© 2020 IJSRST | Volume 5 | Issue 7 | Print ISSN : 2395-6011 | Online ISSN: 2395-602X

4th National Conference on Advances in Engineering and Applied Science
Organized by : Anjuman College of Engineering and Technology (ACET) Nagpur, Maharashtra, India, In association with
International Journal of Scientific Research in Science and Technology

Design and Implementation of QoS for Underwater Communication

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ABSTRACT

Underwater wireless communication is the wireless communication in which Acoustic signal (waves) carry digital information through an underwater channel. Electromagnetic waves are not used as they propagate over short distances. Over past decade Heavy cables were used to establish a high speed communication between remote end and the surface. To overcome such difficulties, underwater wireless communication has come into existence. The increasing exploitation of natural resources under water, particularly in the sea, has ignited the development of many technological advances in the domains of environmental monitoring, oil and gas exploration.

Keywords : Acoustic, Electromagnetic, Ignited, Exploitation, Monitoring

I. INTRODUCTION

Underwater wireless communication present new and distinct challenges when compared to wired and wireless communication through the atmosphere, requiring sophisticated communication devices to achieve relatively low transmission rates, even over short distances. The aim of this paper is to survey the main features inherent to each underwater wireless communication technology.

Under water, several phenomena may influence communication , such as salt concentration, pressure, temperature, amount of light, winds and their effects on waves. The easiest technological way to communicate with a robot is through a physical connection, such as a copper or fiber optic tether. Though this allows for efficient and high speed communication, a tether provide many operational challenges when dealing with mobile robot, limiting the range and maneuverability of the vehicle, as well as requiring an often cumbersome tether management system. Since humans are limited in their ability to work underwater ,remotely operated vehicles(ROV) and autonomous underwater vehicles(AUV) have been in service to perform underwater tasks, such as collecting data and retrieving items. Operation of these vehicles is challenging, but as oil resources are found further off shore, ROV and AUV are required to go deeper and stay deployed longer in order to perform critical tasks.

Underwater Wireless Communication

What is Underwater wireless communication?

Underwater acoustic communication is a technique of sending and receiving messages below water. There are several ways of employing such communication but the most common is by using hydrophones. Compared to terrestrial communication, underwater

has low data rates because it uses acoustic waves instead of electromagnetic waves.

RF Communication

For frequency ranges employed by mobile services, TV, radio and satellite communication, the seawater is highly conductive, thus seriously affecting the propagation of electromagnetic waves. As a result ,it is not easy to establish communication links for distances beyond 10 m in the ocean in both very and ultra high frequency range,or even in high frequency.

Another characteristics of underwater RF signal is that they can travel through several paths: the signal can cross the water air boundry and can propagate through the seabed.

Working

We are developing a system which can be used to send the data wirelessly underwater.

Our system consist of transmitter section which will be having keypad to enter the data, Arduino Uno (Controller) to execute different operations , LCD to display what

we are going to send and light source to transmit data . At the other end we are having Receiver section which will be having Photodiode to receive signals from light , Arduino Uno again to execute operations and LCD to display the data received. Initially data will be entered by using keypad and Arduino will receive that data and that Data will be first displayed on LCD to confirm the data. After displaying the data Arduino will send the data using light source. The data transmitted from the light source will be received by photodiode and it will be given to Arduino . Arduino will receive the data and will display the same on LCD.

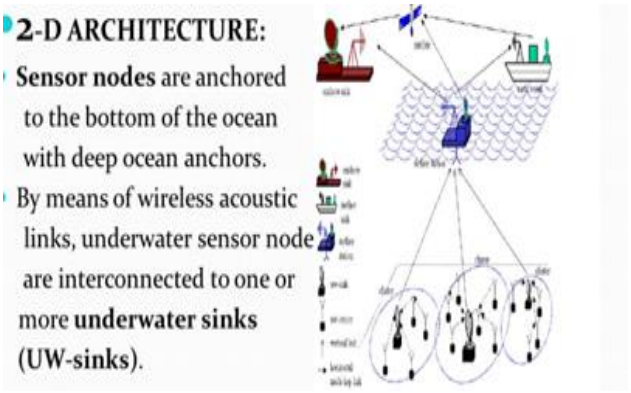

Fig 1. 2D Architecture

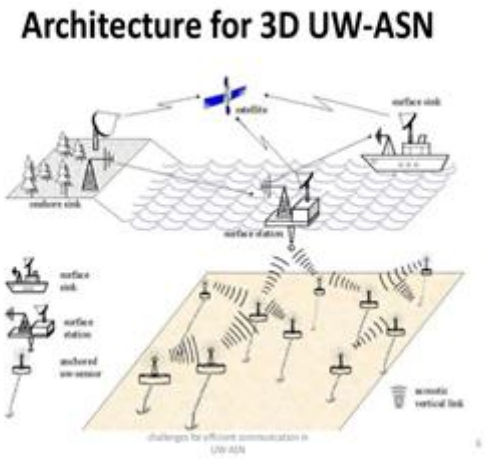

Fig 2. 3D Architecture

Quick Start Guide To
Express PCB

There are two parts to ExpressPCB, our CAD software and our board manufacturing service. Our CAD software includes ExpressSCH for drawing schematics and ExpressPCB for designing circuit boards.

1.We recommend that you begin by drawing a schematic using ExpressSCH

2. Next, use the Express PCB program to lay out your PC board. If you link your schematic to ExpressPCB, it will guide you through the wiring process.

3. When your layout is complete, determine the exact cost to have boards made with the Compute Board Cost command.
4. To order the boards, enter your name, address and billing information into ExpressPCB and press the Send button within the Order Boards Via The Internet dialog box.
5. In a few business days (typically 2 or 3) an overnight courier will deliver your PC boards.

Designing a PCB

ExpressPCB is a very easy to use Windows application for laying out printed circuit boards. While not required, we suggest that you draw a schematic for your circuit using the ExpressSCH program. By linking your schematic, ExpressPCB will guide you by
highlighting the pins that should be connected together with traces.

Beginning a New Layout

1.Begin a new layout by running ExpressPCB . If you are designing a four-layer board, select Board properties from the Layout menu and check the 4-Layer option.
2. In the main window, the yellow rectangle defines the perimeter of the PC board. Set the size of your board by moving three of its four corners (the upper left corner is fixed at 0,0). Move the corners by dragging them with the mouse, or by double-clicking them and entering coordinates. Additional corners can be added to the perimeter to change its shape (see ExpressPCB: Changing the Board Perimeter).
3. Select the size of the Default via. In some cases as you place traces, ExpressPCB inserts via (plated-through holes) when a trace changes between the upper and lower layers. When inserted, these via pads are always visible. Set the Default via in the Board properties dialog box.
4. If you have drawn a schematic of your circuit using ExpressSCH, link theschematic file to your circuit board layout using the Link schematic to PCB command found under the File menu.
5. Finally, give your board a name by selecting Save As from the File menu.

Zooming and Panning

The easiest way to move around your layout is with the scroll wheel on the mouse. Turning the wheel zooms in and out. Pressing the wheel and dragging the mouse pans.

IC 7805

IC 7805 is a series of 78XX voltage regulators. It's a standard, from the name the last two digits 05 denotes the amount of voltage that it regulates. Hence a 7805 would regulate 5v and 7806 would regulate 6V and so on.

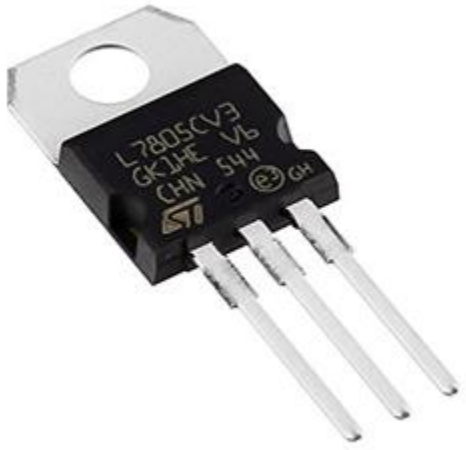

Fig 3. Regulator IC

Three-Terminal Positive Voltage Regulator Ic

II. FEATURES

- Output Current In Excess Of 1a;
- No External Components Required;
- Internal Short Circuit Current Limiting;
- Internal Thermal Overload Protection;
- Output Transistor Safe-Area Compensation;
- Output Voltage Offered In 4% Tolerance

Factors affecting acoustic communication

- Path loss : Due to attenuation and geometric spreading
- Noise : Man-made noise and ambient noise (due to hydrodynamics)
- Multipath propagation
- High propagation delay
- Doppler frequency spread

Wired under water is not feasible in all situation as shown below-:

- Temporary experiment
- Breaking of wires
- Significant cost of deployment
- Experiment over long distances

To cope up with above situation ,we require underwater wireless communication.

III. Advantages

1. Can be used to provide early warning of tsunamis generated by undersea earthquakes
2. It avoid privacy leakage
3. Pollution monitoring

IV. Limitations

1. Battery power is limited and usually batteries can not be recharge easily .
2. The available bandwidth is limited .
3. Underwater sensors are prone to failure because of fouling ,corrosion .etc
4. Highly affected by environment and natural factors such as heterogeneities of the water column ,variation of sound velocity versus deapths , temperature and salinity , multiple and random sea reflection and significant scattering by fish and bubble clouds.

V. Result and Discussion

Despite much development in this area of underwater wireless communication, there is still an immense scope for such research as major part of ocean and bottom yet remain unexploded. The main objective is to overcome the present limitation and implementation advance technology for oceanographic research.

VI. Future Work

By the further research the mobile underwater communication could be implemented. The problem of channel variability already present the application with a stationary transmitter and receiver becomes the major issues of mobile underwater communication. By making the time synchronization the UWA channel and also by the motion induced pulse compression/dilation the mobile underwater communication can be taken.

VII. REFERENCES

[1]. Camila M.G. Gussen,Paulo S.R. Diniz,Marcello L.R. Campos,Wallace A.Martins,Felipe M.Costa, and Jonathan N. Gois : Vol.31, No.1, 2016 "A Survey of Underwater Wireless Communication Technologies"

[2]. Heather Brundag B.S Ocen Engineering "Designing a Wireless Underwater Optical Communication System" sMassachusetts Institute of Technology, 2006

[3]. Shlomi Arnon, Ben- "A Particle Filter Approach to SGurion University of the Negev Electrical and Computer Engineering Department Satellite and Wireless Communication Laboratory P.O.Box 653 "Underwater optical wireless communication network"

[4]. International Journal of Distributed Sensor Networks'A QoS-Based Topology Control Algorithm for Underwater Wireless Sensor Networks', First published Nov 1,2010 http://doi/10.1155/2010/642053

[5]. Article in International Journal of Distributed Sensor Networks 13(7). July 2017 "Design of Underwater Acoustic Sensor Communication System Based on Software Defined Networks in Big data"