DTMF Technology Used For Enhancement Of Remotely Controlled Sailing Boat

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***Abstract** – In this day and age, it is frequently to change starting with one innovation then onto the next. As of late RF (radio recurrence) technology is used for lion's share of users. In any case, because of the improvement of broadcast communications innovation called DUAL TONE MULTIPLE FREQUENCIES (DTMF), mobiles get to be a distinctly easy method for correspondence and they can be used to control remotely set gadgets without disturbing the scope of scope range and recurrence. In this project we utilize DTMF technology for autonomous sailing boat implies that sailing watercraft development is control by cell phone. The recipient and transmitter pins of DTMF are associated with Transmitter and controller pins of Advanced RISC Machines (ARM) controller separately. Mechanical ARM is utilized for the pick and place mechanism of any object. An ultrasonic sensor is used for the distance measurement and object identification. Metal detector utilized for metal detection. (GLOBAL POSITIONING SYSTEM) GPS and (Global System for Mobile) GSM is used for route reason so that two-dimensional (2D) position of a boat can be resolved and kept up. The wireless camera is interfaced with an arm controller and sends the data to the PC which utilizes propelled picture handling innovation to analyze and recognize pertinent component. Essentially, principle adage of this project is to build up a framework that can be utilized for oceanographic research and perception.*

***Keywords**: ARM, DTMF, GPS, GSM, Sailing Boat*

I. INTRODUCTION

Autonomous sailing boats are relatively new robotics technology; in the last few years with various technologies proposed that relies on the wind to provide propulsion, typically the main power consumer in a robotic vessel [1]. Now a day robotics system is developing for a sailing boat. Here sailing boat is travel on the water surface. The whole process of sailing boat navigation is performed by an autonomously acting system of the technical device. Autonomous robots have been demonstrated in a number of applications, including planetary and submerged exploration. While the utilization of unmanned buoys for ocean observation is well established, the utilization of unmanned systems capable of long-term purposeful navigation is still in its infancy. A sailing vessel will just require negligible electrical energy to alter its control surfaces and power onboard PCs. Sail propelled vessels thus prove a captivating prospect for investigation. A range of sailing boat model and minutely diminutive cruising conveyances were examined, but a number of difficulties arise with each. The sailing boat will additionally require drastic modification to make them self-righting as well as requiring a modified rig to sanction reliable automatic control. Sailing robots and were able to demonstrate rudimental working control systems and prototype developed has exceeded the initial expectations. [2].This paper presents the autonomous sail propelled roboat for ocean observation with using DTMF technology.

The robot control system is physically included in the mobile robot. It consists of an external CDMA modem; control method uses commercial mobile communication networks as the path of data transmission [3]. At this time it is important to control and acquire information from anywhere. DTMF is a system of signal tones used in telecommunication to connect. In this, the signal generated by the DTMF system through a simple telephone call is the used for sending information. The System can generate a control signal through a Global system for mobile communication (GSM) modem either by SMS or Dual Tone Multi-frequency technique [4]. DTMF is the basic

thing of this project which will control the movement of the boat from a far distance and a person can easily operate the boat through this Dual Tone Multiple Frequency which is generated by cell phone.

Here ARM7 is used as its controller; ARM7 is 32-bit microcontroller architecture. Much of microcontroller architecture edified in engineering is predicated on 8-bit architectures -- like 8051, Atmel AVR8, Microchip PIC etc. Due to their minute size and low power consumption, LPC2148 is ideal for applications where miniaturization is a key requisite, such as access control and point-of-sale [5]. The square outline of proposed arrangement of transmitter and beneficiary area appeared in Fig.2 and Fig.3 respectively.

II. METHODS AND MATERIAL

A. Hardware Description Of Major Components In This System

1) *DC Motor*: 4 Dc series motors (Motor drivers) are used in this project. Three motors for controlling the Robotics Arm function and one for the base motor, in which 4 operations are done likes forward, backward, left, right. The activities of dc motor are controlled by pic microcontroller. The purpose behind selecting DC arrangement motor in this innovation is for high torque.

2) *GPS Module*: GPS is used for navigation purpose. GPS mainly used to track the location of a sailing boat in the ocean and help to navigate in right direction.

3) *GSM Module:* GSM Module is instant Available in the market. GSM is Global Framework for MobileCommunication. The GSM standard was created after original (1G) simple cell systems, also, initially depicted an advanced, circuit exchanged system improved for full duplex voice communication and was generally utilize also, supplant different frameworks. Through this, we can send and get a message which will teach our arm to move. We are utilizing GSM Module 900.

4) *Ultra sonic sensor:* The ultrasonic sensor is utilized for deterrent location. Ultrasonic sensor transmits the ultrasonic waves from its sensor head and again gets the ultrasonic waves reflected from an object.

5) *Metal detector:* A metal locator is a gadget which reacts to metal that may not be promptly evident. The least difficult type of a metal finder comprises an oscillator creating an exchanging current that goes through a loop delivering a substituting attractive field. In the event that a bit of electrically conductive metal is near the loop, swirl streams will be prompted in the metal and this delivers its very own attractive field. In the event that another loop is utilized to gauge the attractive field.

6) *ARM Microcontroller (LPC2148):* Here ARM7 is used as its controller; ARM7 is 32-bit microcontroller architecture. Much of microcontroller architecture edified in engineering is predicated on 8-bit architectures -- like 8051, Atmel AVR8, Microchip PIC etc. Because of their moment size and low power consumption, LPC2148 is perfect for applications where scaling down is a key imperative, for example, get to control and purpose of the offer.

7) *DTMF decoder (MT8870):* The MT8870 is a DTMF receiver that coordinates capacities bandpass channel and digital decoder, which can identify and unravel the 16 DTMF tone sets to code 4bits. It is a tone consisting of two frequencies superimposed (see Fig. 1) For its operation requires a precious stone oscillator of recurrence 3,5795MHz. The channel segment utilizes changed limits procedures to separate between the gatherings of high/low frequencies. The gadget has low power utilization (35mW approximate) and gives shut down (PDWN) choice, this permit to lessen his utilization to 0,5mW.
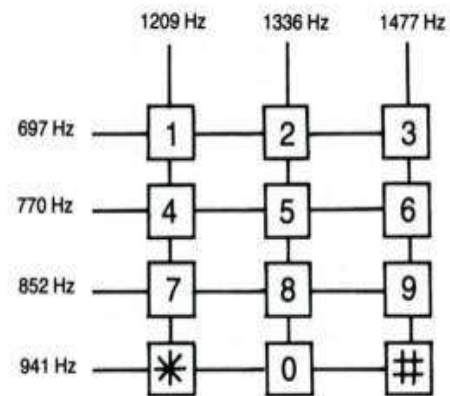

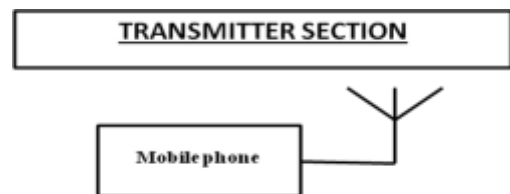Fig.1 Frequency assignment in DTMF system

B. System Block Diagram
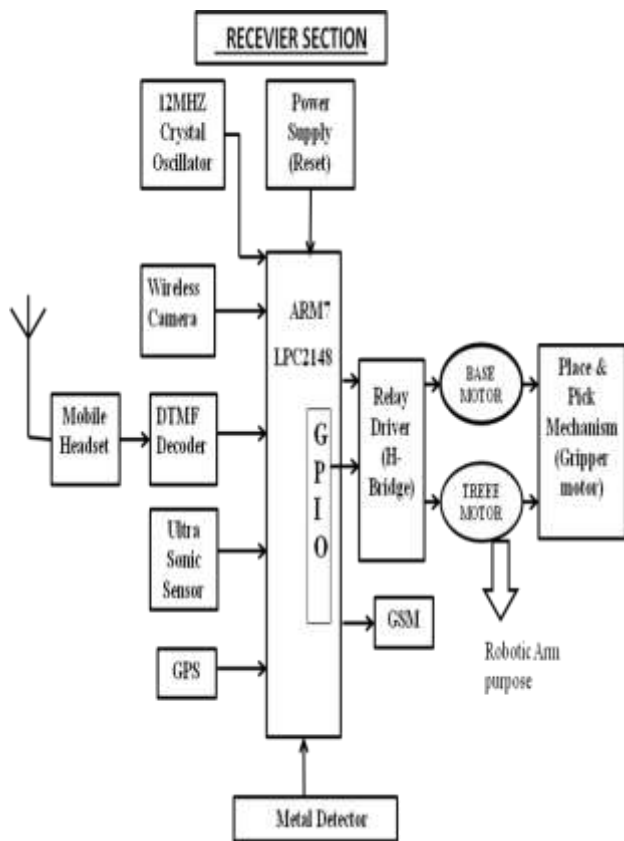

Fig.2 Transmitter section

Fig.3 Recevier section

Table 1. *Shows the various controlling keys used by user to control the sailing boat direction*

KEY	DIRECTION
#2	BACKWARD
#4	RIGHT
#6	LEFT
#8	FORWARD
#0	STOP

C. Related Work

1) The Sailing Boat Control Using The Dtmf Technology

The sailing boat predicated on DTMF (Dual Tone Multi Frequency) technique is implemented. The DTMF Decoder circuit is made utilizing M8870 Decoder IC. The decoding is performed by receiver MT8870 - Zarlink Semiconductor, which perceives the double DTMF tones created by the console of a phone in advanced mode, being changed over to 4-bit amounts. This binary information goes about as summons that is translated by the route framework and dislodging of the robot [6]. Associating phone headset (earphone) jack to the cell phone and after that portable control electrical apparatuses and electrical hardware through DTMF key pad , cell phone and this concept is implemented in this proto type boat so that it can able to control anywhere in the world wherever mobile network is available. Security system is implemented so sanctioned users only able to access this Robot, each key has different capacity such a large number of operation can be performed in this robot. A 4 digit secret key is given and just when the use enters the watchword, the robot can be gotten to by use. DTMF have restrained key to work the robot. As the robot requires more controls various key capacity idea is executed so that each key have 2 capacities and over every one of the 24 operations can be performed.

2) Interfacing GSM with LPC2148

Show a content in versatile from LPC2148 primer board by utilizing GSM module through (Universal asynchronous receiver/transmitter) UART. In LPC2148 Primer Board contains two serial interfaces that are UART0 and UART1. Here utilizing UART0. The GSM modem is being interfaced with the microcontroller LPC2148 Primer Board for SMS correspondence. The SMS can send and accepting for the information sharing and circumstance data and control.

3) Interfacing GPS with LPC2148

Get information from satellite to LPC2148 Primer Board by utilizing GPS module through UART0. The serial information is taken from the GPS module through MAX232 (The MAX232 is an incorporated circuit that proselytes signals from a TIA-232 (RS-232) serial port to signals appropriate for use in TTL-good advanced rationale circuits. The MAX232 is a double transmitter/double beneficiary that commonly is utilized to change over the RX, TX, CTS, RTS signals.) into the SBUF enrol of LPC2148 microcontroller (allude serial interfacing with LPC2148). The serial information from the GPS collector is taken by utilizing the Serial Interrupt of the controller. This information comprises of a succession of NMEA (National Marine Electronics Association) sentences from which GPGGA sentence (Global Positioning System Fix Data) is distinguished and prepared.

4) Sailing Mechanism

The Contrivance is a high voltage, high current integrated four channel driver designed for standard DTL or TTL logic levels and drive inductive loads and switching power transistors. A separate supply input is provided for the logic which sanctions operations at lower voltages. The internal clamp diodes are enabled in the circuit and the contrivance is felicitous for

switching applications at frequencies less than 5 KHz. The L293D assembled in a 16 lead plastic package has 4 centre pins connected together while the L293DD assembled in 20 lead surface mount has 8 centre pins connected together and both of them can be utilized for heat sinking. Transmitter consists of GSM handset (mobile) and is utilized as a remote control to operate robot. AV or camera receiver is placed in transmitter section and DTMF encoder is fine-tuned in mobile phone as default. Microcontrollers, DTMF receiver or decoder, Mobile phone, motor drivers, power source (battery), robot platform, arms and camera are placed in receiver section. One mobile phone is placed in the Robot and gets output through the audio jack and it's given to the DTMF decoder. DTMF decoder output is given to the input of master and the slave Microcontroller discretely. Master Microcontroller is utilized to deal with password aegis and the slave cull. The slave1 controller is utilized to control the Robot platform and camera arm and slave2 controller is utilized to control the robot and camera arm. DTMF encoder is placed in mobile phone acts as a remote control and 3x4 matrix mobile key pads is the control keys of the Robot [7]. The Robot acts according to the program coded by the programmer when a call is being made to the receiver mobile. The low and high frequency incipient tone engendered by the DTMF encoder is transmitted to receiver through the call and the remote controlled operation can be performed. Only 12 operations can be performed, but Robot can perform 24 operations with receiver coding. One mobile phone is kept perpetually in the receiver. Audio jack of mobile phone sent the received analog signal to the DTMF decoder for decoding and filtering it, and gives a 4 bit digital output. The 4 bit output is victualler to the input of Microcontrollers. The Robot utilizes 3 Microcontrollers of which one Microcontroller act as Master and remaining 2 Microcontroller act as slaves. Master controller contains.

To move the boat forward, both the motors are operated in clockwise direction by the micro controller. To move the boat reverse, both the motors are operated in counter clockwise direction by the micro controller. To turn left / right, one motor is rotated in clockwise and the other is rotated in counter-clockwise directions. The DC motor direction is controlled by H-Bridge (L293D IC).An H-Bridge is an electronic circuit that enables a voltage to be applied across a load in either direction [8]. Pick and place operation is done by robotic arm [9]. This all motor operation and Robotic ARM operation can be handling with mobile phone utilizing DTMF technique. All operation of boat handle through ARM7 microcontroller system working program and its Input output ports.

III. CONCLUSION

This is composing and execute ARM7 microcontroller based model of a versatile roboat for remote monitoring and control. In this paper, we introduce a water surface traveler prototype sailing boat for oceanographic research by using DTMF Technology and robotics arm technology for pick and place mechanism. In developing a prototype we used 12v battery to power complete mechanism of a sailing robot. We can improve the system in future by allowing the use of solar driven batteries. We can monitor or control it with IOT based embedded web server also we can monitor its location on IOT.

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