Wireless Data Transfer in Under Water System

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ABSTRACT

The aim of this project is to develop under water communication system using the Zigbee protocol stack. This is very useful to find out any problem in caves and mines. An embedded system is a special purpose system in which the compute is completely encapsulated by or dedicated to the device or system. It controls personal digital assistant (PDAs) or handheld computers are generally considered embedded devices because of the nature of their hardware design, even though they are more expandable in software terms.

Keywords: Under water communication system, Personal digital assistant and Zigbee.

1. INTRODUCTION

This work investigates whether a contactless, wireless underwater coupling could be developed for under water sensor networks. This requires a wireless transmission of power from the sensor hub to the transducer module, and the two-way wireless data communication between hub and transducer. Results from a trial deployment of systems with conventional waterproof coupling show that these are a major shortcoming of existing systems. Experiments are conducted which demonstrate that a Zigbee transceiver, operating in the 2.4 GHZ band, can communicate with low error rates up to 40mm at low RF power (-25dBm) and up top 70 mm at higher power (-3dBm) in sea water.

Ranges are slightly higher in fresh water. Inductive power transfer, using a split transformer design, can transmit low power, in the 50-100mW range with efficiency of approximately 50% demonstrating that wireless sensor couplings are feasible.

2. EXISTING SYSTEM

1) Embedded Bluetooth Data Acquisition System based on ARM for Unmanned Underwater Vehicle (UUV).
2) This presented an abstract model of Embedded B1uetooth Data Acquisition system which was designed using the ARM processor as an embedded target and B1uetooth device which is connected to the ARM processor through a RS-232 serial port with ARM processor as the Central Data Acquisition System and controlling system that controls the Bluetooth device connected to it and acquires the data from the different subsystems of a UUV.

Disadvantages

1) Bluetooth technology is a short-range wireless communications technology.
2) Bluetooth security is weak compared to Wi-Fi and other wireless data standards.
3) Bluetooth is intended to be very energy-efficient, it sends data relatively slowly

3. PROPOSED SYSTEM

1) In this project the DC motor is used for the movement of the robot with small coil for rotating purpose. Normally the robot is float upper side of the water, when the robot is in the forward position the right side of two DC motor should be on remaining motor should be off.
2) Automatically the coil will be rotated, so the robot is moving forward direction. Now for robot in reverse direction the right side of the two relay should be on and remaining relays should be in off state.
3) The robot direction is controlled by command through Zigbee with the help of micro controller. As well as temperature maintained at underwater also monitored. Obstacles found out using ultrasonic sensor.

Advantages

1) One Zigbee network contains one master device and maximum 254 slave devices. There can be as many as 100 Zigbee networks within one area.
2) This new method of implementation of Zigbee as a medium for data acquTemperisition system will be useful for cleaning, monitoring, understanding the clean and unclean underwater environment.
3) ZigBee devices are usually asleep and packets are small. These small packets usually have no troubles over-the-air.
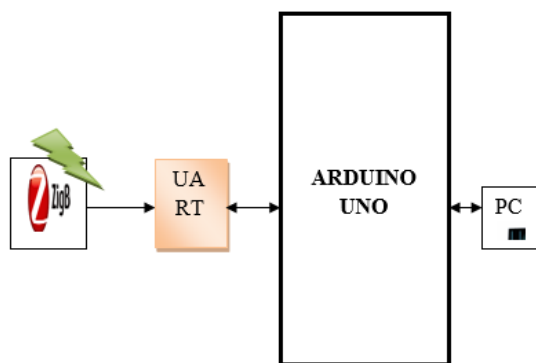4) ZigBee is an acknowledgement based protocol and will re-send message if no acknowledgement is received.

4. BLOCK DIAGRAM

Robot Unit
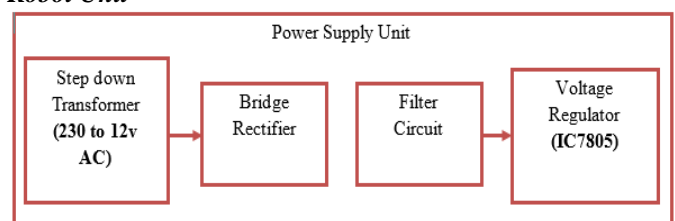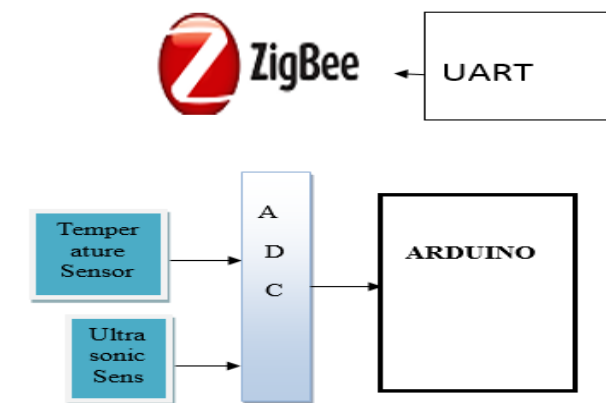
Monitoring Unit

Temperature Sensor

Temperature is the most-measured process variable in industrial automation. Most commonly, a temperature sensor is used to convert temperature value to an electrical value. Temperature Sensors are the key to read temperatures correctly and to control temperature in industrials applications. A large distinction can be made between temperature sensor types. Sensors differ a lot in properties such as contact-way, temperature range, calibrating method and sensing element. The temperature sensors contain a sensing element enclosed in housings of plastic or metal. With the help of conditioning circuits, the sensor will reflect the change of environmental temperature.

In the temperature functional module we developed, we use the LM34 series of temperature sensors. The LM34 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Fahrenheit temperature. The LM34 thus has an advantage over linear temperature sensors calibrated in degrees Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Fahrenheit scaling. The LM34 does not require any external calibration.

Ultrasonic Sensor

Ultrasonic sensors work on a principle similar to sonar which evaluates distance of a target by interpreting the echoes from ultrasonic sound waves. This ultrasonic module measures the distance accurately which provides 0cm - 400cm with a gross error of 3cm. Its compact size, higher range and easy usability make it a handy sensor for distance measurement and mapping. The module can easily be interfaced to micro

controllers where the triggering and measurement can be done using two pin. The sensor transmits an ultrasonic wave and produces an output pulse that corresponds to the time required for the burst echo to return to the sensor. By measuring the echo pulse width, the distance to target can easily be calculated. With the sensor oriented as shown alongside, locate Pin-1 as the 1st pin on the left hand side.

UART

The Universal Asynchronous Receiver/Transmitter (UART) controller is the key component of the serial communications subsystem of a computer. UART is also a common integrated feature in most microcontrollers. The UART takes bytes of data and transmits the individual bits in a sequential fashion. At the destination, a second UART re-assembles the bits into complete bytes. Serial transmission of digital information (bits) through a single wire or other medium is much more cost effective than parallel transmission through multiple wires. Communication can be "full duplex" (both send and receive at the same time) or "half duplex" (devices take turns transmitting and receiving).
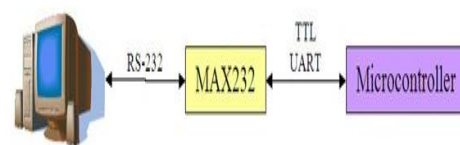
A UART (Universal Asynchronous Receiver/Transmitter) is the microchip with programming that controls a computer's interface to its attached serial devices. Specifically, it provides the computer with the RS-232C Data Terminal Equipment (DTE) interface so that it can "talk" to and exchange data with modems and other serial devices. As part of this interface, the UART also:
1) Converts the bytes it receives from the computer along parallel circuits into a single serial bit stream for outbound transmission
2) On inbound transmission, converts the serial bit stream into the bytes that the computer handles
3) Adds a parity bit (if it's been selected) on outbound transmissions and checks the parity of incoming bytes (if selected) and discards the parity bit
4) Adds start and stop delineators on outbound and strips them from inbound transmissions
5) Handles interrupt s from the keyboard and mouse (which are serial devices with special ports.
6) May handle other kinds of interrupt and device management that require coordinating the computer's speed of operation with device speeds

Arduino Software (IDE)

The Arduino Integrated Development Environment or Arduino Software (IDE) contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

Zigbee

ZigBee is a mesh network specification for low-power wireless local area networks (WLANs) that cover a large area. ZigBee was designed to provide high data throughput in applications where the duty cycle is low and low power consumption is an important consideration. (Many devices that use ZigBee are powered by battery.) Because ZigBee is often used in industrial automation and physical plant operation, it is often associated with machine-to-machine (M2M) communication and the Internet of Things (IoT). ZigBee is based on the Institute of Electrical and Electronics Engineers Standards Association's 802.15 specification. It operates on the IEEE 802.15.4 physical radio specification and in unlicensed frequency bands, including 2.4 GHz, 900 MHz and 868 MHz. The specifications are maintained and updated by the ZigBee Alliance.

5. HARDWARE REQUIREMENTS
- ✓ Temperature sensor
- ✓ Ultrasonic sensor
- ✓ Arduino controller
- ✓ Zigbee
- ✓ UART
- ✓ PC

6. SOFTWARE REQUIREMENTS
- ✓ Embedded C
- ✓ ARDUINO IDE

7. CONCLUSION

Monitoring the quality of water & collecting comprehensive data, achieves sequential follow up of water pollution status in remote region. This system not only provides comprehensive evaluation of water environment but also can quickly discover urgent water pollution accidents or natural disasters, transferring the abnormal water quality information to monitoring centre by quicker communication network and provides graphical references for the decision making department to comprehend the status of the disaster to establish the prevention and cure policy.

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