

## Hull Monitoring System for Submarine

K. Yashwanthi Mala, N. Samba Murthy, Dr. M. Kamaraju

M.TECH Embedded systems Dept. of ECE Gudlavalleru Engineering college

Assistant Professor Dept. of ECE Gudlavalleru Engineering college

Professor and HEAD Dept. of ECE Gudlavalleru Engineering college

**Abstract:** In ancient time, submarines are definitely in cigar-shaped. Their layout in beginning submarines looks noticeable often known as "teardrop hull". The hydrodynamic drag is decreased whenever underwater, but it reduces the sea-keeping abilities and improves pull while surfaced. Because the restrictions of the propulsion techniques in very beginning submarines powered them to manage surfaced most of the time, their own hull models were a compromise. Mainly because of the slower submerged speeds of those subs, commonly well below 18 km/h, the improved drag for submerged journey was acceptable.

**Key words:** Lpc (Linear Predictive Coding), Lcd (Liquid Crystal Display), Triac (Triode For Alternating Current), Uart (Universal Asynchronous Receiver/Transmitter), Arm (Advanced Risc Machine), Rf (Radio Frequency)

### I. Introduction

Submarine is a watercraft able of individual process under the sea. That varies from a submersible, which has a much more minimal under the sea capacity. The expression many typically relates to a huge, crewed, self-directed vessel. It is also often used traditionally or colloquially to refer to slightly managed automobiles and robots, as well as medium sized or compact vessels, like the midget submarine as well as the wet sub. Applied as an adjective in phrases such as submarine wire, "submarine" means "under the sea". The noun submarine evolved as a reduced form of submarine boat. For causes of naval traditions, submarines are generally called to as "boats" instead of "ships", irrespective of their size.

### II. Block Diagram

The block diagram for this system is shown in the figure 1, It consists of two power supply (L1117), two motors, two Arm controller (LPC2148), two LCD display, TRIAC, Buzzer, Switches, Driver (L293D), Temperature sensor (LM35), Smoke sensor (MQ6), Ultrasonic sensor, UART and a RF Receiver.

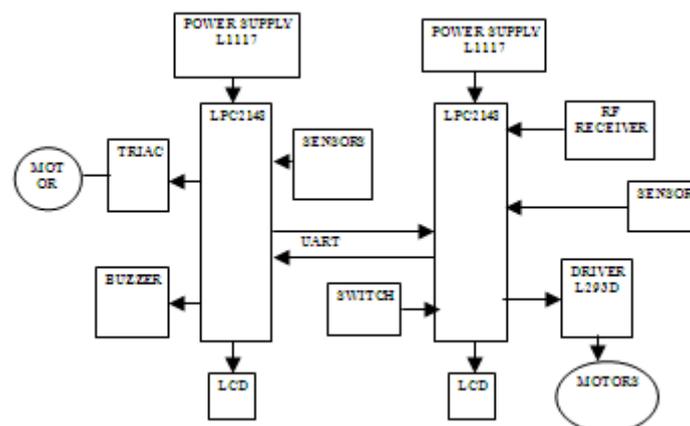


Fig. 1 Block Diagram For Hull Monitoring System For Submarine

### III. Microcontroller (LPC2148)

We selected LPC2148 microcontroller for our project execution, because of its speed. It is a 32-bit microcontroller with 32kb to 512kb flash memory. This controller supports totally 2 serial ports here we are using 2 microcontrollers for master and slave communication, both microcontrollers are communicating with UART communication. The slave controller contained sensors and it will send the data to the master controller the master will display this data in the LCD.

The slave section operates motor and buzzer and master drives the hull motors .the master will take different decisions related to the hull, by collecting data from the keypad and RF receiver.

#### **IV. Gas/Smoke Detector (MQ 6)**

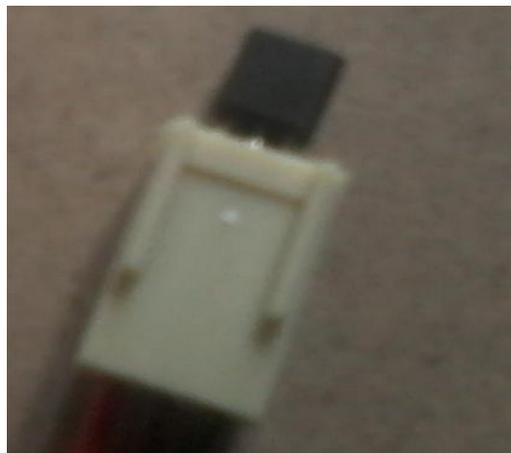
A smoke detector is a device which detects the presence of smoke within an area, usually as part of a safety system. This type of equipment is used to detect a smoke leak and interface with a control system so a process can be automatically shut down. A smoke detector can also sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave the area. This type of device is important because there are many type of smokes that can be harmful to organic life, such as humans or animals.



**Fig.2** Smoke/Gas Detector (MQ6)

#### **V. Tererature Detector (LM35)**

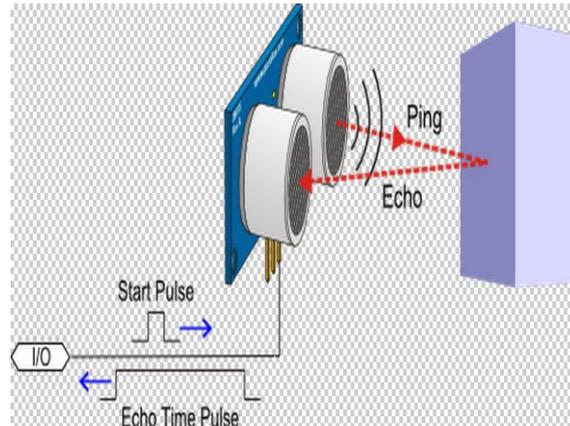
The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of  $\pm 1/4^{\circ}\text{C}$  at room temperature and  $\pm 3/4^{\circ}\text{C}$  over a full  $-55$  to  $+150^{\circ}\text{C}$  temperature range.



**Fig.3** Temperature Detector (LM35)

#### **VI. Principle Of The Ultrasonic Detector**

Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo.



**Fig. 4** Detection Of Ultrasonic Sensor

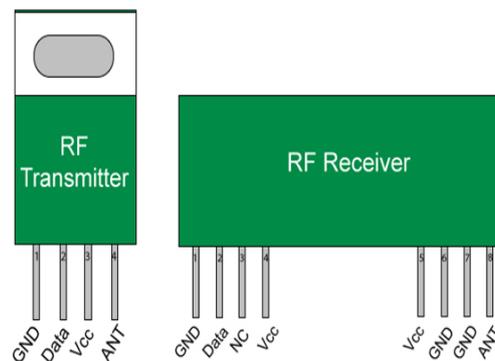
Virtually all materials which reflect sound can be detected, regardless of their colour. Even transparent materials or thin foils represent no problem for ultrasonic sensor. Micro sonic ultrasonic sensors are suitable for target distances from 20 mm to 10 m and as they measure the time of flight they can ascertain a measurement with pinpoint accuracy. Some of our sensors can even resolve the signal to an accuracy of 0.025 mm. Ultrasonic sensors can see through dust-laden air and ink mists. Even thin deposits on the sensor membrane do not impair its function. Sensors with a blind zone of only 20 mm and an extremely thin beam spread are making entirely new applications possible today: Fill level measurement in wells of micro titer plates and test tubes, as well as the detection of small bottles in the packaging industry, can be implemented with ease. Even thin wires are reliably detected.

### VII. About RF

- 1) The STT-433 is ideal for remote control applications where low cost and longer range is required.
- 2) The transmitter operates from 1.5-12V supply, making it ideal for battery-powered applications.
- 3) The transmitter employs a SAW-stabilized oscillator, ensuring accurate frequency control for best range performance.
- 4) The manufacturing-friendly SIP style package and low-cost make the STT-433 suitable for high volume applications.

### VIII. Features

- 1) 433.92 MHz Frequency
- 2) Low Cost
- 3) 1.5-12V operation
- 4) Small size



**Fig. 5** Internal Diagram For Rf Trasmmitter And Receiver

#### IX ALGORITHM:

##### 1) Slave Side

1. Start the project
2. Check the temperature
3. Send the temperature to the master, display the value in LCD then switch on the buzzer and motor
4. Check the smoke



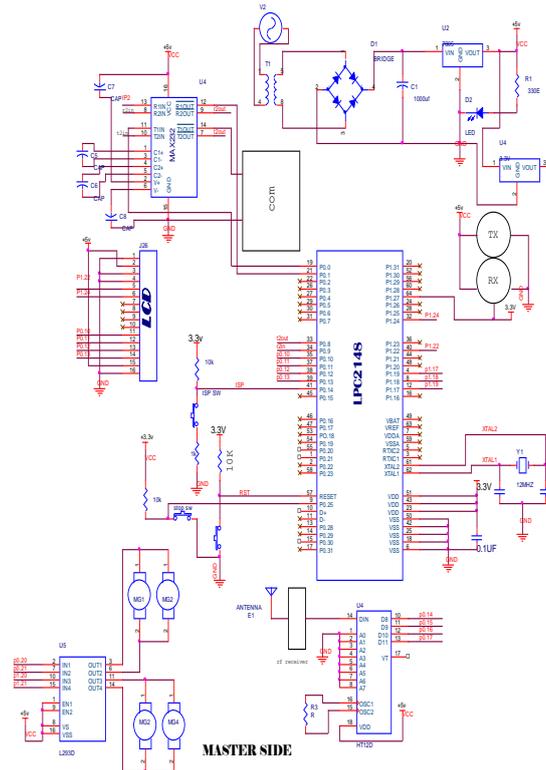


Fig. 6 Internal Operation Of Master Side

### X. Outputs

The outputs pictures related to hull monitoring system for submarine is Shown in the below figures,

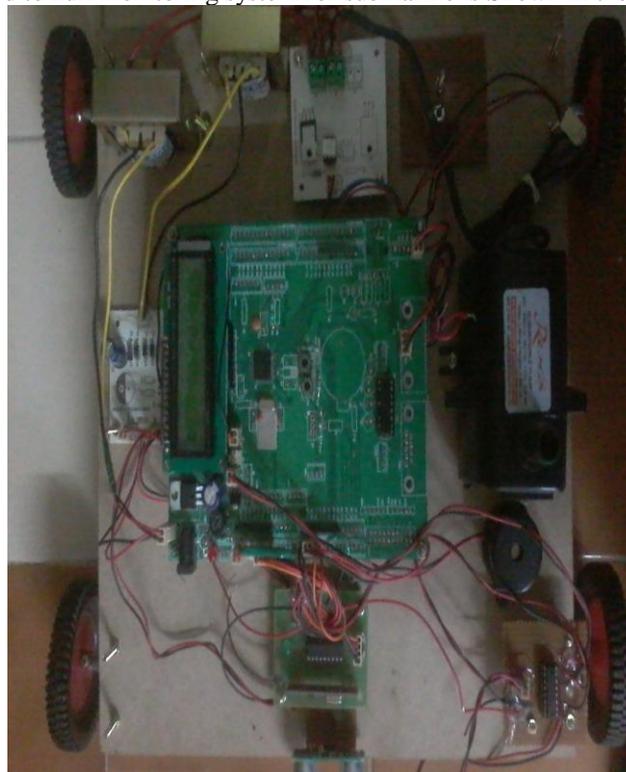


Fig.7 The Kit For Hull Monitoring System For Submarine



**Fig.8** Working Of The Kit When We Supply The Power



**Fig.9** The System Detected Smoke And Temperature Readings Displayed On The Lcd Display

### **XI. Conclusion**

The mechanism is cheap and flexible for testing submarine by using alarm and monitoring control. This control setup use for submarines which has both digital and analog circuit boards interface. The proposed designed control system control several types of self-running process control station, each type is dictated to certain task. The alarm system is connected to sensors all over the place in the submarine and always monitors them, if any sensor reading is outside the preset limits we get an alarm. The observing setup can capture any alarm condition and store it in hard disk or printer with timestamp. Including to that it will be applied as basic to test variety of all ship condition from the link. They require to shorten manning stage led to the improvement of automated controls essential schemes for the engine room plant which allowed unattended operation of devices spaces. With vessels capable of safe functioning for any stage of time in this mode, all the handling functions and following features are gathered combined in a system controls Room for sample. The system take small energy in arrange of only a few mill amperes per interface and drivers is safeguarded like that it frequently holds the consumer from harmful sensor that was in place or developed inappropriately. This system feature increases the setup and decreases the slide down time. The direct development layout interface enables the multiple use of the design in a variety of cases specifically when putting in or improving sensor or method in the submarine. Engaging this system high speed for testing is obtained and will be utilized to test more advanced styles according the specifications.

### References

- [1]. Aldwinckle, D. S., PhD. & Lewis, K. J.; Prediction of Structural Damage, Penetration and Cargo Spillage Due to Ship Collisions with Icebergs, The Society of Naval Architects and Marine Engineers, Ice Tech '84, pp D-2 - D14.
- [2]. Passive sampling for target and nontarget analyses of moderately polar and nonpolar substances in water Environ. Toxicol. Chem., 32 (8) (2013), pp. 1718–1726.
- [3]. Qihu Li , Advanced Topics in Science and Technology in China, Digital Sonar Design in Underwater Acoustics: Principles and Applications, Zhejiang University Press, 2012, p. 524.
- [4]. Global aquatic passive sampling: maximizing available resources using a novel exposure procedure Environ. Sci. Technol., 45 (15) (2011), pp. 6233–6234.
- [5]. Effect of sampler material on the uptake of PAHs into passive sampling devices Chemosphere, 79 (4) (2010), pp. 470–475.
- [6]. Diel periodicity in both sei whale vocalization rates and the vertical migration of their copepod prey observed from ocean gliders Limnol. Oceanogr., 53 (5) (2008), pp. 2197–2209.
- [7]. Identification, definition and quantification of goods and services provided by marine biodiversity: Implications for the ecosystem approach Mar. Pollut. Bull., 54 (3) (2007), pp. 253–265.
- [8]. Correcting echo-integration data for transducer motion (L)
- [9]. J. Acoust. Soc. Am., 118 (4) (2005), pp. 2121–2123

### Author's biography



K. Yashwanthi mala presently pursuing her Masters degree in Embedded Systems specialization at Gudlavalleru Engineering College, Gudlavalleru, AP, India. She received his Bachelors ( Electronics and communication) degree Gudlavalleru Engineering college, Gudlavalleru affiliated to JNTUK University in the year 2012. She is the author of 1 technical paper in Embedded System.



Dr. M. Kamaraju received his B.E and M.E from Andhra University and Ph.D from JNTUH, Hyderabad, In the area of Low Power VLSI Design. He current research interests include Microprocessors, Microcontrollers, Digital system Design, Embedded System Design, Low Power VLSI Design. He published 74 technical papers in national and international journals and conferences. He reviewed number of papers for international journal and conferences. He is a Fellow of IETE and IE and member of IEEE. He is presently working as a Professor and Head of the E.C.E Department, Gudlavalleru Engineering College, Gudlavalleru, India. He is a past chairman of IETE and present chairman of IE Vijayawada local centre.



N.Sambamurthy received his B.TECH from JNTU Hyderabad and M.TECH from Gudlavalleru engineering college, Gudlavalleru and presently pursuing Ph.D from JNTUK, Kakinada in the research area of VLSI architecture Design. He research interests are Microcontrollers, Embedded System Design, Microprocessors and VLSI architecture Design. He is a member of IE. He is currently an Assistant Professor in ECE Department, Gudlavalleru Engineering College, Gudlavalleru.