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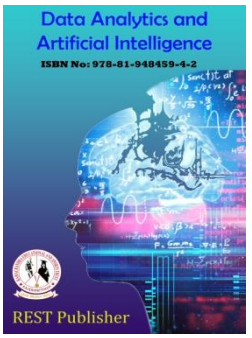

Voice Control Hot-Cold Water Dispenser System Using Arduino

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Abstract: *The Technology is transforming human life into a smart world due to its rapid expansion. To make people's lives easier, smart sensors connected to physical items give data. We show a case study of a smart water dispenser that uses weight sensors, temperature sensors, and Arduino to track how much water customers and water bottle suppliers use on a daily basis. When the water in the dispenser is ready to run out, the smart water dispenser weighs the water that is still within and sends out a warning. It takes the temperature and sends the user notifications regarding water use. Here, we propose an Arduino and Relay-based completely automated RFID-based water dispenser system. Using solenoid tap and sensors, the device may fully automate the water distribution process. In order to prevent water deterioration if no glass is placed at the counter panel, the system also detects the presence of glass there. Infrared (IR) sensors are used by the system to identify glass, after which the sensors provide a signal to the microcontroller. Now that the sensors have provided information, the microcontroller is processing it to see if glass is present. The system features an RFID Reader that may be used to read specific tags and provide information about valid tags to the microcontroller. When a valid tag is found, the system now sends a signal to the controller, which then determines whether glass is there before starting the motor to pour water into the glass while the glass is still there. If glass is removed while the process is running, the mechanism shuts off the water flow until glass is found. So, in this article, we propose a smart water dispenser system with a water-saving feature.*
Keywords—*Water dispenser, Arduino, RFID Reader, Sensor*

1. INTRODUCTION

Voice command The Hot Cold Water Dispenser System using Arduino is a project that will be highly beneficial to the elderly, the disabled, and essentially anyone who struggles to execute daily tasks effectively. This notion is in line with the modern era of automation and technology. This automation system's primary objective is to simplify living. Due to its convenient portability and user-friendly interface, mobile devices are widely used by everyone. Through the use of Bluetooth as a communication channel between Arduino and Android devices, Arduino becomes a better solution for the home in this project where we hope to manage electrical home appliances using Android and voice commands.The humble water cooler - a device to chill (and more recently, heat) your drinking water bean ads humbly as it stands as a piece of equipment today. The water Cooler- from a simple block of ice dating back to the Victorian days to now-being noted as one of the most important pieces of equipment that has contributed to the health and well-being of children and adults. In modern times, the water cooler is now more preferred source of water over a variety of alternatives thanks to its cost effectiveness, portability and, of-course, provision of safe drinking water for all to enjoy. A sophisticated air filtering technology is built into contemporary refrigerators. By preventing germs from entering your machine, this technology eliminates the risk of polluted water or unwelcome substances getting into the machine. This technology also makes it possible to preserve the water, providing you the best flavour without any unpleasant odours. The cooler's internal water reservoirs are made of food-grade stainless steel and can hold both hot and cold water. One of the materials that is least likely to allow germs to grow is this one. A device that administers water at a temperature of about 940 c (201 F) is known as an instant hot water dispenser or boiling water tap (near boiling). There are types for hot-only and hot and cool water, and the water can be heated while also being filtered. In

the 1970s, instant hot water dispensers gained popularity. Instant hot water dispensers and portable showers have a lot in common. The latter features a heating element that heats water quickly once a switch is turned on. [1]Design Automatic Dispenser for Blind People based on Arduino Mega using DS18B20 Temperature Sensor- Ali Nur Fathoni, Noor Hudallah, Riana Defi Mahadji Putri - Those with visual impairments, who have restricted vision, may face many challenges when trying to carry out daily tasks and engage in social interactions. For blind persons, equipment is still generally not user-friendly. The aim of this project was to construct an automatic dispenser that is safe and convenient for visually impaired people to use when bringing hot water to the dispenser. The HC-SR04 ultrasonic sensor is used in this study as a predictor of high water levels, together with an SD Card Module to play sound and an Arduino Mega microcontroller as the primary control. A proximity sensor is also used to detect the presence of glass. The Research and Development (RnD) approach is being used in this study.The outcome of this work is an automatic dispenser that can fill glasses with a glass height of 8 automatically. [2]Implementation of Ziegler-Nichols PID Tuning Method on Stabilizing Temperature of Hot-water Dispenser- Ratna Aisuwarya, Yulita Hidayati -The low-cost dispenser has drawbacks like its inability to stabilise the water temperature. The ideal temperature for brewing hot beverages like coffee and tea is between 90 and 96 °C. The challenges with automatic dispensers have been covered in a number of earlier studies, but there are still some issues with maintaining temperature stability in the dispenser. To address these issues, more development is required. We suggested a dispenser that can keep the temperature of the hot water stable for that purpose. With the help of this dispenser, users will find it simpler to brew coffee and tea with the right water temperature and to maintain a consistent temperature that results in a high-quality beverage. The system's design makes use of a temperature sensor that is waterproof. Voltage regulation is used with. [3]Research and Development of a Practical Water Dispenser- Chin Jung Huang, Fa Ta Tsai- In daily life, the usage of heated water is common. For example, while preparing milk using newborn formula powder, the water is boiled to a certain temperature and released in a specific amount. However, the market's current water dispensers can only provide a single type of fixed-temperature hot water, warm water, or ice water and cannot provide boiled water at the temperature and quantity the users set as needed; additionally, the water filling could not be stopped automatically when the water overflowed the cup, which is not practical or convenient and cannot meet the real needs of users. The circuit design of the practical water dispenser uses the 8052 Micro Controller Unit programme control to regulate the water release time and flow rate.[4]A Smart Power Saver Based on Composite Switch and Self-Learning Fuzzy Control for Drinking Water Dispenser - Zhongren Chen, Yejun He- To address issues with drinking water dispensers commonly found in homes and offices, such as energy waste and the production of "thousands of boiling water," a smart power saver based on a composite switch and self-learning fuzzy control has been developed. In order to decrease useless heating of the drinking water dispenser, a single-chip microcomputer is employed as the CPU and self-learning fuzzy control is used as the control technique. A few low consumption designs of power savers are suggested to increase the effectiveness of power savings. Conduction loss can be reduced by using composite switches and buzzer warning circuits. The power saver also features a variety of operating modes so that it can be used for various situations and their own requirements. [5]Power-saving for IoT-enabled Water Dispenser System- Wen-Zhi Cheng , Ray-Guang Cheng , and Shuo-Yan Chou - An IoT-enabled water dispenser system is designed and implemented in this article. We track the temperatures of the hot, warm, and cold water tanks as well as how much each tank is used by its customers using the commercial water dispenser's communication module and our own gateway. To determine the water dispenser's power usage, we utilise a commercial clamp metre. We can understand how the water dispenser functions and how consumers behave based on the data that has been gathered. We go on to show how our early findings can be applied to the suggested system's customizable parameters in order to reduce the water dispenser's power usage. [6]Intelligent Water Dispenser System Based on Embedded Systems- Jinhuang Huang, Jun Xie- The system was created based on micro controller STC89C52 and uses single-bus temperature sensor DS18B20 to measure the drinking fountains' real-time temperature. Clock chip DS1302 provides the calendar and time, and HS0038B receives data from the remote. LCD12864 displays the calendar and time as well as the current temperature value. The general design concept of the system, the hardware circuit, the software flow chart, the temperature error of processing, and the application of the fitting method have all been shown. Remote control, temperature control, cooling, variable power heating, high levels of safety and stability, intelligent control, and low power consumption are just a few of the features available on the system. [7]Design of Food, Medicine & Water Dispensing Automation Device- Nilabh Niran, Dhrubajyoti Das, Dipak Das, Subhabrata Banerjee- Nature is not under the control of humans. The biggest loss and a very difficult task for many countries has been the casualties in natural calamities as a result of weak governance and the lack of critical goods like food, medicine, and safe drinking water. This study makes a proposal for an intelligent system that would prevent impacted persons from contracting infectious diseases as well as hunger and thirst. Additionally, the system has been created so that users can reap the full benefits by adhering to specific limitations and requirements. The technology may also turn polluted water into drinkable water for those in need by passing it through a natural filtration mechanism. The dispensers were created.

2. SYSTEM HARDWARE DESIGN

This includes a block diagram of the procedure for classifying automatic water dispensers. It is made up of the following major components: Water fever, Micro controllers, Sensors, and Display Part. The system's flow and interoperability are depicted in the diagram below. When water reaches the sensor in the cistern at a certain level, voltage is transferred to the copper, which is then turned over to the circuit for additional processing. The HIGH and LOW signals are fed into the microcontroller as we operate the circuit, and the microcontroller uses these signals to regulate the water point. On the LCD(Liquid Crystal Display), the water level yield is displayed. We discuss the idea behind the voice-based warm and cold water distribution system in this. The entire block diagram for the upcoming technique is explained. Each and every procedure block is thoroughly explained. This suggested block diagram includes a number of sensors. The ARDUNI UNO controller is coupled to the water level, IR sensor, and temperature sensor. The controller is processing the sensor values to distribute hot or cold water while also accessing sensor values and receiving commands from a Bluetooth module. Each parameter is also displayed on an LCD screen. Water flow will be controlled by a solenoid regulator, which, when powered on, releases water and, when de-powered, blocks it up. Therefore, we will create a regulator program that will constantly check to see if any object is close to the valve, if so, switch on the solenoid, wait for the object to separate, and then turn off the solenoid by design to stop the flow of water.

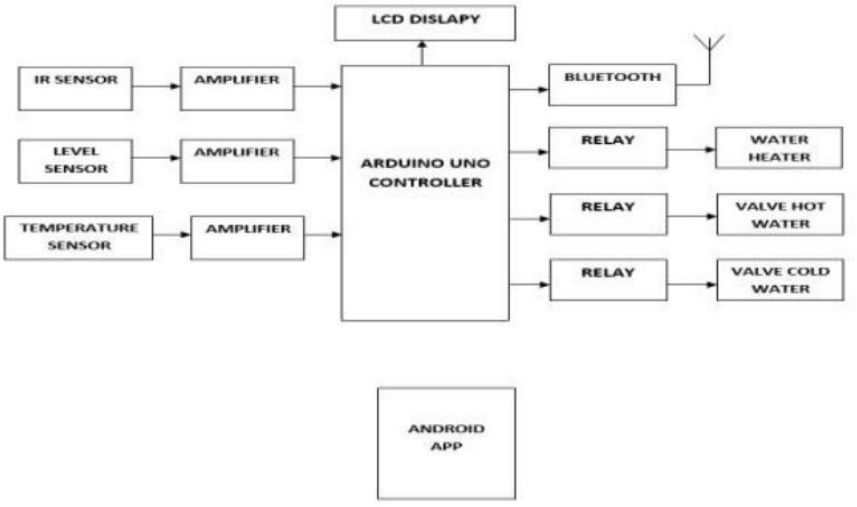

FIGURE1: Block Diagram

The 12V solenoid valve employed in this project has a constant current rating of 700mA and a maximum current rating of 1.2A. When the valve is switched on, it will use around 700mA to maintain its turned-on state. We need a switching driver circuit for the solenoid to turn on and off because, as we all know, an Arduino is a development board that runs on 5V. The IRF540N N-Channel MOSFET is the switching component utilised in this project. It has three pins, correspondingly labelled Gate, Source, and Drain from pin 1. The Vin pin of the Arduino powers the solenoid's positive terminal, as illustrated in the circuit diagram. Because the Arduino will be powered by a 12V adaptor, the Vin pin will produce 12V, which can be utilised to control the solenoid. Through the Source and Drain pins of the MOSFET, the negative terminal of the solenoid is linked to the ground. Therefore, only if the MOSFET is turned on, will the solenoid be powered. The MOSFET can be turned on or off via its gate pin. If the gate pin is grounded, it will stay off, but if a gate voltage is provided, it will switch on. The gate pin is pushed to ground by a 10k resistor to keep the MOSFET off when no voltage is given to it. The MOSFET is switched on or off using Arduino pin 12, therefore the D12 pin is wired up to the gate pin through a 1K resistor. This 1K resistor is employed to limit current flow. The Arduino's +5V and ground pins provide power to the ultrasonic sensor. Pins 8 and 9 are used to link the Echo and Trigger pins, respectively. Once an object is detected, we can programme the Arduino to switch on the MOSFET and measure distance using the Ultrasonic sensor. Since the entire circuit is straightforward, a breadboard may be used to construct it.

3. WORKING PRINCIPLE

In this research article, voice instructions are used to summon hot or cold water. We can issue commands using Bluetooth. We'll receive water as a result of it. IR sensors are positioned to detect the presence of glass. This system, which employs an Arduino Uno board and an I R sensor to store water and control the motor and pipes, is entirely voice-activated. In this project, the voice is picked up by the Bluetooth module, and the sensor transmits the appropriate data to the microcontroller so it can determine if the individual needs hot or cold water. The microprocessor analyses the data from the I R sensor to decide whether or not to place the glass below the pipe. In order to start the motor and force water through the pipes from a specific source (hot/cold), the system uses an I R sensor to detect the presence of water in the glass. If the glass is not in place, the sensor notifies the motor accordingly, delaying the start of the water flow through the pipe until the glass is in place. By simply using a voice command, this technology can be utilized to acquire hot or cold water at home or in an office. In this study, we created an Android application called "Home Control Automation" that performs user authentication through registration and login. After successfully logging in, the user can issue voice commands for operation, and after the specified electronic device has been turned ON or OFF, they can log out. Android app "Home Control" is a voice-to-text converter that translates spoken commands into text. Any supplied instruction is translated into text, processed by Arduino, and the necessary action is taken by the electronic devices. The user command "Lights On" is supplied to the app interface and Arduino receives the input. After completion of the task an acknowledgement is given back and displayed in the App interface in Snack bar . Overall, this project functions like a smart device. It will have voice control capabilities and a cooling chamber constructed of Peltier modules. It will include a smart capability where we can simply ask our Android phone for water (hot or cold) by speaking to it. An android phone can serve as a microphone, LEDs will serve as the output display while Arduino serves as the processor. Heat sinks will reduce power losses during operation, disperse heat from a particular semiconductor, and shield power electronics components from overheating and failure. Relay module: This 4-channel relay interface board enables you to manage a variety of equipment, including large-current appliances.

4. RESULTS AND DISCUSSION

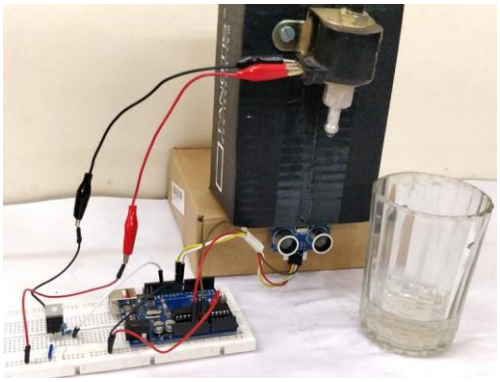

FIGURE 2: Three circumstances will be used for system testing.

(1) Testing the system's ability to maintain the water's temperature after 500 ml of water has flowed through the water flow sensor 1. (2) The stability of the remaining hot water's temperature inside the heating tube will be checked when the hot water that has been stabilised is reduced by 200 ml. In addition, (3) checks the system's capacity to replenish water in the heating tube once it runs out and continue heating the water until it reaches the desired temperature. Without a controller and with a PID controller, the hot water temperature is significantly different. With a PWM value of 237 that is supplied to a solid state relay, the hot water temperature obtained by managing PID tends to reach a stable point of 92°C. Without a PID controller, the temperature of hot water is unable to maintain the stability of the water's temperature. Instead, the temperature of hot water rises to a maximum of 95.62°C, which exceeds the setpoint value, before falling to 87.44°C. The 16x2 LCD will display the temperature sensor's measurement results.

5. CONCLUSION

The goal of making the project user-friendly and cost-effective is considered and accomplished. Different sensors are used to regulate the system, and a Bluetooth module is used to receive commands from the user's smart phone. The goal of making the project user-friendly and cost-effective is considered and accomplished. Different sensors are used to regulate the system, and a Bluetooth module is used to receive commands from the user's smart phone. The ARDUINO UNO, which has been programmed to control a hot and cold water dispenser valve based on sensor signals and on explicit user requests, is the system implementation's brain. The system has been configured to support Bluetooth connectivity. The project created is user-friendly, taking into account the target demographic of elderly and handicapped persons. It has been configured to operate a hot and cold water dispenser valve in response to signals from sensors and user-initiated commands. The system has been configured to support Wi-Fi connectivity. The project created is user-friendly, taking into account the goal to decrease COVID 19 viral dissemination.

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