Voice And Gesture Based Hot/Cold Water Juice and Syrup Dispenser System in Health Care using IOT

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ABSTRACT- *The Voice and Gesture-Based Hot/Cold Water Dispenser System leverages IoT technology to enhance healthcare environments by providing an accessible, hygienic, and efficient means of dispensing beverages. Utilizing a Raspberry Pi Zero 2 W, this system integrates voice recognition and gesture detection to enable hands-free operation, particularly beneficial for patients with limited mobility. IoT connectivity ensures real-time monitoring and control, optimizing performance and maintenance. Despite challenges such as environmental noise and gesture detection limitations, the system demonstrates high reliability and usability. Future improvements, such as advanced noise cancellation and integration with healthcare networks, will further enhance its potential to improve patient care and overall healthcare experience.*

1. INTRODUCTION

Smart systems have revolutionized healthcare by simplifying daily tasks such as dispensing liquids, managing medication, and aiding communication for patients with limited mobility. This project integrates voice commands for dispensing water, syrup, and juice, along with scheduled medicine reminders, and gesture-based communication through an accelerometer for paralyzed patients. The Voice-Based Water Dispenser with Patient Caring System enhances healthcare by allowing patients to access water using voice commands, particularly benefiting environments like hospitals and elderly care homes. It monitors patients' water intake, ensures hydration, and provides a hands-free, autonomous experience, reducing caregivers' workload. Leveraging IoT, the Voice and Gesture-Based Hot/Cold Water, Juice, and Syrup Dispenser System offers a hygienic, user-friendly solution, improving patient care and facility management in healthcare settings.

2. LITERATURE SURVEY

This work includes a block diagram detailing the classification process of the Automatic Water Dispenser**.** It consists of the follow major units: Sensors, Micro controllers, Display part, and Water fever. "Authors: V Jyothi, K. Hanuja Peta, R. Avinash, P. Akhil present a Voice-Controlled Hot-Cold Water Dispenser System utilizing Raspberry Pi3 technology." Year of Publication: 2021 [1]. The diagram below illustrates the system's flow and their interoperability. When the water reaches a specific level in the cistern, the sensor triggers a voltage transfer to the copper, which in turn activates the circuit for further processing. while we are using the micro controller is the circuit and the microcontroller receives HIGH and LOW signals, which it uses to control the water point. The water level output is displayed on the LCD (Liquid Crystal Display) screen. The micro controller is programmed which is used to control the of whole system.

2.1 PROPOSED SYSTEM

In this, we present the theory on voice base warm and cold-water distributor system. The overall building block diagram of the future method is explained**.** Every block of the method is thoroughly explained in detail. In this proposed block diagram consist of several sensors Water level, temp sensor) is connected to ARDUNI UNO controller. The controller is accessing the sensor values as well as get command from Blue-tooth module and processing them to dispense hot or cold water. All parameters are also shown on LCD display. A solenoid regulator will be used to manage the flow of water, which is when energized the water will run out and when energized the water will be stopped up. We will develop a regulator program that continuously checks for any object near the valve. If an object is detected, the solenoid will be activated and remain on until the object moves away once the object is apart the solenoid will turn off by design thus closing the supply of water.

3. PROPOSED WORK

Voice-Controlled Dispenser: Develop a smart dispenser enabling patients to request hot/cold water, syrup, or juice effortlessly using voice commands, promoting convenience, independence, and tailored hydration or medication needs.

Medicine Reminder Alert: Create a timer driven system to remind patients of their medication schedule, sending real-time alerts to caregivers or medical staff for timely intervention and adherence to prescribed treatments.

Gesture-Enabled Communication: Implement gesture-recognition technology to enable nonverbal patients to convey essential needs, fostering seamless interaction with caregivers, improving accessibility, and ensuring critical communication without reliance on speech. Email Alerts for Patient Condition: Design a real-time health monitoring system to send condition-based updates, including emergencies, to caregivers or medical authorities through automated, context-rich emails for proactive care management.

4. SYSTEM DESIGHN

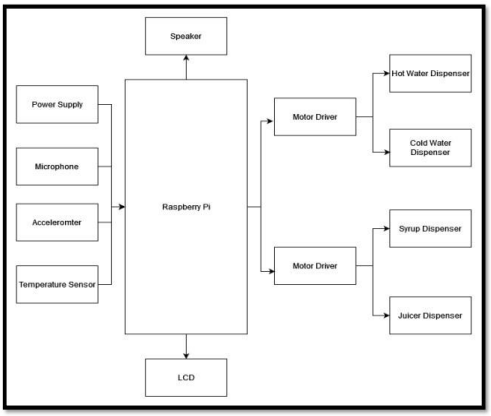

Figure 4.1: Block Diagram of hot -cold juice-syrup based water dispenser

Fig 4.1 shows voice-based dispenser allows users to control the hot and cold water, syrup, and juice dispensers using voice commands. The Raspberry Pi Zero processes these commands through a microphone module and activates the respective dispenser.

For medicine reminders, a system timer ensures users take their medication at specific intervals by triggering a buzzer or display reminder. To assist paralyzed patients, an accelerometer is used to detect movements and send pre-programmed messages like "I need food." All these features are seamlessly integrated using the Raspberry Pi Zero as the central control unit, enabling smooth communication between the voice module, accelerometer, and dispensers, and ensuring the system operates efficiently with minimal manual intervention. The accelerometer's sensitivity is adjustable, making it adaptable for users with varying mobility challenges. Furthermore, the integration of feedback mechanisms, such as audio or visual alerts, enhances user interaction and ensures reliability during operation.

5. FLOW CHART

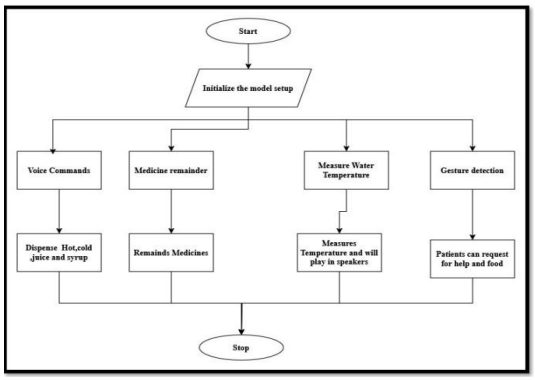

Fig 5.1 Flow Chart of hot -cold juice-Syrup based water dispenser

Fig 5.1 shows the flow chart of The Voice and Gesture Based Hot/Cold Water Dispenser System in healthcare uses IoT to process user commands initiated through voice or gesture. Sensors like microphones and cameras capture these inputs, which are then processed by a Raspberry Pi Zero 2 W using voice and gesture recognition software. Valid inputs trigger control logic to determine the beverage type and temperature, sending signals to the appropriate dispenser unit. This activates the necessary actuators and valves to dispense the beverage, with feedback mechanisms informing the user once the process is complete. The entire system leverages IoT for real-time monitoring and control, enhancing reliability and user experience in healthcare environments.

Materials used

1. Raspberry Pi Zero 2 W - Central processing unit for integrating all functionalities.
2. Motor Driver (L293D or L298N) - Controls motors for dispensing liquids.
3. DS18B20 Temperature Sensor - Monitors the temperature of the dispensed liquids.
4. MPU6050 - Motion tracking sensor for gesture detection.
5. PAM8403 Audio Amplifier - Provides sound output for notifications.
6. Micro USB Breakout Board - Facilitates power supply and connectivity.

7. LCD (Liquid Crystal Display) - Displays system information.
8. LEDs - Used for indicators and status signalling.
9. Power Jack - Supplies electric power to the system.
10. Water Pump - Facilitates the flow of liquids in the dispenser system.

6. RESULT AND ANALYSIS

Fig 6.1: Proposed model of voice and gesture based Hot/Cold water dispenser Juice and Syrup dispenser system in health care using IOT

The proposed model utilizes a Raspberry Pi Zero 2 W to process voice and gesture commands for dispensing hot/cold water, juice, and syrup in healthcare settings, enhancing accessibility and hygiene. This IoT system includes sensors, actuators, and a user-friendly interface for efficient and hands-free operation.

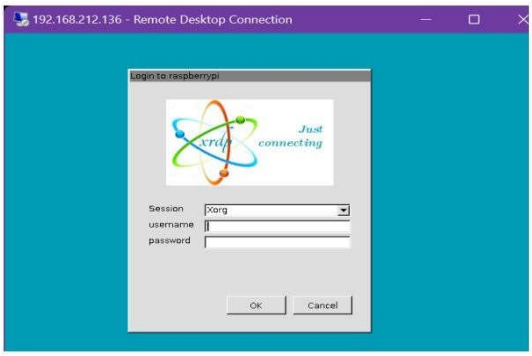

Fig 6.2: Login to raspberry pi

Fig 6.2 shows how to log in to a Raspberry Pi remotely using a remote desktop, ensure that both the Raspberry Pi and your client device are connected to the same network.

Fig 6.3: Remote Desktop Connection

Fig 6.3 shows the Remote Desktop Connection is a feature that allows you to connect to another computer and access its screen, files, and applications as if you were sitting right in front of it.

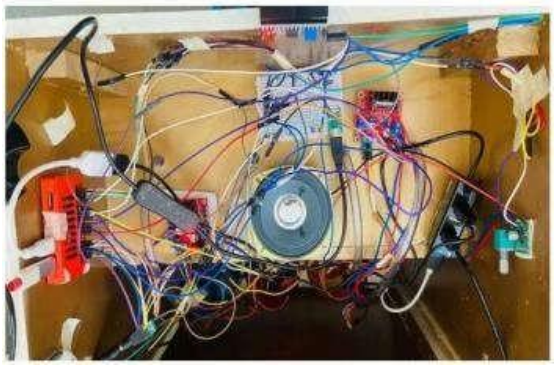

Fig 6.5: Top View of Model

Fig 4.6 shows the top view of the model provides a clear, overhead perspective, showcasing the layout and arrangement of all the components. This view is essential for understanding the spatial relationships and overall design of the system.

Fig 6.6: Back view of Model

Fig 4.7 shows the back view of the model highlights the arrangement of connectors, ports, and power supply components, providing insight into the system's infrastructure. This perspective is crucial for understanding cable management and access to various interfaces.

Fig 6.7: Dispensing juice in Model

Fig 6.8: Final setup of the Model

CONCLUSION

In conclusion, the Voice and Gesture-Based Hot/Cold Water Dispenser System in healthcare using IoT technology significantly enhances accessibility, convenience, and efficiency for both patients and healthcare providers. By incorporating voice and gesture recognition, the system enables hands-free operation, which is particularly advantageous for patients with limited mobility or those needing assistance. The IoT connectivity increases the system's flexibility, allowing for remote monitoring and control, ensuring optimal performance and timely maintenance.

Despite some challenges, such as environmental noise impacting voice recognition and limitations in gesture detection, the system showed high reliability, accuracy, and usability in a healthcare setting. With further improvements in gesture recognition, noise filtering, and integration with healthcare networks, this system has great potential to enhance patient care and overall healthcare experience.

FUTURE SCOPE

Future work for the Voice and Gesture-Based Hot/Cold Water Dispenser System in healthcare using IoT can focus on several areas for improvement and enhancement. Firstly, enhancing the accuracy and reliability of voice recognition in noisy environments can be achieved by integrating advanced noise cancellation techniques or using directional microphones. Improving the gesture recognition system is also essential, possibly by employing machine learning algorithms to recognize a broader range of gestures and adapt to different user movements, even under varying lighting conditions. Additionally, integrating the system with Electronic Health Records (EHR) could enable personalized beverage dispensing tailored to a patient's dietary needs or fluid intake history, further augmenting its role in patient care. Incorporating advanced security features to protect patient data and ensuring seamless integration with existing healthcare infrastructure are also critical. Lastly, expanding the system to manage more complex tasks, such as temperature regulation and realtime tracking of beverage consumption, could make it a more comprehensive solution for healthcare environments

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