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IOT Based IV Bag Monitoring and Alert System

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Abstract - The current design of the IV bag monitoring system aims to improve patient safety throughout medical facilities by providing automated fluid supervision. An HX711 load cell amplifier together with a load sensor enables the system to perform accurate weight measurement of IV bags before calculating their corresponding volume values. The 16x2 I2C LCD shows current IV volume using a graphical bar gauge and displays the volume values in milliliters. Through the combination of Wi-Fi connectivity with RemoteXY, you can perform wireless and instant monitoring of the fluid levels using linear visual indicators together with their textual descriptions. The system features a buzzer that sounds an alert to healthcare providers whenever the IV volume reaches designated low thresholds, thus helping to avoid unrecognizable fluid depletion. The equipment operates using a 500 ml IV bag measurement capacity with distinct volume ranges that trigger warning indicators during the volume depletion process. A volume reading averaging system produces smoother displays, and the buzzer activates according to current volume values. Through an affordable monitoring system, healthcare providers can perform efficient real-time IV fluid checks in both hospital and home settings, which cuts down on manual assessments while enhancing patient care trustworthiness.

Key Words: Microcontroller, Weight Sensor, Led Alert, Buzzer Alert, Fluid Level Detection.

1. INTRODUCTION

This system combines an IV bag monitoring device, which uses a load cell sensor to track intravenous fluid levels continuously for enhancing patient safety as well as care quality. The HX711 module serves as the weight measurement module, which turns the readings into estimated fluid volume numbers. Real-time volume information shows on the 16x2 I2C LCD screen along with buzzer alerts to prevent empty bags, which endanger patient safety. The RemoteXY wireless interface gives users real-time fluid level monitoring through graph and text displays. Each volume threshold value comes with a weight range that determines the feedback responses. The system operating at a low price point enhances medical staff efficiency and protects patient safety by detecting IV fluid levels before they run out. This system features adaptable design sections that enable code modification and interface adaptation for monitoring medical and fluid systems alike.

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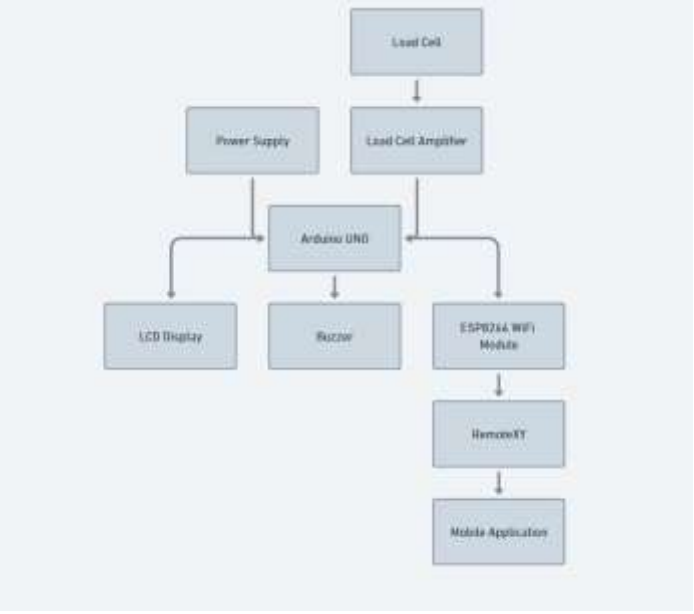
2. EXPERIMENTAL DETAILS

2.1 METHODOLOGY

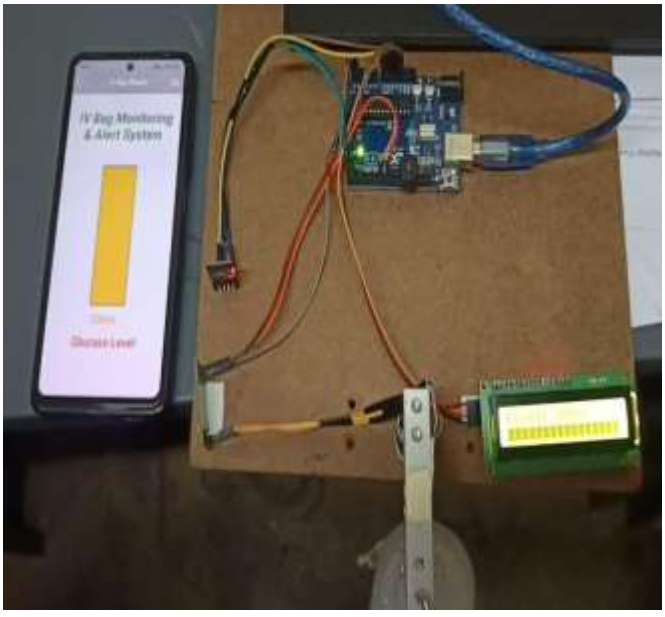
The project utilized an ESP32 microcontroller to develop an IV bag monitoring system through integration of a load cell with an HX711 amplifier to determine IV fluid weight. Through defined weighting thresholds, the system transforms weight measurements into estimated milliliter amounts to calculate remaining volume. The LiquidCrystal_I2C display displays current volume measurements, while RemoteXY enables smartphone-based wireless observation of the system. The system performs continuous reading averaging for precise measurement, which results in updated display data on both local interfaces and remote monitoring devices. A built-in buzzer system activates its warning sound whenever the monitored fluid volume falls beneath important threshold levels. The methodology starts by initializing all hardware components, followed by load cell calibration, before implementing control logic in Arduino IDE, which defines weight-to-volume mapping with warning conditions. Real-time monitoring with user-friendly controls and dependable performance exists within this design framework because it meets clinical requirements for unattended IV bag level management.

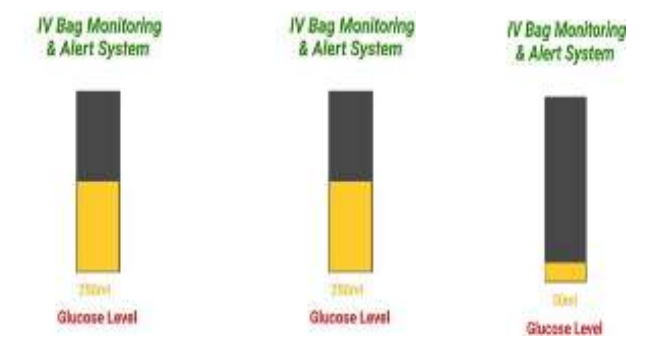
2.2 BLOCK DIAGRAM



3. RESULT

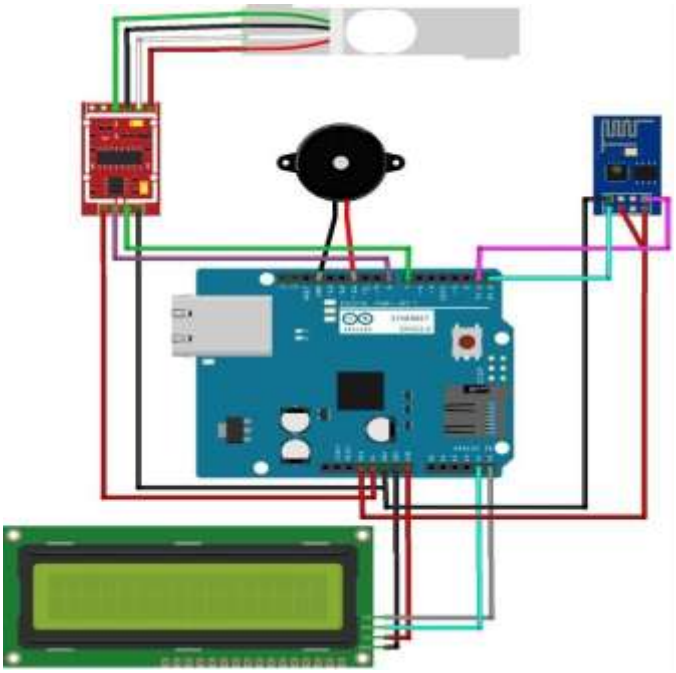
The Arduino system monitors IV fluid levels through real-time tracking by combining a load cell sensor and HX711 amplifier. The device precisely monitors IV bag weights with multiple reading averages to eliminate noise before displaying measurements according to a volume scale between 500 ml and 0 ml. A16x2 I2C LCD displays the volume measurements simultaneously with a visual indicator that provides the fluid level status of the bag. The system connects to the RemoteXY mobile application, which provides a simple dashboard for remote controls. The application presents a combination of calculated fluid level status along with a bar that displays percentage-based linear progress measurement. Patient safety is ensured by an alarm system that activates a buzzer when current fluid volume reaches 50 ml or below. The system begins with an initial display before showing warnings about uninstalled bags in the system. The solution targets medical applications because it serves purposes within hospitals as well as clinics and home care settings. The system decreases the need for human supervision and simultaneously decreases the probability of IV fluids finishing without being detected. The smart tracking device provides reliable IV therapy through its compact design, which serves to improve patient healthcare. This system establishes itself as a budget-friendly solution that enables straightforward installation for different healthcare environments.





HIGH LEVEL MIDDLE LEVEL LOWLEVEL

3.1 CIRCUIT DIAGRAM



4. CONCLUSIONS

An IV bag monitoring system composed of Arduino along with a load cell (HX711), LCD, and buzzer, as well as a RemoteXY interface, demonstrates real-time fluid volume display. The load cell tracks weight measurements from the bag, after which it computes the corresponding volume through established thresholds. The RemoteXY interface displays both the volume measurements in milliliters and the graphical bar representation of percentage values on a mobile screen by receiving data from an LCD display. The system generates alerts when the fluid content drops into predefined weight ranges. The system will alert medical personnel through an audible buzzer whenever the fluid amount reaches less than 50 milliliters. Both audio alarms and visual signals from the system aid downstream staff members in timely replacement of IV bags. During operation, the device presents the welcome screen, after which it maintains continuous monitoring of the weight and display updates and responds to warning events. The system has modular programming that enables simple adaptations because users can define different bag measurements. The hospital and clinical system prevents unnoticed IV fluid depletion through its safety features and automates the maintenance of appropriate fluid levels.

5. REFERENCES

[1] S. Bhorge, P. Avhad, G. Nemade, H. Sonarkar and R. Dhawale, "IoT Based IV Pole Monitoring System," 2023 IEEE 8th International Conference for Convergence in Technology (I2CT), Lonavla, India, 2023, pp. 1-6, doi: 10.1109/I2CT57861.2023.10126408.

[2] A. A. Shetty, P. G and A. Balasubramanyam, "Smart IV Bag Monitoring and Alert System," 2023 International Conference on Recent Advances in Science and Engineering Technology (ICRASET), B G NAGARA, India, 2023, pp. 1-5, doi: 10.1109/ICRASET59632.2023.10420374.

[3] V. Kumar M, R. Sundar. G, M. K, K. C and S. S, "IoT based Smart Intravenous Fluids (IV) Drip Monitoring and Reverse Blood Flow Prevention System," 2023 International Conference on Intelligent Data Communication Technologies and Internet of Things (IDCIoT), Bengaluru, India, 2023, pp. 16-20, doi: 10.1109/IDCIoT56793.2023.10053449.

[4] K. Sreekumar, J. Francis and B. R. Prathap, "Smart Intravenous Infusion Monitoring and Alert System using IoT-based Force Sensitive Resistor and Whatabot API," 2023 IEEE International Conference on Contemporary Computing and Communications (InC4), Bangalore, India, 2023, pp. 1-6, doi: 10.1109/InC457730.2023.10262987.

[5] S. Nayak, A. Agrawal, J. Yadav, J. Zalke and S. R. Pandey, "IoT-Based Intravenous Fluid Level Indicator Enhancing Patient Safety In The Era of Smart Healthcare System," 2024 IEEE International Conference on Interdisciplinary Approaches in Technology and Management for Social Innovation (IATMSI), Gwalior, India, pp.16, doi:10.1109/IATMSI60426.2024.10502712.

[6] S. Joseph, N. Francis, A. John, B. Farha and A. Baby, "Intravenous Drip Monitoring System for Smart Hospital Using IoT," 2019 2nd International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICICT), Kannur, India, 2019, pp. 835-839, doi: 10.1109/ICICICT46008.2019.8993241.

[7] P. S. et al., "IoT based Healthcare Monitoring and Intravenous Flow Control," 2020 International Conference on Computer Communication and Informatics (ICCCI), Coimbatore, India, 2020, pp. 1-6, doi: 10.1109/ICCCI48352.2020.9104119.

[8] S. Barath Sanjay et al., "IoT Based Smart IV Drip Stand," 2021 International Conference on Advancements in Electrical, Electronics, Communication, Computing and Automation (ICAECA), Coimbatore, India, 2021, pp. 1-5, doi: 10.1109/ICAECA52838.2021.9675560.

[9] A. Sonkar, N. Pal, H. Gupta and J. K. Dhanoa, "Smart Intravenous Drip Monitoring System with Bubble Detection Indicator using IoT," 2022 2nd International Conference on Intelligent Technologies (CONIT), Hubli, India, 2022, pp. 1-7, doi: 10.1109/CONIT55038.2022.9848118.

[10] S. Usha, G. Jeevitha, M. Logesh, M. Karthik, M. Kaviyaa and S. S. Prasanth, "IoT based Integrated Health Care Monitoring System," 2023 4th International Conference on Smart Electronics and Communication (ICOSEC), Trichy, India, 2023, pp. 353-358,doi: 10.1109/ICOSEC58147.2023.10276248.