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IoT Based Electronic Valve System with Quantitative Control and Patient Monitoring

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Abstract: ***Electronic valves have been widely used in production and daily life. Now electronic valves are moving towards four directions of streamlining, intelligent, generalization and customization. Automated glucose flow control and monitoring system is about monitoring the flow of glucose automatically. By using this monitoring system, we can monitor the glucose flow. Health monitoring system is one of most important and practical applications of wireless sensor network (WSN). Even though various health monitoring devices based on WSN are used, they are still quite limited in the sense of mobility and accuracy. This project can be implemented in automatic flow control of glucose in hospital, in physical vapor deposition, in chemical supply control of plants which grows in water (hydroponics).***

Keywords: Electronic valve, Quantitative analysis, Flow control, Hydroponics, WSN, Health monitoring.

I. INTRODUCTION

Health monitoring systems integrated into a telemedicine system are novel information technology that will be able to support early detection of abnormal conditions and prevention of its serious consequences. The valve collects flow pulse signal from the impeller Hall flow sensor. Microcontroller chip is used to calculate the flow value and cumulate the total value. Electronic valves have been widely used in production and daily life. In this project we are interfacing a load sensor to the ARDUINO micro controller this load sensor will sense the weight of the chemicals and displayed it on the LCD display. In the next stage we are giving a flow input in ml/sec, in one second a particular quantity of chemical should go to the outlet this will be controlled by a solenoid valve. This project can be implemented in automatic flow control of glucose in hospital, in physical vapor deposition, in chemical supply control of plants which grows in water (hydroponics).

A. Objectives

Monitoring the temperature and pulse of the patient. Transmitting patient related parameters to PC using Wi fi. Interfacing of load sensor, LCD, keypad and measuring the weight of fluid in milli-liter Interfacing of relay, solenoid valve and verifying the functionality. Interfacing hall flow sensor and inlet, outlet and verifying the flow rate. Verifying flow rate for different cases.

B. Problem Statement

In existing system, monitoring of patients is done by manual process which might results to reverse flow of blood during drips process. When bottles get empty and if faculties are not aware of it, it might end up with reverse flow. Manual process cannot achieve accuracy especially in drops bottle management, patients monitoring in late night is difficult and communication between doctor and patient is less. AIOT concept WIFI hardware equipment has been developed and implemented to enable transmission of the temperature and heartbeat signal of a patient.

II. METHODOLOGY

The system consists of ARDUINO, Load Cell, Solenoid Valve, Keypad, Relay and ESP8266. Drip bottle weight is measured using an electronic load cell and information about it will be sent to doctor using a WIFI Module. For demonstration purpose data is sent to basic android Mobile App. When bottle gets to threshold level it intimates to doctor and hospital faculty. Doctor can control the flow rate by sending commands from phone. When the bottle weight gets completely empty ARDUINO controller sends the command to Valve mechanism such that it will be blocked and there will be no reverse blood flow. Temperature sensor is used to monitor the body temperature after drip is injected to patient. If the temperature detects low values, then also valve will be closed and it will be intimated to doctors. Pulse sensor and temperature sensors will be updated to doctors system using LORA.

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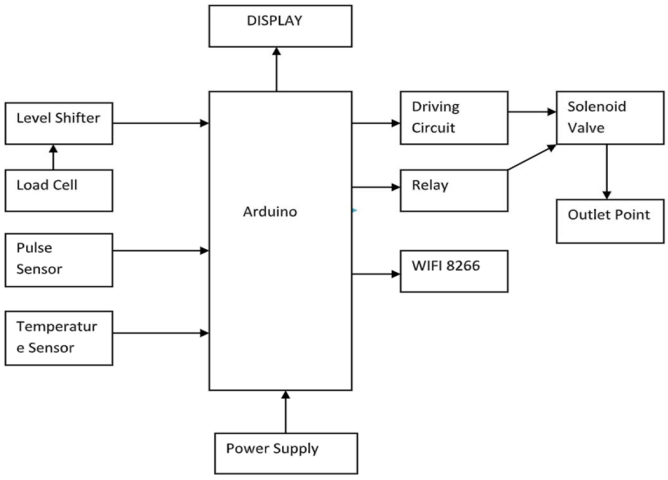


Fig-1: Block Diagram

In this Electronic Valve system, we Interface the load sensor, LCD, keypad and measuring the weight of fluid in milli-liter. The relay and solenoid valve will be used to verify the functionality. The hall flow sensor and inlet, outlet will verify the flow rate for the different flow rate cases. Then all the information is displayed on the LCD screen and it sends all the data to the Android app through the WIFI Module. The figure shows the Model of the saline level monitoring and control system. When drips are given to the patient, load cell continuously measures the weight of the fluid present in the bottle and sends it to the Arduino controller. Arduino controller processes the data obtained from the load cell and updates the doctor continuously and also receives commands from the doctor and invokes the driving circuit by sending instructions i.e., either to reduce the flow rate or to completely close the valve when the bottle is empty and it doesn't receive any command from the doctor. Temperature sensor senses the patient's body temperature. Blood Pressure senses the patient's blood pressure and this information is sent to the Arduino and from there it gets displayed on the LCD. Communication between the doctor and the device i.e., sending and receiving of messages happen through Wi fi.

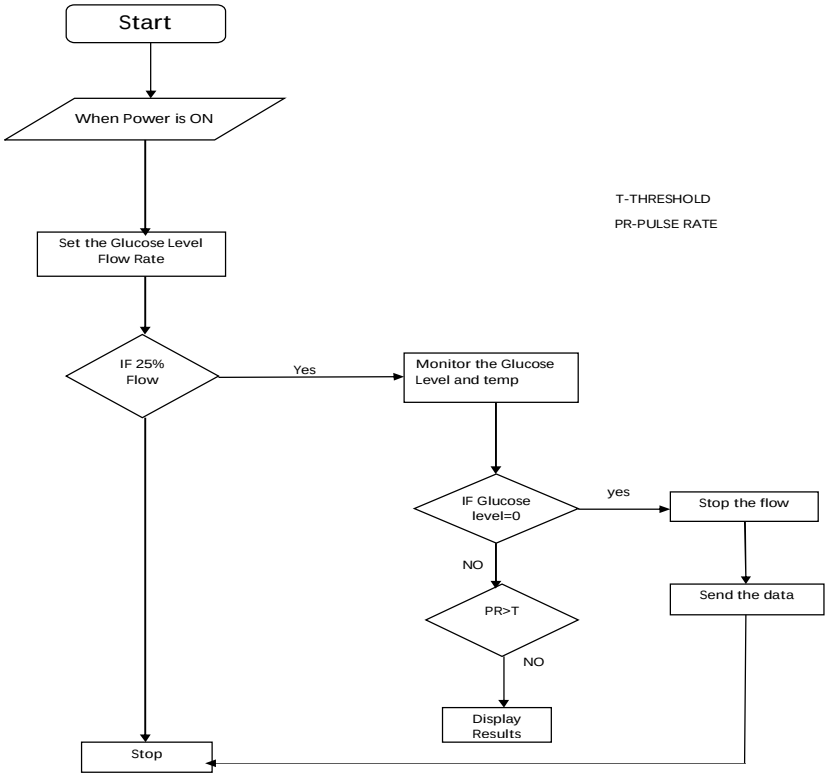


Fig-2: Architectural Design Flow

The above figure shows the design flow of the experiment carried out. When the power is turned ON, the user will set the flow rate on the device. If the flow rate is set at 25%, the next step is to monitor the glucose level and temperature of the patient. If and when the glucose level in the bottle is empty, the device is automatically turned off and a message is sent to the doctor. Otherwise, the pulse rate of the patient is compared with the threshold; If it is found to be greater than the threshold, the data is sent to the Arduino and the flow will be stopped, else the measured results will be displayed on the LCD. The same process is applicable for a flow rate of 50% or 75%.

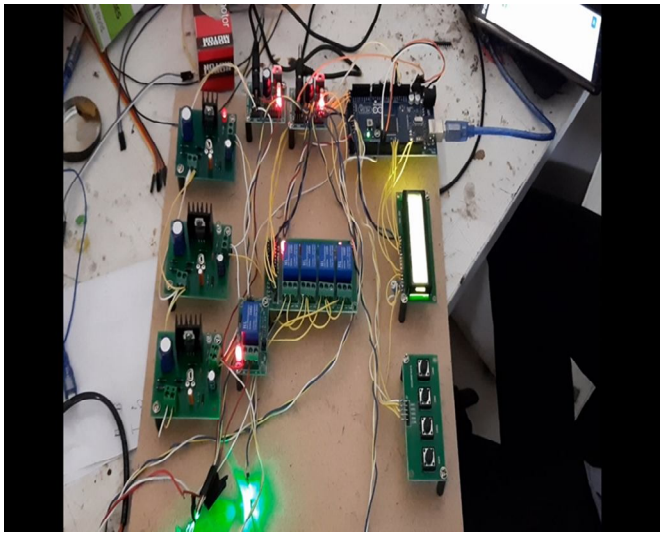


Fig -3: Experimental Setup

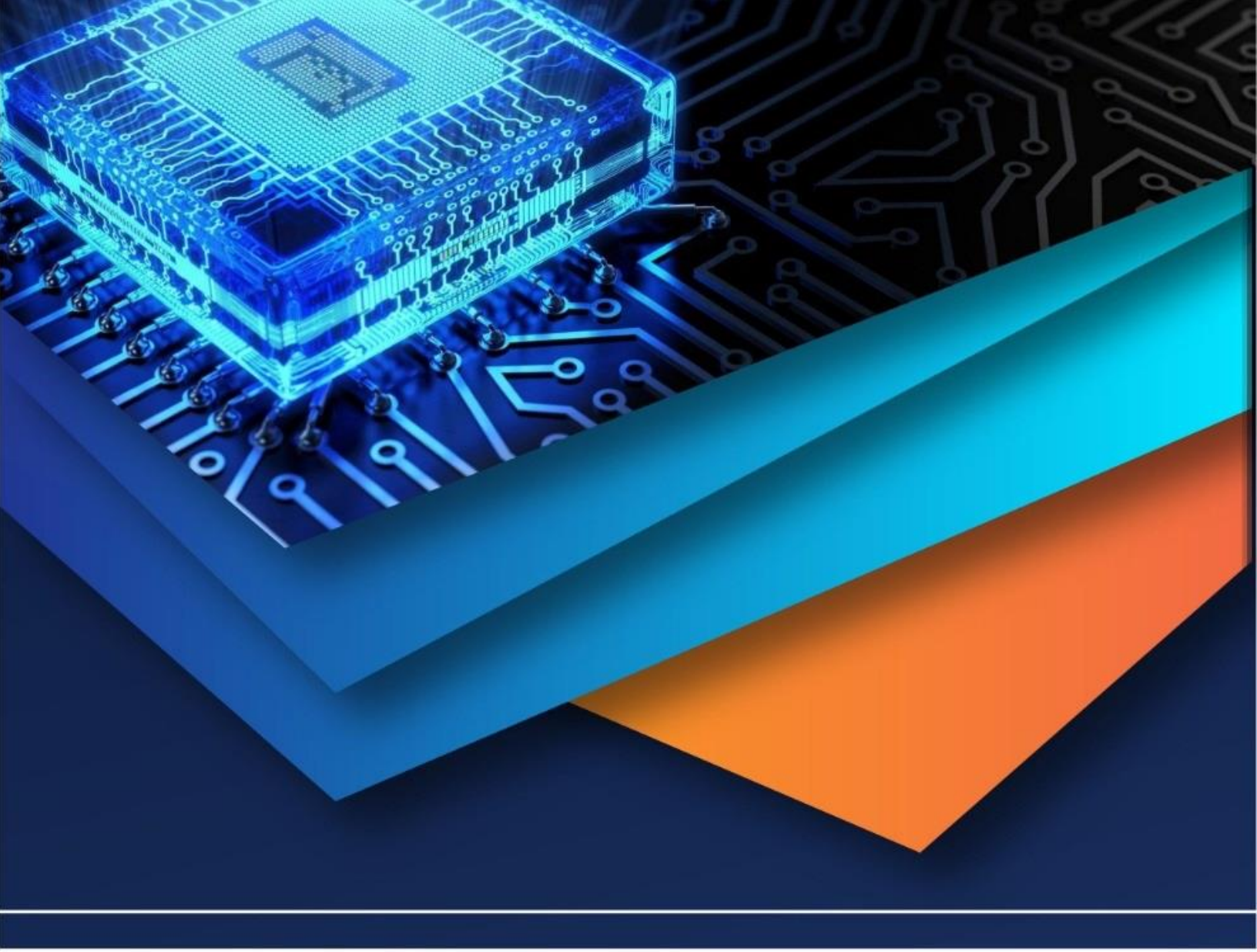
The above figure shows the hardware description of this project, when the hardware initializes with the power supply on, then it checks for the glucose level flow rate in the switch rates, if we sets flow rate for the 25% then, it checks for the body temperature by using the temperature sensor and the flex sensor will be on or off for the fan available in the room (depends on the patient need).If glucose level is zero then it will stop the flow and sends the data to the hospital faculty through the Wi-Fi module of his Android App. If glucose level is not zero then it checks the flex sensor is less than or equal to 450, if its yes then fan will be on, or else it will be off. The same will repeat for the 50%, 75% and 100% of the flow rates of the glucose level.

III. CONCLUSION

This paper presented electronic valve with Quantitative control system, in order to realize for flow control in drip, as a small, compact and advanced technology in the medical field. The proposed model implemented using manual switches to control the flow rate of saline, the same model can be achieved using IOT concepts. Here IOT replaces manual switches by software like user friendly mobile apps so that doctors can control flow rate by sitting at place. IOT concept models can be implemented for remote destinations like villages. Doctors can sit in a different city, different floor of a building or in their house and patient can be anywhere, monitoring and flow rate controlling can be done. Using same IOT concepts one doctor can monitor several patients report on the mobile app or computer screen so one doctor can monitor several patients.

REFERENCES

[1] Takalkar Atul S, Lenin Babu M C “Characterization of Valveless Micropump for Drug Delivery by Using Piezoelectric Effect” IEEE International Conference on Advances in Computing, Communications and Informatics 2016.
[2] Fan Yang, Yu Wang “Research of the New Electronic Valve System with Quantitative Control” IEEE Third Global Congress on Intelligent Systems, 2012.
[3] Jingguo Wen,Zisheng Lian ” Electro-Hydraulic Control System for Hydraulic Supports About the Study on Solenoid Valve Driver” IEEE International Conference on Computing, Measurement, Control and Sensor Network ,2012.
[4] Lu Quan, Sen Bao, Hong Li Jun “Research on Embedded Electro-hydraulic Proportional Valve Controller” IEEE Third International Symposium on Intelligent Information Technology Application,2009.
[5] Shuxi ng Guo,Jian Wang, QinxuePan and Jian Guo “ Solenoid Actuator based Novel Type of Micropump” IEEE International Conference on Robotics and Biomimetics,2006
[6] The Diabetes Control and Compliance Trials, National Institute of Diabetes and Digestive and Kidney Disorders, NIH Publication, 199. 33.
[7] A. Tura et al., “Non-invasive glucose monitoring: Assessment of technologies and devices according to quantitative criteria,” Diabetes Res. Clinical Practice, vol. 77, no. 1, pp.
[8] S. K. Vashist, “Non-invasive glucose monitoring technology in diabetes management:A review,” Analytica Chimica Acta, no. 7 50, pp. 16–27 , Apr. 2012.
[9] K. Song et al., “An impedance and multi-wavelength near infrared spectroscopy IC for non-invasive blood glucose estimation,” in Symp. VLSI Circuits Dig. Tech. Papers, 2014.



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