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Design and Development of Saline Monitoring System Using Load cell

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Abstract-

As the world population grows, the need for health care increases. In recent years, progress in medical care has been rapid due to the advancements in the field of sensors, microcontrollers and computers. A major reason for this is the combination of the two important disciplines namely medicine and engineering.

This paper describes the development of an automatic saline monitoring system using a low cost indigenously developed load cell and GSM (Global system for mobile communication) modem. This enables the doctor or nurse on duty to monitor the saline flow rate from a distance. The Atmel16microcontroller is used for providing co-ordination action.

Load cell which acts as a weight sensor , used to sense the weight of the bottle. The detection of saline drop rate is quite faithful. Message about the status of the bottle is transmitted through GSM technology to a distant mobile cell for future actions as well as displayed on LCD display.

Keywords : AVR Atmega16 Microcontroller, Load cell,GSM, Stepper motor.

I. INTRODUCTION

Generally in civil hospital, it is necessary to take care of patient on every bed. But the scenario here is, it is practically impossible to take care of each patient on each bed as there is lack of medical staff in hospital. By considering such a situation ,we should develop low cost health monitoring system available to every hospital in the days to come.

This project deals with developing an system useful in medical field. The idea here is to develop an advanced saline monitoring system. It will automatically adjust the saline flow rate &Identifies the status of the bottle (content of liquid) i.e(100ml,200ml.500ml).Using communication module i.e GSM module, it will send message according to the status of the bottle to remote nurse and doctor's cell phone. It will also display the same message on LCD display which is near the saline bottle. The technology used here consists of AVR microcontroller, load sensor and GSM module. This makes the product easily affordable and would serve the society. By considering this problem we find out the solution through our project i.e.name entitled-'SALINE MONITORING SYSTEM'.

A. IMAGE PROCESSING:

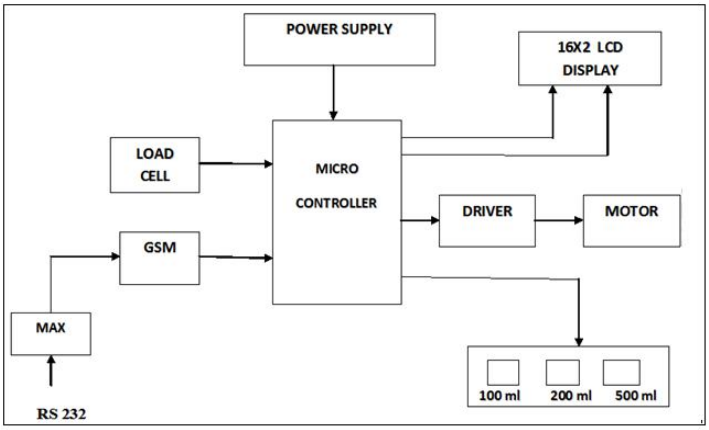

Figure 2. Block diagram of Saline Monitoring System

III.OPERATION:

Block diagram consists of load cell which has 4 arm & it works on the principle of Wheatstone meter bridge. It sense the wieght of the saline bottle and accordingly gives the output. The output of the load cell is analog. There is need to change the output of load cell to digital. This output is given to the ADC port of AVR Atmega16

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which has feature of inbuilt ADC. So the complexity of the system is reduced.

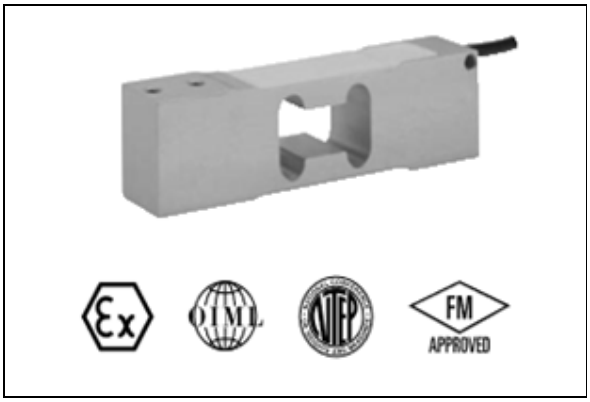
By using GSM module the updates of the saline bottle (i.e full,3/4,1/2,1/4) is send to the nurse or doctor's cell phone & it is also displayed on the 16x2 LCD display which is near to patient. There is provision for selection switch to select weight of bottle (i.e100ml,200ml,400ml.). The stepper motor is used to control the flow rate of saline bottle by reducing the diameter of the saline pipe.

Power supply circuit is used to obtain a fixed DC voltage of 5V. In addition to that if the bottle is about ¼ in level and the bottle is about to be empty, there is occurance of reverse blood flow. To prevent this, there is a provision to reduce the diameter of pipe for each 3.7 degree rotation using stepper motor by sending message to cell phone.

Stepper motor used here is 4 wire bipolar stepper motor having holding torque 0.65 Kgcm at 0.6A per winding. The driver used is ULN2003 whose features matches with the compatibility of the system. The situation where the saline bottle is getting empty in abence of nurse or doctor near the patient, then there is a sawtooth strip provided with motor which pinches the diameter of pipe anticlockwise as the motor rotates and adjusts the saline flow rate.

In this way, the system works.

IV.LOAD CELL:



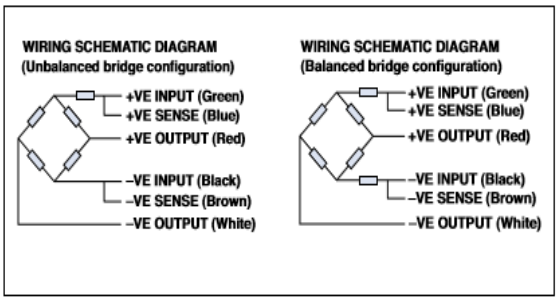


FIG.Internal Block Diagram Of Load Cell.

V.CONVERSION TABLE FOR LOAD CELL:

Table 1 Weight vs. Load cell & Instrumentation amplifier output

Sr. No.	Weight (Kg)	Load cell o/p (mV)	Instrumentation amplifier o/p (V)
1	0	5.0	1.34
2	1	6.9	1.66
3	2	8.8	1.90
4	3	9.7	2.25
5	5	13.5	3.31
6	7	17.1	3.94
7	10	20.3	4.63
8	11	21.7	4.90

Example: If we apply 0 Kg weight of bottle then at the output of load cell we get minimum 5 mV voltage.& instrumentation amplifier convert that output into 1.34V ideally.

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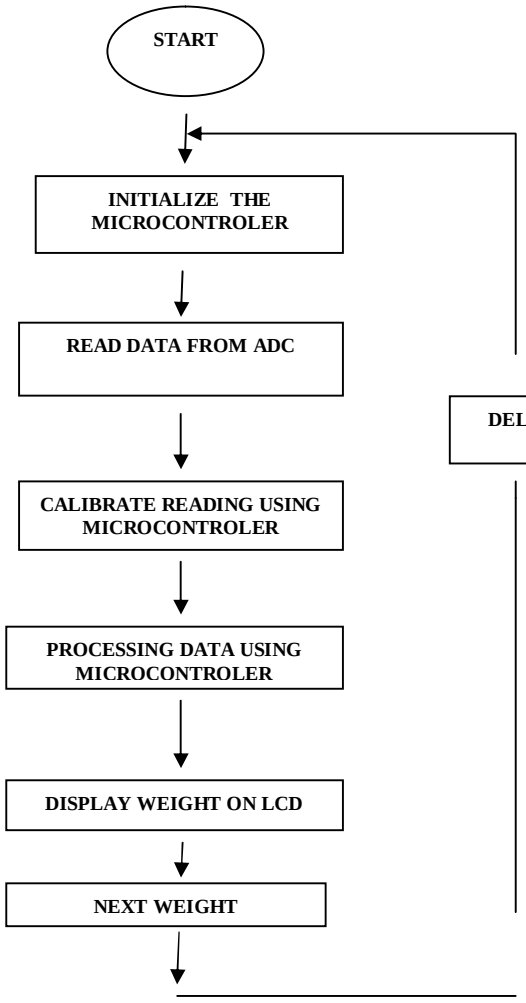
VI.FLOWCHART



VII.RELATED WORK RESULTS:-

Figure 3. Result of Status of Saline Bottle

VIII.CONCLUSION:

This paper studies about the automatic saline monitoring system which provides more flexibility to the doctors; thereby the patient's caring is enhanced. The work presented here is based on AVR technology which perform in co-ordination with GSM technology in which saline flow rate is controlled and hence it saves lot of time for the doctor
or nurse who is on duty.

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