International Journal of Engineering Research in Electronic and Communication Engineering (IJERECE) Vol 3, Issue 3, March 2016

# Aquatic Vehicle Navigation System Using AVR Microcontroller

[1] ShubhangiKhade [2] ShitalParkhi [3] JayaKhairkr [4] MonaliMude [5] RupaliGaybhiye
[1][2][3][4][5] B.E., Electronics engineering, D.M.I.E.T.R., Wardha, INDIA

***Abstract:*** **Distance measurement of an object in the path of a person, equipment, or a vehicle, stationary or moving is used in a large number of applications such as robotic movement control, vehicle control, medical applications, etc. Camera capturing the multiple images by stereovision is 3D concept. In this paper we are going to develop an autonomous system which should be able to monitor obstacle, objects, bouys etc. Measurement using ultrasonic sensors is one of the cheapest among various options and it will spark off the navigation system and intimate the base station about it. Distance measurement of an obstacle by using separate ultrasonic transmitter, receiver and a microcontroller is presented.**

***Keywords*— GSM Module, Microcontroller unit(MCU), Ultrasonic sensor(obstacles detection).**

## I. INTRODUCTION

In the field of electronics, automation is stretched most frequently which brought much resolution in the existing technologies. Numerous techniques for navigation are present. Among those, Land navigation is very easy as compared to the marine navigation.[1]Distance measurement of an object in front or by the side of a moving entity is required in a large number of devices. These devices may be small or large and also quite simple or complicated. These use various kinds of sensors and systems. Low cost and accuracy as well as speed is important in most of the applications. Ultrasound sensors are very versatile in distance measurement. They are also providing the cheapest solutions. Ultrasound waves are useful for both the air and underwater. Ultrasonic sensors are also quite fast for most of the common applications.[2] Vehicles are being operated manually or by using image sensor which has been used by strong network monitoring just as GPS.[1]

## II. METHODOLOGY

### 1. *System Architecture*

The following block diagram shows methodology.

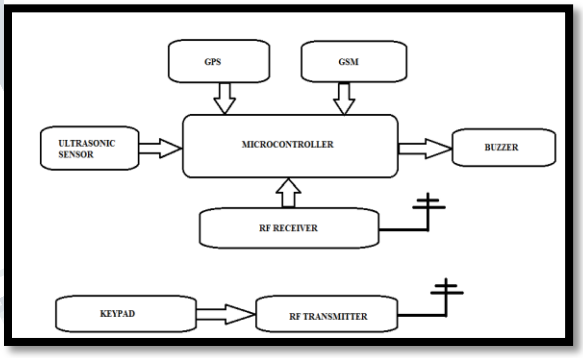


***Fig 1.Block diagram of system***

Now-a-days, automation is a need in the field of electronics. Numerous automation applications are present in the field of aquatic navigation. In our paper, we are designing and implementing aquatic vehicle navigation system using AVR microcontroller and ultrasonic sensor.

The objective of the paper is to develop an autonomous system which should be able to monitor the obstacle, hurdles,etc. and will trigger the system to change its path. Here, we are using ultrasonic sensor for detection of obstacles.

### 2. *Ultrasonic Sensor*

The working principle of an ultrasonic sensor is easy. The sensor transmits ultrasonic sound waves and waits for reflected sound waves. After receiving reflected sound wave or usually named echo, sensor detects the distance in different ways. Fig.2.shows the detection of an ultrasonic sound waves in an object. Ultrasonic modules

includes transmitters, receivers and control unit. The ranges can be increased by using other type of ultrasonic sensors.[3] The basic principle of work:

- Using IO trigger for at least 10us high level signal.
- The Module automatically sends eight 40KHz and detect whether there is pulse signal back.
- If the signal back, through high level, time of high output IO duration is the time from sending ultrasonic to returning.
- Test Distance=(high level* velocity of sound)/2.

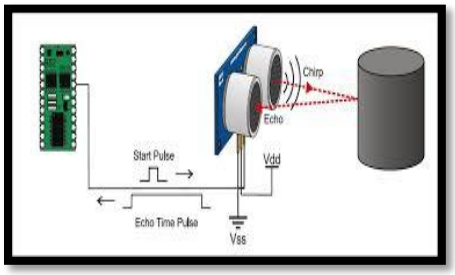


***Fig.2 shows the detection of an ultrasonic sound wave in an object.***

As we are implementing this on miniature of aquatic vehicle, we are using keypad to move the ship to and fro, left and right. The device is working wirelessly using RF module on the transmitter and receiver side. Whenever a keypad is used the RF transmitter will encode the signal. Parallel data are sent from the keypad, whereby the Encoder will convert the parallel data into series, and similar action will provide on the receiver side but in reverse order.

In case if the vehicle lost the direction GPS which will provide navigation, positioning time, longitude and latitude.

### *3. GPS*

GPS is also known as the NAVSTAR (Navigation System for Timing and Ranging). GPS works all across the world and in all weather conditions, thus helping users track locations, objects, and even individuals.GPS having three terminal VCC,GND& Trigger which is interfaced with microcontroller. The location will be provided to controller through GPS.

Another module is used in system i.e,GSM which is used for communication.

### *4. GSM*

The GSM Module Unit is able to send and read SMS or call, connect to internet via general packet radio service (GPRS) through simple AT commands. The modem needed only three wires (Tx, Rx, GND) except power supply to interface with microcontroller unit.[3]

IC L293D motor driver IC to drive the motors. The motor driver IC L293D pins are connected to microcontroller pins of port C. IC L293D motor driver which is used for Amplify the current because output Current of Microcontroller is very less i.e in mA. In 16*2 LCD there are 16 pin in which, data pins (D0-D7) are connected to the pins of port B.

### *5. LCD*

LCD is used to present textual information to the users. It is great fun to work with LCD. Also LCD makes your application more interactive. LCD comes in various configurations and the most popular one is 16x2 matrix display.

The controller which we are using is Microcontroller ATmega16.

### *6. Microcontroller*

ATmega16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing, Know more about RISC and CISC Architecture) architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum frequency of 16MHz. ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes.

In the case of any emergency a system is provided with an emergency buzzer.

### *7. BUZZER*

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.

## III. CONCLUSION

Implementation ofour project is mainly intended to design a navigation system, a navigable Boat using GPS, GSM and LCD. The controlling device of the whole system is a Microcontroller. The controller continuously reads data from GPS (Global Positioning System) receiver and displays this information on LCD display unit. The Microcontroller extract GPS coordinates sent by user and moves the Boat in that direction with the help of GPS and LCD. The boat also uses ultrasonic sensor to detect obstacles in its way and when it finds obstacle it stops and sends the location to the user in the form of SMS messages.

## REFRENCES

1] AditiDakhane , Manish. P. Tembhurkar ,***"An Autonomous Aquatic Vehicle Routing Using Raspberry PI"*** , International Journal of Advanced Research in Computer Science and Software Engineering Volume 5, Issue 4, 2015**.**

2] A. K. Shrivastava, A. Verma, and S. P. Sing,**"*Distance Measurement of an Object or Obstacle by Ultrasound Sensor using P89C51RD2",*** International Journal of Computer theory & Engineering , Vol 2, February 2010

3] Shinu N Yoannan, Vince TVaipicherry Don K Thankachan , Prof Ram Prasad Tripathy ,"***Security System Based on Ultrasonic Sensor Technology****",* IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) Volume 7, Issue 6 (Sep. - Oct. 2013),