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Bi-Directional Rotation of Induction Motor With IR Remote Control

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Abstract— This project is about how to drive an induction motor using wireless technology for the required application in forward and reverse directions. For an example, an exhaust fan takes fresh air in and throws hot air out. It is used in both directions .This suggested system gives a review about a technology to rotate squirrel cage induction motor in clock wise as well as anti-clockwise direction the direction of the motor can be also control by a IR remote in future further developments can be mode for controlling operation of induction motor using thyristors which is noise free instead of relays.

Keywords—Induction Motor, Infra red(IR),Arduino.

INTRODUCTION

In general ,a bidirectional rotation of induction motor with ir remote control is used to control the rotation of single phase motor in both clock-wise and anti-clock wise directions. We cannot turn the single phase motor at once in both directions ,we control this motor with single phase one way switch. we must use any kind of motor drive to control the motor in both directions. which will be expensive hence due to such problems we have designed a bi-directional rotation of an induction motor with a remote control

Problem statement

The main objective of this study is to develop remote control system in homes. In IOT home networks inventions are made for controlling temperature .the server IOT commands a device module such as certain ,lighting, heater, air conditioned. a measured sensor value is transmitted to the server from sensor module as a sampling time. An injected device &sensor module is connected to each IOT. Hence IOT communication increased using this method and also less IOT module is required to control many devices.

Overview of embedded system

An embedded system is a controller programmed and controlled by real-time operating system with a dedicated function within a larger mechanical or electrical system, often with real time computing constraints it including hardware and mechanical parts.

ARDUINO NANO

ARDINO is an open source electronics prototype platform. it is flexible, easy to use hardware and software. Simply ,arduino nano is a small microcontroller board consisting of digital and analog pins ,ATMEGA 328P microcontroller ,USB jack,16MHZ crystal along with a reset button. In such a way that when button of the IR remote is pressed, IR signals are send to IR receiver in RC5 code. This IR receiver is known as TSOP1838.The output from this TSOP is fed to at MEGA3285MC and then the relay switching is then in bi-stable mode to rotate the induction motor in forward and reverse directions. Arduino nano is a small, complete and bread-board friendly board based on at MEGA328.It has more are less the same

functionality of the Adriano Due milance ,the arduino nano can be programmed with the arduino software. Arduino nano is designed in a way that allows it to be reset by software running on a connected computer[1-2].

PIN DESCRPTION OF ARDUINO BOARD

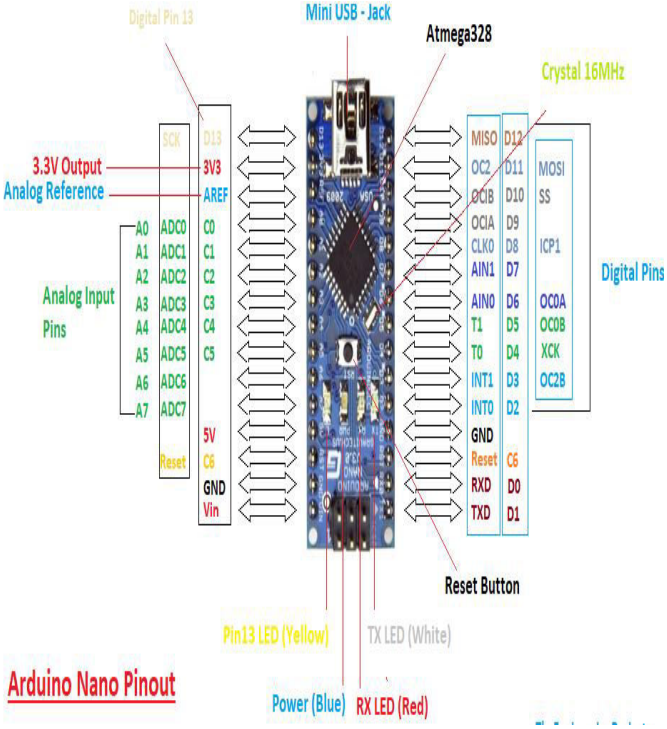

Figure 1: Pin diagram of Arduino

PIN DESCRPTIONS

- Ardino nano has 12 digital pins starting from D2 to D13
- If also has a 8 analog pins starting from A0 to A7
- This digital and analog pins are assigned with multiple function but their main functionis to acts input and output
- It performs 3 types of protocols
  1.serial protocol
  2.SPI protocol
  3.I2C protocol
- Pin 0&1 are used for serial communication
- Where pin 0is RX used to receive data
- Where pin 1 is TX used to transmit serial data via this pin
- It is also SPI protocols and pins used for SPI communicate are pins 10,11,12,13
- Where pin 10 is SS short for slave sact
- Where pin 1
- 1is MOSI short for master out slave in
- Where pin 12 is MISO short for master in slave out
- Where pin13 is SCK short for serial clock
- I2C protocol is in ardino nano and positive pins used for I2C communications are A4&A5
- Where A4 is SDA short for date line
- Where A5 is SCL short for clock line
- RTC works on I2C protocol A4&A5
- GSM module which works on serial protocol
- Ardino nano has 6 PWM pins
- It has two RESET pins which are used to reset this aurdino nano programmatically
- It has 4led on it
  1.TX
  2.RX
  3.POWER
  4.TESTING

MEMORY OF ARDINO NANO

In ardino there are three types of memorys
1.flash memory(32KB)
2.SRAM memory(2KB)
3.EPROM memory(1KB)

- In aurdino nano but we have used for powering up as well as uploading code in aurdino nano

AURDINO SPECFICATIONS:

Microcontroller	Atmega328p/Atmega 168
Operating Voltage	5V
Input Voltage	7 – 12 V
Digital I/O Pins	14
PWM	6 out of 14 digital pins
Max. Current Rating	40mA
USB	Mini
Analog Pins	8
Flash Memory	16KB or 32KB
SRAM	1KB or 2KB
Crystal Oscillator	16 MHz
EEPROM	512bytes or 1KB
USART	Yes

HARDWARE TOOLS

1.Power supply
2.Transformer
3.Bridge rectifier
4.Filter
5.LCD display
6.Voltage regulators
7.Relays
8.Induction Motor
9.IR receiver

POWER SSUPPLY:

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage.

TRANSFORMER:

Usually, DC voltages are required to operate various electronic equipment and these voltages are 5V, 9V or 12V. But these voltages cannot be obtained directly. Thus the a.c input available at the mains supply i.e., 230V is to be brought down to the required voltage level. This is done by a transformer. Thus, a step down transformer is employed to decrease the voltage to a required level.

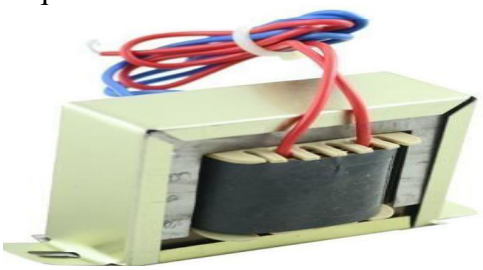

Figure 2: Transformer

BRIDGE RECTIFIER

The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification.

FILTER

Capacitive filter is used in this project. It removes the ripples from the output of rectifier and smoothens the D.C. Output received from this filter is constant until the mains voltage and load is maintained constant.

LCD DISPLAY

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc[4].

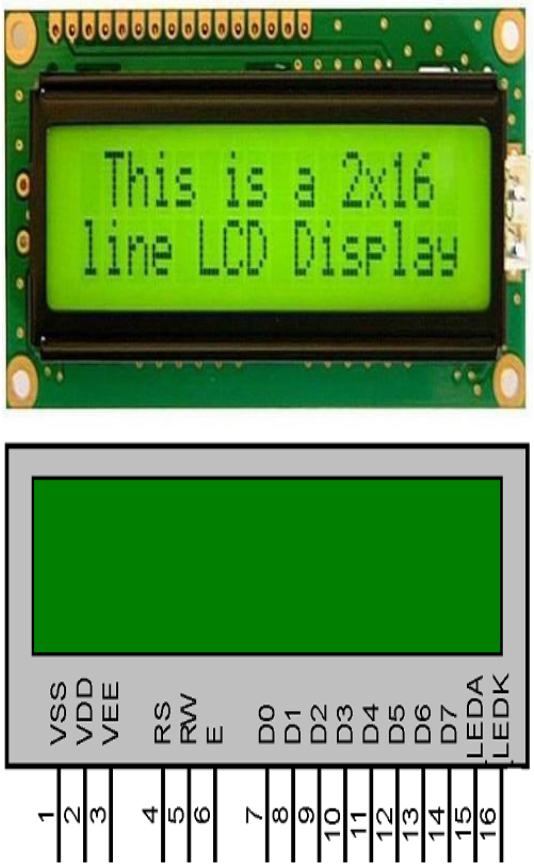

Figure 3: LCD Display with Pin configuration

VOLTAGE REGULATOR

As the name itself implies, it regulates the input applied to it. A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level. In this project, power supply of 5V and 12V are required. In order to obtain these voltage levels, 7805 and 7812 voltage regulators are to be used. The first number 78 represents positive supply and the numbers 05, 12 represent the required output voltage levels. The L78xx series of three-terminal positive regulators is available in TO-220, TO-220FP, TO-3, D2PAK and DPAK packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible[5].

Figure 4: Voltage Regulator

Relays - A **relay** is an electrically operated switches many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal[6].

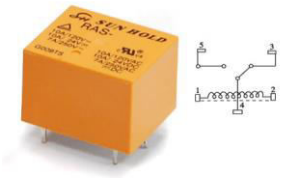

Figure 5: relay

Single phase induction motor

A **Single Phase Induction Motor** consists of a *single* phase winding which is mounted on the stator of the motor and a cage winding placed on the rotor. A pulsating magnetic field is produced, when the stator winding of the single-phase induction motor shown below is energised by a single phase supply[7-8].

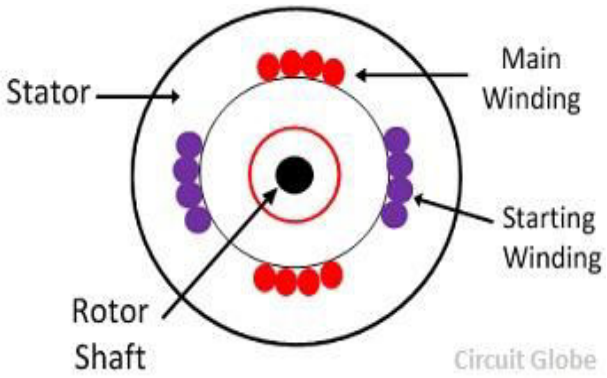

Figure 6: 1-Ph Induction Motor

The word Pulsating means that the field builds up in one direction falls to zero and then builds up in the opposite direction. Under these conditions, the rotor of an induction motor does not rotate. Hence, a single phase induction motor is not self-starting. It requires some special starting means. If the 1 phase stator winding is excited and the rotor of the motor is rotated by an auxiliary means and the starting device is then removed, the motor continues to rotate in the direction in which it is started. The performance of the single phase induction motor is analyzed by the two theories. One is known as the **Double Revolving Field Theory**, and the other is **Cross Field Theory**. Both the theories are similar and explain the reason for the production of torque when the rotor is rotating.

IR RECEIVER

- Photo detector and preamplifier circuit in the same casing.
- Receives and amplifies the infrared signal without any external component.
- 5 V output on idle (active at level 0).
- 38 kHz integrated oscillator.
- High sensitivity.
- High level of immunity to ambient light.
- Improved shielding against electrical field interference.
- TTL and CMOS compatibility.
- Applications: infrared remote control.

Hardware Kit & Display

Figure 7: shows the running of induction motor in clock wise direction

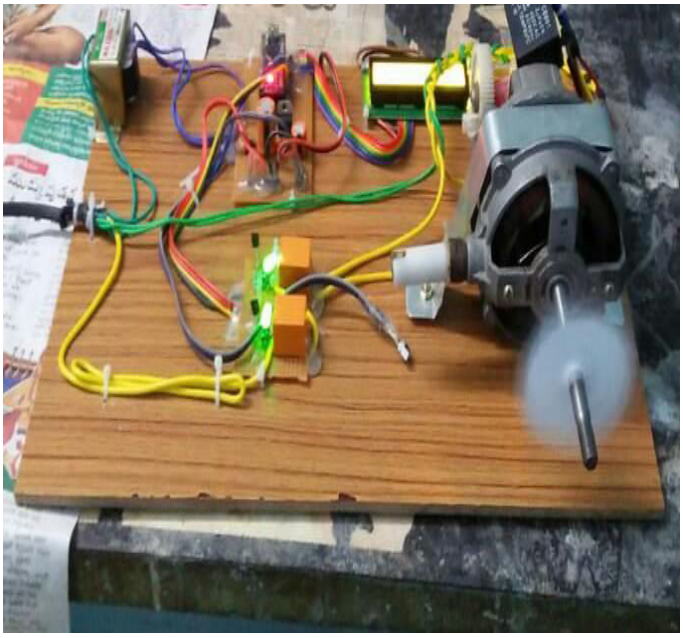

Figure 8: shows the running of induction motor in Anti-clock wise direction

Figure 9: Project Kit Demo in QIS Campus-Power Electronics Lab

CONCLUSION

In this project we have remotely operated single phase induction motor and direction control by using the ir receiver. The motor operated with 230v alternating power supply through the relay board, this relay board acts as a switching in the network like to on and off the induction motor. The Arduino micro controller have the main roll in the project i.e ATMEGA328 microcontroller can handle the logical operations in the project. we control the direction of the motor in a home wireless technology is pre posed. The proposed wireless system is designed for monitoring and remote control of different appliances connected over network in a home environment. The developed home network system includes emulation programs of each device and a home server program. The system has been simulated to be functioning by developing sensor modules and device control systems. The usefulness of the proposed method is proven through simulations and experiments using the developed device module.

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