Research Paper on Voice Based Hot and Cold- ater Dispenser using Rasberry Pi 3B+

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Abstract: In today's world Voice technology is one of the widely used technology today. The operation of voice recognition is done through giving commands to control devices that are integrated with the user as tool to facilitates human activities and replace the human work. In the use of dispensers it is necessary to choose hot and cold water and draw the tap directly on the dispenser, while in this pandemic time like today, we have limitation to reduce the direct touch with the material object used together and this projects will help for the needful people. The use of dispenser also as drawbacks as the amount of water released as it cannot pass in the definite amount and the researches are going through this fields. In this way the voice recognition module is used as one method to reduce the direct touch with the dispenser and uses voice commands given by the user and water flow sensor is used to calculate the amount of water come out of the water tap using the dispenser. The system uses the IR sensor to detect the presence of water glass and sends the signal through the main board and then based on this motor starts to rotate and water flows through the pipe from the jar.

I. INTRODUCTION

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives easy. Have you ever wondered about home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using a remote control? Off-course, Yes! But, are the available options cost-effective? If the answer is No, we have found a solution to it. We have come up with a new system called voice based automation using Bluetooth. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project gives the commands to smart phone to control the hot and cold water dispenser using Raspberry pi. Time is a very precious. We all want to save time as much as possible. New technologies are emerging to save our time. To save time and upgrade new technology, Bluetooth module is used to dispense hot and cold water using voice commands.

The system is based on voice commands sends from mobile Bluetooth to Raspberry Pi. This water dispenser system also uses IR sensor, solenoid valve jars for storing water, pipes and water heater. In this project the voice is detected by the smartphone, and then the smartphone sends the respective information to the Raspberry Pi via Bluetooth, to understand whether the water required by the person should be hot or cold. The Raspberry Pi gives the information to the IR sensor to detect whether the glass is placed below the pipe or not. The system uses IR sensors to detect the presence of water glass and then the IR sensor sends the signal to the Raspberry Pi about the presence of the glass, accordingly the motor starts and the water flows though the pipes from the particular jar (hot/cold). If the glass is not placed, the sensor sends respective signal to the motor, which does not because the water to flow through the pipe until the glass is placed. This system can be used at

home, offices etc. to get hot or cold water by just giving voice command.

II. LITERATURE SURVEY

[1]. V. Jyothi;K. Hanuja;Peta Shirisha;R. Avinash;P. Akhil – "Implementation of Voice Based Hot-Cold Water Dispenser System Using Raspberry Pi 3" -This system is completely supported voice-based, and it employs a Raspberry Pi circuit. It also has an IR sensor, a voice app, a Bluetooth module, jars for holding water, pipes, and a motor. During this project, the voice app detects the person's speech and transmits the appropriate information to the Raspberry Pi 3, which determines whether the water requested by the person should be hot or cold.

[2]. Muhammad Azlan Alim;Samsul Setumin;Anis Diyana Rosli;Adi Izhar Che Ani – "Development of a Voice-controlled Intelligent Wheelchair System using Raspberry Pi" - a voice recognition-based intelligent wheelchair system for physically disabled people who unable to control the wheelchair by their upper and lower limbs. This development employs voice command to controls the movement of the wheelchair in different directions. The android device is used as microphone to be connected to the Google Assistant prior to data processing by the Raspberry Pi. The Raspberry Pi will then command the servo motors to act accordingly. This system offers automatic obstacle detection via the use of an infrared sensor which aids the user to apply momentary brake button upon the obstacle detection.

[3]. Pooja Singh;Pinki Nayak;Arpita Datta;Depanshu Sani;Garima Raghav;Rahul Tejpal – "Voice Control Device using Raspberry Pi" - a device based on implementation of a voice command system as an intelligent personal assistant. The services provided by the device depends on the input given in the form of voice command by the user and ability to access information from a variety of online sources such as weather, telling time or accessing online applications to listen to music. This Voice driven device uses Raspberry Pi as its main hardware. Speech to text engine is used to convert the voice command to simple text. Query processing is then applied using natural language processing (NLP) onto this text to interpret the intended meaning of the command given by the user. After interpreting the intended meaning, text to speech conversion is used to give appropriate output in the form of speech.

[4]. Ratna Aisuwarya;Yulita Hidayati – "Implementation of Ziegler-Nichols PID Tuning Method on Stabilizing Temperature of Hot-water Dispenser" - The low-cost dispenser has disadvantages such as unable to maintain the water temperature to remain stable. To brew hot drinks such as coffee and tea require a specific range of temperature of 90 - 96 °C. Several previous studies regarding automatic dispensers have discussed the existing problems; only there are still some drawbacks when controlling the temperature stability in the dispenser. Further development is needed to overcome these shortcomings. For that purpose, we proposed a dispenser that can maintain the stability of hot water temperature. This dispenser will make it easier for users to brew coffee and tea with the ideal water temperature and produce a stable temperature that produces a good quality drink. The designed system uses water-resistant temperature sensor. Voltage control

is applied to the heating element using the Ziegler-Nichols PID Tuning Method in order to control the temperature stability. Experimental results show that the system can maintain the temperature of hot water in the dispenser to keep it stable with a range from 92.31 °C to 92.62 °C, while the system without controller unable to maintain the stability of hot water temperature because the hot water temperature reaches a maximum temperature of 95.62 °Cexceeding the set point of 92 °C.

[5]. Wen-Zhi Cheng;Ray-Guang Cheng; Shuo-Yan Chou "Power-saving for IoT-enabled Water Dispenser System" - This paper presents the design and implementation of an IoT-enabled water dispenser system. We use the communication module of the commercial water dispenser and our own gateway to collect the temperatures of the hot, warm, and cold water tanks, users' usage of the three water tanks. We use a commercial clamp meter to estimate the power consumption of the water dispenser. Based on the collected data, we can learn the operation of the water dispenser and the users' behavior. We further demonstrate our preliminary results to use the proposed system to adjust configurable parameters to optimize the power consumption of the water dispenser.

[6]. Ali Nur Fathoni;Noor Hudallah;Riana Defi Mahadji Putri;Khusnul Khotimah;Tri Rijanto;Miftahul Ma'arif - "Design Automatic Dispenser for Blind People based on Arduino Mega using DS18B20 Temperature Sensor" - People with visual disabilities, who have limited vision, will experience many obstacles in carrying out activities and social interaction. Equipment, in general, is not still user friendly for blind people. The purpose of this study was to create an automatic dispenser design that provides convenience and safety for visually impaired people when taking hot water to the dispenser. This study uses Arduino Mega microcontroller as the main control, proximity sensor to detect the presence of glass, and the HC-SR04 ultrasonic sensor as a determinant of high water levels and an SD Card Module to play sound. This research uses the Research and Development (RnD) method. The results of this study are an automatic dispenser that can fill glasses automatically with a glass height of 8 cm, 10 cm, and 12 cm. This dispenser can automatically tell blind people when the glass is full and turn off the tap when the water reaches 1-2 cm from the surface of the glass so that the water in the glass does not spill. Based on the test results, this automatic dispenser can detect glass of any color and make it from melamine, plastic ceramic, iron. However, this automatic dispenser cannot detect glass made of glass and transparent colored glass. When going to use hot water, blind people can choose a temperature with a setpoint of 50°C, 70°C, 80°C. The results of testing the tool using hot water show that the temperature of the water in the glass has a difference of 1°C - 3° C with a setpoint.

[7]. Nilabh Niran;Dhrubajyoti Das;Dipak Das;Subhabrata Banerjee - "Design of Food, Medicine & Water Dispensing Automation Device" - Human beings do not have control over nature. The casualties in natural calamities due to poor governance and non-availability of essential products like food, medicine and safe drinking water is the biggest loss and it has been a very challenging task for many countries. In this paper, an intelligent system has been proposed which would not only save

affected people from hunger but also saves them from thirst and infectious diseases. Moreover, the system has been designed in such a way that people could get the full benefit by applying certain constraints and conditions. The system is also able to provide drinkable water to the people in need by taking dirty water as the input through a natural filtration system. The dispensers have been designed to ensure hassle-free distribution of essentials.

III. OBJECTIVES

- The objective of the project is it uses Raspberry Pi to control the voice commands given by the user in the smartphone.
- The system uses IR sensor, Temperature sensor and motor for water dispenser.
- Raspberry Pi detects the voice commands sent through microphone by the user to understand whether the person require hot/cold water.
- Water temperature and water dispensing quantity can be set through voice commands.
- Total water consumption data is uploaded to IoT cloud to get the required recordings and analysing in the future.

IV. PROJECT OUTCOME

After completion of this project, we will be able to-

- Raspberry Pi 3B+ board uses the voice recognition given by the user through Bluetooth module which gets the hot andcold water.
- It is secured to use voice rather than any other mode, Because the voice is stored and processed in the database and it is safer for user also.
- The project helps in connecting IoT with daily home appliances: The Voice based hot/cold water dispenser using Raspberry pi is an Internet connected device where it uses the internet for voice controlled by the user and processing, and it's safe also.
- It helps the disabled people in order to use hot / cold water: This project also helps special people who is disabled i.e., A person can walk but his hands cannot be able to move or hands is disabled/Lost his/her hands during any accidents etc.
- The disabled people can make use of this who does not have hands and can just speak through the microphone through voice commands.
- This will be useful during current pandemic situation, where any surfaces often touched, then that surface is contaminated and the risk of getting infections is very high in particular times. This project /model can be used inthe hospitals, offices, schools, colleges, or in parks etc. This reduces part of spreading infections

V. PROPOSED SYSTEM

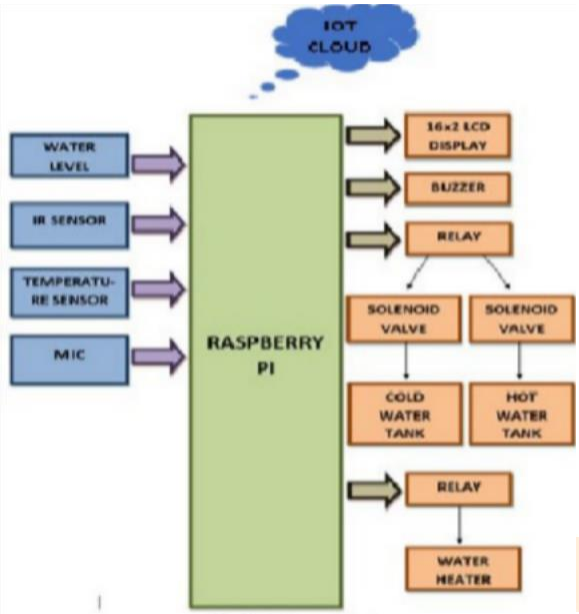


Fig: Block diagram of system

- The main aim of this project is to make this project fully voice operated as well as the other new side features i.e., temperature control of hot water is controlled through the voice of the user, quantity of water dispensed as per user needs which is also controlled via voice of the user.
- This project gives more understanding for the user in order to utilize it fully voice controlled which enables user to use the special side features as well.
- The voice based hot/cold water dispenser based on Raspberry pi contains a water level sensor, IR sensor, temperature sensor, microphone,16x2 LCD display, buzzer, solenoid valves,2 water tanks (1 for hot water and another for cold water), water heater, relays.
- The main backbone of the model is Raspberry pi 3 model B+ is the latest product in the Raspberry Pi 3 range, boasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4 GHz and 5 GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE capability via a separate PoE HAT.
- Raspberry pi 3B+ uses the SDHC slot or USB storage device for booting up and storing files.
- Python is used as the programming language to interface with the Raspberry Pi.
- The microphone is connected to the Raspberry pi 3 model B+ in order to take voice commands from the user which is processed in the Raspberry pi board and 16x2 LCD display is used to display the temperature of hot water only.
- The solenoid valve is connected to the relay which is connected to the Raspberry pi pin which in turn relay ON/OFF when the voice commands has been processed by the Raspberry pi when user provides voice commands. The solenoid valves are connected to hot and cold-water tanks when the raspberry pi sends the signals to the solenoid valve of any tank (depends on the user commands weather he/she needs hot/cold-water) via relays connected to the Raspberry pi dispenses the water particular quantity (depends on user applications).
- The Ultrasonic sensor is connected to the Pi board at the place where cup/jar/bottle is placed to know that there is a cup/jar/bottle at the dispenser pipe where hot/cold-water is dispensed which is used to identify weather the cup/jar/bottle is placed or not for proper water dispensing into the cup/jar/bottle, which also notifies the user via buzzer beeps when the cup/jar/bottle is not placed properly in the water dispensercounter.
- Buzzer in the system beeps in order inform the user that the water is fully

dispensed. The temperature sensor is used to measure the temperature of thehot which is connected to Raspberry piand the water heater via relay in the hot water tank. When the user the water heater through relay to turn-off the heater.

- The data about water consumption is uploaded to IoT cloud to get therecording and for future analyzation.

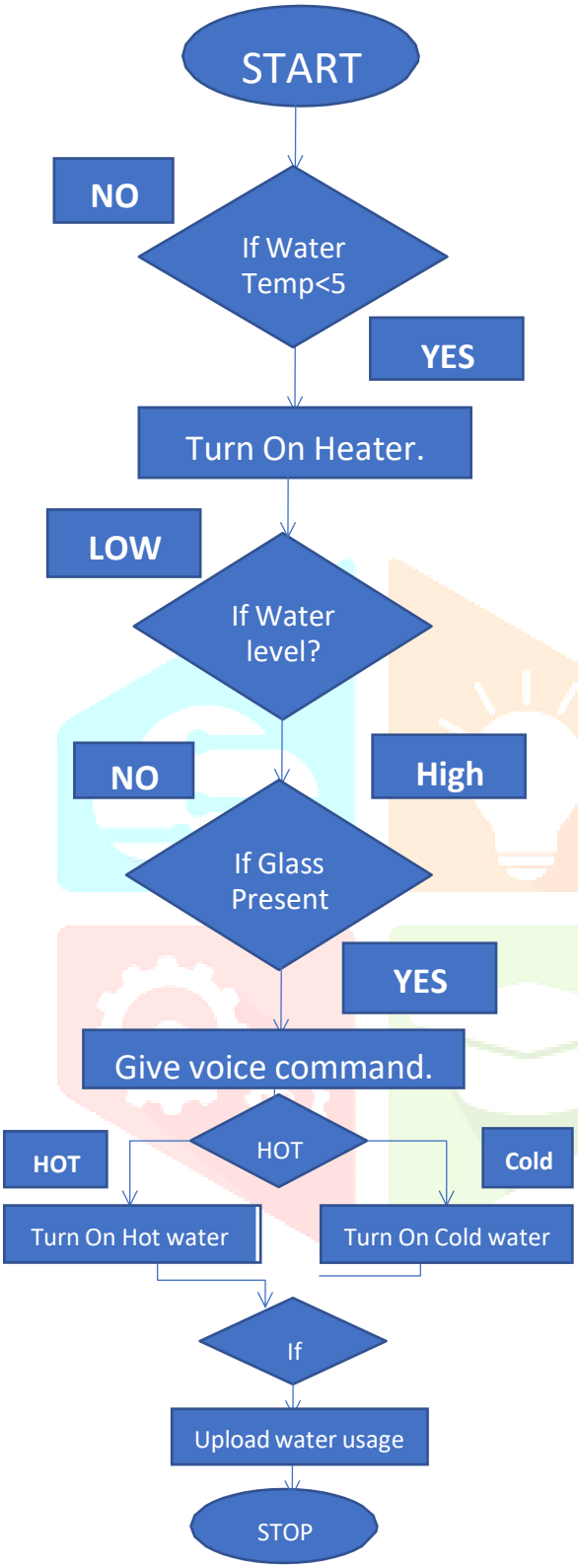
VI. METHODOLOGY

- The Raspberry Pi processes the signal given by Bluetooth module through voice recognition helps the system to dispense hot and cold water.
- In certain case, when the user communicates through BT module and gives the instruction “Dispense Hot water", then the Raspberry Pi processes the voice signals via microphone and sends the signal for the relays to switch on the water heater and same when the user says “Dispense Cold water, then the Pi board sends the signal to the solenoid motors to turn ON to dispense cold water from cold water tank.
- Python IDLE software is used for programming the Raspbery Pi.
- Water level sensor will measure the quantity of the hot and cold water as well in the Jar/glass/bucket (which depends on the applications). It gives the signals to the Raspberry Pi in order to turn off the solenoid valve motor.

Ultrasonic sensor is used to measure the water quantity and through voice command the quantity of water dispensed it is controlled.

- set the particular temperature via Voice, theRaspberry
- The data will be uploaded to IoT cloud to get the required recording and for future analyzing of the project..

VII. FLOW CHART



Raspberry Pi 3B+. Water level sensor. Ultrasonic Sensor.IR Sensor. Temperature Sensor.Microphone(1m). 16x2 LCD Display I2C.Solenoid Valve. Relay. Buzzer. Water Heater.

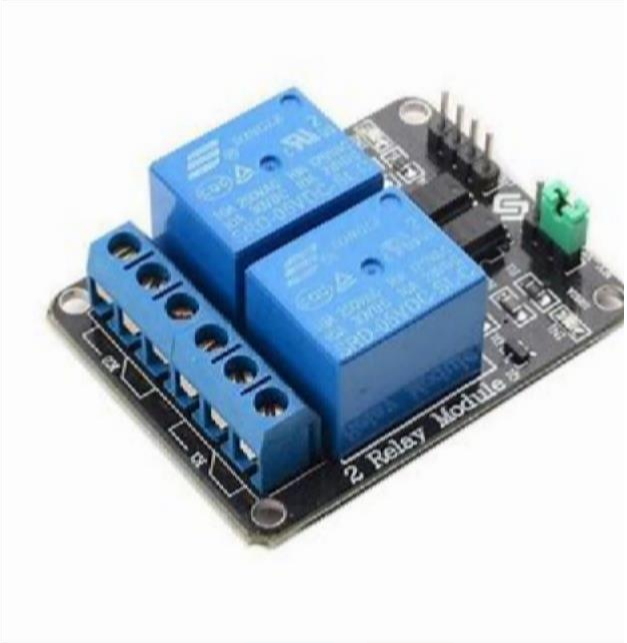
- **Software Requirements:**

Python IDLE.

Python Programming. ThingSpeak IOT Cloud.

- **Hardware Requirements:**

Fig(a): RASBERRY PI 3B+

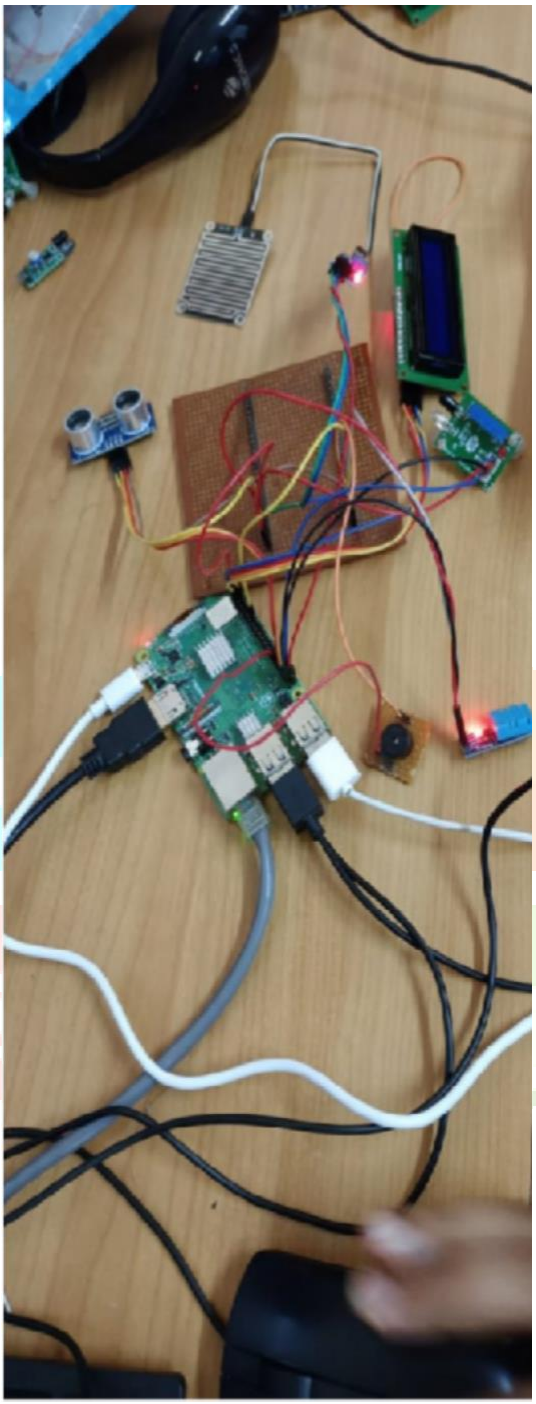


Fig(b): RELAY MODULE

Fig(c): BUZZER

Fig(d): MICROPHONE

- **RESULT:**



VIII. CONCLUSION

- By implementing this project the overallresult will be successful.
- The motive of making the project cost efficient and user friendly is taken into account and achieved. The proposed system is created with the use of different sensors, Raspberry Pi as controller and microphone to get command from user.
- With the help of the Raspberry Pi, the voice recognition mode can be controlled and is sent to the sensor.
- The system has been programmed to have communication capability. Taking into consideration the target audience of elderly and handicapped people, the project developed is user friendly.

By uploading the water consumption data toIOT cloud we can record and analyze data every regular interval

IX. REFERENCES

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