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AUTOMATIC WATER DISPENSER USING ARDUINO

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Abstract— The development of an Automatic Water Dispenser using Arduino aims to create an efficient, hygienic, and automated system for water dispensing. This system is designed to cater to modernday needs where manual intervention is minimized, and water is dispensed in an intelligent, controlled manner. The water dispenser system is simple, cost-effective, and energy-efficient, making it suitable for use in homes, offices, and public spaces. The system works by employing an ultrasonic sensor to measure the distance between the dispenser nozzle and the container, ensuring that water is only dispensed when the container is correctly placed.

Keywords — Arduino Uno, Automatic Water Dispenser, Embedded Systems, Proximity Sensor, Solenoid Valve, Water Conservation, Contactless System, Automation, Microcontroller, Smart Water Management

I.INTRODUCTION

In today's world, automation plays a crucial role in enhancing efficiency, hygiene, and convenience across various applications. One such practical application is an automatic water dispenser, which provides a touch-free method to dispense water, thereby promoting hygiene and reducing water waste. This is especially important in public places, hospitals, offices, and homes where minimizing physical contact is essential for health and safety. This project focuses on the design and implementation of an automatic water dispenser using an Arduino microcontroller. The system utilizes an ultrasonic or infrared (IR) sensor to detect the presence of a hand or container near the dispenser outlet. Once detected, the Arduino processes the input signal and activates a water pump or solenoid valve to dispense water for a predefined duration or until the object is removed. The integration of Arduino in this system allows for easy customization, cost- effectiveness, and efficient control of components. It serves as an excellent example of how embedded systems can be used to create smart, responsive, and user-friendly devices. This project not only emphasizes practical skills in electronics and programming but also contributes toward building more sustainable and hygienic living environments. Traditional water dispensers require users to touch levers or buttons, which can contribute to the spread of germs and viruses, especially in high-traffic areas. With rising concerns about hygiene and the need to prevent disease transmission (as seen during the COVID-19 pandemic), touchless solutions have become essential. An automatic water dispenser addresses these issues by using sensors to detect the presence of a hand or container, thereby eliminating the need for direct contact.

II.LITERATURE SURVEY

[1] A Automatic water dispensers have gained significant attention in recent years due to their potential to improve hygiene and reduce water wastage. Research indicates that touchless dispensing systems greatly minimize the risk of pathogen transmission compared to traditional manual dispensers, with infrared (IR) and ultrasonic sensors being the primary technologies used for contactless detection. IR sensors are widely favored for their low cost and simplicity; however, their performance can be affected by ambient lighting conditions. Ultrasonic sensors, on the other hand, offer more reliable and consistent detection by measuring distance, making them suitable for varied environments. The integration of microcontroller platforms such as Arduino or Raspberry Pi has simplified the development of automated dispensers, allowing for efficient sensor management and precise control of actuators like solenoid valves. These valves are commonly used to regulate water flow due to their fast response time and reliability.

[2] M.A. Prabu et al. This paper presents a smart water dispenser system that utilizes an Arduino microcontroller to automate the dispensing of water.The system is designed to be user friendly and efficient, aiming to reduce water wastage and enhance convenience in

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various settings.The methodology involves integrating the Arduino microcontroller with sensors and actuators to create an automated system.The sensors detect the presence of a container and the water level, while the actuators control the water flow based on signals from the microcontroller.The user interface allows for easy interaction with the system, and the power supply ensures uninterrupted operation.This smart water dispenser system has practical applications in various settings, including offices, homes, and public places.By automating the dispensing process, the system reduces water wastage and enhances user convenience.Additionally, the use of sensors and actuators ensures accurate and efficient operation.

[3] Kristyawan Y., &Kholil, Z. F. This study addresses the need for touchless operation of water dispensers, particularly in light of hygiene concerns during the COVID-19 pandemic.The proposed system ECEDEPARTMENT/NNRGESI 7 AUTOMATIC WATER DISPENSER utilizes an APDS-9960 gesture sensor to detect hand movements, allowing users to select between hot and cold water without physical contact.A servo motor then activates the corresponding faucet, and an HC-SR04 ultrasonic sensor ensures the presence of a glass before dispensing water.The entire process is managed by an Arduino microcontroller.Hand movements are detected at a maximum distance of 15 cm, with a movement speed range of 2 to 3.7 seconds.The system can identify the presence of ceramic, clear glass, and plastic cups within a distance of 1 to 3 cm.Once a glass is detected, the system dispenses approximately 240 ml of water over 30 seconds.The Arduino microcontroller coordinates the sensors and actuators to ensure seamless operation.

[4] Gondesi Krishna Mohan This study presents a voice-activated water dispenser system utilizing a Raspberry Pi microcontroller.The system employs a voice sensor to detect user commands, determining whether hot or cold water is desired.An infrared (IR) sensor is used to detect the presence of a glass beneath the dispenser.Upon receiving a valid command and confirming the presence of a glass, the system activates the appropriate pump to dispense water from the corresponding jar.If no glass is detected, the system prevents water flow, ensuring safety and efficiency. Raspberry pi acts as the central processing unit, managing inputs and controlling outputs.Voice SensorCaptures user commands to determine the desired water temperature .IR SensorDetects the presence of a glass beneath the dispenser. Pump MotorsControl the flow of water from the hot or cold water jars.Relay ModuleSwitches the pump motors on or off based on the system's logic.LCD DisplayProvides real-time feedback to the user regarding system status.Buzzeralerts the user to system status changes or errors.

III.SYSTEM DESIGN

1) Input Unit

The input unit is responsible for detecting the presence of a user or container and initiating the water dispensing process. In the Automatic Water Dispenser Using Arduino, sensors such as an IR sensor, ultrasonic sensor, or proximity sensor are used as input devices. When a hand, bottle, or glass is placed near the sensor, it detects the object and sends a signal to the Arduino controller.

This contactless mechanism eliminates the need for manual switches, reducing water wastage and improving hygiene. Optionally, a push button or level sensor can be added to enable manual control or to detect the water level in the tank. A buzzer may also be included to provide audible feedback indicating the start or stop of water dispensing.

2) Processing Unit (Arduino Controller)

The Arduino Uno acts as the core processing unit of the automatic water dispenser system. It continuously monitors the signals received from the input sensors and processes them according to the programmed logic. When the sensor detects an object within a predefined range, the Arduino activates the output device to dispense water.

The Arduino is programmed using the Arduino IDE, where control logic is written to manage sensor input, control the pump or solenoid valve, and ensure accurate dispensing. Timing delays and safety conditions are implemented to prevent continuous flow or overflow. The controller ensures efficient operation, minimal power consumption, and reliable automation of the water dispensing process.

3) Output Unit

The output unit controls the actual dispensing of water and displays system status information. A relay module or motor driver is used to control a water pump or solenoid valve, allowing water to flow only when required. When the Arduino receives a valid signal from the input sensor, it activates the relay, which turns ON the pump or valve, dispensing water automatically.

A 16×2 LCD display is used to show system messages such as “Place Glass,” “Dispensing Water,” and “Water Dispensing Stopped.” This provides clear visual feedback to the user. Optionally, the system can store usage data or transmit it to a computer or IoT platform for monitoring and analysis.

4) Power Supply Unit

The entire system operates on a 5V DC power supply, which can be provided through a USB connection or an external adapter. A regulated power supply module ensures stable voltage for the Arduino and connected components such as sensors, LCD, and relay module.

If higher power devices like a water pump or solenoid valve are used, an external 12V DC power source may be required. Proper voltage regulation and isolation ensure safe and consistent operation of the system without damaging sensitive electronic components.

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IV.IMPLEMENTATION

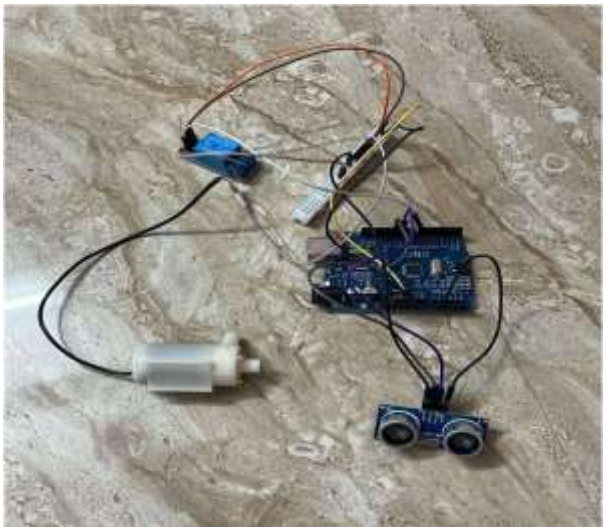

Fig. 1. Experimental Setup

The image shows the hardware prototype of an Automatic Water Dispenser using Arduino. It consists of an Arduino Uno as the main controller, an ultrasonic sensor (HC-SR04) used to detect the presence of a hand or container, and a mini DC water pump for dispensing water. A relay module is connected between the Arduino and the pump to safely control the high-current load. The components are interconnected using jumper wires and a breadboard for power distribution and signal routing. When an object is detected by the ultrasonic sensor, the Arduino activates the relay, turning ON the pump and allowing water to flow automatically. FLOW CHAT

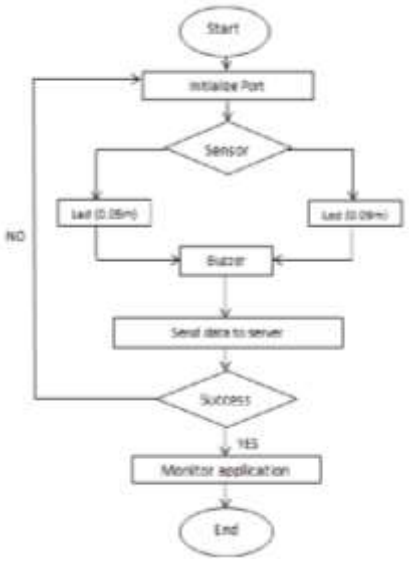

Fig.2.Flow Chart

The flowchart begins with powering ON the system and initializing the Arduino along with all connected components such as the ultrasonic sensor, relay module, and water pump. The Arduino continuously monitors the sensor to detect the presence of a hand or container. If no object is detected, the system remains in an idle state. When an object is detected within the predefined distance, the Arduino activates the relay, which turns ON the water pump. Water is dispensed as long as the object remains in front of the sensor. Once the object is removed, the pump is turned OFF and the system returns to the monitoring state.

V. EXPERIMENTAL RESULT

The automatic water dispenser system was successfully designed and implemented using an ultrasonic sensor, Arduino microcontroller, and a relay-controlled water pump. The system accurately detected the presence of a hand or container within a range of 10 cm and activated the water pump accordingly. When the object was removed or out of range, the pump turned off automatically, ensuring contactless operation and minimizing water wastage. The serial monitor displayed real-time distance measurements and status updates, confirming correct sensor functionality and control logic. The prototype operated reliably under test conditions, achieving the intended goal of a hygienic, touch-free water dispensing system.

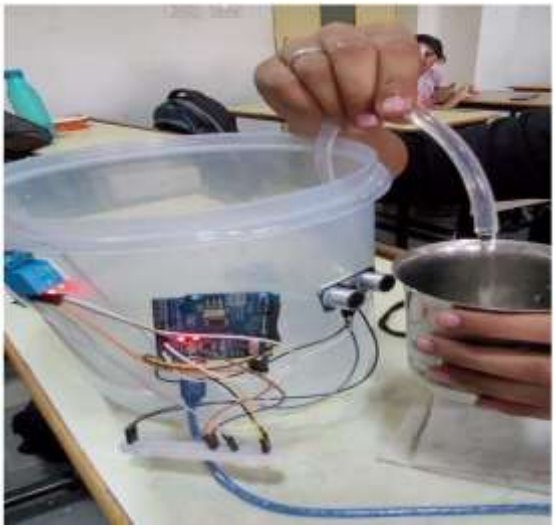

Fig 3.Results

VI. CONCLUSION

The automatic water dispenser project was successfully designed and implemented using an ultrasonic sensor, microcontroller, and relay-controlled pump. The system effectively achieved its goal of providing a contactless, hygienic solution for water dispensing. By detecting the presence of a hand within a specified distance, the dispenser ensures minimal human contact, reduces the risk of contamination, and conserves water by operating only when needed. The project demonstrated the practical use of basic electronic components and embedded programming to solve real-world problems. With further enhancements such as IoT integration, smart flow monitoring, and renewable power sources, this system can be scaled and adapted for use in homes, offices, schools, hospitals, and public places. The development of the automatic water dispenser project successfully demonstrated how sensor-based automation can improve hygiene and water conservation in everyday applications. By utilizing an ultrasonic sensor, Arduino microcontroller, and relay circuit, the system was able to detect the presence of a hand or container and automatically control the water pump accordingly. This touchless approach significantly reduces the chances of bacterial transmission, making it especially valuable in public areas,

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hospitals, and schools. The system operated efficiently in testing conditions, with accurate object detection and quick response time. The use of cost-effective and easily available components makes the project affordable and accessible for wider implementation. Moreover, it offers an environmentally friendly solution by reducing unnecessary water wastage through controlled dispensing.

REFERENCES

[1] M. Banzi and M. Shiloh, *Getting Started with Arduino*, 3rd ed., Maker Media, USA, 2014.

[2] Arduino Official Website, "Arduino Uno – Technical Specifications,"

[3] S. Monk, *Programming Arduino: Getting Started with Sketches*, McGraw-Hill Education, 2016.

[4] HC-SR04 Ultrasonic Sensor Datasheet, "Ultrasonic Distance Measuring Module," Available online.

[5] Todupunuri, A. (2024). Explore How AI Can Be Used To Create Dynamic And Adaptive Fraud & Rules That Improve The Detection And Prevention Of Fraudulent & Activities In Digital Banking. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.5014699

[6] A. Kumar and R. Singh, "Design and Implementation of Automatic Water Control System Using Arduino," *International Journal of Engineering Research & Technology (IJERT)*, vol. 8, no. 4, 2019.

[7] Nandigama, N. C. (2018). Advanced Deep Learning Architecture for Multimodal Biometric Authentication Using Feature-Level Fusion and Dimensionality Reduction. Research Journal of Nanoscience and Engineering, 2(3), 34–38. https://doi.org/10.22259/2637-5591.0203005

[8] R. Patel et al., "Smart Water Management System Using IoT and Arduino," *International Journal of Advanced Research in Computer Engineering & Technology (IJARCET)*, vol. 7, no. 6, 2018.

[9] Relay Module Datasheet, "5V Single Channel Relay Module for Arduino," Available online.

[10] Nandigama, N. C. (2018). Deep Vision Networks for Multimodal Biometric Authentication: A Hybrid Feature-Level Fusion Approach with Machine Learning Optimization. Research Journal of Nanoscience and Engineering, 2(4), 22–29. https://doi.org/10.22259/2637-5591.0204005

[11] D. Ibrahim, *Microcontroller Based Applied Digital Control*, John Wiley & Sons, 2006.

[12] N. Gupta and S. Verma, "Automatic Water Dispensing System for Public Places," *International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET)*, vol. 6, no. 2, 2020.

[13] A. Rajesh and P. Kannan, "Sensor-Based Automatic Water Dispenser Using Embedded Systems," *International Journal of Computer Applications*, vol. 175, no. 22, 2020.