

Voice Controlled Industry Automation System using Arduino

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Abstract—This paper proposes a system for automation which is mainly design by considering the parameters such as accuracy, reliability, flexibility and some personal benefits. In some areas, the rise of machines may be considered as ominous but other than that automation is going to be huge and effective. We should have to welcome the automation in all sectors because automation is a thing which gives confidence in results. Automation has become a boon but it should have to monitor carefully and use efficiently then it will be more advantageous. Our proposed system contributed to form an open source, low-cost, effortless system which can be done by interacting the open source Arduino microcontroller with input devices. It can be anything such as smart phone, laptop, etc. which will forge ease to drive anything automatically. There are various steps which are carried out in the working of our proposed system firstly Arduino is interacted with the smart phone and the system constituted to function with devices in a well-equipped place. In our paper, we have mentioned an automation system which makes use of speech commands ordered by a user to monitor various devices for these we have to use an AMR voice app for voice recognition.

Keywords-Arduino,AMR voice app,Smart Phone

I. INTRODUCTION

Day by day we are developing ourselves and our surrounding to getting called ourselves developed one. Many years ago, when the technology comes to existence that is when the first computer is developed no one even has thought that the device can be controlled by voice commands. This was just a supposed in science fiction however through our desire our passion to be developed we are using voice interfacing. As we know that voice transmission is the very efficient way of communication with less endeavor, ideas can be explicated and executed easily. In the current scenario, electricity stringency is one of the major issues that we are facing in our day to day life. It can be severe in future if we didn't concentrate on it in present condition. As we know resources are not available in large amount so we have to use it according to need and conserve it for future use because if we waste it, it will expire soon and everything will be useless. So to overcome this situation a system is proposed which will work only when it has to be used, otherwise, it will be switch power saving mode. Controlling or switching devices which are located far away from the user is might be difficult so we developed our proposed system up to this extent that it can be operated from a distance through a voice. Due to the addition of this feature, our system becomes so helpful and efficient at a low-cost budget. This might be the best way to conserve energy and save power. Many methods have been introduced to achieve the above goals but here is the system which is capable of achieving all goals of a perfect system.

II. LITERATURE REVIEW

Automation is not a new concept, it has been in used for so many years so there are lots of research papers and journals already published on automation. As technology is being advanced day by day the field of automation is also increasing rapidly. There are so many systems which have been introduced such as Wi-Fi, cloud, wireless sensor, Android, GSM, and IOT based. The earlier systems which have been introduced are as follows.

Lun-Wu Yeh, Ming-Hsiu Hsu, Hong-Ying Huang, Yu-Chee Tseng [1] designed and implemented a self-guided robot based on RFID and Wi-Fi. They build an indoor mobile robot that can be used in home appliances. They had proposed a robot which is self-guided. The robot can determine its location as well as navigate to the location where it is ordered to and it can even roam into an area which is new to it, but it only moves on smooth floors, not on bumpy floors and can't even from one floor to another. As we know that RFID tags are installed to detect hurdles which are costly and complex

Dr.Pramod Sharma, Preeti Verma, Km. Bhoomika, Ravi Kumar, Saurabh Baghel [2] proposed a system of home automation using IR (Infrared sensor) and Arduino-nano single board microcontroller. Here author discussed the use of IR sensor in a remote i.e. IR sensor to automate home using Arduino-nano single board microcontroller. The proposed system does not have any limitations of network, coverage and any GSM network, However as they are using IR sensor, IRsensor requires line of sight(LOS) to communicate so this factor will limit their proposed system.

D.Baladhandabany, S.Gowtham, T.Kowsikkumar, P.Gomathi [3] designed a PLC based automatic liquid filling system. Here author mentions controlling the entire system by programming the PLC. PLC is considered as the heart of the system. The installation cost is very high and it is so complex.

Jay Kumar, Anshul Sengar, Mohit Kumar Sharma, Manoj Kumar Patel, Simant Rahul Singh [4] designed home automation system using Android via Bluetooth. They had proposed a home automation system using an Arduino board with Bluetooth being remotely controlled by any Android OS smart phone. Bluetooth based home automation system gives complete control over home appliances as long as the user is in range of Bluetooth network. It has high communication rate, great security, and low cost, so it can be implemented as real time system.

Pawan Singh, Krupa Chotalia, Sanket Pingale, Sandhya Kadm[5] has designed a smart GSM based home automation system. The proposed system uses GSM technology which provides a wide range so that you can operate your system from any corner of the world. Home appliances are monitor and accessed by SMS. The main drawback of GSM based automation system is that there is no guarantee that every time the text message delivered to the system. So that the proposed system is not reliable, thus such home automation system cannot be implemented as real time system

III. PROPOSED SYSTEM

After studying all above systems, we have designed a system that aims to monitor devices using Bluetooth module and Arduino. Our paper proposed a system in which the automation of devices is done with ease at a suitable distance with the help of Arduino and Bluetooth module. Bluetooth module is united with the Arduino which interacts or interlink the cell with Arduino. Arduino is programmed in such a way that monitoring of devices based on the data sent by smart phone to Arduino through Bluetooth interfacing module. The block diagram of our proposed system is as shown in figure 1.

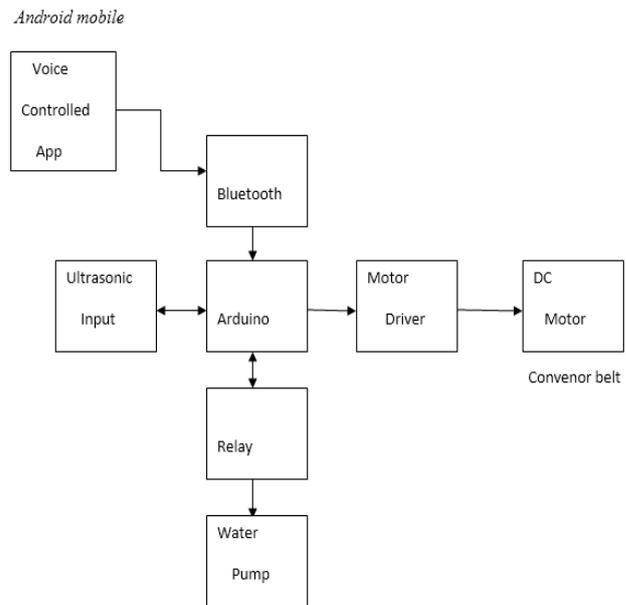


fig.1: Automation through voice recognition

Our proposed automation system is made up of the various components which are centrally control by Arduino. The Ultrasonic Sensor is used to detect the presence of bottle, D.C. Motor will be liable for impressive transfer of bottle by the means of conveyor system. Water tap will control the amount of liquid filling the bottle. The input and output display devices are executing as an interface between system and user. The entire system will be controlled by the Arduino unit. Required voice signals are provided through the internet activated Android phone. Again to convert the voice signal, we need a voice app like AMR voice app.

Voice commands send over the Arduino kit through Bluetooth. Bluetooth is used for the communication interfaced and Arduino. If we say anything through the mobile app, accordingly the signal will be generated through the Bluetooth. We can check those signals through the serial monitor.

In our system, if we said “Start”through the app then it will automatically turn ON the Motor and rotate the conveyor belt on which the bottle to be filled is placed. After some time when this moving bottle comes closer to the refilling tap, then the ultrasonic sensor mounted on tap stand will detect a minimum distance. When Arduino kit receives any signal from an ultrasonic sensor, if the sensed value is less than the precise one then an automation will automatically stop and make the water pump ON to refill the bottle. It remains ON for next few seconds. As soon the bottle gets filled, the water pump will be OFF. And again the conveyor belt will start moving to pass on the filled bottle at another end. We can stop the system again by sending the signal “Stop” through the App. The details of the various components of the system will be given in the following section

A] Arduino UNO:

Arduino is an open source electronics prototyping platform supported versatile, easy-to-use hardware and software system. It is supposed for artists, designers, hobbyists

and anyone inquisitive in creating interactive objects or environments Arduino Uno relies on ATmega328 microcontroller (MCU). It consists of 14 digital input/output pins, six analogue inputs, a USB connection for programming the onboard MCU, a power jack, an ICSP header and a reset button. It is operated with a 16MHz crystal oscillator and contains everything needed to support the MCU. It is very easy to use as you simply need to connect it to a computer using a USB cable, or power it with an AC-to-DC adaptor or battery to get started. The MCU onboard is programmed in Arduino programming language using Arduino IDE. The Arduino is as shown in figure 2.

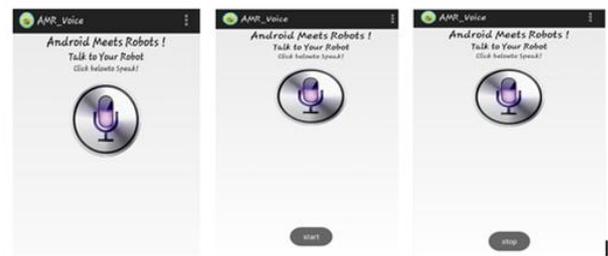


fig.3: commands through AMR voice app

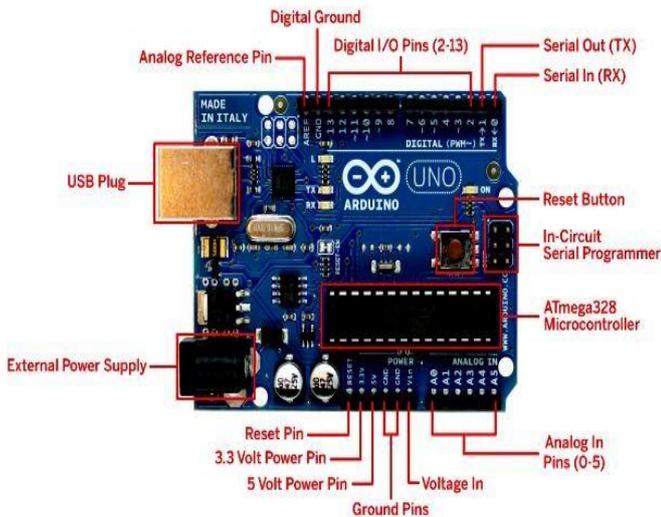


fig.2: Arduino UNO

The open-source Arduino Software package (IDE) makes it straightforward to write any code and transfer it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software package can be used with any Arduino board.

B] Voice controlled App

The AMR Voice app is well known as ‘BT Voice Control for Arduino’. Voice recognition uses android mobiles internal voice recognition to pass voice commands to system pairs with Bluetooth modules and sends in the recognized voice as a string. A mobile phone is also known as a wireless phone which can be used to communicate over long distances without wire. Mobile phones are basically small computers. It has a inbuilt facility of Bluetooth so we are going to use it for interacting with Arduino. AMR voice app will be installed in mobile phone to pass voice commands as an input.

C] Bluetooth module

It is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The Bluetooth module being used here is the HC-05. Serial port Bluetooth module is fully qualified Bluetooth. The Bluetooth module being used allows us to transmit and receive signals. Bluetooth is a wireless technology commonplace for interchanging data over short distances. Bluetooth module make use of short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz. It receives the text from the humanoid Android phone and sends it to the serial port of the Arduino Uno. Bluetooth module used supports master and slave mode serial communication SPP and UART interface. Using these features it can communicate with other Bluetooth-enabled devices like mobile phones, tablets and laptops. Bluetooth module is as shown in figure 4.

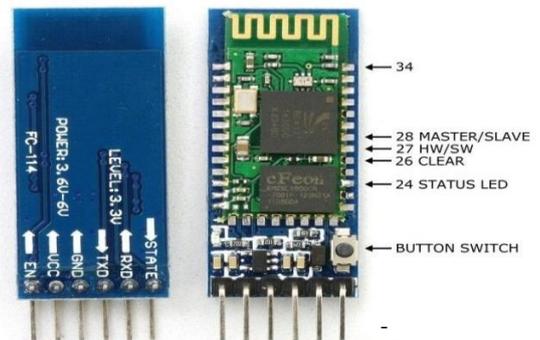


fig.4: Bluetooth module

D] Ultrasonic sensor

A sensor is a device or detector which is used to detect events or changes in its atmosphere, and then offer a corresponding output. A sensor is a type of transducer, which may give various types of output, however generally use electrical or optical signals. The module sends an ultrasonic signal, lift up its echo and in addition it also measures the time period between the two events and outputs a waveform who’s high time is modulated by the measured time which is proportional to the distance. The ultrasonic sensor is as shown in figure 5.

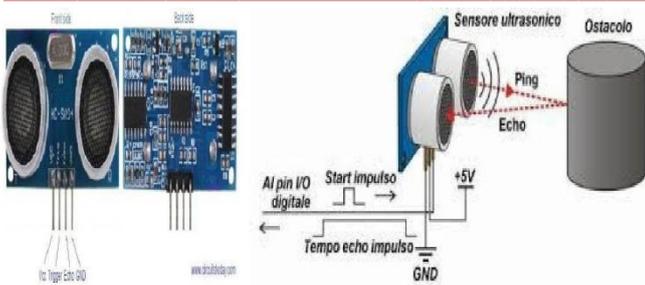


fig.5: Ultrasonic sensor

E]Relay

A relay is a device which is used to turn on or turn off a circuit using voltage or current much abundant than what Arduino might handle. It also provides complete isolation between the low-voltage circuit on Arduino side and the high-voltage side controlling the load. It has a standard interface that can be monitor directly by microcontroller. The relay is as shown in figure 6.



fig.6: Relay

F] Motor driver

A motor driver is a driver which is mainly used to control the two geared DC motors. The unique feature of motor driver is it can easily make a motor rotate not only in clockwise but also in anti-clockwise direction pursuant to the control inputs provided to it by the microcontroller. The motor driver is as shown in fig.7.

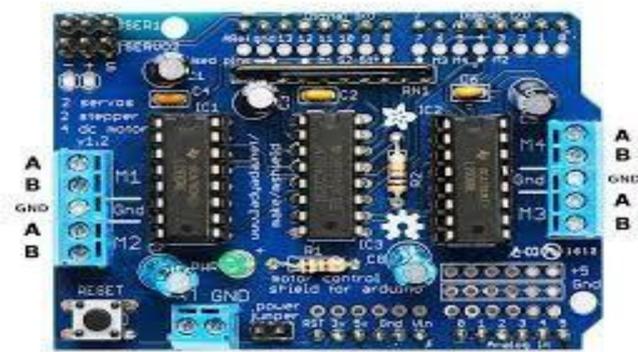


fig.7: Motor driver

Here we are using L293D, L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction.L293D is a 16-pin IC.

L293D is an IC which can control a set of two DC motors simultaneously in any direction. So it can control two DC motor with a single L293D IC. The l293d can drive not only small but also quiet big motors fluently,there are two Enable pins on l293D IC i.e. Pin 1 and pin 9. As it is a Dual H-bridge Motor Driver Integrated Circuit, so for driving the motor with left H-bridge we need to enable pin 1 to high i.e. logic 1. And for right H-Bridge we need to enable the pin 9 to high. If anyone of the either pin1 or pin9 goes low i.e. logic 0 then the motor within the corresponding section can suspend operating. It's sort of switch

G] DC motor

In simple words, D.C.Motor is a Motor or device that converts electrical energy into mechanical energy. A conveyor belt will be connected to monitor the positioning of bottles. D.C. Motor will be liable for impressive transfer of bottle by the means of conveyor system.

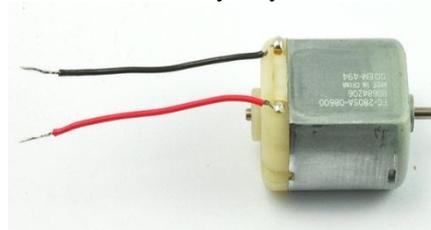


fig.8: D.C. motor

H] Water pump

Water pump is used for controlling the flow of water. There will be a water tap connected to the water pump. Water tap will control the amount of liquid filling the bottle. Water pump is controlled by Arduino board using a relay.



fig.9: water pump

IV. RESULTS

After completion of our proposed system, we are able to monitor it through voice commands. Simply a program has written and fed up for execution. Controlling devices through our voice commands is fully effective and enjoyable, enjoying our work makes the task easy and also boost up the energy level. So we came to know that our proposed system is very reliable, reduces efforts and makes life more convenient and fast.

V. CONCLUSION

In our paper, the proposed method .i.e. Bluetooth based home automation using Arduino microcontroller has been discussed and its application for Bluetooth based automatic bottle refilling system using Arduino has been successfully demonstrated . Our proposed system has evolved an automation system using Bluetooth, Arduino and android phone. Our proposed system is very cost effective there is no need of maintenance or we can say that it is negligible. This proposed system is so user-friendly which was design to help for automation. This system has a centralized monitor system to control the operation and status of the devices. As compared to the conventional method the use of wire is drastically reduced.

This system helps to save time for the monitoring of the devices. The idea in our paper can expand or elaborate for automation of various application at large scale. However, this method is valid up to a specific range due to the limited range of Bluetooth module but we can further extend it by preferring some other methods as per need. The ultimate aim of our proposed system is to make us master of a world that we command by our voice.

VI. FUTUREWORK

Lots of work has already done for automation on advancement. Day by day automation is having a great impact. Our proposed system is more reliable and inexpensive at the same time it is easy to implement. In future, we can make it more accurate and we can extend it for fixing cap for the bottle and packaging of the bottle.

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