Smart Life Saver System for Scuba Divers using Water Data Transmission Techniques

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***Abstract*-The communication between under water and land is very highly challenging one. Because the underwater sensors cannot share data to those who are on land, since both of them use different technologies that only work in their respective mediums. Radio signals that travel through air die very rapidly in water. Acoustic or sonar, sent by underwater devices mostly reflects off the surface without ever breaking through. This causes inefficiencies and other issues for a variety of applications, such as ocean exploration and submarine-to-plane communication. To start, there are two choices of underwater communications: Hardwired uses a cable to transfer the data, and wireless uses water for communications. Mostly communicate with land side to transfer their emergency situation we accompanied it. As opposed to hardwired, wireless communication provides the ability to communicate with land side human. Here we use water as data transmitting medium for communication between under water scuba divers to land.**

Keywords-Water data medium, frequency signals, message transmission, ball shaped conductivity module

I.INTRODUCTION

The main objective of this paper is to construct a device to monitor the health of the scuba divers. Water data communication is a potential Technology to realize under water communication. Currently, there are lots of efforts at using underwater vehicles, gliders and moorings for the spatial and temporal measurements in Oceanography research. Sensor data collected by these platforms is usually internally recorded and then transmitted via a cable or wireless communication. Traditional acoustic links are fundamentally bandwidth limited to low rates of bit per second. Optical methods are well posed to provide a alternative solution for high bandwidth communications in undersea. This device provides a complete security for scuba divers by constantly monitoring the pulse rate and body temperature. Along with life jacket the transmitter side is scuba divers they are connect by temperature and heart beat sensor to monitor their temperature and pulse rate. The signal is transmitted through water medium to the control room and the life of scuba divers is saved.

The frequency domain characteristic of data communication through water channel is experimental water is measured and compared. The results show that the type and provide particle size of the agents will significantly affect its water properties, and the frequency domain component of the water communication signal will be affected by the agents concentration. By having separate transmitter and receiver module in the water between the modules can transmit the sea researcher's biomedical conditions and interactions to the monitoring end available on the ship.The transmitter on scuba divers and the receiver side is on the land side that is control room. The data's which collect from transmitter side Arduino and send to the receiver side to the control room through frequency conducting ball. The frequency conducting ball is drop on the water and it act as transferring medium of data.

II.WATER DATA TRANSMITTER

The water data transmitter side implies that is a collection of data from Arduino UNO. The transmitter part consists of Arduino, 16×2 LCD display, body temperature sensor, heart beat sensor. The temperature and heart beat sensor is connected directly to the human body make contact with body to sense the heat and pulse changes. The heart and temperature sensor used in name of heart beat sensor used as potentiometer. The reason of using potentiometer in our project is if heart beat sensor is used the variation of pulse range through human heart occurs only in real time but during project the real human heart experiment output can't predict so the reason potentiometer is used. In real time heart beat sensor used as pulse sensor which senses the heartbeat. The temperature sensor name is LM35 its sensitivity is 10mv/degree Celsius. As temperature increase output also increases. It does not need any external calibration circuitry. It measures temperature from -55degree Celsius to 150degree Celsius. It requires low input voltage as 4v and required pins also low so it is used.

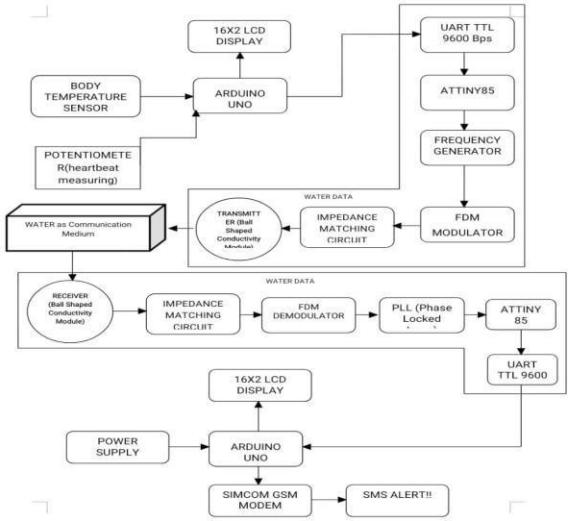

Figure1.Block diagram for communication between under water scuba divers to land.

The data from sensor it stored in ARDUINO UNO. The ARDUINO used to collect the data and send it to the 16xLCD display. The LCD display displays the value of sensed input in transmitter side. The ARDUINO sends the collected and sensed data to the water data transmitter.

The first part and sending wireless cable is UART TTL the reason of using this it was a serial communication and reliable and send data in speed of 9600bps. The microcontroller used here is ATTINY85 it's a small controller consist of 8 pins. It has small number of pins so space storage can be saved for required pin can use. In this project we require only 2 pins in sending input data to microcontroller so small pin is used. characteristics it sends in form of one by one to display in receiver side and to conduct and transfer in communicating medium. It divides incoming signal through cable or optical fiber. It mainly helps to display and getting information of desired cable channel.
The FDM sends data to the impedance matching circuit it checks that final incoming signal and input signal are in same phase and amplitude. Is there any distortion it matches incoming signal proportional to the input signal. The signal from impedance matching circuit sends to frequency ball is the transferring medium of data to the water communicating medium.

III.COMMUNICATION MEDIUM

The communication between the transmitter and receiver module is carried out using the stainless steel ball. This is responsible for the capture of the signal from the transmitter side and to pass on to the receiver side. The structure of the ball is in a round shape so that the signals from all the possible sides can be captured without any losses in the input signal. The stainless steel ball is used so that the ball would not get corroded in any type of the water. The parameter using for passing on the signal is the frequency. The range of the frequency using for the transition is 4MHZ.

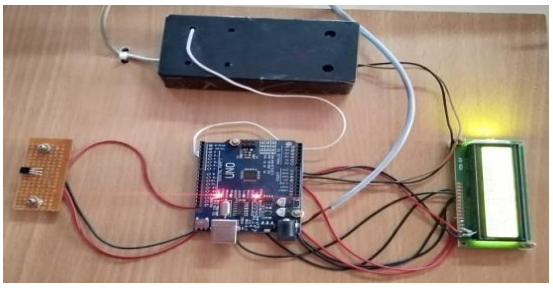

Figure2. Transmitting medium

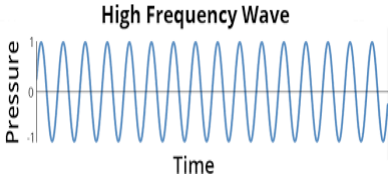

Figure3. Transmitting medium

The frequency wave signals are more efficient then the ultrasonic waves. When we use the ultra-sonic waves the transmitted waves can get reflected back due to any obstacles like giant fish, rock and boats that are sailing.

During the application of this device the frequency which is used to transmitter the signal is varied as required. High amount of frequency signal has to be given when the transmitter and receiver is far and low amount of frequency signal can be given when both the module are nearby.

Figure4. Communication medium

The transmitter part consists of arduino, 16×2 LCD display, GSM module. All these components at the receiver side are placed at the controller roomabovethe sea level. The signals which are obtained from the receiver module are given to impedance matching circuit. The impedance matching circuit monitor the input signal is in same phase and amplitude. It also checks any distortion in matches incoming signal proportional to the input signal.
The signals from the impedance matching circuit are then passed on to the FDM demodulator. FDM demodulator is used to extract the original signal from the obtained signal at the receiver side. The incoming signal in form of two characteristics it send in form of one by one to display in receiver side and to conduct and transfer in communicating

medium. The FDM demodulator conveys the original signal to the output. The signals from the FDM demodulator is then send to the phase lock loop. This is a type of controller system. The output signal is related to the phase of the input signal. The phase lock loop is used to recover the signal from the noise. Communication channels where the data have been interrupted.

The signals are then sent to the ATTINY 85 which is a type of micro controller with 8 pins. The high performance and low-power Microchip 8-bit AVR RISC-based microcontroller combines 8KB ISP flash memory, 512B EEPROM, 512-Byte SRAM,
6 general purpose input and output lines,32 general purpose working registers, one 8-bit timer/counter with compare modes, one 8-bit high speed timer/counter, USI, internal and external Interrupts, 4-channel 10-bit.

Analog to digital converter, programmable watchdog timer with internal oscillator, three software selectable power saving modes, and debug WIRE for on-chip debugging. The device is used to achieve the throughput of 20 MIPS at 20 MHz and operates between 2.7-5.5 volts.

The signals from the ATTINY 85 are then send to the UART TTL. The use of the Universal Asynchronous Receiver/Transmitter was a serial communication and reliable and send data in speed of 9600bps. It is the basic chip or a virtual function in a microcontroller which is used to encodes the data bits serially into the standard format with a start bit, stop bit, speed. The signals from the Universal Asynchronous Receiver/Transmitter is then send to the Arduino. The Arduino used to collect the data and send it to the 16xLCD display at the controller room where the temperature and the heartbeat of the scuba divers has been monitored. There is a power supply which is given at the receiver side. That is used to operate the receiver part of the system. The power supply is given by input DC voltage as 5v by UART protocol as 9600bps.The UART is mainly used because it is serial communication and reliable. The frequency is given as 4MHz and its tested in 4 to 6 feet fish tank and output is defined.

V. MESSAGE INDICATION

Here For the message indication purpose we use global system for mobilecommunication (GSM) and LCD display. The data's are transmitted in a digital sequence that is 0's and 1's.when the temperature sensor senses the temperature above 40 degree it sends the alert message to the control room .And also the heart beat sensor is included in order to monitor the cardio condition of the scuba divers.

A data from body temperature sensor and a potentiometer is stored in Arduino and it can be viewed by LCD display. The stored data is transmitted through the UART Port in a serial communication to the frequency generator which generates a signal.

Figure5. Power suppy

This signal is transferred to the FDM modulator which includes the carrier signal and removes the unwanted noise signal present in the transmitted signal. The signal is transferred to the impedance matching to maximize the power transfer and minimize the signal reflected. The signal from the impedance matching circuit is transferred to the water data transmitter module. The data transmitted by keeping the water as a medium in form of frequency to the water data receiver module. The received signal is demodulated to get the original form of signal. Phase-locked loop(PLL)is used to stabilize, filter or recover a signal from a noisy communications channel where data has been interrupted. The received stored in an Arduino at the output port. Which is viewed by the LCD. When the temperature rises above certain level and if there is any change is heart rate of scuba divers it sends an alert message as "ALERT!!SCUBA DIVER IS IN DANGER EXTREME TEMPERATURE". As the temperature and the heartbeat of the scuba divers increased above certain lever the message is will be send to the mobile in the form of the alert message through the Global System for Mobile communication (GSM). The GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot.It operates at either the 900 Megahertz (MHz) or 1,800 MHz frequency band.


Figure6. Receiving medium

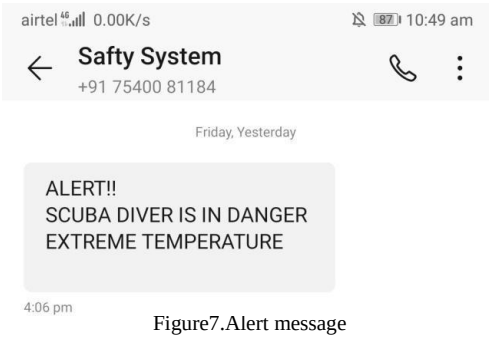

Figure7.Alert message

VI. CONCLUSION

From this paper we conclude that there would be a complete security system for the scuba divers through water data communication module. The project was completed with keeping in mind all the safety measures that are required for the scuba divers.

VII. REFERENCES

[1] Li ma,huayang,minfuli, "Experiment of recreating domain properties of seawater cannel for underwater optical communication", Department off electric engineering ocean university of china Qingdao,china.

[2] Meihongsui,Xinshengyu,fengliZhang(2009), "The evaluation of modulation techniques for underwater wireless optical communication", IEEE

[3] Ashish kumar, ArpitaghoshVibin A M,and Shansi Prince(2012), "Underwater communication system for deep sea divers using visible light", IEEE

[4] Jaydip M kavar, Wandra K H(2014), "survey paper on underwater wireless sensor network", international journal of advanced research in electrical, electronics and instrumentation engineering

[5] ..AndreaManzoni,Nicolapeserico(2013), "Electromagnetic communication solution for scuba diving", IEEE.

[6] ReshmaN, Ramesh T K(2017), "Underwater diving and diver health concerns a survey", IEEE.

[7] Nasir asaeed, Abdulkadircelik, TareqY.Al- Naffouri, Mohammedsalim(2018), "Underwater optical wireless communications, networking and localization", IEEE

[8] Mischandar B, Vairamuthu S,(2019), "A review on underwater acoustic sensor networks: perspective of internet of things", International journal of innovation technology and exploring engineerg.