

An Energy Efficient Data Transmission in Wireless Sensor Network

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Abstract— Wireless Sensor Network (WSN) is a communications architecture composed of several nodes with small power supply, it is preferable to assure the adoption of the minimum transmission power in order to extend the WSN lifetime, on the other hand, it is crucial to guarantee that the nodes receive the transmitted data correctly. Therefore, trading off power optimization and quality of service has become one the most important concerns when dealing with modern systems based on WSNs. The main aim of the proposed method is that by evenly distributing the energy all over the sensor nodes and by reducing the total energy dissipation, the lifetime of the network is enhanced, so that the node will remain alive for longer times inside the cluster. Thus, on one hand, it is preferable to assure the adoption of the minimum transmission power in order to extend the WSN lifetime, as far as possible. On the other hand, it is crucial to guarantee that the nodes receive the transmitted data correctly.

Key words: WSN (Wireless Sensor Network), Wi-Fi Module, Wireless Transceiver, Arduino Board, Energy Saving, Sensor.

I. INTRODUCTION

A software requirements specification (SRS) is a document that has the information of complete description about how the system should perform. It is usually carried out at the end of requirement gathering phase. Software requirements specification establishes the basis for an agreement between customers and contractors or suppliers (in market-driven projects, these roles may be played by the marketing and development divisions) on what the software product is to do as well as what it is not expected to do. Software requirements specification permits a rigorous assessment of requirements before design can begin and reduces later redesign. The software requirements specification document enlists enough and necessary requirements that are required for the project development.

A. Sensor:

A sensor is an electronic component, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. A sensor is always used with other electronics, whether as simple as a light or as complex as a computer. Sensors are used in everyday objects such as touch-sensitive elevator buttons (tactile sensor) and lamps which dim or brighten by touching the base, besides innumerable applications of which most people are never aware. In micromachinery and easy-to-use microcontroller platforms, the uses of sensors have expanded beyond the traditional fields of temperature, pressure or flow measurement, for example into MARG sensors. Moreover, analog sensors such as potentiometers and force-sensing resistors are still widely used. Applications include manufacturing and machinery, airplanes and aerospace, cars,

medicine, robotics and many other aspects of our day-to-day life.

A sensor's sensitivity indicates how much the sensor's output changes when the input quantity being measured changes.

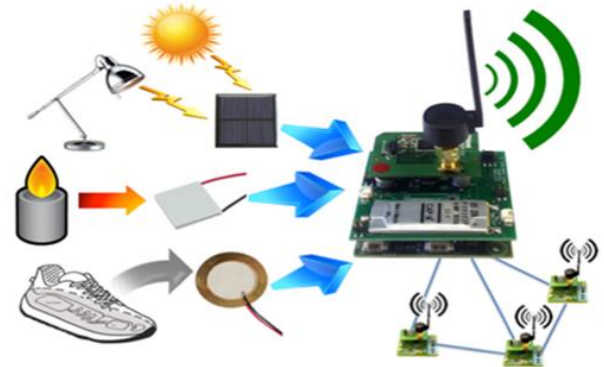


Fig. 1.1: sensor

In this project we are using any sensor to taking input from environment and send this input to system. for example temperature sensor is used to sense the temperature in the environment this temperature are in the form of Celsius, Fahrenheit etc. and this input is send to the system for processing.

B. Wi-Fi module:

Wi-Fi modules also called Serial wifi modules, Function is the serial port or TTL level to comply with wifi wireless network communication standard embedded modules, built-in wireless networking protocols 802.11b / g / n protocol stack and TCP / IP protocol stack. Traditional embedded wifi wireless Wi-Fi module can directly access the Internet, is an important part of the intelligent home, M2M and other networking applications. Wi-Fi Module interface and TTL UART serial ports, built-in WIFI drivers and protocols. It includes two types of topologies: basic network (Infra) and ad hoc network (Adhoc). AP based wireless network is based on components, created by the AP, consisting of a number of STA joins the wireless network, which summarizes all communication through AP to forward complete. MANET is composed of only two or more STA own composition, the network does not exist in AP, this type of network is a loose structure, all of the STA in the network can communicate directly. USR IOT Wi-Fi module has been widely used in monitoring, wireless de



Fig. 1.2: Wi-Fi module

Radio Signals are the keys, which make Wi-Fi networking possible. These radio signals transmitted from Wi-Fi antennas are picked up by Wi-Fi receivers, such as computers and cell phones that are equipped with Wi-Fi cards. Whenever, a computer receives any of the signals within the range of a Wi-Fi network, which is usually 300 — 500 feet for antennas, the Wi-Fi card reads the signals and thus creates an internet connection between the user and the network without the use of a cord. Access points, consisting of antennas and routers, are the main source that transmit and receive radio waves. Antennas work stronger and have a longer radio transmission with a radius of 300-500 feet, which are used in public areas while the weaker yet effective router is more suitable for homes with a radio transmission of 100-150 feet.

Feature of Wi-Fi Module:

- 1) Wake up and transmit packets in < 2ms
- 2) Integrated PLLs, regulators, DCXO and power management units
- 3) Integrated TR switch, balun, LNA, power amplifier and matching network
- 4) A-MPDU & A-MSDU aggregation & 0.4ms guard interval

Advantages of Wi-Fi module:

- 1) This is a wireless connection that can merge together multiple devices.
- 2) Wi-Fi network is particularly in cases where the wiring is not possible or even unacceptable.
- 3) Wi-Fi network are widely used to connect the verity of devices, not only between themselves but also to the internet.
- 4) Another advantage can be pretty easy to create mesh Wi-Fi.

Arduino uno:

This is a single board micro-controller this board provides various analog and digital pins and this pins are provide the interface to various board and circuit. It is including the universal serial bus (USB) and the serial communication mechanism are provide based on programming language to provide integrated development environment. Arduino are support the programming languages like C, C++. The arduino is used to SRAM Memory, FLASH and EPROM storage device.

- 1) Applications of Arduino uno:
- 2) It is open source board.
- 3) It is provide the water quality software testing .
- 4) It is compatible with microcontroller.

II. SYSTEM OVERVIEW

A. Architecture:

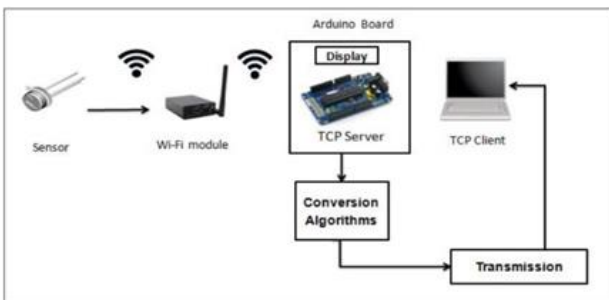


Fig. 2.1: Block Diagram of Transmitter Section

In this architecture the sensor are sense the temperature and send this input to the Wi-Fi module this module are receive this input and send to the micro-controller this micro-controller are using the conversion algorithm when the input are in binary then this algorithm are convert into gray format and this output are send to the receiver.

Algorithm:

B. Algorithm for Binary to Gray Code Conversion:

- 1) The MSB of gray code is exactly equal to the MSB of the binary code.
- 2) Now, the second bit of the gray code will be exclusive or of the first and second bit of the binary code. If both bits are equal then result will be 0 and if bits are different result will be 1.
- 3) The gray code third bit will be equal to the exclusive . Thus the binary to the gray code conversion goes on.

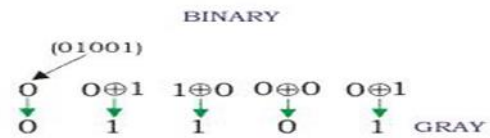


Fig. 2.2: Binary to gray conversion

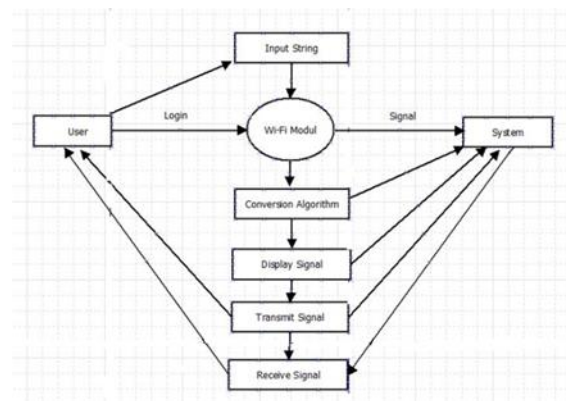
III. MATHEMATICAL MODEL

Mathematical Model with Functions:

- $s = (D, b, f1, f2, O)$
- S = Decimal Input
- b = Binary Conversion output
- $F1 = D \text{ b Conversion}$
- $F2 = \text{Count Function for Energy}$
- O = Energy Count Output
- $F1 = b = D \text{ 8-Bit binary number}$
- $F2 = \text{Count No. 1s in b}$
- 8-Bit binary XOR same 8-Bit binary
- $F2 = O = \text{Energy Count Output}$
- So $O = F2 * 400pj$

Here O will produce the final output of energy count in unit Pico joule (Pj).

A. Data Flow Diagram:



IV. CONCLUSION

An Energy efficiency techniques in wireless sensor network. Because of difficulties in the replacement of usable batteries,

energy efficient communication is very important. Communication through silence is widely used technique and it gives better result than other techniques as well as it saves energy at both transmitting and receiving end. In this system, it presents a new energy efficient communication technique that can reduce energy consumption at both the transmitter and receiver. For data monitoring wireless sensor network can be designed in underground mine involves several steps, including the selection of node locations and power assignments. These collected data in this system could help the network designer by providing useful information. This data used to modify node locations to ensure adequate coverage for users in the largest target area service. Gray code method based on encoding the source data in gray code number system, coupled with the use of silent periods for communicating the 0s in the encoded message and transmission is done in gray code format.

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