SYNCHRONIZATION, SPEED & DIRECTION CONTROL OF DC MOTOR USING SST89516RD2 CHIP

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ABSTRACT: **In recent days DC motors are used in the industrial sectors, because of their easy controlling, speed-torque relationship which will be helpful in the synchronization and direction control. In industries, there is more demand for the synchronization of multiple motors. So there is a need of common synchronization between the motors. Among the multiple motors which are working on load, with one motor as a reference motor, synchronization need to be done. Keeping the above problem statement in mind we are designing a project which is able to control the speed and direction of a motor. In this project we used dc motors for synchronization because of its smooth operation, less noise & low torque. PWM is the major technique used in our project to control the speed. Microcontroller is used for the direction of rotation on either side. Finally this project provides higher efficiency and less maintenance operation in industrial sectors.**

KEYWORDS: **Dc motor, Microcontroller, GSM modem, motor driver, ADC, Potentiometer.**

1. INTORDUCTION

This Project is helpful for the operation of DC motor is different applications. in the industrial side/sectors Dc motor has a main applications to control the speed and change the direction which gives the characteristics of speed v/s torque, here we using one of the easiest and simple method to control the Dc motor is PWM(pulse width modulation) here we are using SST89s516RD2 chip of microcontroller 51 family's chip. Which has many more advanced features in the chip.

The DC motor which is used is 12v, 230v, 120 rpm. Pot/Potentiometer is the one of the main input method to control the DC motor if one of the motor is decreased the other motor speed also will get disturbed effected on the other motor's.

2. LITERATURE SURVEY:

After considering the survey of the journals papers about this paper we have got a lot of information's regarding to this project. While by referring these journal paper we got one of the method to control the DC motor in easiest way i.e., PWM technique, it is widely used in recent days.

Paper 3. The paper "Use of PIC microcontroller's in multiple DC motors control Appliances" by Dr.STEVE.C.HSIUNG in the year 2007.
This paper is designed with modern upgraded technology of PIC µc. Using simple with serial communication protocols in a microprocessor/controller.
The microcontroller 68th family which is HC11 model that has been since 1980. By controlling master motor achieve the speed control of remaining slave motors. Using suitable command which is burn in the chip using development tool/kit.

Paper 1. In the paper "Speed Control and Direction control of DC motor using ARM7" the author of this paper is K A WADILE has published in the year of FEB 2015.
The paper described that how to control the DC motor by using ARM7.
By using Armature voltage control method we they can control the DC motor by supplying rated and excited voltage to the motor. The regulator used by using Buck method. There is one method to control the motor by giving signal from PWM to control the gate terminal of regulator to control the duty cycle the serial connected compensator are placed by using PWM method they achieve the peak value of voltage.

Paper 2. In the paper "Microcontroller based speed control of DC motor through RS232 interface with PC". The author M/s. PRIYA D. DUGGAL" has published in the year of NOVDEC 2013. The paper describes that by using microcontroller using interfaced with PC using RS232 cable without power circuit/ switching circuit we can control the speed of the motor smoothly to zero and also achieve peak value and DC motor also response quickly. By using suitable set of commands the motor is controlled and monitor's the status of the device.

3. WORKING:

In the Market/Recent trends the cheapest and high durable chip is "MICROCONTROLLER 51 Family" the chip which is the same family of 51 is SST89S516RD2/89S52. Which has a 256 Byte of super flash high speed ROM and consist of 3 timers.
This project consist of mainly two modes of operations to control the speed and direction control of DC motors that are

- **Potentiometer/manual control**

Manually control of mode which is used by using manually control of device/regulator which is interfaced/ connected to load

In the industry the number of serial motors running with the fully loaded. If the any one of the motor speed is interrupted the whole production/manufacture is gets wasted.
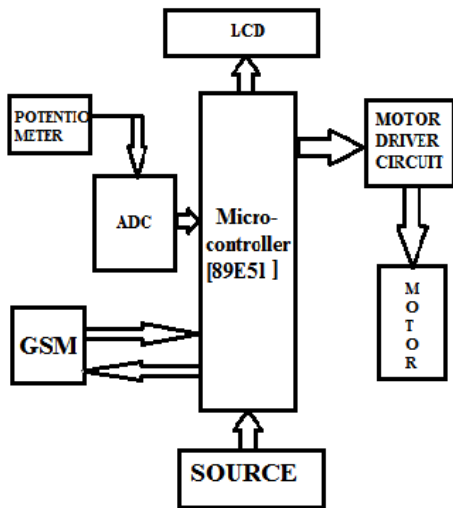
BLOCK DIAGRAM OF PROJECT

So by monitoring time to time status of the motors we can control the device by regulating/ using POT vary the speed. Once the analog signal's is generated from the pot connection/regulator, that analog signal is given to the ADC converter which again converts from analog to digital signals output of ADC is given
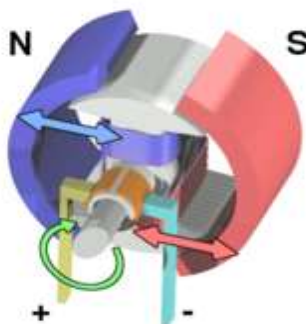
Further to LM293D motor driver circuit which consist of H-bridge construction inside which works only on different input

IN1	IN2	Motor1
0	1	Rotates in one direction
1	0	Rotates in other direction

i.e, if the two same input are given to the motor is gets in rest position if one of the input gets high the motor rotates in clockwise direction/anti clock direction respectively. From LM293D driver circuit/IC the motors are controlled by receiving digital pulses from driver circuit, this is used for prototype only but in industries uses the power electronics devices of high ratings. There they used SCR, TRANSISTORS…etc..

LM293D MOTOR DRIVER IC/CHIP

- **GSM/Wireless control**
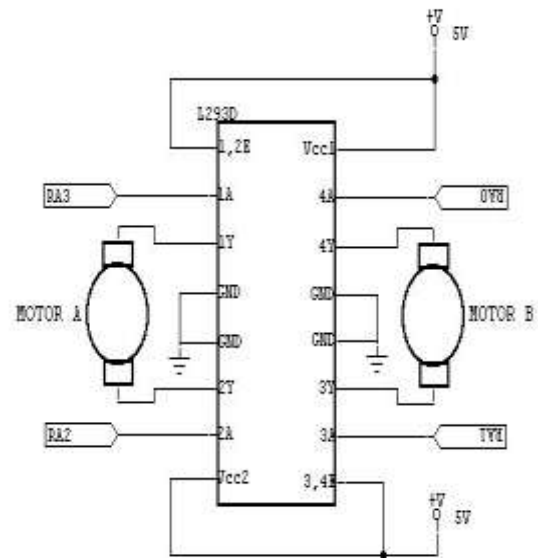
The one of the comfortable and easily controllable mode is GSM mode which we can control the motors from remote places where the labors are strictly prohibited their we can use this type of control method Places in industries during working conditions. Which is called serial communication Port which is interfaced to the modem (modulator/demodulator) which interact between the user and the devices which is connected to the modem

In the microcontroller the PORT(0) which consists of RXD(receiver) and TXD(transmitter) which is called serial communication port which is interfaced to the modem (modulator/demodulator) which is interact between the user and the devices which is connected to the modem.

If the interrupt is occurred in the load/motor the immediate notification is delivered to the user which is using the GSM, by seeing the notification status the user sends the message to the microcontroller through the modem which is duplex communication means two way communication between the user and microcontroller

When the microcontroller receives the signal which converts it from digital signals from ADC converter. Which is given to the LM293D IC Motor driver chip that controls the motor speed and also we can control the direction of the motor whether it should rotate in forward/reverse direction by simply texting the message to the microcontroller.

4. SOFTWARE:

Firstly the software to burn the chip is used is KIEL and for write the commands using Embedded C.

The Kiel of 51 development Kit/Tool is used to design the number of programs it is used in the manner of Machine Language and it is complex after it is converted in to the Hex code/File. It is burnt in the microcontroller with the help of the Microcontroller development Kit/Tool it supports Embedded C.

5. ADVANTAGES:

- Cost is low
- Low maintenance
- Low power consumption
- provide more automation works

•   Skilled persons not required

•   Use of GSM we control devices from remote places

6. APPLICATION:

•   Used in large scale industries like rolling mills, textile mills, cement mills.........

•   These are very robust in control system applications

•   Used in robotics controls wining, drilling machines.

7. CONCLUSION:

now a days the use of DC motors applications in various fields id getting more as the use of DC MOTOR used the problems occurred also gets increased to control that problem i.e., speed synchronization and direction control is the main vital role, keeping in mind e are designing this project and by using PWM method the speed of the Motor is controlled easily.

REFERENCE:

[1]   **A.A.Thorat[1], P.D.Pange[2], V.S.Doijad[3] has proposed in the year 2014.** The paper conveys ID (proportional based controller) and fuzzy logic controller (FLC)s. have been developed for speed controller of dc motor.

[2]   **Dr. Steve C. Hsiung** has published the Journal of "THE **USE OF PIC MICROCONTROLLERS IN MULTIPLE DC MOTORS CONTROL APPLICATIONS**" in the year 2007, vol 23, and number 03.

[3]   **PriyaDuggal[1],P.M.Palpankar[2],A.Y.Fadnis[3]**. Has published under the journal of "**MICROCONTROLLER BASED SPEED CONTROL OF DC MOTOR THROUGH (R.S.232). INTERFACE WITH**   **PC**.