MICROCONTROLLER BASED SPEED CONTROL OF DC MOTOR THROUGH RS-232 INTERFACE WITH PC

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ABSTRACT

In this paper microcontroller based speed control of DC motor through RS232 with PC goal of this as Role of electrical drives is a major concern in industrial automation. Industrial applications use dc motors because the speed-torque relationship can be varied to almost any useful form for both dc motor and regeneration applications in either direction of rotation. Dc motors are often applied where they momentarily deliver three or more times their rated torque. In emergency situations, dc motors can supply over five times rated torque without stalling (power supply permitting). Dc motors feature a speed, which can be controlled smoothly down to zero, immediately followed by acceleration in the opposite direction without power circuit switching. And dc motors respond quickly to changes in control signals due to the dc motor's high ratio of torque to inertia. Having intelligence PC available to control operation of speed of motor which can increase productivity in broad range of industry. RS232 signal transmitter end receiver transmit information according to signal relative to data size. The system is intended to design here different information thyristor based design objective are 1) Serial communication(UART-UNIVERSAL ASYNCHRONOUS RECEVIER AND TRANSMITTER). 2) Selection of microcontroller.3) Designing a small size drive. 4) provides RS232 interface which is a standard for both PC and PLC. A set of commands is used to control drive. PC Showing Reduction in power consumption.

KEY SKILL : DC MOTOR,PC,RS-232 INTERFACE.

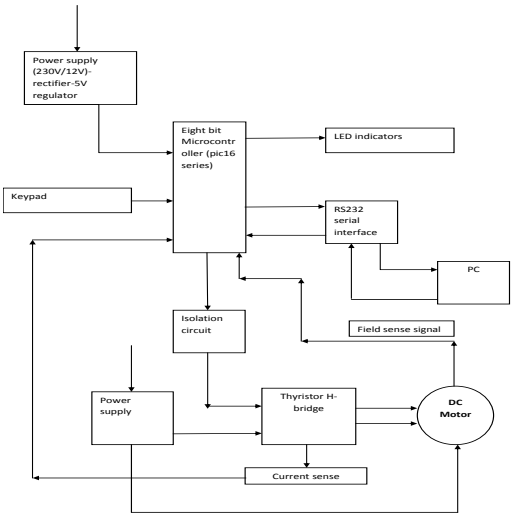
INTRODUCTION:

This system is used to control the dc motor up to 3hp.In a previous system the drives is control by the Variac. But this system results in a high power consumption .Because variac takes power to itself to drive. And motor also not run smoothly. But this drive is fully digital .and its firing is done by the microcontroller.**Principle:-** The firing in this system is done according to the firing angle. And the firing angle is done by the analog port of the microcontroller. And on the analog port potentiometer is connected. **Working:-** This system has three parts:-

1. Firing circuit.
2. Armature power section
3. Field power section

Firing circuit.:- This is most important or main heart of the circuit. This section controls the firing angle of the phase. By varying the firing angle the power of the semi converter is varied.Its has pulse transformer which convert the firing pulse which is square wave in a pulse of fine edge is fed to the gate of SCR. to fire it rapidly. It is fired rapidly because fine edge contains more current.Pulse transformer is drive by the transistor which provides sufficient current gain to the pulse. It is used because microcontroller gives the pulse of low current. Which is not enough to fire the SCR.? Pulse Transformer contains resistance and the diode in series. Diode is use as to rectify the one polarity and resistance to limit the amount of current.Potentiometer is use to decide the firing angle. Potentiometer gives the microcontroller dc voltage from 0 to 5v.Op amp is use to detect the tripping of armature and field. Process control and energy conservation are the two primary reasons for using an adjustable speed drive. Historically, adjustable speed drives were developed for process control, but energy conservation has emerged as an equally important objective. SCADE type systems often require controlling devices from PC directly. PLC demands PROFIBUS support in drives for interfacing. But PC does not have PROFIBUS. Thus only one drive cannot be used with both technologies. The system is intended to design here different information thyristor based design objective are 1) Serial communication(UART-UNIVERSAL ASYNCHRONOUS RECEVIER AND TRANSMITTER). 2) Selection of microcontroller. .3) Designing a small size drive. 4) provides RS232 interface which is a standard for both PC and PLC. A set of commands is used to control drive. PC Showing Reduction in power consumption.

HARDWARE DESIGN:



DC MOTOR DRIVE INTERFACE RS232

It include we use.

i) **Thyristor H-Bridge 616**

ii) **Transistor TIP-122**

iii) **AT-Mega 16**

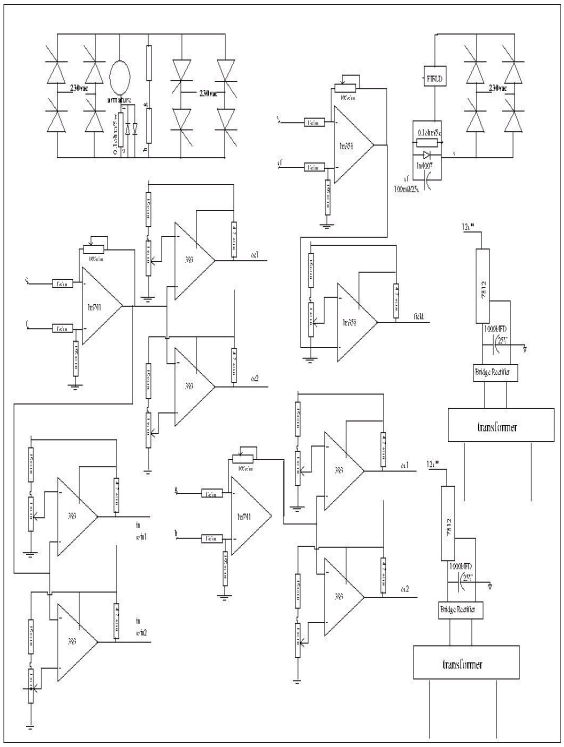
iv) **Optocoupler**

v) **Lm239 dual operator**

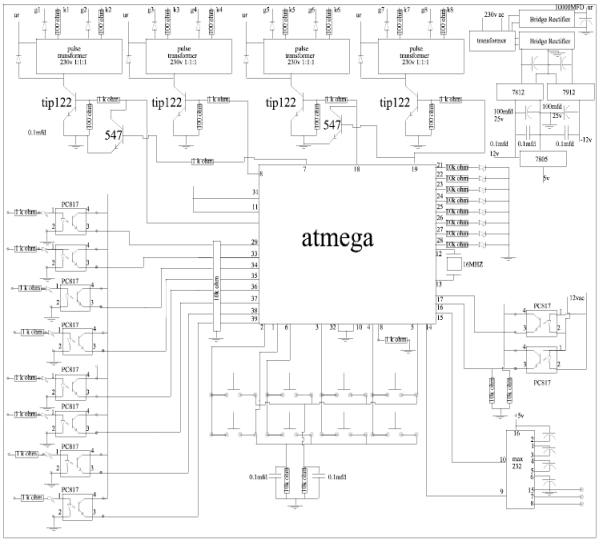
vi) **RS-232 interface**

vii) **Max-232 driver.**

SYMATIC DIAGRAM OF POWER CIRCUIT :

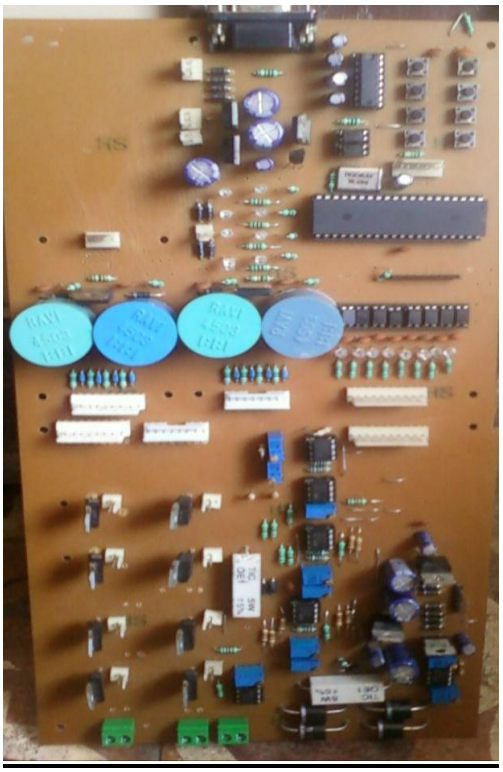


SYEMATIC DIAGRAM OF CONTROL CIRCUIT



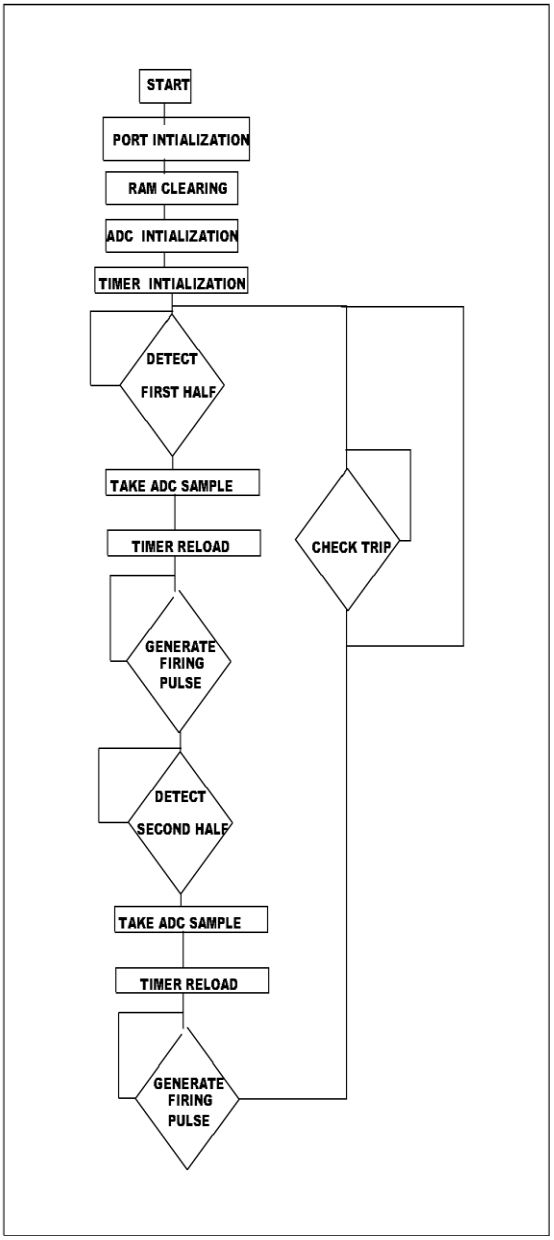
Transformer step down high AC voltage to low voltage AC, which can pass to voltage regulator which make constant DC output voltage parallel capacitor connected which eliminate ripple content output obtain dc voltage the four thyristor are connected in forward bias and reversed bias when thristor in forward bias armature coil burns which develop armature voltage across resistance which differenential applifier amplify the voltage obtain output in dual comparator which control tripping signal microcontroller read tripping signal if output high logic one if output low logic zero.simillarly microcontroller read the signal winding signal and high voltage command motor run in forward and reversed mode set start and stop command in microcontroller in logic zero and one.led indicator indicate the signal give command set in microcontroller optocoupler are connected respected pins of microcontroller which isolate the two system this is use which system work in low voltage as microntroller then transmit to MAX input to receive pin of RS232 then receive pin of RS232 to output of microcontroller pin.

HARDWARE DESIGN:



SOFTWARE-DESIGN:

1. Ram is cleaned for avoiding false data reading/writing
2. Initialization Steps:
3. Ports are initialized to input/output.
    i. Port used for LED is configured as output
    ii. Port pins used to interfaced keypad are configured as input & output
4. LED is initialized for
    i. Clear LCD on Power on
    ii. 2 lines and 16 characters
    iii. 5x7 font size
    iv. Incremental cursor
5. ADC is initialized for
    i. Using particular channel
6. Tripping signal is checked
7. If any tripping signal comes
    i. Immediately stop PWM
8. If no tripping signal is active
    i. Break the loop
9. If interrupt occur
10. Go to Interrupt Service Routine
11. Increment counter of RS232
12. Return from interrupt
13. Check keys
14. If key pressed Set flags corresponding to each keys
15. Display on PC
16. RS232
17. Input analog value in ADC
18. Loop back to check tripping signal again(Step-6)



RESULT: **A)Vs= 230 ac**

B)VS= 230*1.414 DC

C)SPEED=1500 RPM

D)(0-90 DEG)- FIRING PULSE.

rs232 interface-9600 boudrate bit/sec

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