Bidirectional Rotation of Motor Using Wireless Technology

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Abstract: **In any industry direction control of an electric device system is very critical and crucial. Every designer aims at achieving a control methodology having high degree of precision. This idea is proposed to drive the dc motor for the required application in both forward and backward direction by using wireless technology. In this we using Arduino micro controller which is interfaced with motor driver to achieve the desired output.**

INTRODUCTION

The electrical direction control has many economical as well as engineering advantages over mechanical direction control. Historically any industrial equipment have its speed change mechanically by means of stepped pulleys or by the gear mechanism. With this proposed system, simply with the command inputs which are given to the input terminals validates and perform three modes of operations in accordance with the validated output of the controller. And initially controller is being dumped with input commands inform of hexa-code. Hence the controller executes the load to rotate forward and reverse directions. And we are supposed to implement this technique on dc motor. Further it can extended to ac motors also which has a wide range of applications.

Dc motors are classified into three types depending upon their field winding are excited i.e., series, shunt and compound. The dc motors are in general much more adaptable speed drives than ac motors which are associated with a constant speed rotating field. Hence this speed of the motor can be controlled by changing the flux. This can be done by using flux control methods. In order to control the direction we are using Arduino micro controller which is being interfaced with the motor driver. Arduino controller is communicated with the IR(infrared) sensors initially.

The field of wireless communication has been in existence since, the first humans learn to communicate. In early days of civilisation humans would transmit notices of important events such as enemy invasions or royal births through the sounding horns or lightning of fires. While simple messages could be effectively transmitted in this manner in order to communicate over long distances the man power expense was great since watch towers had to be built within sight of each other and continually manned, and the number of messages was small.

Now a day's all home appliances are preferred to control wired and wireless mechanism in our project proposed to control the direction of a dc motor high efficiency delivery from input dc to output supply.

DESCRIPTION

TRANSFORMER

Transformer is an electrical device which transfers the electric power from one circuit to another circuit without changing the frequency. The transformers are used to step-up and step-down the voltage. Generally it works on the principle of mutual induction.

VOLTAGE REGULATOR IC 7812

7812 is a voltage regulator integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in 1a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7812 provides +12V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending output pins depending upon the respective voltage levels.

RECTIFIER

Rectifier is a power electronic component that converts alternating current (AC) to direct current (DC). A diode like one way current that flows in one direction, this process known as rectification.

MICROCONTROLLER

Microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes processor memory and I/O peripherals on a single chip and micro controller processor vary by application to application. In this project 8-bit micro controller with 16 k bytes are used.

IR SENSORS

An IR sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. This of sensors measures only infra red radiation, rather than emitting it that is called passive IR sensor.(TSOP 1738 Receiver).

MOTOR DRIVER

The motor driver we use here in this project is L293D.This is a H-Bridge motor driver integrated circuit(IC).Motor drivers act as current amplifiers since they take a low current control signal and provide a higher current signal is used to drive the motors. And in depth which is made up of relays.

RELAY

A relay is an electromagnetic switch. Its basic function is to allow a low power control voltage operate a high power switch. The control and the switch are electrically isolated from each other and they have their own voltage and current ratings/requirements.

Relays are first used as amplifiers and these are used to transmitted signal from one circuit and re-transmitted to other circuit. These are extensively used in telephone exchanges and before that used in computers as logic operations

In a low power circuit, the output from a Microprocessor is very low. It is sufficient for a LED to glow but to drive a high load you will need a Relay (Electromagnet Switch), and to give proper voltage or current to a relay you will need a relay driver. Many times one transistor with a resistance is enough to make a Relay Driver. In this type of circuit Transistor is use as current amplifier and Relay does two things one is isolate the flow of current and other one is act as electro magnet switch It is a type of mechanical Switch which is pulled by an electro-magnet.

PRINCIPLE

In this circuit we are using TV remote and IR sensor based operating system. The main component is ARDUINO microcontroller. Here we provided different inputs to the motor/relay driver through micro controller to rotate the motor in both clockwise and anti clock wise directions and as well as to start and stop the motor. We observed the operation by the load output.
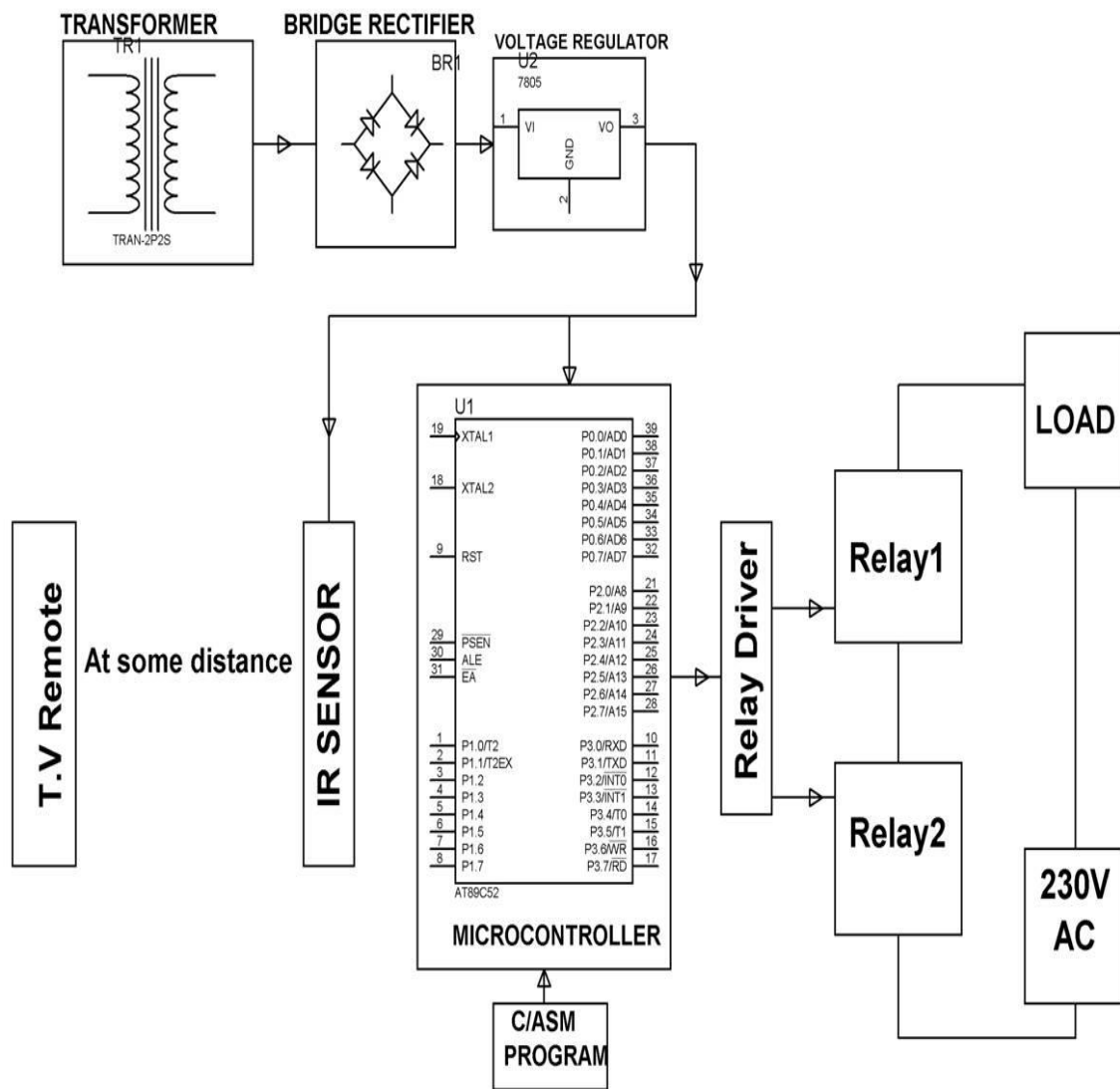
WORKING

This project demonstrates a technology to turn a dc motor in mutually clockwise and counterclockwise direction. It also has the condition to control the motor's direction using a TV remote. When a TV remote key is pressed, it transmits an infrared sign al in RC5 code which is received by an infrared receiver called TSOP-1738. The microcontroller gets the IR signal from the remote, the code which is recognized by the receiver to function a set of the relays.

The relays activate the appropriate relay to control a dc motor to get preferred direction by exchanging the leading supply terminals from the major winding to the secondary winding. The TSOP output is fed to an ARDUINO microcontroller which is interfaced to a relay driver IC. After that, the relay switching is done by steady mode for a dc motor to rotate in forward and reverse directions.

This proposed system demonstrates a technology to rotate a dc or ac motors such as squirrel cage induction motors etc. In both clockwise and counterclockwise direction.

Here is the block diagram of bidirectional rotation of an induction motor with a remote control device with all their essential components

The Block Diagram of Bidirectional Rotation of a DC Motor with a Remote Control Device

The working of this bidirectional rotation of a DC motor with a remote control device is very simple. For controlling the direction of rotation of any type DC motor or ac induction motor such as exhaust fan or any motor, this device is connected in series with main supply of that specific circuit.This device mostly consists of electronic components which are operated at 5 or 6v dc. For making 5or 6V dc, main supply is stepped down to 12v ac with the help of single phase transformer then these voltages are converted into dc with the help of bridge rectifier. After that, these voltages are regulated into 5V dc with the help of voltage regulator.

From these regulated voltages the Arduino microcontroller and IR sensors are powered up. Microcontroller is the main controller of this device. It is programmed in c language with the help of Arduino IDE software.IR sensor are basically the infrared sensors which can be operate with any type of TV remote. When TV remote switch is pressed then IR sensors are switched on. When these are switched on, then these give the logic high signal to Arduino microcontroller. Then microcontroller efficiently controls the direction of rotation of DC motor. DC motor is directly cannot powered up with 230V ac, So we are using a bridge rectifier and a voltage regulator to get required dc voltage. In this bidirectional rotation of a Dc motor control device, we have configured the remote switch no.1 for forward direction of rotation of motor, switch no.2 for stop and switch no.3 for reverse direction of rotation of DC motor. This was done only for make the convenient for user interface. Two relays have been used for making the polarities of supply to change the motor rotating direction. These relays are derived through relay driver IC.

Further it can extend to ac motors which have wide range of applications.

Applications and Advantages of Bidirectional Rotation of a Motor with a Remote Control Device
- By using this bidirectional rotation of a motor with a remote control device the user can easily rotate the series motor in either direction.
- This bidirectional rotation of an induction motor device could be easily used with domestic and industrial exhaust fans for fresh air in and hot air throw out.
- By using bidirectional rotation of an induction motor device, the user can easily on or off the split phase inducing motor with some distance without wasting any time.

RESULT

It is observed that when supply is switched on, the motor starts rotating in clockwise direction, and on pressing the push button present on the TV remote enables the motor to rotate in anti-clockwise direction. Using the microcontroller program enables the motor to rotate in both directions (clockwise and anticlockwise direction). It is simpler compared to other methods of rotating motors, flexible in design, lighter in weight and suitable for low power applications. In future this idea can be implemented by using ac motors to control the rotation motor in both directions.

REFERENCES

[1] E. Fitzgerald, Charles kingsley jr, Stephen Umans "Electric machinery", Mc Graw-Hill Higher Education, Sixth Edition.
[2] Bimal K Bose "Power Electronics And Motor Drives: Advances And Trends". Academic Press, 2006 Edition.
[3] J.Petrovic,s.strmcnik," A Microcomputer Based Speed Controller For Lift Drives"IEEE Trans.
[4] Unique conveyor problems and solutions-Fenner Dunlop.
[5] www.atmel.com.
[6] http://www.controldesign.com