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Feasibility Study and Implementation of Sea Researcher's Bio-Parameters Monitoring by Water Channel Model

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ABSTRACT: The analysis mentioned health services within the role of medicine and life support. Underwater communication is needed in several applications like transfer of messages and speech transmission between submarines Ships, aqualung different etc., and additionally to trace lost ships and find sunken planes. The designed system was a system ready to offer data on the user's health condition, during this case, a live of pulse and blood heat employing a pulse device (fingertip sensor). It took the info from the blood flow on the forefinger for sixty seconds, and then displayed it on the alphanumeric display. The LM35 temperature device was used for blood heat information assortment. Changes within the device heat would be born-again into electricity, translated into digital type through a 10-bit ADC, processed by the PIC microcontroller, and displayed on the alphanumeric display. The complete system consists of two components, the on top of Water unit, and also the submarine unit for oceanographer's model. The system realizes the dominant of the submarine model to attain numerous styles of movement once the antenna is three meters on top of the water. The space error, time error and speed error all meet the wants. The whole system operates merely and functions well.

KEYWORDS: Health Services, LM35, 10-bit ADC, Fingertip Sensor, PIC Microcontroller.

I. INTRODUCTION

Underwater data communication is essential to our continued development of the underwater environment. In 2004, the US Commission on Ocean Policy directly stated, "Advanced communication capabilities are also required for scientists to remotely operate ocean exploration vehicles, similar to the highly successful use of space probes (USCOP, 2004)." Due to the extremely hostile environment which one interacts with while underwater, it is often much safer to make use of remotely controlled vehicles to perform manual tasks. Although our ability to make these vehicles self-guiding and autonomous is increasing, often the task is too undefined and sensor information must be relayed to a person who can make a decision. The decision must then be communicated back to the vehicle to be implemented. Much more research and development of these communication methods needs to be done to provide acceptable options to the system designer. This can be facilitated by delivering a successful methodology that can be implemented by hobbyists, business and academics. Each of these sectors can make immediate use of this type of ability to streamline research and increase public interaction with the underwater environment. The previous technology used to address this need was the use of a cable which extended from the vehicles pilot to the vehicle. The first tethered ROV was used in 1953 (Christ and Wernli, 2007). It was immediately apparent that the tremendous problems involved with signal degradation and the lateral drag when such a device is deployed in even a slowly moving current necessitated a better solution than a cumbersome cable. This greatly limits the capabilities of the vehicle at the end of this tether cable and much of the design of a successful remote vehicle in the past depended on designing around the tether restrictions. Although such vehicles will be in use for years to come, they will inevitably be replaced by vehicles with the increased maneuverability and depth capabilities that can be realized by using acoustic digital data communication to replace the venerable tether.

II. METHODOLOGY

The device was expected to meet the specification, namely, to count the number of heartbeats in one minute, and to measure body temperature constantly. Figure 1 displays the block diagram of the system. It shows that one of the fingers is inserted into the finger sensor transducer block, then the LED light that penetrates the finger will be received by the LDR where the frequency of the blood flow will be detected. The data will be processed on the microcontroller, and the results will be displayed on seven segments that show the number of hearts beats every minute. Some researchers have researched on temperature sensors and microcontrollers such as Yilei and Airong who designed a real-time temperature monitoring based on the operating system. The system consisted of a DS18B20 sensor, an nRF24L01 wireless module, and a STM32F103ZET6 microcontroller. Fuady et al studied extreme machine learning and neural network to control the temperature and humidity of oysters based on microcontrollers. The system consisted of a microcontroller and a DHT 11 sensor. Wang and Chi investigated the Arduino Uno platform wireless temperature and humidity monitoring system consisting of an Arduino microcontroller, a temperature sensor and humidity sensor, a 128641 LCD, and an nRF24L0 wireless module.

3. PIC MICROCONTROLLER

PIC is a family of modified Harvard architecture microcontroller made by Microchip technology, derived from the PIC1650 originally developed by General Instrument’s Microelectronics Division. The name PIC is referred to as "Peripheral Interface Controller". PICs are popular with both industrial developers and hobbyists due to their low cost, wide availability, availability of low cost or free development tools, and serial programming (and reprogramming with flash memory) capability.

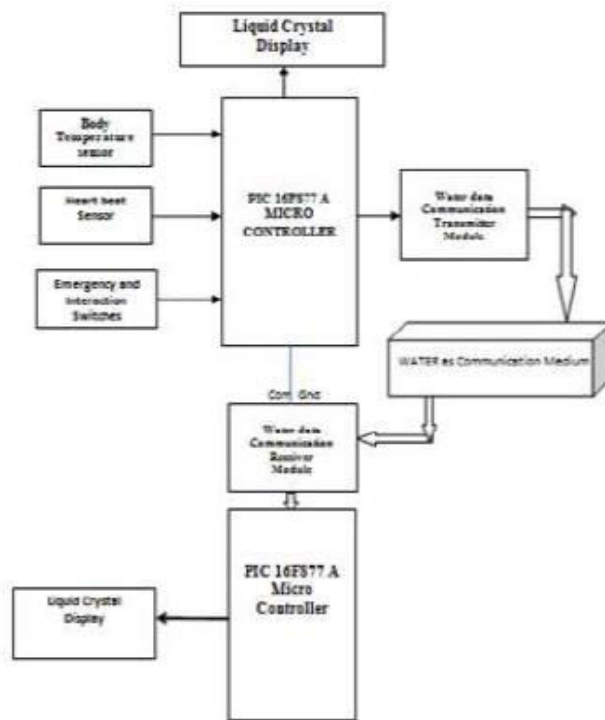


Fig 1: Block Diagram of Proposed System

Microchip introduced the new PIC32MX family of 32-bit microcontrollers operates at 2.3V to 3.6V supply voltage with 80 MHz frequency. The initial device line-up is based on the industry standard MIPS32 M4K Core. The device can be programmed using the Microchip MPLAB C Compiler for PIC32 MCUs.

PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory. The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with a small pin count. The main advantage of CMOS is that it has immunity to noise than other fabrication techniques.



4 POWER SUPPLY

The potential transformer will step down the power supply voltage (0-230V) to (0-12V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op-amp. The bridge rectifier produces a voltage output that is nearly twice that of the conventional full-wave circuit.

Heart Beat Sensor

Heart rate is a window into your muscles and lungs as it reveals how hard they are working! The need for an accurate, yet affordable heart monitor is essential to ensure ones health quality. So here's a prefatory article to help you design/build a compact and costefficient heart rate (pulse rate) monitor that will provide an accurate reading of one's heart rate. Remember, your heart rate is a very good indicator of your physical condition. The non-invasive type of optical heart rate sensor consists of an electronic circuit that monitors heartbeat by clipping onto a fingertip. It does this by shining light into (or through) the finger and measuring how much light is reflected (or absorbed). This goes up and down as blood is pumped through the finger.

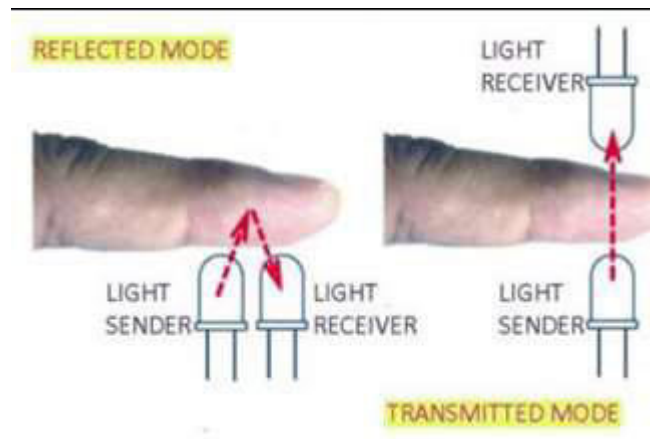


Fig 2. Heartbeat sensor

Temperature Sensor

Temperature sensor senses the temperature of body. It can sense the temperature of human body. It is an analog sensor and gives the output into form of analog signal. This signal is feed to ARM controller and ADC will convert it into digital form. Once converted into analog form the controller can process the digital temperature signal as per the application.

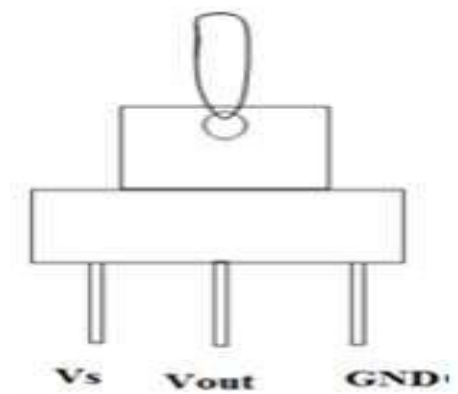


Fig 3- Temperature Sensor



Temperature sensor senses the temperature of body. It can sense the temperature of human body. It is an analog sensor and gives the output into form of analog signal. This signal is feed to ARM controller and ADC will convert it into digital form. Once converted into analog form the controller can process the digital temperature signal as per the application.

Switch Module

A toggle may be a category of electrical switches that area unit manually motivated by a mechanical lever, handle, or rocking mechanism. The phrase “toggle switch” is applied to a switch with a brief handle and a positive snap-action, whether or not it really contains a toggle mechanism or not. Once the actuator-the toggle itself-is affected, the coil within switch moves the transferable contact into position either energizing the circuit or de-energizing it.

Underwater Wireless Transceiver

The modem hardware is split into three main portions: a wakeup receiver, a data receiver, and a single transmitter. The transmitter has three output frequencies, which correspond to the data mark, data space, and wakeup tone. It is not possible to transmit data and the wakeup tone simultaneously. Figure 4 is a block diagram of our modem hardware. The entire circuit operates from a 5 volt power supply.

V. RESULTS AND DISCUSSION

We have proposed a system in which oceanographers body temperature, heart rate, body movements and results that are being monitored by the system. The various sensors are placed on the oceanographers body and they take the readings and send the corresponding signal to the PIC microcontroller. The Here, various sensors are used to measure the patient’s body temperature, heart rate, and their respective results are sent to the water medium via water data transceiver and can be monitored from above water surface through the UWSN receiver facilitated via UART communication.



Fig 4 Result

V. CONCLUSION

High-speed underwater optical communication has now become an enabling technology that has many prospective employments in a range of environments from the deep sea to coastal waters. In this paper, we have presented and proved the prototype for an automatic system that guarantees a constant monitoring of oceanographers health parameters and prediction of any kind of disease or disorder that prevents the oceanographers from the emergency situation. The proposed system can be set-up in the boats or ships and massive amount of data can be obtained and tested with many peoples. Even the results can be made to be accessed from mobile through an application. The system can be further improved further by adding artificial intelligence system components to facilitate the doctors and the



patients. The data, consisting medical history of many patients' parameters and corresponding results, can be explored using data mining, in search of consistent patterns and systematic relationships in the disease.

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