Frequency Locked Loop DC Motor Speed Control

The purpose of this project is to control and maintain constant speed of a DC Motor even at variable loads.

This involves a microcontroller based control system with an input reference frequency and a feed back frequency (speed equivalent) from DC motor optical encoder. Optical encoder is to detect speed of a DC motor and converts speed into equivalent frequency. Initially DC motor tries to maintain the speed equivalent to the reference frequency. Once the speed (or frequency) of the DC Motor is locked with the reference frequency, then onwards the DC motor will maintain constant speed at variables loads too.

The speed of DC Motor can be varied by varying the input reference frequency. These two frequencies are continuously compared and the difference of these frequencies gets converted into equivalent voltage and fed to DC motor. If the reference frequency is greater than the feedback frequency, then the voltage input to the motor is increased till both the frequencies are equal. If the reference frequency is less than the motor feedback frequency then the voltage input to the DC motor is reduced so as to match with reference frequency.

In this way the speed of a DC motor can be controlled based on input frequency.

The objectives of the project include:

1. Real-time speed control.

2. Uses contact less sensor to calculate the speed of the motor.
3. Displays the Speed of the DC motor using a LCD.

The project provides us exposure on:

1. Embedded C program.
2. PCB designing.
3. Interfacing Sensor to controller.
4. LCD interfacing.

The major building blocks of this project are:

1. Microcontroller with regulated power supply.
2. DC Motor (6 Volts)
3. Optical Encoder for contact less DC Motor speed measurement.
4. The reference input frequency (Can be supplied from external function generator).
5. LCD Display (To display speed of DC Motor and Input frequencies)

Block Diagram:

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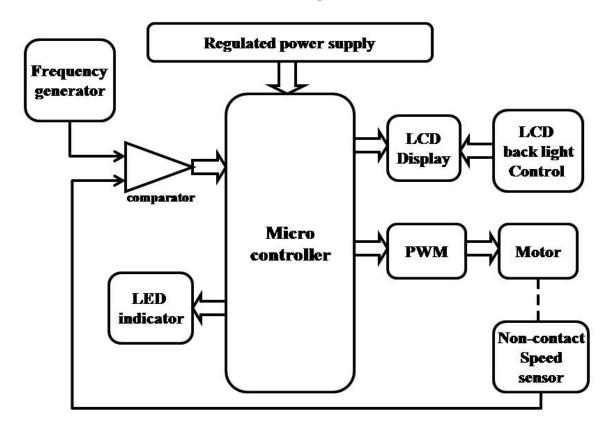
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