

Speed Synchronization of Multiple Bldcmotors In Textile & Paper Mills Using Micro Controller

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Abstract

Multiple motor setup has vast application in industries. The application can be in textile mills, paper mills and robotics. In these all application the synchronization is must between the motors to perform certain task. Speed synchronization is very essential in these all operation to avoid damage to the product. The synchronization is done by using microcontroller chip which controls the master slave whose speed is followed by the other motors which all have to be synchronized.

Index Terms—Speed synchronization, textile mills, paper mills, microcontroller chip, master slave.

I. INTRODUCTION

In this project motors are wirelessly synchronized to make the differential speed error among multiple motors to zero. One motor acts here as transmitter and rest of all as receivers. so, if a particular speed is set in the transmitter then automatically rest of the motors speed would be matched to the same speed of the master slave. A display unit connected with the module will display the full speed in rpm and the observer can enter the required percentage with help of a keypad to obtain the required speed for rest of the motors. The pulse width output from the microcontroller would be automatically adjusted by the microcontroller to maintain the DC power to the motor such that the entered speed percentage matches the running RPM. The above operation is taken care by using OPTO isolator and a MOSFET connected to motor. The aim of this project is synchronization of multiple motor System by making use of wireless technology. This project uses radio frequency to synchronize different motors speeds. This system is used in many industries like textile mills, steel plants, and paper plants where large numbers of the motors used on conveyor are desired to be synchronized for performing certain task. In paper mills & textile mills where multiple motors work together on a conveyor belt to draw clothes, it is desirable that all the motors should run at same speed, so that balanced tension can be achieved to avoid

damage to the clothes. Manpower and time is also saved in this arrangement. User can set the desired rpm for the motors. As this system is Wireless, it is easy to operate and control the system which eases the whole process. The speed synchronization of multiple motor arrangements is very important task which is here carried out wirelessly by using

microcontroller chip. Due to wireless connection between the motors the motors can be kept in any position it is not necessary as earlier old concept of conveyor belt that the motors should be kept only on parallel series or mixed. with each other. Multiple motors used in textile industries & paper mills or any other for cloth drawing or to pull the paper as in paper mill need to be synchronized for same speed. Traditionally we use conveyor belts in order to synchronize multiple motor for such works. But that has many draw backs. This can be come over by using the wireless synchronization of multiple motors.

Drawbacks of using conveyor belt for speed synchronization. [Earlier Method]

- The master slave [main motor] will be the hardest to start, stop and maintain smooth motion on the whole process.
- All the motors should be connected in Parallel.
- As there are moving elements like belts between the motors, we need to change then if it is not serviceable and regular service in also required when they will get damage.
- The design of master slave or follower motors in the system may be series, branch, or mixed.
- Again the system and its product will determine what piece of equipment is directly synched or digitally rationed to each other piece of equipment.

Maintenance is bit difficult as there are more mechanical parts in the system.

Solution for old Concept of Conveyor Belt:

There are so many other different techniques for the solution this problem. But those are not that reliable. In order to reduce man intervention and save

the labor cost and time both we can use microcontroller to control, operate and synchronize this task. As compared to conveyor belt method is compatible as it involves hardware as well as software in this module. We can program microcontroller to control its speed and also can set the required speed through keypad to get our work done. Synchronization can done either wired or wirelessly. In this project we are using RF communication technology for wireless communication.

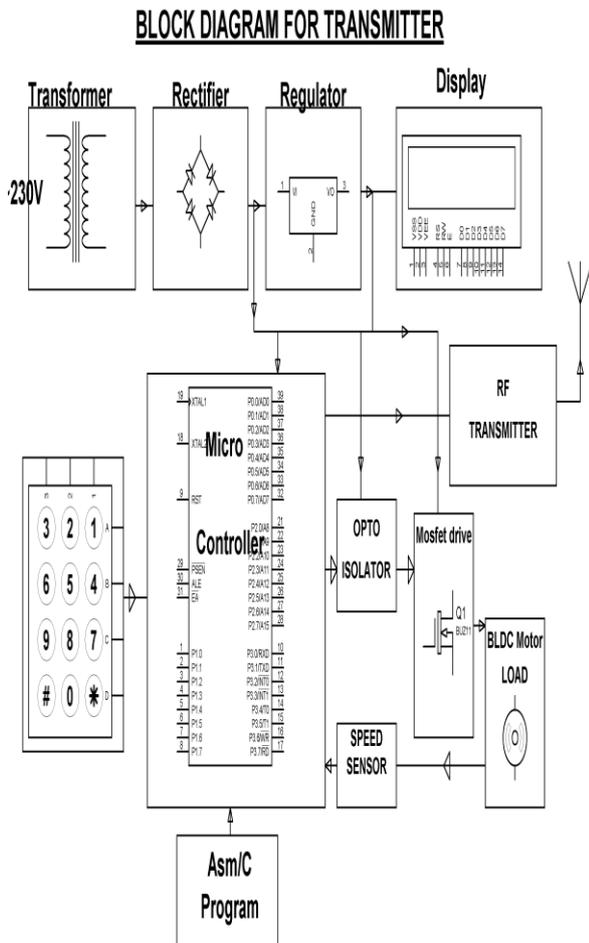
II. HARDWARE REQUIREMENTS:

8051 series Microcontroller, Crystal, RF MODULE, LEDs, Resistors, Capacitors, Diodes, Transformer, Voltage Regulator, IR sensor, MOSFET, Keypad, Transistor, OPTO-isolator, BLDC fan.

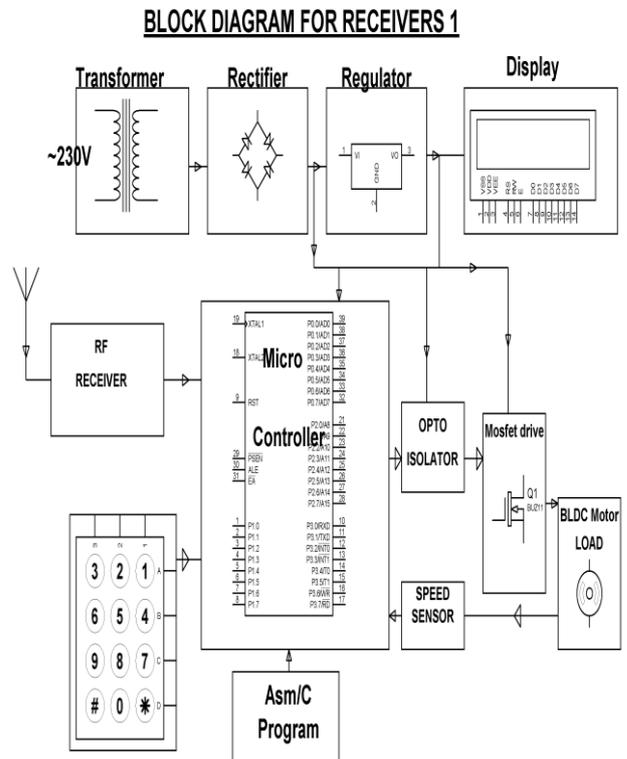
III. SOFTWARE REQUIREMENTS:

MPLAB & CCS C compiler. Language: Embedded C or Assembly.

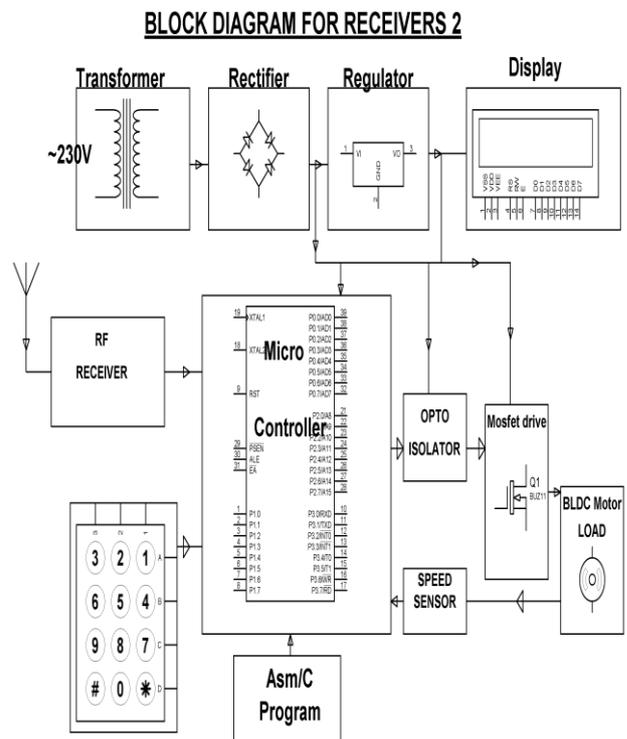
IV. BLOCK DIAGRAM FOR TRANSMITTING UNIT:



V. BLOCK DIAGRAM FOR RECEIVER UNIT:



VI. BLOCK DIAGRAM FOR RECIEVER UNIT:

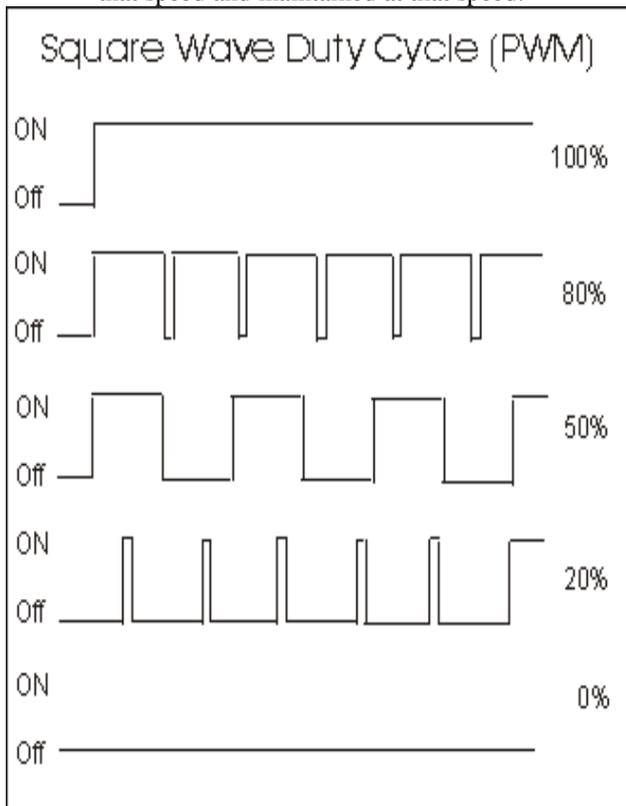


VII. HARDWARE COMPONET:

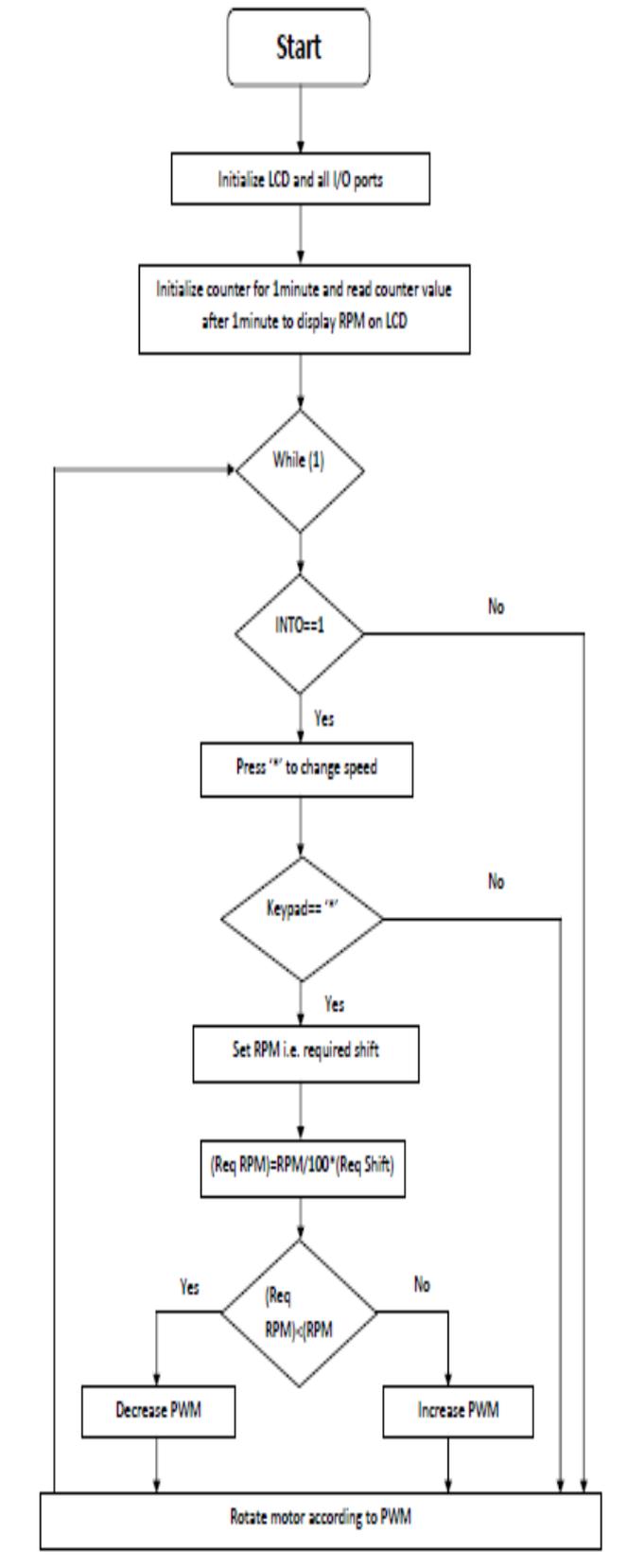


VIII. WORKING OF PROJECT:

- The speed of the motor is sensed by an IR pair and is displayed on LCD and is also fed to the MC.
- The required speed is entered using a keypad which is interfaced with MC.
- The motor is interfaced to the MC through aopto-coupler & a MOSFET which drives the motor.
- PWM pulses are generated from MC according to the entered speed and the motor is adjusted to that speed and maintained at that speed.



IX. FLOW CHART:



X. SOFTWARE REQUIRED:

- Keil an ARM Company makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulators for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 MCU families.
- Compilers are programs used to convert a High Level Language to object code. Desktop compilers produce an output object code for the underlying microprocessor, but not for other microprocessors.
- i.e., the programs written in one of the HLL like 'C' will compile the code to run on the system for a particular processor like x86 (underlying microprocessor in the computer).
- For example compilers for Dos platform is different from the Compilers for Unix platform So if one wants to define a compiler then compiler is a program that translates source code into object code.

XI. ADVANTAGE OF USING BLDC MOTOR OVER BRUSHED DC MOTOR:

The BLDC motor has to many advantages over the brushed DC motor which is shown below:

- Higher efficiency and reliability
- Lower acoustic noise due to absence of brushes
- Smaller and lighter
- Greater dynamic response
- Better speed versus torque characteristics
- Higher speed range
- Longer life span

XII. OBSERVATIONS AND CONCLUSION:

We can tabulate different-different speeds of motor as we keep on giving input from the Keypad and same speed change can be observed and displayed at the receiving motors. From this project we can successfully control the speed of multiple motors wirelessly through RF communication. Whatever the percentage of speed that we enter at transmitter unit of system same can be observed at the receiving motors. The whole operation is made simple by using this technology. The future works include giving intelligence to the whole system like if any of the motor senses any fault, the whole system will shut down.

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