International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 06 | June-2018 www.irjet.net p-ISSN: 2395-0072

Smart Saline Monitoring System Using Load Cell and RF Sensor

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Abstract -*In hospitals, Saline is fed to patients to treat dehydration and thus improve their health. In current health care measures, whenever a saline is fed to any patient, the patient needs to be continuously administered by a nurse or any caretaker. Almost in all of the hospital, a nurse or caretaker is responsible for monitoring the saline level continuously without any interruptions. Due to the negligence and inattentiveness towards saline completion by doctors, nurses or caretaker of the patients and lack of nurses with sufficient skills in hospitals and their excessive workload, a huge number of patients are dying and are being harmed in the hospitals. Hence to prevent the patient from getting harmed and protect their lives during saline feeding period, the saline level monitoring system have been developed. The proposed system is built using Radio Frequency(RF) Trans receiver platform. The proposed system comprises of a sensor which will act as a weight sensor for monitoring the critical level of the saline in the saline bottle. Whenever the level of the saline reaches to the pre-defined critical level, then the nurses, caretaker, doctors will be alerted through the buzzer and an indicator will glow to alert the nurses, caretakers, doctors that there is a need for replacement of the saline bottle. This proposed system can be utilized efficiently in homes as well as hospitals.*

***Key Words*: Load cell, RF sensor, Arduino Nano, Encoder IC, Decoder IC, Saline.**

1. INTRODUCTION

The medical field is progressing and advancing rapidly due to the advancement in technology. The combination of medical and engineering disciplines has revolutionized the modern medical practices. Traditional methods used for health care are becoming outdated due to increase in population. Innovative health monitoring systems are required with less human mediation/intervention which can be available at low cost in rural as well as urban areas. A Microcontroller &RF based saline monitoring system is a perfect example of such innovative health management system. This system can be easily and readily installed in every hospital which will help out the nurses and doctors for efficient monitoring of saline flow in the hospitals.

2. SYSTEM DEVELOPMENT

The transmitter part contains load cell, hx711, Arduino nano, encoder HT12E, rf transmitter. The receiver part contains rf transmitter, HT12D, PIC16F877A, green and red leds and buzzer. The transmitter and receiver block diagram are shown in fig 1 and 2.

2.1 Load cell

A load cell is a force sensing module - a carefully designed metal structure, with small elements called strain gauges mounted in precise locations on the structure. Load cells are designed to measure a specific force, and ignore other forces being applied. The electrical signal output by the load cell is very small and requires specialized amplification.

2.2 HX711

Based on Avia Semiconductor's patented technology, HX711 is a precision 24-bit analog to-digital converter (ADC) designed for weigh scales and industrial control applications to interface directly with a bridge sensor.

2.3 Arduino nano

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack and works with a Mini-B USB cable instead of a standard one. The ATmega328Pprovide UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). The ATmega328P also support I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus.

2.4 Encoder and Decoder IC

These encoders are a series of CMOS LSIs for remote control system applications. They are capable of encoding information which consists of N address bits and 12^N data bits. Each address/data input can be set to one of the two logic states. The programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal.

The 212 decoders are a series of CMOS LSIs for remote control system applications. The decoders receive serial addresses and data from a programmed 212 series of encoders that are transmitted by a carrier using an RF or an IR transmission medium. They compare the serial input data three times continuously with their local addresses. If no error or unmatched codes are found, the input data codes are decoded and then transferred to the output pins. The VT pin also goes high to indicate a valid transmission.

2.5 RF sensor module

434Mhz is rf transmitter and receiver module which is used for wireless transmission.

2.6 Block Diagram

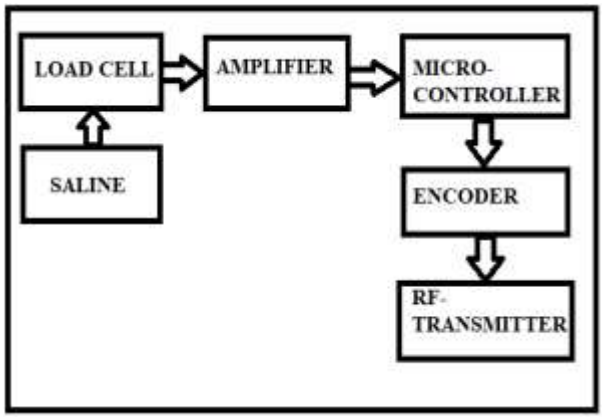

Fig 1: Transmitter Block Diagram

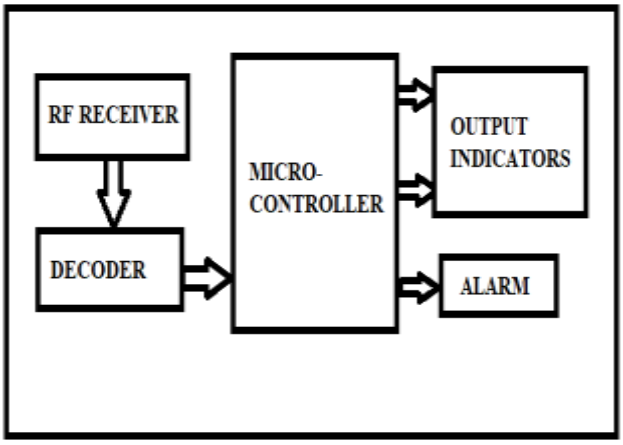

Fig 2: Receiver Block Diagram

3. CONCLUSIONS

With RF based saline level monitoring system, the manual effort on the part of the nurses is saved. As the entire proposed system is automated, it requires very less human intervention. It is beneficial for nurses as well as doctors at rural hospitals. It will be advantageous at night as well, as there will be no such requirement for the nurses to visit patient's bed every time to check the level of saline in the bottle since an alert alarm would be ringed so that the nurses, doctors, caretakers will come to know when saline reaches the critical level. It will save the life of the patients. This will reduce the stress in continual monitoring by the doctor or nurse at an affordable cost. As it is very easy in installation it can be implemented in any Hospital across the globe.

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