

VOICE BASED HOT COLD WATER DISPENSER

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ABSTRACT

The purpose of research paper is to illustrate the implementation of automatic water dispenser system. The voice based water dispenser is the idea which will be helpful for old age home, hospitals, canteens and offices. The main aim of project is not only to make water hot and cold but also it work on voice command. This system works on the primary input of user's voice. Additionally this system includes temperature sensor which displays temperature and also control temperature.

KEYWORDS: Raspberry Pi, Python, Voice Command, Peltier Module, Temperature Controller Module, Touch Sensor.

I. INTRODUCTION

Till now voice based water dispenser system was not existing. This system include series of many function like cooling and heating process, voice based controlling, maintaining temperature and controlling flow of water and also displaying temperature. Voice is integral part of the system. Since, it is faster to process rather than to process written text.

Voice based water dispenser consist of hardware and software. Hardware include Peltier module, dispenser system to control flow of water using pump motors, temperature sensor module to control the temperature of water and to display it and touch sensor to detect whether the glass is place below the tap of dispenser system. Raspberry pi is a credit card size computer, used for voice recognition. Software part consist of VNC viewer and raspbian. VNC viewer provide platform to view the program running on raspberry pi. By combining hardware and software part an adaptable voice based hot cold water dispenser using raspberry pi is design.

II. LITERATURE SURVEY

Water dispenser consisting of compressor, ARM processor, and evaporator were designed. It provide good result but heat pumps were added because of which temperature increases during winter season, thereby decline its effectiveness [3]. Hot cold water dispenser with inbuilt inverter, consist of Peltier module, hot cold chamber, inbuilt inverter. This device work without compressor, condenser or evaporator but was not automated or based on voice command [4]. Water dispenser system using coin consisting of components like IR sensor, microcontroller and water pumps. Automatic heating and cooling of water were absent [1]. Voice command using raspberry pi which help to get best performance from system terms of space, time and complexity. This also provide way of using IOT [2].

III. DESIGN METHODOLOGY

a) Heating and cooling process

Thermo electric cooling and heating system works on Peltier effect. Peltier is semiconductor device which is rectangular in shape. When voltage is applied, one side get heated and other get cool. Continuously applying voltage increases the temperature on one side and on other side decreases by making the side coldest. As we are heating and cooling the water for drinking purpose therefore, temperature need to be maintain it should not exceed beyond the limit. So temperature controller module is used for that purpose. Which controls the

temperature by setting the value in the module. When temperature increase than the set temperature, Peltier turns off thus heating and cooling process of water stops.

b) Voice recognition process

Inbuilt Alexa in raspberry pi is used for voice recognition. Voice control service of amazon, web hook, IFTTT trigger alexa, python pub nub library are used in this process. Various templates are there in IFTTT trigger we can choose any trigger command or can add any trigger command as per our need on that. By recognizing the voice input “hey alexa, trigger cold water” or “hey alexa, trigger hot water” turns on raspberry pi. Raspberry pi further turn on the relay and thus we get the output.

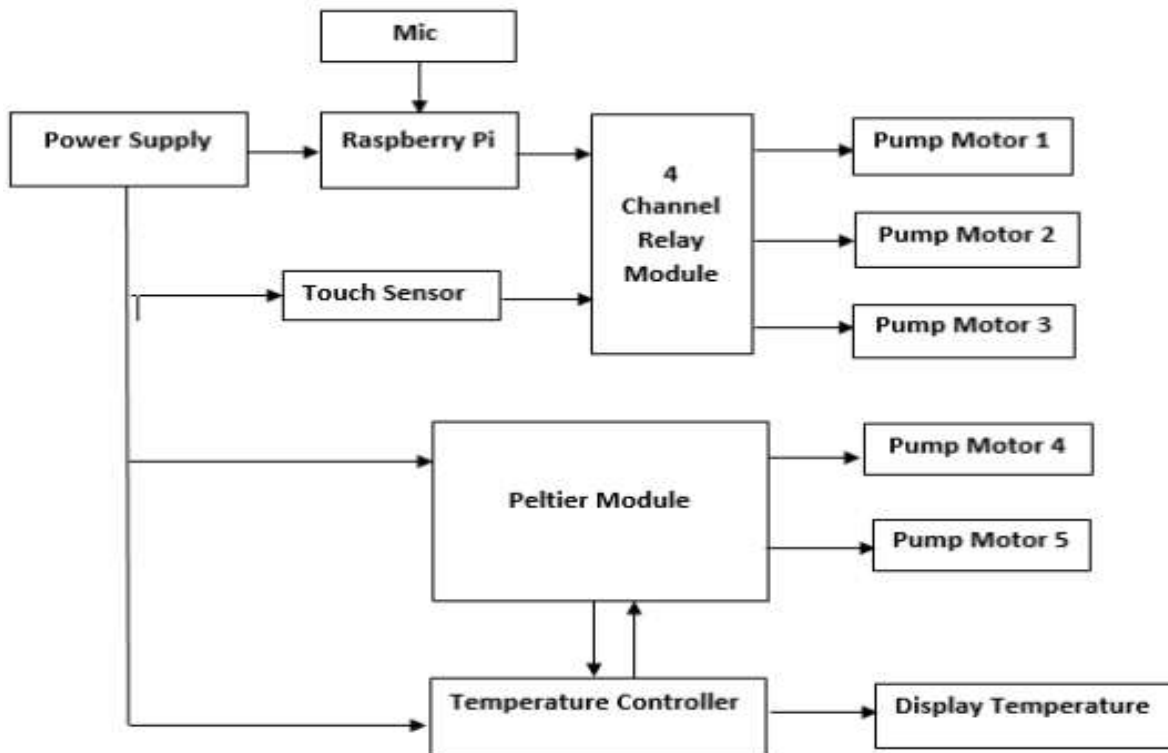


Fig-1: Block diagram of voice based water dispenser system.

Voice as an input is given to Raspberry pi through mic and another input signal is given to relay module through touch sensor. If and only if glass is place below the tap or nozzle of the water dispenser system then only the relay will turn the pump motor on. Depending input, the relay will turn on or off the respective pump motor. This pump motor regulate the flow of water. Peltier module operate at 12v and 4A, one side get hot and other get cold. Another two pump motor are used to continuously flow the water through heat and cold exchanger tank which is present on both side of Peltier module to maintain the temperature of water. To maintain the temperature of hot water so that it should not exceed beyond the limit, temperature controller module is used. Maximum temperature is set on temperature controller module, if it reaches beyond the set temperature then the Peltier module will turn off. As the temperature start falling below 3 degree Celsius that of the set temperature, Peltier module will turn on. All modules operates on 6v battery except Peltier module which operates on 12v battery.

IV. CIRCUIT DIAGRAM

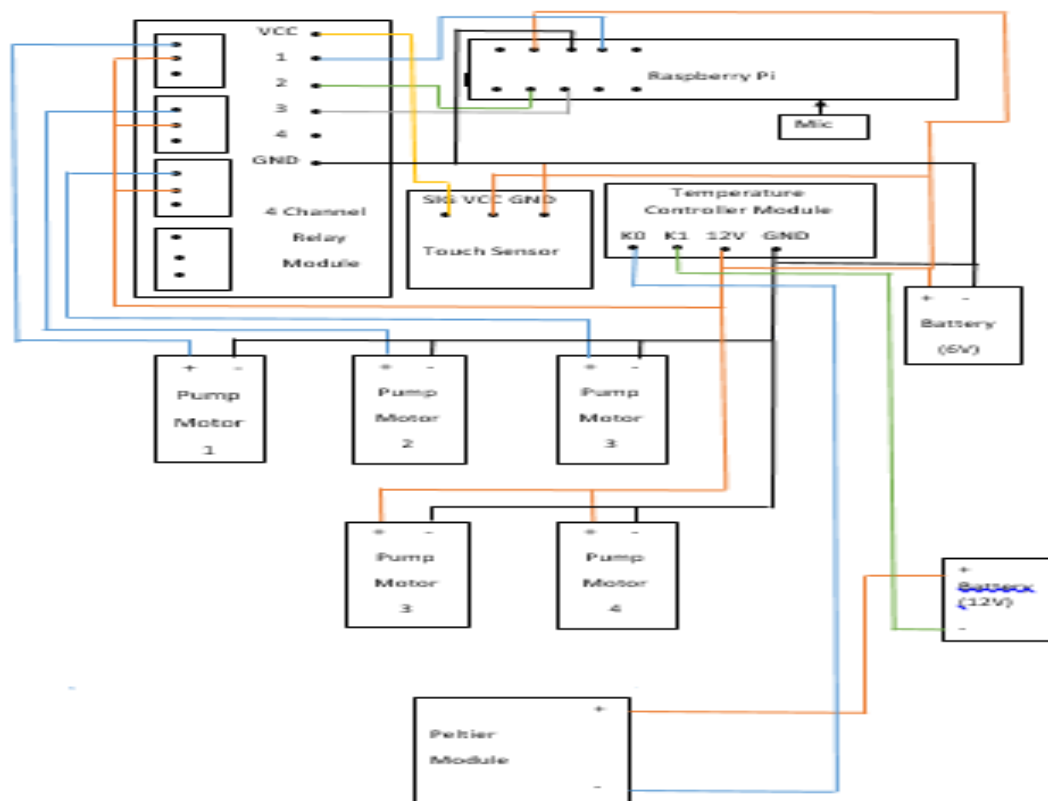


Fig-2: Circuit diagram of voice based water dispenser system

V. IMPLEMENTATION OF SYSTEM

In this system the water dispenser is fully automated. Not only voice recognition but also heating and cooling processes are inbuilt in this system. This system includes a series of many functions like heating and cooling process, voice based controlling, maintaining temperature, controlling flow of water and also displaying the temperature. Power supply is provided to Raspberry Pi which is connected to 4-channel relay module. 4-channel relay module act as a switch. Pin no.2,3,4,VCC and GND of Raspberry Pi is connected to 1,2,3,VCC and GND of 4-channel relay module respectively.4-channel relay module consist of four relay, each relay has Normally Open(NO),Normally Close(NC) and Common(COM) terminal.4-channel relay module allows voltage up to 5V-6V through them, when relay is on. Five submersible pump motor i.e. m1,m2,m3,m4 and m5. Three pump motor m1,m2 and m3 is connected to 3 relays i.e. positive terminal of each motor is connected to each normally open terminal of relay. A touch sensor is used to sense whether the glass is placed in below the pipe or not. The signal pin of touch sensor is given to VCC pin of relay module. Here it sense the glass and send further information to relay switch. Relay switch decides whether drain the water on not. The power supply is given by battery connecting positive pin of battery and VCC pin of touch sensor. The GND pin of touch sensor is given to negative of battery. Temperature controller module consist of K0, K1, 12V, GND pins. Each common terminal of relay in shorted and connected to 12V terminal of temperature controller module. Negative terminal of m1, m2 and m3 is connected to ground terminal of temperature controller module. To detect the temperature of water and also control the temperature which does not exceeds more than 45C. Two Peltier module require is taken common and connected to positive terminal of battery. Negative terminal of each Peltier is taken common and connected to k0 terminal of the temperature controller module.k1 terminal of temperature controller module is connected to negative terminal of battery or vice versa. For heating and cooling continuously through heat sink which is on both side of Peltier module pump motor m4 and m5 are used. Positive terminal of the both pump motor is connected to wire i.e. come from 12V of temperature controller module which is shorted and

connected to positive of 6V battery. Negative terminal of temperature controller module which is given to negative of 6V battery. Audio input is given to microphone. This audio input passed through the Raspberry Pi. Raspberry Pi and micro-controller are connected via I2C SPI bus communication. Micro-controller takes input from IR sensor. Four channel relay modules operating at 24Volts. Relay work as a switch, which is operated by micro-controller. Relay module is used to operate the pump motor. Pump motor operating at 3-6Volts, 130-220 mA and flow rate is 80-120L/H. Pump motor regulate the flow of water. The IR sensor checks whether glass is present below the tap or not. If the glass is present then IR sensor sends the signal to micro-controller, which switch on the relay and hence pump motor starts. If glass is not present near the tap IR sensor sends the signal to micro-controller to turn off relay and hence pump motor stops. Heating and cooling of water in dispenser system is done by using Peltier device. Peltier device operating at 12Volts and 6-7A. Simultaneously both side get heat and cold. After turning on the device, the hot side will heat quickly, the cold side will cool quickly. Maximum temperature of water is set by using temperature controller so that the temperature of water should not exceed beyond the set temperature. Raspberry Pi module is small sized computer. VNC is software used to program a Raspberry Pi. The program is in form of language Python. This Raspberry Pi module is used to decide whether input is hot water or cold water. This module is programmed in such way that water will stop after 10 seconds. This will save the water and also limit the flow of water.

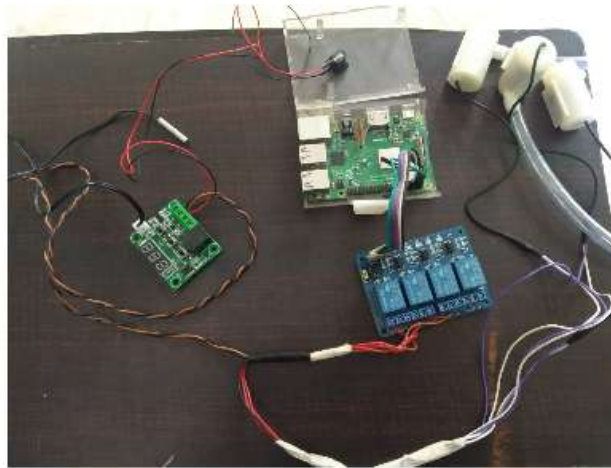


Fig-3: Hardware implementation with raspberry pi

VI. CONCLUSION

This system is automated by voice command and easy to handle. Anyone can use this system without operating it manually. Requires less power consumption which save electricity. Within few seconds, after giving the voice input we get the output as water from dispenser system. There is no unnecessarily waste age of water because of touch sensor.

VII. REFERENCES

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