

Voice based Hot and Cold Water Dispenser

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Abstract - Technology is a never ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. Voice Based water dispenser Automation System using controller is the project which will be very useful for old age people and disabled people, basically for one's who cannot perform basic activities efficiently. It is the idea which corresponds to the new area of automation and technology. This paper presents the design and implementation of a low cost but yet flexible and secure voice based hot and cold water dispenser system. The communication between the cell phone and the controller board is wireless. Voice command sends from mobile 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 through the pipes from the particular jar (hot/cold).

Key Words: Bluetooth Module HC05, DS18B20 TEMP Sensor, Water Level Sensor, ARM7 LPC2148, Solenoid Valve

1. INTRODUCTION

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real 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 Bluetooth.

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 through 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.

1.2. LITERATURE REVIEW

[1]The idea of automation can be dated back to 1800s, when Nikola Tesla developed the idea of having a remote control for vessels and vehicles in 1898. Later with the advent of electrical appliances, the idea of home automation became more important. A.R.Al-Ali and M.Al-Rousan developed a Java based Home Automation System.

[2] It used Wi-Fi as a medium for communication between the hardware and software component. Its main disadvantage was that Wi-Fi range is limited and hence the user has to be in a certain range for operating the system. An android based HAS was developed.

[3] It would use internet as a medium for connectivity. Its disadvantage was that the unavailability of internet would fail the entire system. Embedded smart home management scheme was presented.

[4] It was based on use of Ethernet network. The system also had GSM support for the issue of unavailability of network. It was thus costly and hence was the only disadvantage. D.Naresh, B.Chakradhar & S.Krishnaveni presented the idea of Bluetooth based HAS in.

[5]It used arm processor (ARM9 and ARM7), and so the system has a complex architecture.

2. PROPOSED SYSTEM

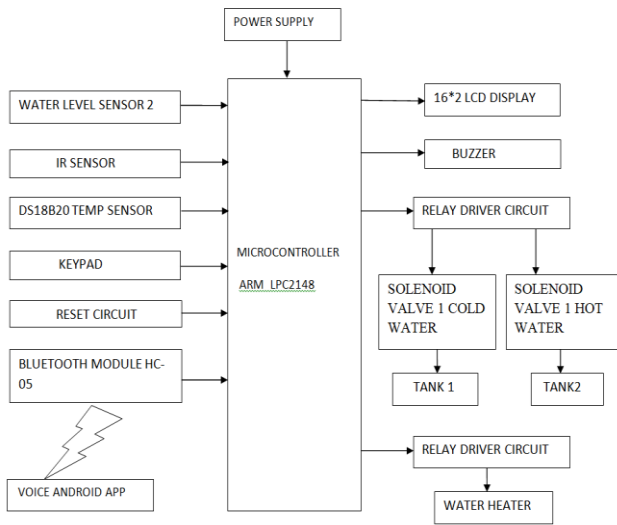


Fig 1: Block Diagram of System

In this, we present the theory on voice based hot and cold water dispenser system. The overall block diagram of the proposed method is explained. Each and every block of the system is explained in detail. In this proposed block diagram consist of several sensors (water level, IR sensor, DS18B20 temp sensor, HC05 temp sensor) is connected to ARM7 controller. The controller are accessing the sensor values as well as get command from Bluetooth module and processing them to dispense hot or cold water. All parameters are also shown on LCD display. A solenoid valve will be used to control the flow of water, which is when energized the water will flow out and when de-energized the water will be stopped. So we will write an controller program which always checks if any object is placed near the tap, if yes then the solenoid will be turned on and wait till the object is removed, once the object is removed the solenoid will turn off automatically thus closing the supply of water.

A. ARM7 LPC2148 Microcontroller:

The LPC2148 ARM Header Board is a Low Cost Board that can be used to quickly evaluate and demonstrate the capabilities of NXP LPC2148 (ARM7TDMI) microcontroller. The Header board is designed as DIP package with access to all Port pins for external connection. The LPC2148 ARM Header Board consists all basic components required to function the microcontroller. The board is populated with voltage regulators, RTC crystal, Main Crystal and necessary de-coupling capacitors.

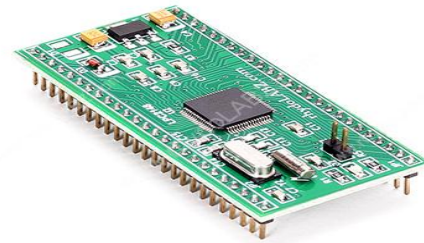


Fig -2: ARM7 LPC2148 Microcontroller

B. Bluetooth module (HC-05):

Bluetooth wireless technology is becoming a popular standard in the communication. it is one of the fastest growing fields in the wireless technologies. It is convenient, easy to use and has the bandwidth to meet most of today's demands for mobile and personal communications. Bluetooth technology handles the wireless part of the communication channel; it transmits and receives data wirelessly between these devices. It delivers the received data and receives the data to be transmitted to and from a host system through a host controller interface (HCI). The most popular host controller interface today is either a UART or a USB .Here, I will only focus on the UART interface, it can be easily show how a Bluetooth module can be integrated on to a host system through a UART connection and provide the designer an optimal solution for Bluetooth enabled systems.

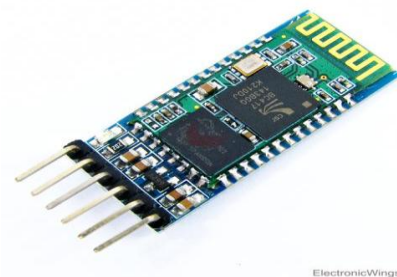


Fig -3: Bluetooth Module HC05

C. Water Level Sensor:

Level sensors are used to detect the level of substances that can flow. Such substances include liquids, slurries, granular material and powders. Level measurements can be done inside containers or it can be the level of a river or lake.



Fig -4: Water Level Sensor

D. DS18B20 Temperature Sensor:

This is a 1 Meter Long Waterproof, sealed and pre-wired digital temperature sensor probe based on DS18B20 sensor. It is very handy for when you need to measure something far away, or in wet conditions. Because they are digital, you don't get any signal degradation even over long distance. These 1-wire digital temperature sensors are fairly precise ($\pm 0.5^{\circ}\text{C}$ over much of the range) and can give up to 12 bits of precision from the onboard digital-to-analog converter.



Fig -5: DS18B20 TEMP Sensor

E. Relay unit:

Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show, when a relay contact is normally open (NO), there is an open contact when the relay is not energized. When a relay contact is Normally Closed (NC), there is a closed contact when the relay is not energized. In either case, applying electrical current to the contacts will change their state.

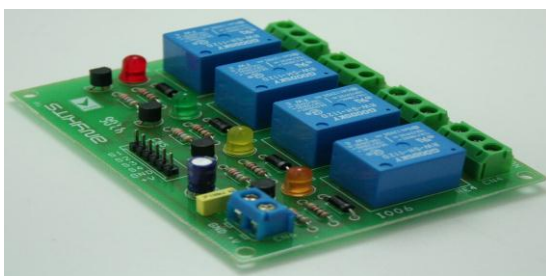


Fig -6 Relay Unit

F. Solenoid valve:

A solenoid valve is used as a water controlling valve, it is a simple electromagnetic device that converts electrical energy directly into linear mechanical motion. A solenoid valve is the combination of a mechanical valve and basic solenoid. So a solenoid valve has two parts namely Electrical solenoid and a mechanical valve. A solenoid valve is an electromechanically operated valve.

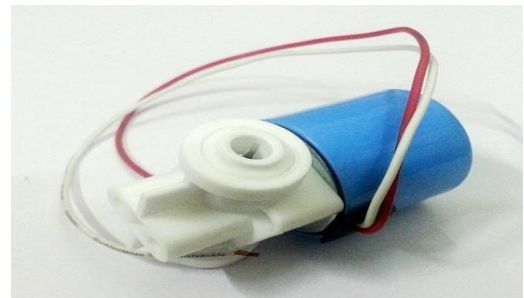


Fig -7 Solenoid valve

G. LIQUID CRYSTAL DISPLAY:

This is the first interfacing example for the Parallel Port. We will start with something simple. This example doesn't use the Bi-directional feature found on newer ports, thus it should work with most, if not all Parallel Ports. It however doesn't show the use of the Status Port as an input for a 16 Character x 2 Line LCD Module to the Parallel Port. These LCD Modules are very common these days, and are quite simple to work with, as all the logic required running them is on board.



Fig -8 LCD Display

3. CONCLUSION

The implementation of this project overall is 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, ARM7 as controller and Bluetooth module to get command from user smartphone. The system implementation is based on the ARM7 microcontroller, 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 Bluetooth communication capability. Taking into consideration the target audience of elderly and handicapped people, the project developed is user friendly.

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