# Implementatioin of Enhanced Transitional Communication Interface Between Mediums Using Adaptive Techniques

N L Sujatha chavakula[1], A.Pravin[2], S.Kanaka Durga[3], G.Mallikarjuna[4]

[1]M.Tech (ES) pursuing, BVC Engineering College (BVCE), Odalarevu, Andhra Pradesh, India.
Email id: sujathach0@gmail.com

[2]Associate professor in ECE department, BVC Engineering College (BVCE), Odalarevu , Andhra Pradesh, India
Email id: akula.pravin@gmail.com

[3] Associate Professor in ECE department, BVC Engineering College (BVCE), Odalarevu,Andhra Pradesh, India
Email id: bvenkatarajesh@gmail.com

[4] Assistant Professor in ECE department, BVC Engineering College (BVCE), Odalarevu,Andhra Pradesh, India
Email id: mallik419@gmail.com

## ABSTRACT:

 Implementation of an innovative and interactive device which is having the capability of changing its own properties with dynamic nature is presented in this project. This project acts as mediator between mediums. Data through water is a challenging task in now a day. Due to random change of properties like water flow, density; framed data energy may changes. So, modulation schemes have to be changed dynamically depends up on flow and density of water. At the receiver side GSM technology is used to re-send the data. Here GSM is used as interface device between water and air.

## Keywords

ARM Processor; Modulation; Demodulation; Flow Density Wireless sensor networks (WSNs); Gsm Module.

# 1. INTRODUCTION

WSN's are mainly aimed to control and monitor various applications with relatively low power consumption and large scale deployments are the main system features. The existing system as only uni-direction and has insecurity and is incapable of monitoring and controlling the flow of operations

The largest section is the controlling and security of the data and to be transmitted and received through both the ends Previously in underwater applications, there is no more advanced technologies to control the data communication or else to monitor the data when only in under water. The major disadvantages of existing system are

➢ It doesn't check the temperature conditions of the water.

➢ It doesn't identify the flow of water.

➢ No more accuracy

➢ It doesn't have framing format

The security management system for data communication in this paper adopted wireless communication technology and embedded system. This paper discusses the hardware and software of wireless communication in this system mainly. It improves, enhance and strengthens the communication with the usage of various sensors which continuously sense and monitors the system. It is mainly aimed for the marine application for sending data to the two ends, designs emergency remote security monitoring and control system based on ARM processor. Uses advanced RISC machine processor embedded with the real time systems to monitor and control the communication of data using adaptive techniques.

The method could solve problems with highly efficient and rapid, also could reduce the loss of country effectively. So it has the important significance and social and economic benefits for the dependability and the controllability of remote communication.

Minimize harmful effects.

➢ Checking the flow density before communication.

➢ Generating frames for the data.

➢ Ease of data communication on both sides.

The monitoring and controlling section of this system mainly consists of microcontrollers AT89S52 and LPC3130 and the sensors data is communicated via GSM and level control measurement

## 1.1 Function of LPC3130

LPC is a family of microcontroller ICs by NXP semiconductors (formerly Philip semiconductors).The LPC chips are based on the 32-bit RISC ARM cores from ARM Holdings, such as Cortex-M4F, Cortex-M3, Cortex-M0+, Cortex-M0, ARM9 and ARM7 cores.

The NXP LPC 3130/3131 combine an 180 MHz ARM926EJ-S CPU core, high speed USB 2.0 On-The-Go (OTG), up to 192 KB SRAM, NAND flash controller, flexible external bus interface, four channel 10 bit ADC, and a myriad of serial and parallel interfaces in a single chip targeted at consumer, industrial, medical and communication markets. To optimize system power consumption, the LPC3130 have multiple power domains and a very flexible Clock Generation Unit (CGU) that provides dynamic clock gating and scaling.

The processor embedded in the LPC3130 is the ARM926EJ-S. It is the member of the ARM9 family general-purpose microprocessors. It is intended for multi-tasking applications where fully memory management, high performance, and low-power are important.

The ARM926EJ-S supports the connection of on-chip coprocessors to the ARM9EJ-S core through an external coprocessor interface. Coprocessors determine the instructions that they have to execute by using a pipeline follower in the coprocessor. As each instruction arrives from memory, it enters both the ARM9EJ-S pipeline and the coprocessor pipeline.

The Coprocessor interface of ARM926EJ-S processor through CP15 system configuration coprocessor is shown in figure 1
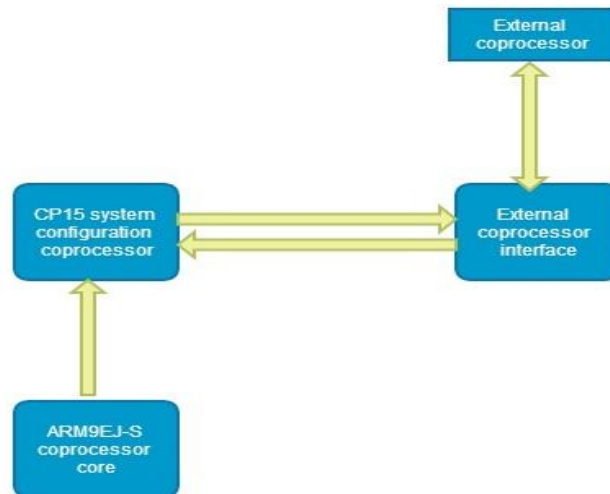
**Fig 1. Coprocessor Interface of ARM9EJ-S**

## 1.2. Function of AT89S52

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable flash memory. The device is manufactured using Atmel's high-density non volatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 become a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89S52 provide the following standard features:

8K bytes of flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit Timers/counters, a six-vector two level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The power down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

## 2. SYSTEM STRUCTURE

The system structure mainly consists of Transmitter Section and Receiver Section which are shown in figure 1 and figure 2 respectively.

Transmitter section mainly consists of sensor network and transducers in this system which senses various effects . Various sensors used here are flow Sensors. As the output through these sensors is a physical quantity, they are connected to ADC (Analog to Digital Converter) to convert this analog information to digital format and then this digital information is monitored through AT89S52 microcontroller.

The controlling section of this system is of great interest. The transmitted data is with the processor and s data are stored in the processor memory and continuously monitored. If any of the sensors exceeds its threshold level, it indicates the workers through the transmitted section which have a connection to the microcontroller. Initially the transducer sense the flow rate and when a particular sensor crosses the limit, it announces that the sensor level is high. If the flow rate high or low based on the rate, modulation and demodulation is done automatically. The data is set by the framing method for easy communication the receiver section also consists of microcontroller and demodulation section for the communication.
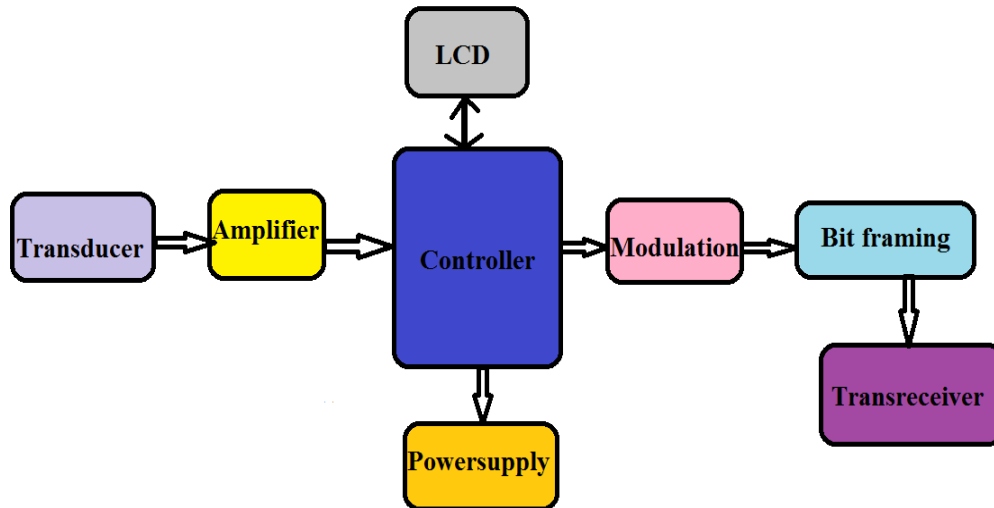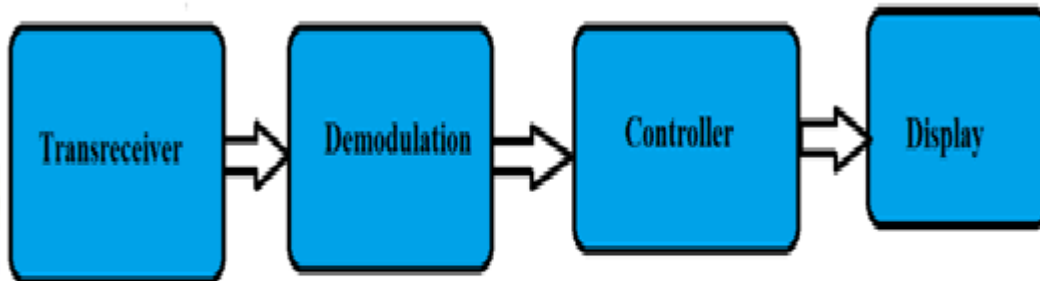
Fig 2:Block diagram Transmitter section

fig 3: block diagram of receiver section

# 3. HARDWARE DEVELOPMENT

## 3.1. Level Measurement Control

The float changes the resistance value depending on the water level. This change in resistance is converted into corresponding voltage signals which gives to inverting input terminal to the comparator. The reference voltage is given to non inverting input terminal.

l.        the comparator is constructed with the help of operational amplifier LM741.the comparator compares with the reference water level and delivered the error voltage at the output terminal. Then the error voltage is given to next stage of gain amplifier which is constructed by another operational amplifier LM 741.in the gain amplifier the variable resistor is connected in the feedback path, by adjusting the resistor we can get the desired gain, then the final voltage is then given to ADC for converting analog signals to digital signals. The the corresponding digital signal is given to microcontroller in order to find the level of water

## 3.2 Function of LM565/LM565C

The LM 565 AND 565C rae general purpose phased locked loops containing a stab le,highly linear voltage controlled oscillator for low distortion FM demodulation, and a double balanced phase detector with good carrier suppression.. The VCO frequency is set with an external resistor and capacitor, and a tuning range of 10:1can be obtained with the same capacitor. The characteristics of the closed loop system-bandwidth, response speed, capture and pull in range-may are adjusted over a wide range with an external resistor and capacitor. The loop may be broken between the VCO and the phase detector for insertion of a digital frequency divider to obtain frequency multiplication

**Feature**

- 200 ppm/§C frequency stability of the VCO
- Power supply range of g5 to g12 volts with 100 ppm/% typical
- 0.2% linearity of demodulated output
- Linear triangle wave with in phase zero crossings available
- TTL and DTL compatible phase detector input and square wave output
- Adjustable hold in range from g1% to l g60%

## Applications

- Data and tape synchronization
- Modems
- FSK demodulation
- FM demodulation
- Frequency synthesize
- Tone decoding
- Frequency multiplication and division
- SCA demodulators
- Telemetry receivers
- Signal regeneration
- Coherent demodulators

### 3.3. Function of UA741

The UA741 is a high performance monolithic operational amplifier constructed on a single silicon chip. It is intended for a wide range of applications.

- Summing amplifier
- Voltage follower
- Integrator
- Active filter
- Function generator

The high gain and wide range of operating voltages provides superior performance in integrator, summing amplifier and general feedback applications. The internal compensation network insures stability in closed loop circuits

## Applications

- Large input voltage range
- No latch-up
- High gain
- Short-circuit protection
- No frequency compensation required

### 3.4. Function of XR-2206

The XR-2207 is a monolithic function generator integrated circuit capable of producing high quality sine, square, triangle, ramp, and pulse waveforms of high stability and accuracy. The output waveforms can be both amplitude and frequency modulated by an external voltage. frequency of operation can be selected externally over arrange of 0.01Hz to 1MHz.the circuit is ideally suited for communication ,instrumentation and function generator applications requiring sinusoidal tone.AM,FM,FSK generation. It has a typical drift specification of 20ppm/°C. the oscillator frequency can be linearly swept over a frequency range of 2000:1 with an external control voltage ,while maintaining low distortion

**Features**

- Low-Sine Wave Distortion, 0.5%, Typical
- Excellent Temperature Stability, 20ppm/°C, Typ.
- Wide Sweep Range, 2000:1, Typical
- Low-Supply Sensitivity, 0.01%V, Typ.
- Linear Amplitude Modulation
- TTL Compatible FSK Controls
- Wide Supply Range, 10V to 26V
- Adjustable Duty Cycle, 1% TO 99%

**Applications**

- Waveform Generation
- Sweep Generation
- AM/FM Generation
- V/F Conversion
- FSK Generation
- Phase-Locked Loops (VCO)

## 3.5. Fsk modulation and demodulation

Frequency-shift keying (FSK) is a form of frequency modulation in which the modulating and demodulating signal shifts the output frequency between predetermined values. Usually, the instantaneous frequency is shifted between two discrete values termed the mark frequency and the space frequency. Continuous phase forms of FSK exist in which there is no phase discontinuity in the modulated signal. The example shown at right is of such a form. Other names for FSK are *frequency-shift modulation* and frequency –shift demodulation and *frequency-shift signalling*

## 3.6. Function of HEF40106

HEF 40106 is a hex inverting Schmitt trigger. Each circuit of the HEF40106 function as an inverter with Schmitt trigger action. The Schmitt trigger switches at different points for the positive and negative going input signals. The difference between the positive going voltages and negative going voltages and is defined as hysteresis voltage. The device may be used for enhanced noise immunity or to square up slowly changing wave forms.

## 3.7. Function of Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be ON or OFF. So relays have two switch positions and they are double throw (changeover) switches.

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example, a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

The coil of the relay passes a relatively large current from low voltages. Most IC's (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA. So these devices can supply relay coils directly without amplification.

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts. Most relays are designed for PCB mounting but we can solder wires directly to the pins providing to take care to avoid melting the plastic case of the relay.

## 3.8. Function of UART

A Universal Asynchronous Receiver/Transmitter is a type of "Asynchronous Receiver/Transmitter", a piece of computer hardware that translates between parallel and serial forms. UARTs are commonly used in conjunction with other communication standards such as EIA RS-232.

A UART is usually an individual integrated circuit used for serial communication over a computer or peripheral serial port. UARTs are now commonly included in microcontrollers. A dual UART or DUART combines two UARTs into a single chip.

The UART controller is the key component of the serial communication subsystem of a computer. It takes bytes of data and transmits individual bits in a sequential fashion. At the destination, a second UART re-assembles the bits into complete bytes. Each UART contains a shift register which is the fundamental method of conversion between serial and parallel forms.

## 3.9. Function of ADC

In this paper we are using ADC0808 converters to convert the analog data coming from various sensors to digital data. The ADC0808 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The 8-bit A/D converter uses successive approximation as the conversion technique. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree a successive approximation register. The 8-channel multiplexer can directly access any of 8-single-ended analog signals. The device eliminates the need for external zero and full-scale adjustments. Easy interfacing to microprocessors is provided by the latched and decoded multiplexer address inputs and latched TTL TRI-STATE outputs. The design of the ADC0808, AD0809 has been optimized by incorporating the most desirable aspects of several A/D conversion techniques. The ADC0808, ADC0809 offers high speed, high accuracy, minimal temperature dependence, excellent long-term accuracy and repeatability and consumes minimal power. These features make this device ideally suited to applications from process and machine control to consumer and automotive applications

## 4. RESULT ANALYSIS

The transmitter section consists of microcontroller AT89S52, LPC3130, various sensors, display. The receiver section consists of a GSM receiver and this module is connected to a PC present at some distance through UART for communication.

In underwater communication there are drastic changes in the flow of water. It may be up to some times the density will be high and sometimes the density of water is low or sometimes the density will be moderate. Here a prototype of flow rate identifier LM 741 is used which shows the values of flow of water. Similarly a prototype of framer is used to frame the bits in this paper which mainly used to create the communication in underwater.

The flow sensor and transducer are continuously monitored by the microcontroller AT89S52. This processor is interfaced with the LPC2148 ARM7TDMI-S processor. The fsk modulation and fsk demodulation are used and Gsm communication is done by LPC2148 controller. The result analysis of this paper is shown below.
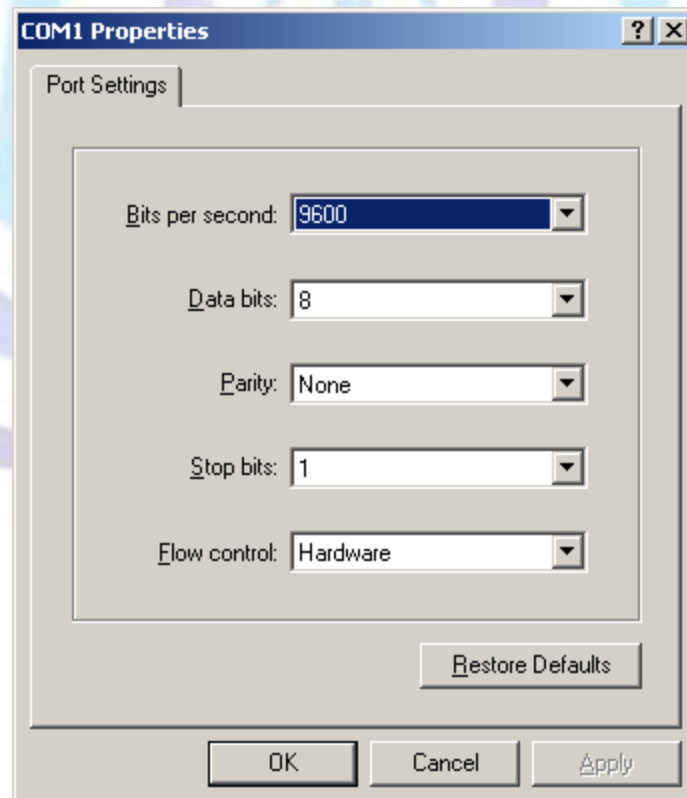


Fig 4: Communication setting on both sides

## 5. CONCLUSION

The hardware and software design of an embedded monitoring system for real time applications is presented in this paper. The random properties are maintained properly for the communication. Vibration signals have been analyzed to

detect the mechanical faults and necessary steps are taken to reduce the faults. The proposed system data communication monitoring and control based on WSNs is verified with different levels of severity.

# REFERENCES

[1] E. M. Sozer, M. Stojanovic, and J. G. Proakis, "Underwater acoustic networks," *IEEE J. Oceanic Eng.*, vol. 25, no. 1, pp. 72–83, Jan. 2000.

[2] I. F. Akyildiz, D. Pompili, and T. Melodia, "Challenges for efficient communication in underwater acoustic sensor networks," *ACM Sigbed Rev.*, vol. 1, no. 2, pp. 3–8, Jul. 2004.

[3] J. Jaffe and C. Schurgers, "Sensor networks of freely drifting autonomous underwater explorers," in *Proc. Wuwnet'06*, Los Angeles, CA, Sep. 2006, pp. 93–96.

[4] J. Rice *et al.*, "Evolution of sea web underwater acoustic networking, "in *Proc. Oceans*, Providence, RI, 2000, pp. 2007–2017.

[5] E. Gallimore, J. Partan, I. Vaughn, S. Singh, J. Shusta, and L. Freitag, "TheWHOIMicromodem-2: A scalable system for acoustic communications and networking," in *Proc. Oceans*, Seattle, WA, 2010, pp. 1–7.

[6] Y. Tao, P. Zhu, and X. Xu, "Dual-mode modulation based research of underwater acoustic modem," in *Proc. IEEE Int. Conf, WiCOM*, Chengdu, China, 2010, pp. 1–3.

[7] B. Borowski and D. Duchamp, "The software modem-A software modem for underwater acoustic communication," in *Proc. Wuwnet'09*, Berkeley, CA, Nov. 2009.

[8] L. Freitag and S. Singh, "Performance of micro-modem PSK signalling under variable conditions during the 2008 RACE and SPACE experiments," in *Proc. Oceans*, Biloxi, MS, 2009, pp. 1–8.

[9] H. Yan, S. Zhou, Z. Shi, and B. Li, "A DSP implementation of OFDM acoustic modem," in *Proc. Wuwnet'07*, Montreal, QC, Canada, Sep.2007, pp. 89–92.

[10] R. A. Iltis, H. Lee, R. Kastner, D. Doonan, T. Fu, R. Moore, and M.Chin, "An underwater acoustic telemetry modem for eco-sensing," in *Proc. Oceans*, Washington, DC, 2005, pp. 1844–1850.

[11] B. Benson, Y. Li, R. Kastner, B. Faunce, K. Domond, D. Kimball, and C. Schurgers, "Design of a low-cost underwater acoustic modem for short-range sensor networks," in *Proc. Oceans*, Sydney, Australia, 2010, pp. 1–9.

[12] A. Radosevic, T. M. Duman, J. G. Proakis, and M. Stojanovic, "Channel prediction for adaptive modulation in underwater acoustic communications," in *Proc. Oceans*, Santander, Spain, 2011, pp. 1–5.

[13] Y. Li, X. Zhang, B. Benson, and R. Kastner, "Hardware implementation of symbol synchronization for underwater FSK," in *Proc. IEEE Int. Conf. SUTC*, Newport Beach, CA, 2010, pp. 82–88.

[14] M. Chitre, S. Shahabodeen, and M. Stojanovic, "Underwater acoustic communications and networking: Recent advances and future challenges," *Marine Technol. Soc. J.*, vol. 42, no. 1, pp. 103–116, 2008.

[15] Center for Marine Science and Technology (CMST), Curtin University [Online]. Available: http://cmst.curtin.edu.au/products/actoolbox.cfm