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Solar Sea Weather and Pollution Transmitter Buoy

Erigela Radhamma[1], Kotla Shashank[2], Gaggenapalli Aarthi[3], Sankati Pranay Reddy[4], Yenagandula Shiva Sai[5]

[1,2,3,4,5]Department of Electronics and Communications Engineering, Teegala Krishna Reddy Engineering College, Meerpet, Hyderabad, 500097

A B S T R A C T

Unlike weather on land, sea weather is highly unpredictable and changes drastically at times. Keeping track of sea weather at all times is a very tough task. Also sea pollution is a growing issue of concern and the first step to controlling pollution is measuring it. Another problem is the unavailability of cellular or other data networks in sea or data transmission. It is necessary to use small sea weather stations with own data transmission capability in the sea at all times to get data about these details. So we hereby design and develop a small sea weather as well as sea pollution monitoring station that can transmit this data over to the monitoring station on sea shores. The system uses a range of sensors all controlled by an Aurdino nano controller in order to achieve this task. Along with it we also develop a receiver system to receive and display the data from the transmitter.

Keywords: GSM, MEMS, LCD, Radio Frequency, ASK.

1. Introduction

A radio frequency (RF) signal refers to a wireless electromagnetic signal used as a form of communication, if one is discussing wireless electronics. Radio waves are a form of electromagnetic radiation with identified radio frequencies that range from 3kHz to 300 GHz. Frequency refers to the rate of oscillation (of the radio waves.) RF propagation occurs at the speed of light and does not need a medium like air in order to travel. RF waves occur naturally from sun flares, lightning, and from stars in space that radiate RF waves as they age. Humankind communicates with artificially created radio waves that oscillate at various chosen frequencies. RF communication is used in many industries including television broadcasting, radar systems, computer and mobile platform networks, remote control, remote metering/monitoring, and many more. In this project we use 433MHz RF Wireless Transmitter and Receiver Module also its interfacing with Arduino. We will also learn how this module works and how wireless communication occurs. And finally, we will learn how to use this module with Arduino to transmit and receive data packet wirelessly. It is available online for less than two dollars, making it one of the most affordable data communication options available. And, best of all, this module is so small that you can incorporate it into almost any project.

2. Literature Survey

The primary challenge of IOT networks is the trade-off between the performance and energy consumption of networks and devices. A considerable amount of research has been conducted in the area of green networks considering both device energy consumption and network energy consumption. The examined surveys draw a picture of an emerging domain of IOT applications, with promising preliminary results and many open challenges. To reach maturity, future research in IOT-enabled WQM will have to investigate and design solutions to allow for:

1. Reliable, wide-area connectivity in a range of deployment scenarios, from rural to urban.
2. Perpetual, energy-efficient operation across the seasons, towards an unlimited lifetime.
3. Accurate, stable measurement of a wide range of relevant water properties.
4. Resilient, environmentally compatible construction to survive weather processes.

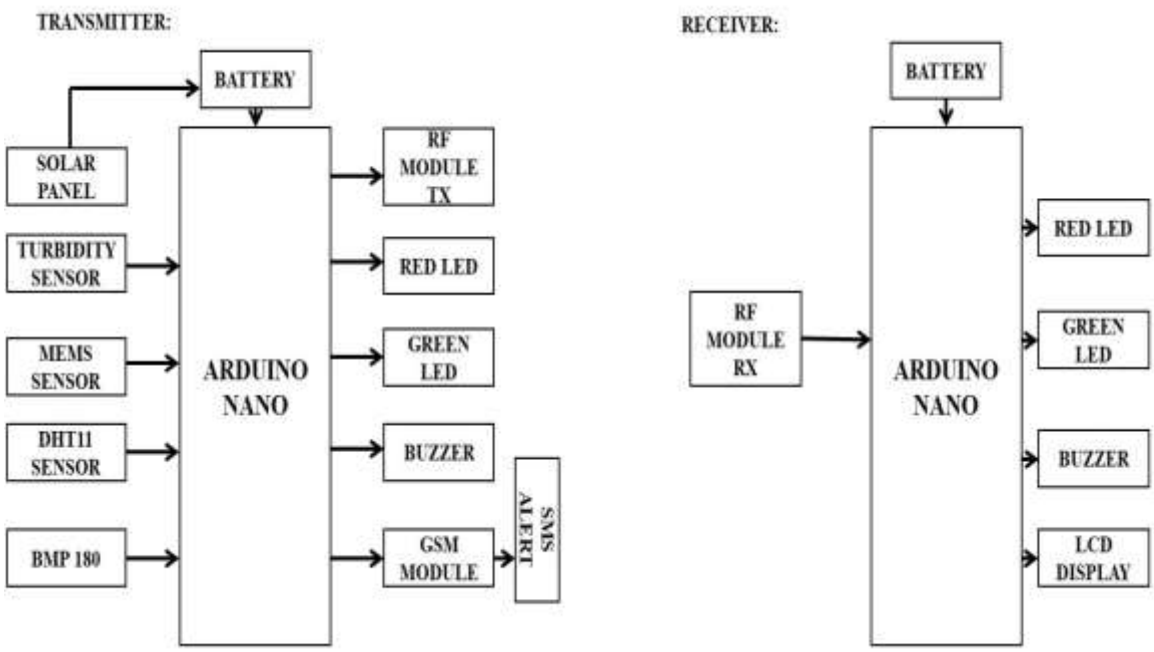
An IOT system featuring these characteristics will enable for high-frequency, real-time WQM over wide areas, resulting in a more economical, higher precision process that traditional ones.

Year	Authors	Domain	Focus	Conn.	Location	Deploy.
2018	Chen, Han	WQM in smart city	Technology demonstrate.	Wi-Fi	Bristol harbor	4 mo.
2018	Manoharan, et al.	WQM in smart village	preliminary assessment	LoRa	Indian villages	future

2018	Paul	WQM at water source	design and prototype	GSM	Dhaka city	lab.
2018	Moparthi, et al.	WQM at water reserv.	design and prototype	GSM	unspecified	lab.
2015	Prasad, et al.	WQM at ocean	design and prototype	GSM	Fiji islands	12 h
2019	Chowdury, et al.	WQM at river	design and data analysis	Wi-Fi	Chittagong city	1 min
2017	Daigavane, Gaikwad	WQM	design and prototype	Wi-Fi	unspecified	undoc.
2019	Wu, Khan	WQM at lake	deploy. and coverage	LoRa	Dardanelle lake	1 day
2020	Huan, Li, et al.	WQM for aquaculture	design and architecture	NB-IoT	Changzhou fishery	1 mo.
2017	Kamaludin, Ismail	WQM at pond	implem. and coverage	Zigbee	USM campus	12 h
2019	Johnston, et al.	AQM in city	prototype and deploy.	LoRa	Southampton city	7 mo.

3. Proposed System

In this system we have a Solar powered buoy which is interface with the sensors like turbidity sensor and DHT11 weather monitoring sensor. Which are transmitted via a RF 433M Hz communication channel to a receiver to display the sensor data. DHT11 stands for Digital Humidity and Temperature sensor. In this system this sensor will sense the temperature and humidity that is present in the sea, turbidity sensor will sense the pollution level of the water based on the colour of the water. This system also has MEMS sensor to detect sea state by throwing the values that can be used to check is sea is clam or rough and also has BMP180 sensor for pressure and altitude of the location. Transmitter unit is always in the sea and it is not possible to constantly charge it from time to time, so we use a solar panel to allow it to generate its own power and keep working in the sea. The solar panel charges the on board battery which is used to power the circuitry. After collecting the data transmitter transmits the data to the receiver using RF 433M Hz communication channels. This data is now received and processed by the microcontroller and displays these values on the LCD. If a value is beyond a set range it also sounds a buzzer alert and displays alert in order to notify station officers to take action and warn ships/people in the vicinity. A GSM module is also provided in the system to increase the range of the system.



As shown in the block diagram it has 2 boards one is transmitter side and other is receiver side and arduino nano microcontroller is used to process the data. Transmitter side will have solar panel, battery, turbidity sensor and DHT11 sensor, MEMS sensor and BMP 180 sensor in it. The transmitter unit is always present in the sea and it is not possible to constantly charge it time to time, so we use a solar panel to allow it to generate its own power and keep working in the sea. Solar panel charges the on board battery which is used to power the circuit. Both transmitter and receiver unit has LED and buzzer to alert if there are any abnormalities. GSM is used to send SMS alert and increase the range of the system.

4. CONCLUSION AND FUTURE SCOPE

A multi-sensor floating buoy system to monitor energy resource parameters in the marine environment has been designed. The design of the floating system has been made using software tools for treating the static and hydrodynamic characteristics of offshore marine systems, including anchoring requirements and materials. Sensors of proven quality for monitoring renewable energy marine parameters have been used. The buoy system has been designed to be expandable and reconfigurable. It was also designed for being used as a test bench in the control and diagnosis of marine energy generators.

a wind turbine and two marine current turbines can be installed. These generators, in a redundant way with the solar panel, guarantee the energy supply of the floating system for long observation periods. In the next stage of the project, the multi-sensor buoy will be used to monitor local renewable energy resources and will be tested in open sea conditions and also adding up OS IOT technology will increase the range of the device.

References

1. Lee, K.H Sclavounos, P.Wayman, E. Floating wind turbines, In Proceedinigs of the 20th Workshop on “Water Waves and Floating Bodies”, Spitsbergen, Norway, 29 May–1 June 2005, p. 418.

2. Ben Elghali, S.E. Benbouzid, M.E.H. Charpentier, “Marine tidal current electric power generation technology: State of the art and current status.”, In Proceedings of the 2007 IEEE International Electric Machines & Drives Conference, Antalya, Turkey, 3–5 May 2007; Volume 2, pp. 1407–1412.

3. Thorpe, T.W, “A Review of Wave Energy”, ETSU Report R-72, The UK Department of Trade and Industry: Harwell, UK, 1992.

4. “Co-ordinated Action on Ocean Energy”, Ocean Energy Conversion in Europe: Recent Advancements and Prospects, EU Project under FP6 Priority: 6.1.3.2.3, Renewable Energy Technologies, Centre for Renewable Energy Sources: Pikermi, Greece, 2006. Available online: http://www.ca-oe.org (accessed on 14 March 2006).

5. Falcão, A.F. Henriques, “Oscillating-water-column wave energy converters and air turbines: A review”, Renew. Energy 2016, 85, 1391–1424.

6. Vicinanza, D. Margheritini, L. Kofoed, J.P. Buccino, M, “The SSG wave energy converter: Performance, status and recent developments”. Energies 2012, 5, 193–226.

7. Buccino, M. Stagonas, D. Vicinanza, “Development of composite sea wall wave energy converter system”, Renew. Energy 2015, 81, 509–522.

8. Vicinanza, D. Nørgaard, J.H. Contestabile, P. Andersen, T.L, “Wave loadings acting on overtopping breakwater for energy conversion”, J. Coast. Res. 2013, 65, 1669–1674.

9. Kofoed, J.P., Frigaard, P., Friis-Madsen, E., Sørensen, H.C, “Prototype testing of the wave energy converter wave dragon”, Renew. Energy 2006, 31, 181–189.

10. Edwards, K. Mekhiche, “Ocean testing of a wave-capturing powerbuoy”, in Proceedings of the Marine Energy Technology Symposium, Washington, DC, USA, 10 April 2013.