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Analysis under Water Depth and Speed of Sound Using High Range Ultra Sound Embedded Altimeter

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Abstract: There are presently many research related to water depth measurement system with high ratio of capability, low price and all of them are ended at Ultrasonic Range Finder. A suitable method to determine water depth and object detection is described in this paper. In this project we used an ultrasonic transducer. Ultrasonic detectors can be used to find water depth and which is placed on the surface of water. Here we measure the time between the pulse transmitted from the transducer and the echo pulse received back. If a pulse transmits through water cause attenuation to avoid signal distortion and attenuation here we develop an amplitude booster circuit. It also provides real-time feature to an RTOS enabled long distance remote access. Create a web page and data displayed in it and access the data using IP address and control the transmission of sound signals by the buttons created in the web page.

Index Terms **- altimeter; depth finder; amplitude booster; echo pulse; IP address; distance remote access**

I. INTRODUCTION

Echo sounder is used on fishing boats and ships to determine the depth of water. which measuring the time interval between a sound pulse transmitted form a transducer and it strike on sea bed or an object reflect back as an echo . Sonic depth finders important element in ship, we can see different type of echo sounder with large display unit and number of control buttons. Here we can access data by using mobile, computer or any laptop by using the created web page to display the result and using the IP adders we can access the data from long distance. We can also find dynamic position of ships using echo sounder. Most of fishing boats using echo sounder for identifying fish clusters. Ocean is classified in to five zones. In which fishing boats highly concentrated in Epipelagic zone because more than 350 fish species are found in this area. most of fish clusters are find in 100 meter sea depth. Most of sea mount are identified in arrange of 200 meter depth and continental rise and slop on the sea bed are also find in this range. To determining the water depth, here we use a simple equation D=s*t*1/2 .s is the speed of sound in water is about 1,480 meter per second and t is the time interval from transmitting and receiving of sound pulse.

When the operating frequency of depth finder increases then depth of penetration will decreases. Normally the operating frequencies of fish finders are range of 50 kHz to 200 kHz. Here we use lowest operating frequency 50 KHz for increase depth of penetration. If a low frequency wave is transmitted there is a chance of attenuation o use an amplitude booster circuit. Remote accessing depth finders are now available with small size here also we proved a portable one.

This paper is organized as follows, Section I consists of Introduction part, Section II block diagram and description, Section III highlights the device's architecture and provides implementation details. Section IV provides simulation results to demonstrate the communication of the proposed system

2. RELATED WORKS

Number of altimeters is available in market but most of them are very costly and difficult market most of them have with high cost and some of them with operating difficulty so here we provide simple portable version of altimeter. In view of significant levels of backscatter created by the tempestuous physical elements, diminishing and biasing investigation to just times of low current speed. Analyze the nearness and nonappearance of sustainable power source structures over a scope of physical and tropic levels over complete spring-neap flowing cycles by investigations draw on arrangements at a flowing vitality site in Scotland. These outcomes can be utilized to illuminate how creatures search in these destinations and whether people face crash dangers [1].Calculating the profundity of water in a particular piece of the ocean. There are various approaches to produce a sign that tracks the profundity of water in a particular piece of the ocean. Ultrasonic locators likewise used to discover the separation between seabed's to the outside of the water. The module is transmitting a ultrasonic wave for a brief timeframe and hang tight for accepting its reverberation. When reverberation got to ultrasonic module, is sent

a heartbeat to small scale controller, which quantifies the time between two heartbeats normally, the water temperature is estimated independently and the real temperature esteem is entered as a boundary to the unit [2].

To identify deterrent present inside the water, measure the profundity of water or a simple specialized technique is utilized. In this technique, both transmitter and collector are set only the outside of water. Sound waves are created by the generator utilizing piezoelectric gem as ultrasonic transducer. Utilizing the recipe Speed = Distance/time (m/s) Distance (profundity) in meter = 1500 * time in second (ultrasonic speed in water is 1500 m/s.)[3].The investigation of the water profundity estimation framework with high range to low cost has finished at Ultrasonic profundity Finder. The trouble in object recognition and estimating water profundity and will never again be a convoluted issue. A basic technique to decide water profundity and item discovery is presenting in this framework. In this task it is utilized sensors like ultrasonic transducer [4]. The current at various profundities, or cells, is legitimately relative to the doppler move in that cell. At the point when the burst or ping is transmitted toward the surface, dissipating happens from entrained air bubbles and different particles in the water. A strong and exact gauge of the Doppler move comprises of a predisposition free estimation of the current with a low fluctuation for different sorts of information. The Symmiktos strategy is an estimation technique that has improved the precision of the Doppler count, contrasted with standard methods.[5]

3. PROPOSED SYSYTEM

3.1. Block Diagram

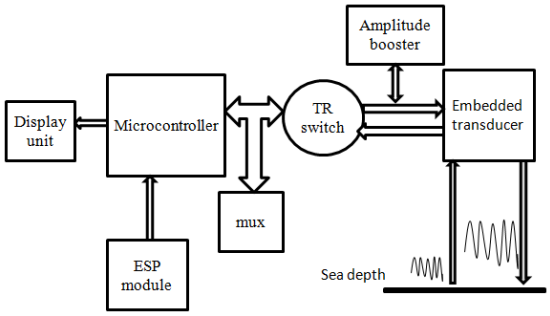

Fig 1: Block diagram of underwater embedded altimeter.

Fig 1 shows the block diagram of underwater embedded altimeter, in this project we proposed to use ultrasonic transducer to communicate with the microcontroller. An ultrasonic transducer is capable of generating and transmitting sound signals. Microcontroller receives data and it send to the remote display unit over ESP wifi module. ESP and microcontroller are part of Client- Server architecture and it's communicated over TCP\IP protocol. Here we use MUX to switch one of several input lines through to a single common output line. An amplitude booster also used to reduce attenuation due to long distance transmission. System has low power consumption and low cost, also we can integrate several arms to this microcontroller board since; board is integrated with med OS.

4. SYSTEM DESIGN

4.1 Laboratory experimental setup

Embedded transducer used for transmission and reception of sonic pulse. Switching done in transducer by 74HCT4067 multiplexer. Completed an experiment by use arduino and 74HC4067 Compare the input and output amplitude frequency obtained using CRO make recode the readings. In laboratory experimental setup we use a signal generator instead of ultra sound transducer and transmission and reception indicate with help of two push buttons**.** Here 74HC4067 multiplexer is also used for switching transmitted and received signals In microcontroller Mbed OS is integrated and code is written for calculating time between transmission and reception of signal and measures the distance travelled by the wave and display it.

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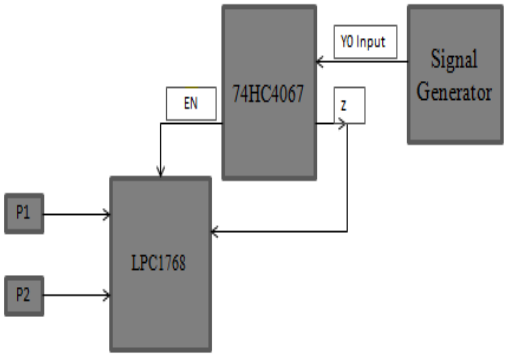

Fig 2: Laboratory experimental setup

Develop an amplitude boosting circuit by use L298 2A motor driver IC. 5v signal given from microcontroller as input and 20 V from power supply and 5V from microcontroller give as in put power to motor driver and we got 20 v output signal as output of motor driver and it used for transition this boosted signal will reuse attenuation. For remote access display unit first we configure ESP to LPC1768 micro controller. Write ESP82266 and LPC1768 configuration program and write web server program.

4.2 Develop Amplitude Boosting Circuit

Lessening misfortune in seawater relies upon temperature and saltiness of the remote medium and recurrence of spreading radio sign. Temperature and saltiness the two changes with variety inside and out this prompts lower weakening of radio waves in profound water when contrasted with shallow water

Here we develop a amplitude boosting circuit for increasing the amplitude of transmitting signal by using L298 2A Dual Motor Diver IC

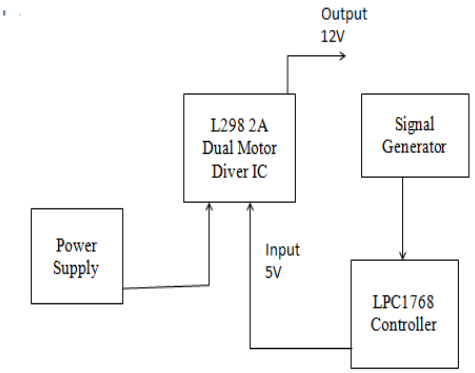

Fig 3: Amplitude Boosting Circuit

5. EXPERIMENTAL RESULT

As a result, we obtained a low cost high capability altimeter with remote accessing feature. The comely used depth finders use transmitting sound signal at a frequency of 180- 250 kHz. Here we use 50 kHz with amplitude booster so increase the range of transmission. Implementation and testing procedures are also simple and easy. Test it on a 1 meter tank and find depth and object identification successfully completed. Test remote accessing of transmission data obtained in web page.

Fig 4: output displayed in smart phone

6. CONCLUSION

In this project we successfully calculate the water depth. By using JSN-SR04 transducer and here we use amplitude booster for accuracy and attenuation. Create a web page and make suitable for Client server programming. Finally develop low cost portable under water altimeter compare with other available altimeter it is simple portable and easy to use.

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