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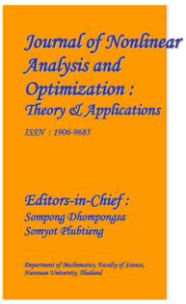

CREATING A VOICE-CONTROLLED HOT/COLD WATER DISPENSER SYSTEM WITH RASPBERRY PI

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Abstract:
This system is fully based on voice sensor, which uses Raspberry Pi circuit, this water dispenser system also uses IR sensor, voice sensor, mic, jars for storing water, pipes and motor. In this project the voice is detected by the voice sensor, then the sensor sends the respective information to the microcontroller, to understand whether the water required by the person should be hot or cold. The microcontroller processes the information to the IR sensor to determine where 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 microcontroller 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 cause 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**.**

I. INTRODUCTION

1.1 INTRODUCTION:

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives really 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 helps the user to control hot cold-water dispenser using his/her voice command to smartphone. Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing hot cold water dispenser system using Raspberry pi.

This system includes series of many functions like cooling and heating process, voice-based controlling, maintaining temperature and controlling flow of water and also displaying temperature.

This system is fully based on voice commands sends from mobile Bluetooth to controller. 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 microcontroller via Bluetooth, to understand whether the water required by the person should be hot or cold. The microcontroller processes the information to the IR sensor to determine where 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 microcontroller 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 Thing

II. EXPLANATION OF EACH BLOCK:

2.2.1 RASPBERRY PI 3A+:

The Raspberry Pi 3A+ is a compact and powerful single-board computer that is part of the Raspberry Pi family of devices. It was first released in November

2018 and is an improved version of the earlier Raspberry Pi 3 Model A. The Raspberry Pi 3A+ features a 1.4 GHz 64-bit quad-core ARM Cortex-A53 CPU, 512MB of RAM, and a single USB 2.0 port. It also has built-in wireless connectivity, including both 2.4GHz and 5GHz Wi-Fi and Bluetooth 4.2/BLE, making it easy to connect to the internet or other devices.

One of the key features of the Raspberry Pi 3A+ is its compact size. Measuring just 65mm x 56mm, it is considerably smaller than the standard Raspberry Pi 3 Model B+, making it an ideal choice for projects where space is limited. It also **has a smaller power** footprint, making it ideal for battery-powered projects.

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FIG 1 RASPBERRY PI 3A+

2.2.2 IR SENSOR MODULE:

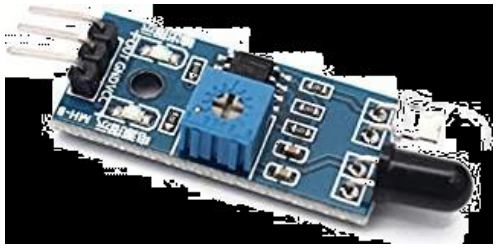

FIG 2. IR SENSOR MODULE

Infrared Obstacle Avoidance IR Sensor Module (Active Low) has a pair of infrared transmitting and receiving tubes. When the transmitted light waves are reflected back, the reflected IR waves will be received by the receiver tube. The onboard comparator circuitry does the processing and the green indicator LED comes to life. To know sensor working

The module features a 3 wire interface with VCC, GND, and an OUTPUT pin on its tail. It works fine with 3.3 to 5V levels. Upon hindrance/reflectance, the output pin gives out a digital signal (a low-level signal). The onboard present helps to fine-tune the range of operation, the effective distance range is 2cm to 80cm. The IR Sensor Module or infrared (IR) sensor is a basic and most popular sensor in electronics. It is used in wireless technology like remote controlling functions and detection of surrounding objects/ obstacles. IR sensors mainly consist of an Infrared(IR) LED and a Photodiode, this pair is generally called IR pair. An IR LED is a special purpose LED, it is can emitting infrared rays ranging from 700 nm to 1 mm wavelength. These types of rays are invisible to our eyes. In contrast, a photodiode or IR Receiver LED detects the infrared rays.

An IR LED is a specially designed light-emitting diode (LED), it's emitting infrared rays. Infrared rays wavelength ranging is from 700 nm to 1 mm. Normally an IR LED looks like a normal LED. It has two Terminals, the longer one is Positive and the smaller one is negative. When IR LED operated at a power supply, it starts emitting infrared rays.

2.2.3 USB MIC:

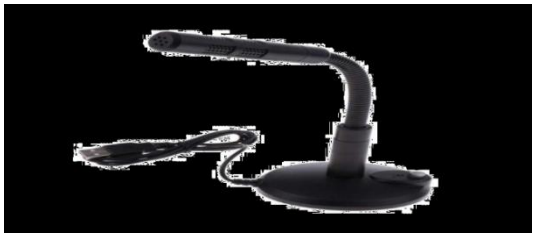

FIG 3:USB Mic

A microphone, colloquially called mic or mike (mark),[1] is a transducer that converts sound into an electrical signal. Microphones are used in many applications such as telephones, hearing aids, public address systems for concert halls and public events, motion picture production, live and recorded audio engineering, sound recording, two-way radios, megaphones, and radio and television broadcasting. They are also used in computers for recording voice, speech recognition, VoIP, and for other purposes such as ultrasonic sensors or knock sensors.

Several types of microphone are used today, which employ different methods to convert the air pressure variations of a sound wave to an electrical signal. The most common are the dynamic microphone, which uses a coil of wire suspended in a magnetic field; the condenser microphone, which uses the vibrating diaphragm as a capacitor plate; and the contact microphone, which uses a crystal of piezoelectric material. Microphones typically need to be connected to a preamplifier before the signal can be recorded or reproduced.

2.2.4 RELAY:

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.The traditional form of a relay uses an electromagnet to close or open the contacts, but relays using other operating principles have also been invented, such as in solid-state relays which use semiconductor properties for control without relying on moving parts. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called protective relays.Latching relays require only a single pulse of control power to operate the switch persistently. Another pulse applied to a second set of control terminals, or a pulse with opposite polarity, resets the switch, while repeated pulses of the same kind have no effects. Magnetic latching relays are useful in applications when interrupted power should not affect the circuits that the relay is controlling.

When an electric current is passed through the coil it generates a magnetic field that activates the armature, and the consequent movement of the movable contact(s) either makes or breaks (depending upon construction) a connection with a fixed contact. If the set of contacts was closed when the relay was de-energized, then the movement opens the contacts and breaks the connection, and vice versa if the contacts were open. When the current to the coil is switched off, the armature is returned by a force, approximately half as strong as the magnetic force, to its relaxed position. Usually this force is provided by a spring, but gravity is also used commonly in industrial motor starters.

III. WORKING OF THE PROJECT

3.1 WORKING:

To create a voice-controlled hot and cold water system using Raspberry Pi, you will need a few components and perform the following steps:

Components:

1. Raspberry Pi (preferably Raspberry Pi 3 or higher)
2. Relay module
3. Temperature sensors (DS18B20 or similar)
4. Microphone module
5. Speaker or audio output device
6. Hot and cold water valves

- Install the Raspbian operating system on your Raspberry Pi.
- Connect the necessary peripherals such as a keyboard, mouse, and monitor.
- Make sure your Raspberry Pi is connected to the internet. Step2. Set up the relay module:
- Connect the relay module to the Raspberry Pi GPIO pins.

- Connect the relay module to the hot and cold water valves.
- Make sure the relay module is properly powered.
- Connect the microphone module to the Raspberry Pi. Step4. Develop the control logic:
- Write a Python script that reads the temperature data from the sensors.
- Define temperature thresholds for hot and cold water.
- Implement logic to open/close the hot and cold water valves based on the voice commands and the current temperature readings.
- Use the relay module to control the valves.

Step5. Output audio feedback:

- Use a text-to-speech library like pyttsx3 or Google Text-to-Speech to convert output messages into speech.
- Connect a speaker or audio output device to the Raspberry Pi.
- Play the generated speech using the audio output device.

Step6. Test and refine:

- Run your code and test the system by giving voice commands for hot and cold water.
- Monitor the temperature readings and observe if the valves open/close correctly based on the commands and temperature thresholds.
- Make adjustments to the code and logic as needed to improve the system's performance.

It's worth noting that this project involves handling water and electricity, so proper precautions should be taken to ensure safety. Additionally, it's essential to consider any legal and plumbing requirements

specific to your location when working on such a system

3.2 CIRCUIT DIAGRAM OF THE PROJECT

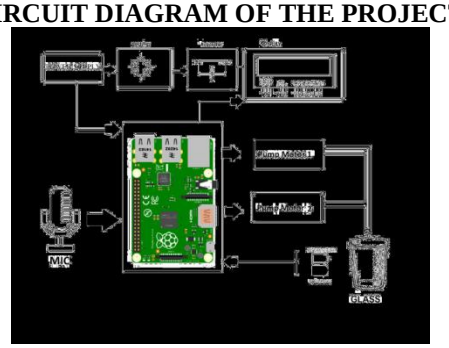

FIG 4 CIRCUIT DIAGRAM OF THE PROJECT

3.3 RESULT:

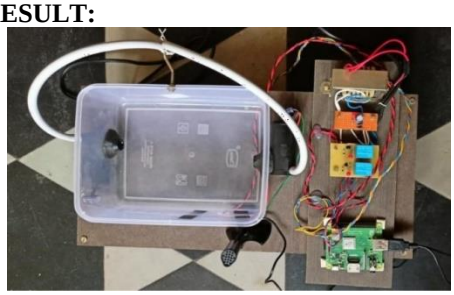

FIG 5 WITHOUT POWER SUPPL

FIG 3.3 WITH POWER SUPPLYFIG

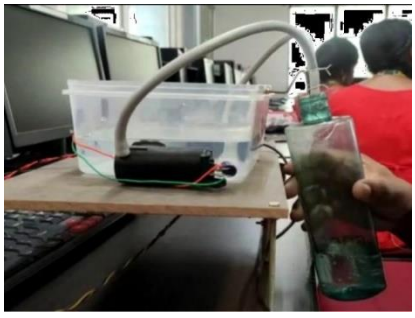

FIG 6 OUTPUT OF THE PROJECT

The main purpose of the project is first we have to set up connections to the desktop to our project with same wiffi connections and after then IP address will display on desktop at VNC viewer App. That IP address we will enter on our laptop at VNC viewer with username and password then it will be open. After we will open file ,in that file there is thonny app .in that we should run code after running code it will ask say something then we have to say bond after that it will display i got it after that it will ask again say something then we have to say hot or cold water then it will display i got it ,if u say hot water we will get hot water from water pump motor1 and if u say otherwise cold water and we will get cold water from water pump2 .first we have to fill plastic tub with one side cold water and other side hot water .Hence this output of the project

IV. ADVANTAGES ,DISADVANTAGES AND APPLICATIONS OF THE PROJECT

4.1 ADVANTAGES

- They require no plumbing.
- Size- they make for easy storing and are usually portable.
- With so many different types of water dispensers on the market, you can choose one that suits your needs and budget.
- There is minimal installation. Almost everything is done for you by the company.
- Cleanup is very simple. The only thing you really have to do is replace the parts when needed.

- How to use the water dispenser is fairly easy. The instruction manual does not require an expert to interpret.

4.2 DISADVANTAGES

- Although perceived as safe, try to keep it away from dust. They can easily become a breeding ground for diseases.
- Cost. The water dispenser itself does not cost much, but it requires a new filter after so many uses. This extra expense increases especially during the summer and can add up.
- Check the quality of the plastic before you make the purchase. If it is made of harmful cheap plastic material, the purpose of drinking chemical free water is pointless. Read our article on: BPA Free Water Bottles
- If you refill old water bottles, you might be causing more harm than good. Most water bottles are meant to only be used once.

The ideal and best solution to drinking water from a good source is investing in a whole house water filtration system. Most filtration systems eliminate 90% of harmful chemicals. Also, knowing where your water is coming from is rather reassuring. The long term effects on your health alone are worth the investment

4.3 APPLICATIONS:

- Water dispensers, called water coolers, are devices that dispense cold, warm or normal room-temperature water. Everyone knows the importance of drinking enough water daily to stay hydrated and healthy
- This approach is frequently utilized in reception, offices, homes, and other places where people want hot or cold water by just voicing a command.

If the glass is not placed, the sensor sends a signal to the motor, which prevents water from flowing through the pipe until the glass is placed.

V. CONCLUSION&FUTURE SCOPE

5.1 CONCLUSION:

The system implementation is based on the raspberry pi, which has been programmed to control a hot and cold water dispenser valve based on sensor signals and on direct commands by the user. The system has been programmed to have voice based capability.

By implementing this project the overall result 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 to IOT cloud we can record and analyze data every regular interval

5.2 FUTURE SCOPE:

- The whole product can be redesigned for it to be aesthetically pleasing and for its better usability.
- Can be used for other liquid refreshment.
- This system can also be converted into IOT based.
- In future we can add PH sensor and conductivity sensor in the given model for detecting the PH level and conductivity of water supply.

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- International Journal on Emerging Technologies (Special Issue NCETST-2017) 8(1): 88-91(2017) (Published by Research Trend, Website: www.researchtrend. ISSN No. (Print): 0975-8364 ISSN No. (Online): 2249-3255 Study of Automatic Water Dispenser Abhishek Srivastava1, Shubham Dwivedi1, Saurabh Bhardwaj1 and Mr. Hem Chandra Joshi2 1Amrapali Institute of Technology and Sciences, Haldwani, Nainital, U.K., India. 2Assistant Professor, Amrapali Institute of Technology and Sciences, Haldwani, Nainital, U.K., India.
- International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 04 — Apr-2018 www.irjet.net p-ISSN: 2395-007 c 2018, IRJET — Impact Factor value: 6.171 — ISO 9001:2008 Certified Journal — Page 1154 Voice Based Home Automation System Using Raspberry Pi Student of Graduation, Department of Computer Engineering, G.V. Acharya Institute of Engineering and Technology, Mumbai University, Mumbai, 400098, Maharashtra, India. 5Head of Department, Department of Computer Engineering, G.V. Acharya Institute of Engineering and Technology, Mumbai University, Mumbai, 400098, Maharashtra, India.
- Design and Development of Adaptable Hot and Cold-Water Dispenser with Inbuilt Inverter for Rural Communities in Nigeria Stanley Okiy1, Benjamin Ufuoma Oreko2* 1Department of Welding Engineering and Offshore Technology, Petroleum Training Institute Effurun, Nigeria 2Department of Mechanical Engineering, Federal University of Petroleum Resources Effurun, Nigeria *Corresponding Author: Benjamin Ufuoma Oreko (20