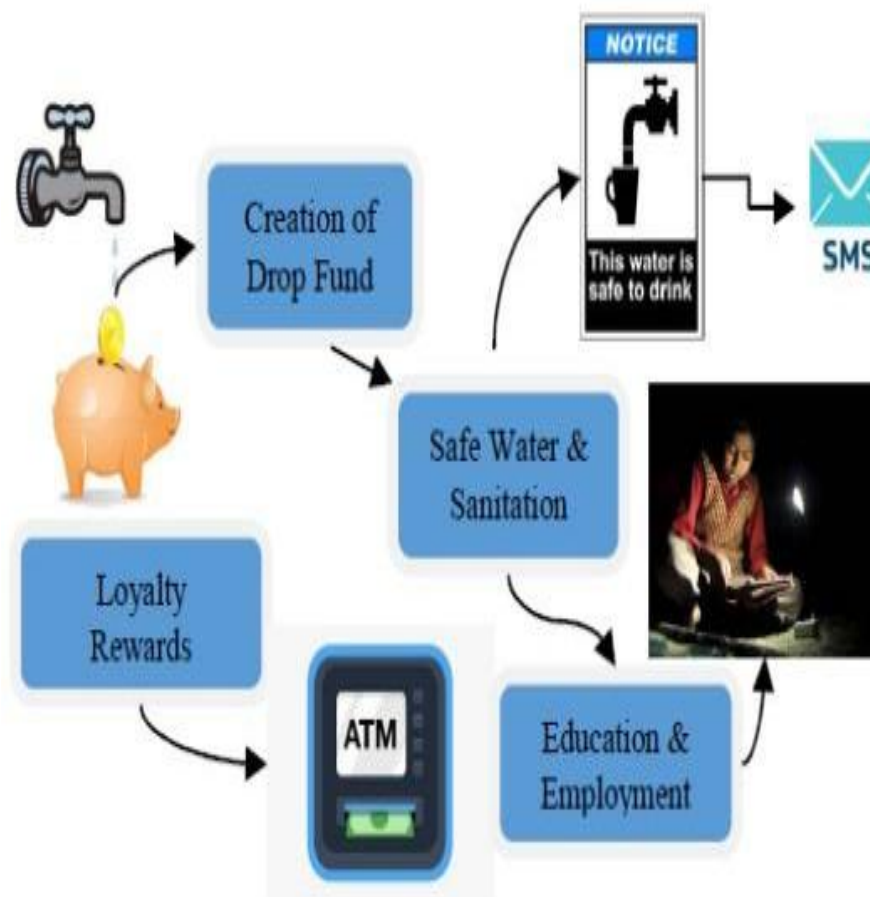
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Nikhil Kedia:

In this paper, we discussed the approach to water quality monitoring, especially for rural areas via sensor-cloud mechanism. Firstly we discussed the several types of sensors and have classified the sensor into 3 categories as per user requirement - HydroQual, HydroQual-A, HydroDepth. Next we discussed a fully feasible embedded system based on the work I had been doing as a part of Acoustic Pinger Location Team. Post this, we explained the self-developed networking mechanism, and after comparing the WSNs with the Sensor- Cloud, arrived at the decision of choosing Sensor- Cloud Infrastructure for high-end deployment. We also gave solution to the security issues based on findings of earlier research papers and finally a fully analyzed and tested economic model was given for the project. There is no doubt that this project is feasible in all aspect. Further scope of development is there, but there can be no denying the fact that it is the need of the hour to propose something on water quality monitoring given the current condition.



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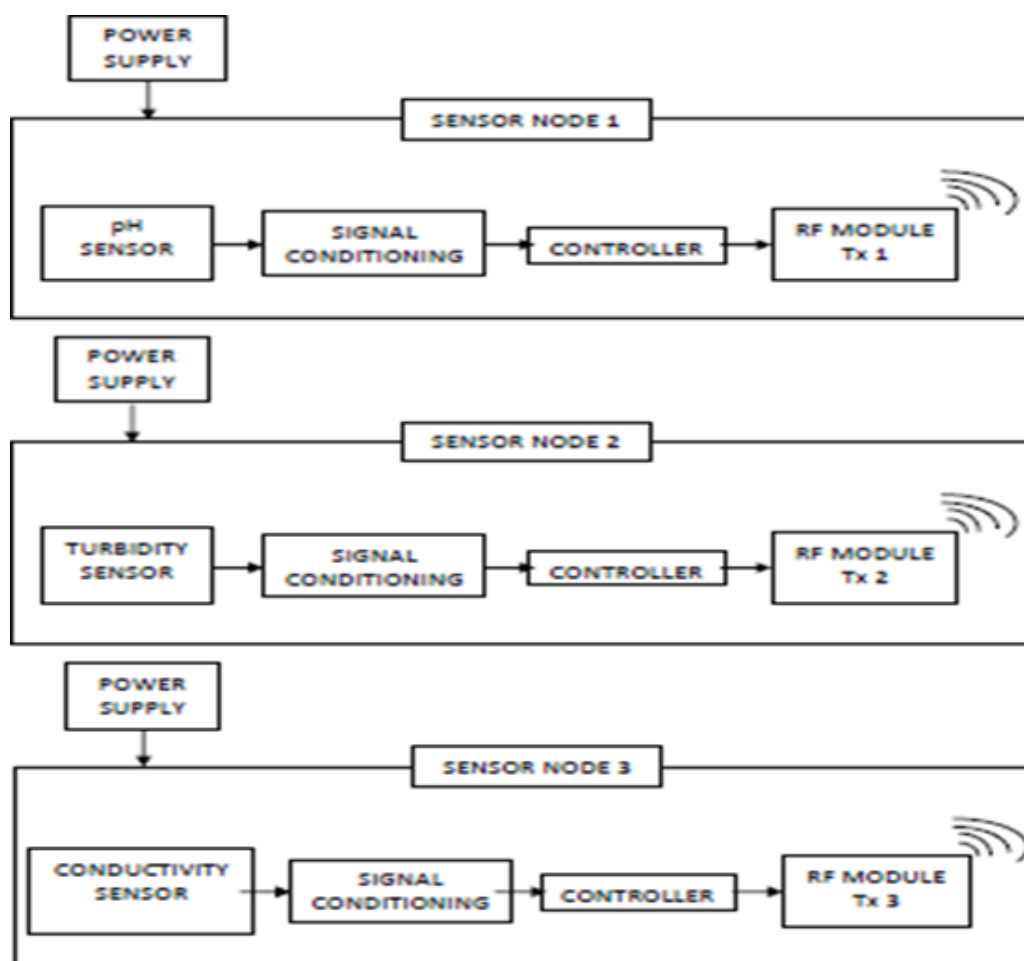
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Satish B. Jadhav & Neeta S. Pingle:

The system can monitor water quality automatically, and it is low in cost and does not require people on duty. So the water quality testing is likely to be more economical, convenient and fast. The system has good flexibility. Only by replacing the corresponding sensors and changing the relevant software programs, this system can be used to monitor other water quality parameters. The operation is simple. The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value. This paper explains water quality and quantity monitoring system using WSN with three main parts namely hardware and software of data nodes and base station and a software for remote Monitoring of Turbidity, PH & Temperature of Water makes use of water detection sensor with unique advantage and existing GSM network. The system can monitor water quality automatically.



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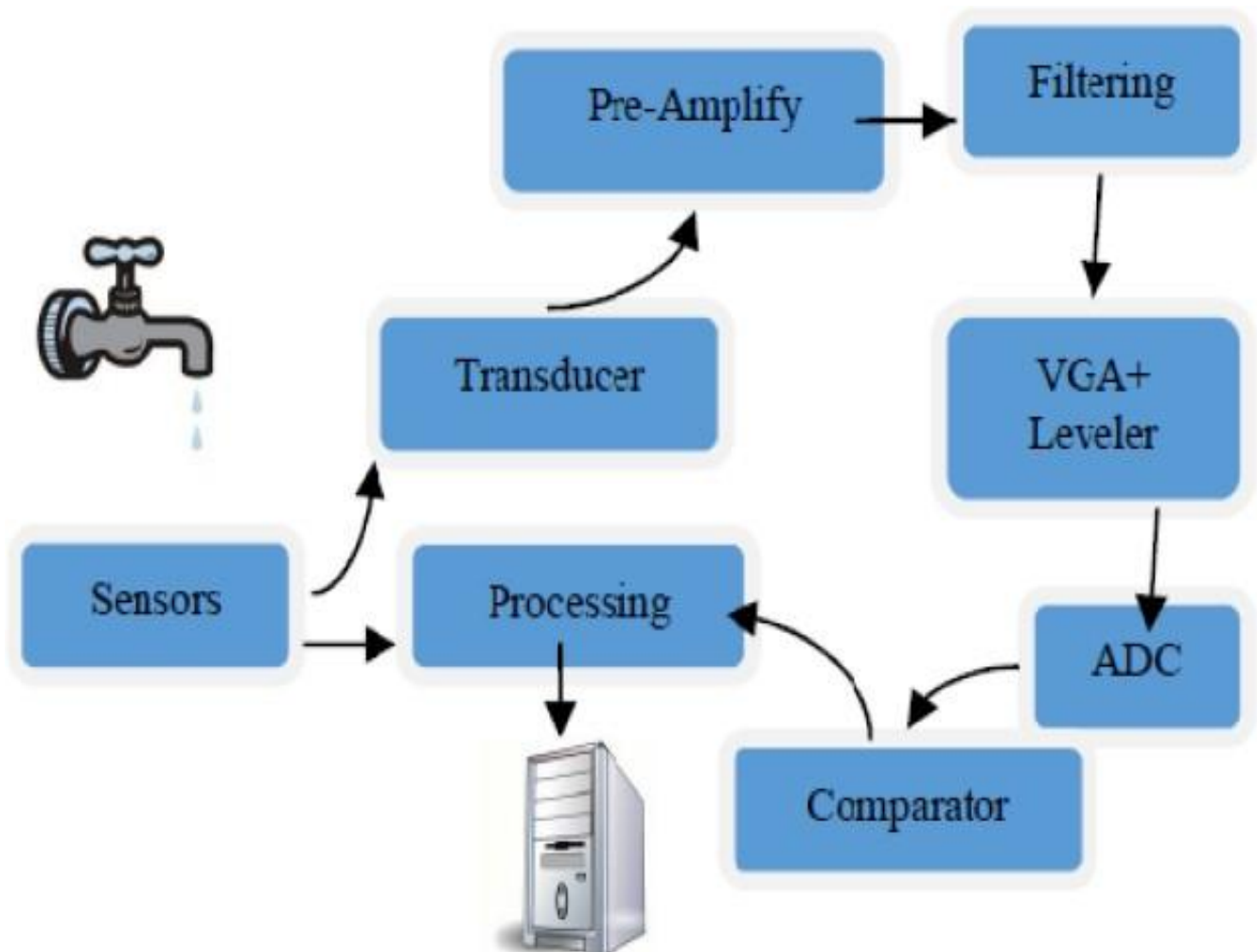
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Mithila Barabde, Shruti Danve:

The paper addresses about developing an efficient wireless sensor network (WSN) based water quality monitoring system, which examines “water quality”, an important factor as far as, irrigation; domestic purposes; industries; etc are concerned. Water pollution can be easily detected by this system, which will help in controlling it. Overall the proposed execution of high power Zigbee based WSN for water quality monitoring system offering low power utilization and low cost is presented. Another important fact of this system is the easy installation of the system that is the base station can be placed at the local residence close to the target area and the monitoring task can be done by any person with very less training at the beginning of the system installation. Performance modelling is one important aspect in different environment to be studied in the future as different kind of monitoring application requires different arrangement during system installation.



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Nazleeni Samiha Haron, Mohd Khuzaimi , B Mahamad:

This research paper proposes a system architecture for proactive water quality monitoring system. It is believed that by having such system, tedious, and cost-consuming jobs of manual monitoring can be eliminated. The architecture proposed is consists of four components; data acquisition, data telemetry, data processing and output. Three parameters will be monitored and used to evaluate the water quality namely; temperature, pH, and dissolved oxygen. Fuzzy logic meanwhile is used to evaluate the fuzziness of the data collected. The project would employ Mamdani style of inference to create the decision over water quality level of the pond. Further work includes developing the prototype of the system and testing the system in actual aqua farm for more accurateresults.

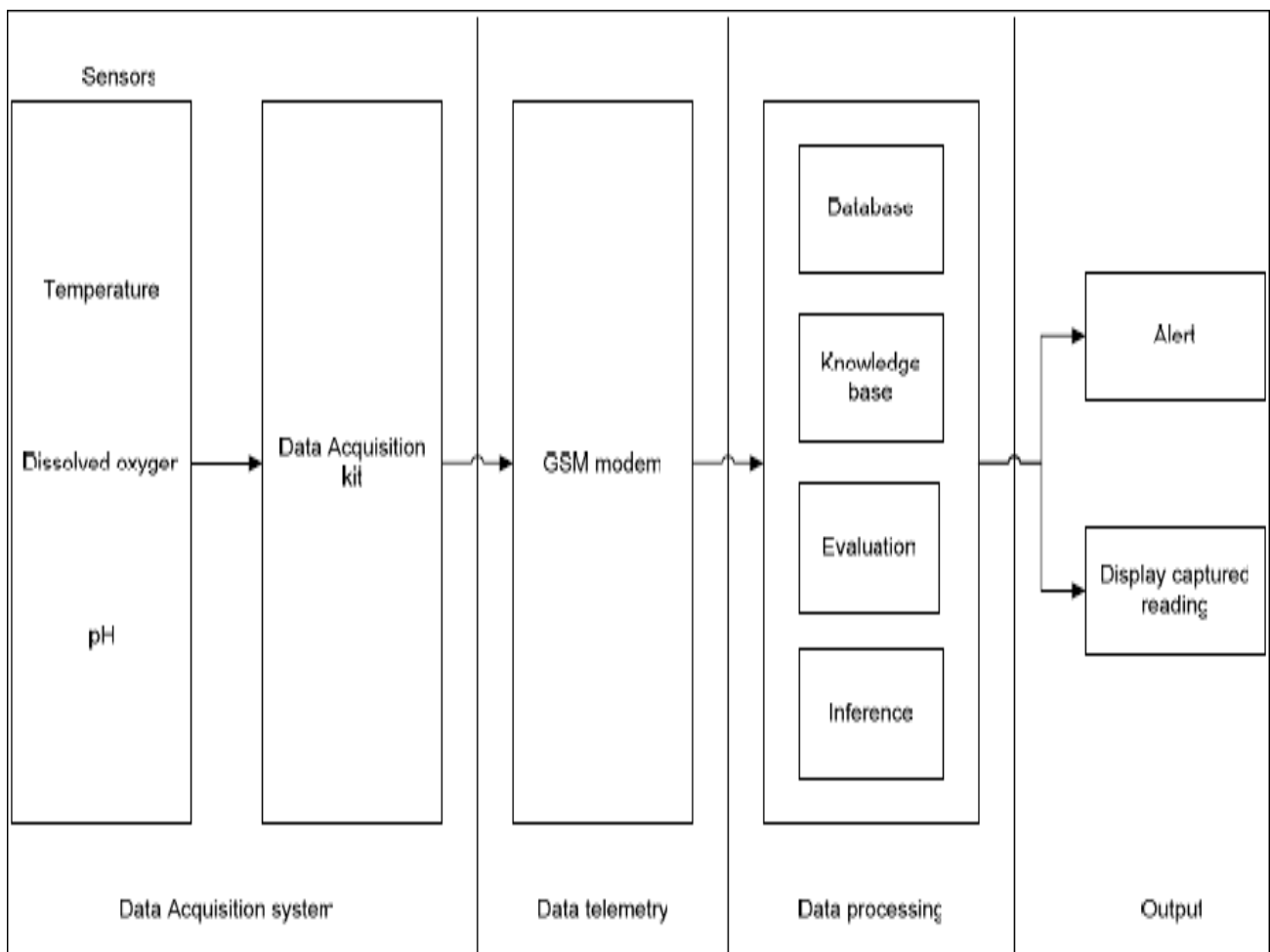


Figure 1. System Architecture

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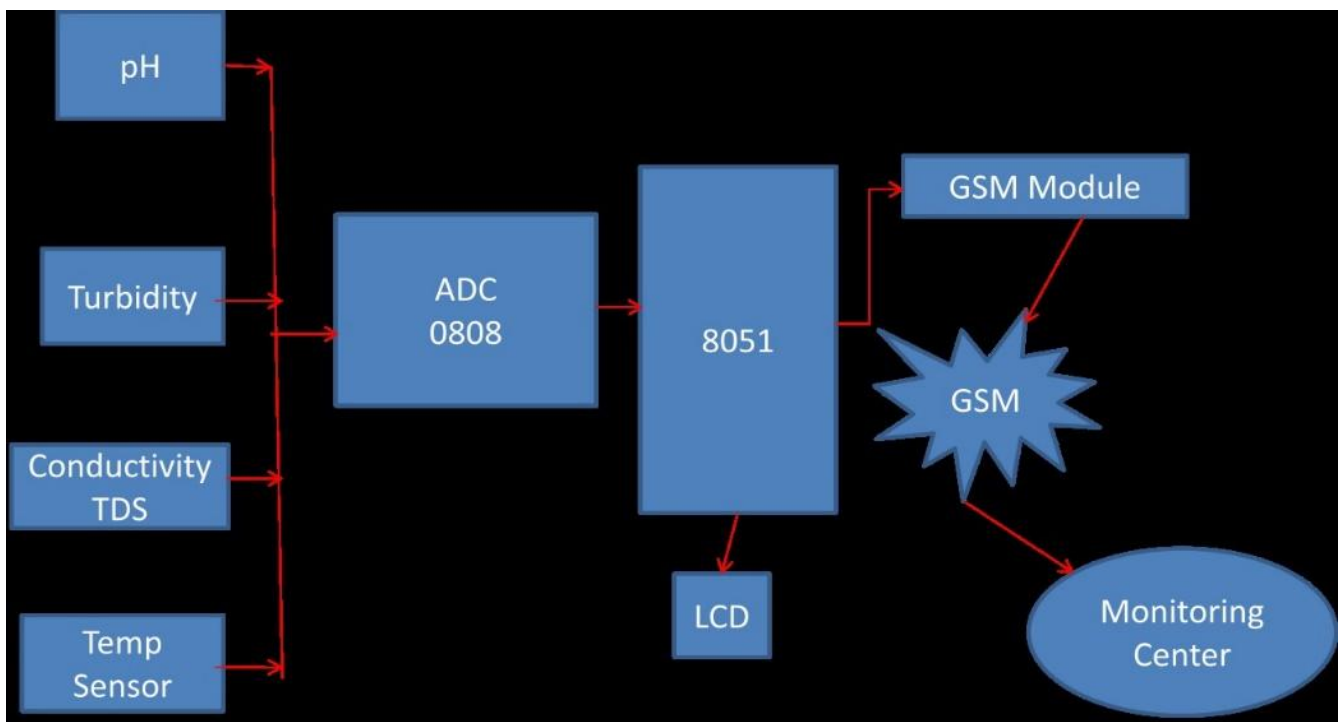
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Akanksha Purohit , Ulhaskumar Gokhale:

Real time system for water quality measuring based on GSM is associate economical system that uses numerous water detection device and GSM network. The system is incredibly versatile and economical. It's realtime system that measures numerous parameters present within the water with the assistance of device and send them to the watching centre mechanically. It doesn't need individuals on duty. Its versatile system as a result of simply by replacement the sensors and by creating some changes within the computer code the system will be created to measure completely different parameters of water. The system is reliable and easy and it will be extended to measure water pollution so on. It's a widespread application.



VI. CONCLUSION

A UAV-assisted in situ water quality measurement system (UAMS) was developed and tested. The backbone of the UAMS was the custom- built hexacopter that carried the open-source multiprobe meter (OSMM). Flotation equipment mounted under the hexacopter allowed the UAV to land on the water surface at the waypoints in the flight mission. Landing and lifting off from water surface avoided requiring the hexacopter to hover during the in situ measurements with the OSMM. This option greatly increased the endurance of the UAMS and the possible number of sampling points in each flight mission. Landing on the water surface during sampling reduced the complexity of the UAMS, by eliminating the need to use additional sensors for safe hovering for taking measurements at a precise depth. The developed prototype UAMS was waterproof, lightweight, and fully functional for collecting geo referenced temperature, electrical conductivity (EC), dissolved oxygen (DO), and pH data from a 1.1 ha agricultural pond.

The developed prototype UAMS can be used to collect field data for the development of algorithms for water quality assessment with satellite remote sensing. UAMS can also be used for conducting field measurements at inaccessible or dangerous water bodies. Another important contribution of the UAMS would be in rapid water quality measurements after natural disasters such as flooding and hurricane events. The major limiting factor for the UAMS

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is flight duration. Advancements in battery technology and optimal UAV designs can increase the endurance of the UAMS. Future research activities will focus on the development of a new UAMS for smart water sampling, based on the OSMM measurements.

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